Bk3	R: Calculation **C: Graphs. Direct proportion** *E: Multiplication, crossing tens*	*Lesson Plan 113*

Activity		*Notes*
1	**Missing digits** Let's fill in the missing digits. Ps come to BB to write numbers in boxes, explaining reasoning Class checks that they are correct or suggests alternative solutions. BB: a) $\mathbf{1}\,4\,\mathbf{6} \times \boxed{\mathbf{3}}$ = $4\,3\,8$ b) $\mathbf{5}\,2\,\mathbf{8} \times 2$ = $\mathbf{1}\,0\,\mathbf{5}\,6$ or $\mathbf{5}2\mathbf{3} \times 2 = \mathbf{1}04\mathbf{6}$ c) $2\,\mathbf{2}\,4 \times \mathbf{5}$ = $\mathbf{1}\,\mathbf{1}\,2\,0$ or $2\mathbf{4}4 \times \mathbf{5} = \mathbf{1}2\mathbf{2}0$; $2\mathbf{6}4 \times \mathbf{5} = \mathbf{13}20$; $2\mathbf{8}4 \times \mathbf{5} = \mathbf{14}20$; $2\mathbf{0}4 \times \mathbf{5} = \mathbf{10}20$ d) $\mathbf{2}\,3\,\mathbf{7} \times 4$ = $9\,4\,8$ e) $1\,\mathbf{4}\,9 \times 6$ = $8\,9\,\mathbf{4}$	Whole class activity Written on BB or SB or OHT or use enlarged copy master At a good pace In good humour! Reasoning, checking, agreement, praising Other solutions are possible in b) and c) if thousands column is used in multiplicant, e.g. $\underline{1}224 \times 5 = \underline{6}120$
	6 min	
2	**Problem 1** Listen carefully and think how you would solve this problem. Which operations should we write? *Adam and Emily went to the seaside for the weekend. Each day, Adam collected 172 shells and Emily collected 3 times as many as Adam.* *How many shells had the children collected altogether by the end of the 2 days?* Elicit that Adam and Emily spent Saturday and Sunday on the beach. Ps could write data and operations in *Ex. Bks* first before dictating to T. **A**, what do you think we should write? Who agrees? Who knows another way to do it? etc. Let's say the answer as a sentence. BB: After 1 day: A: 172 (shells); E: 172×3 (shells) e.g. After 2 days: A + E: $2 \times (172 + 172 \times 3)$ $= 2 \times (172 + 516)$ $= 2 \times 688$ $= \underline{1376}$ (shells) $172 \times 3 = 516$ (carry 2); $516 + 172 = 688$; $688 \times 2 = 1376$ (carry 1 1) *Answer:* They had collected 1376 shells by the end of the 2 days.	Whole class activity T repeats slowly while Ps think and calculate. Ps suggest plan and method of calculation. Ps come to BB or dictate to T. Calculations done at side of BB Reasoning, agreement, praising or 1 day: 172×4 (shells) 2 days: $172 \times 4 \times 2$ $= 172 \times 8$ $= \underline{1376}$ (shells) $172 \times 8 = 1376$ (carry 5 1) Accept any valid method.
	11 min	
3	**Problem 2** How you would solve this problem? *If 3 kg of grapes cost £2.25, how much do 6 kg cost?* **B**, what do you think we should do Who agrees? Who has thought of another way to do it? etc. Ps dictate what T should write. e.g. BB: 3 kg: £2.25 1 kg: £2. 25 ÷ 3 = 225 p ÷ 3 = 210 p ÷ 3 + 15 p ÷ 3 = 70 p + 5 p = 75 p 6 kg: 75 p × 6 = 420 p + 30 p = 450 p = $\underline{£4.50}$ or × 2 (3 kg → £2.25 ; 6 kg → £4.50) × 2 T shows this method if no P suggests it. *Answer:* 6 kg of grapes cost £4.50. Elicit that the weight and the cost increase by the same number of times. We say that they are in <u>direct proportion</u> to one another.	Whole class activity T repeats slowly while Ps think. Reasoning, agreement, praising **Extension** T could show long division, explaining reasoning in detail. Ps do not need to learn it yet! $3 \overline{)225} = 75$: -210, 15, -15, 0 What would 9 kg cost? ($£2.25 \times \underline{3} = £6.75$)
	15 min	

Bk3

Lesson Plan 113

Activity | **Notes**

4

Problem 3

Let's use the same idea to solve this problem

If 2 children can paint 18 eggs in 2 hours, how many eggs can 4 children paint in 4 hours?

C, what do you think we should do Who agrees? Who thinks something else?. Allow Ps to explain their thinking first, then if no P has suggested it, T directs them through this method of solution.

BB:

× 2 (2 children 2 hours → 18 eggs
4 children × 2 (2 hours → 18 × 2 = 36 (eggs)) × 2) × 4
4 children 4 hours → 36 × 2 = 72 (eggs)) × 2

Answer: 4 children can paint <u>72</u> eggs in 4 hours.

19 min

Whole class activity

T repeats slowly while Ps think. Ps note data in *Ex. Bks* or on 'slates'.

Involve several Ps
Reasoning, agreement
Praise all contributions.

T explains, encouraging Ps to help when they understand.

Praising only

5

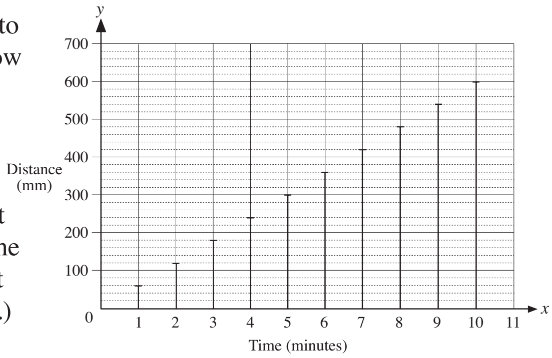
Graph

Frank was doing an experiment. He put a snail on a board at a starting line, then measured how far it had gone after every minute.

He made this graph to show his data but now he wants to show it in a table too.

Let's help him!

First discuss or elicit the components of the graph. (Ps come out to point and explain.)



- The *x*-axis (the horizontal line with arrow) represents the time (measured in minutes) from 0 minutes to 11 minutes.
- The *y*-axis (vertical line with arrow) represents the distance (measured in mm) from 0 mm to 700 mm.
- The thick vertical lines with the bars on top show how far the snail has moved after every minute.

Ps come to BB to point to 1 minute (2 minutes, etc) on the *x*-axis and move their finger vertically to the top of the line. Then they move their finger to the left along the horizontal grid lines until they reach the *y*-axis. Ps read out the distance (with T's help if necessary) and write it in the relevant column in the table. Class points out errors.

BB:

Time (minutes)	0	1	2	3	4	5	6	7	8	9	10
Distance (mm)	0	60	120	180	240	300	360	420	480	540	600

Who can write the rule? Who agrees? Who can write it another way? etc.

Do you think that the snail moved at the same speed throughout the 10 minutes? (Yes, because it travelled the same distance every minute, i.e. 60 mm every minute, or 1 mm every second.)

We can say that the time taken and the distance travelled are in <u>direct proportion</u> to one another, so we can join up the points with a straight line like this to show the snail's path.

Extension

How far would the snail have gone after 11 minutes? (660 mm)

25 min

Whole class activity

Graph and table drawn on BB or use enlarged copy master or OHP

(Ps could have copies on desks too.)

Discussion, revision, agreement, praising

Involve several Ps.

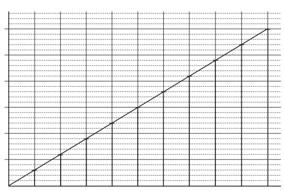
T (or Ps) points to relevant parts of graph.

At a good pace

Agreement, praising

Agree that the snail moves 60 mm each minute, so each column is 60 mm more than the previous one.

BB: *Rule:* $D = T \times 60$ (mm)
$T = D \div 60$ (min)
$D \div T = 60$



Bk3		*Lesson Plan 113*

Activity		*Notes*
6	***Book 3, page 113***	
	Q.1 Read: *Alan went on a cycling tour. He kept a note of how far he had cycled every 10 minutes. He made this graph to show his data.* *Use the graph to help you complete the table.*	Individual work, monitored, helped Graph and table drawn on BB or use enlarged copy master or OHP
	How do you think Alan knew how far he had cycled? (Ps might know about a milometer for bicycles but if not T explains or shows one or demonstrates with a real bicycle.)	Initial discussion with the whole class to clarify context.
	Elicit or point out similarities to (differences from) previous graph.	Axes show the same measures (distance and time) but here the distance is measured in km and the time interval is 10 min.
	Review at BB with whole class. Ps dictate results to T. If disagreement, Ps come to BB to check.	Reasoning, agreement, self-correcting, praising

Solution:

Time (minutes)	0	10	20	30	40	50	60	70	80
Distance (km)	0	5	10	15	20	25	30	35	40

What is the rule? Who can write it another way? etc.

Rule: $D = T \div 2$, $T = D \times 2$, $T \div D = 2$

Notes: Whole class discussion on the rule. Agreement, praising

Extension

Do you think that Alan is travelling at the same speed all the time? (Yes, because he cycles the same distance every 10 minutes.)

Notes: Discussion, agreement

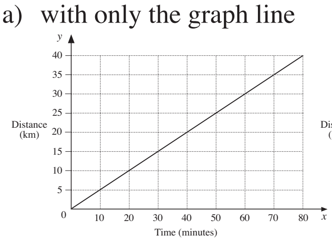
We can say that the time taken and the distance travelled are in direct proportion to one another, so we can join up the points with a straight line like this. (T joins up points on graph.)

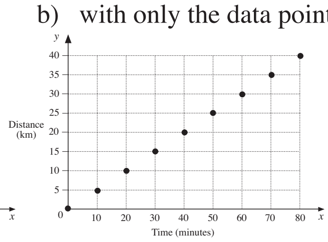
Notes: e.g. if the time taken is multiplied by 3, then the distance covered is also multiplied by 3, and vice versa.

We could also show the graph in other ways, e.g.

a) with only the graph line   b) with only the data points.

Notes: Draw on blank graph or use enlarged copy master or OHP.





Notes: Stress that all 3 graphs show the same data.

Do you think that in real life Alan would be able to cycle at the same speed for 80 minutes? (Elicit that 80 min = 1 h 20 min)

(e.g. No, there would be hills to cycle up and down, there could be other traffic on the road, he could get tired; or Yes, if he was cycling round and round a track and was so fit that he did not get tired – but then he would have to stop for a few seconds every 10 minutes to note down the data!)

Notes: Whole class discussion. Ask several Ps what they think. Praise all contributions.

33 min

Bk3

Lesson Plan 113

Activity		*Notes*

7

Book 3, page 113, Q.2

Read: *This graph shows the approximate height above sea level of famous places. Use the graph to help you fill in the missing numbers.*

T explains the graph. Elicit that there is a horizontal grid line at every 100 m, that the positive numbers show height above sea level and the negative numbers show the depth below sea level.

Deal with one place at a time. Where is this place? What is it? Who has been there? Who has never heard of it? T could show location on an appropriate map and talk about it briefly.

Ps come to BB to point to relevant rectangle, read its height to the nearest 100 m and write it in the appropriate box. Class agrees/disagrees.

Solution:

1. Ben Nevis ≈ 1300 m (= 1343 m)
2. Mount Snowdon ≈ 1100 m (= 1085 m)
3. The Dead Sea ≈ – 400 m (– 397 m)
4. Hay Tor, Dartmoor ≈ 500 m (= 454 m)
5. Death Valley, USA ≈ – 100 m (= – 86 m)
6. Straits of Gibraltar ≈ – 1200 m (– 1181 m: deepest place on sea bed)

Let's list the heights in decreasing order. (Ps dictate to T.)

BB: 1300 m, 1100 m, 500 m, – 100 m, – 400 m, – 1200 m

Are these heights in proportion? Is there a rule? (e.g. No, they are decreasing by different amounts each time, so they are not in proportion and there is no rule, so the rectangles cannot be joined up.)

40 min

Notes: Whole class activity

Graph drawn on BB or use enlarged copy master or OHP

Discussion, explanation but T asking for Ps' help where appropriate.

T could also have pictures to show to class.

With T's help if necessary

Agreement, praising

Ps write approximate heights in *Pbs* too if they wish.

Exact heights are given in brackets in case Ps ask about them.

Whole class in unison

Discussion, agreement, praising

8

Making a graph

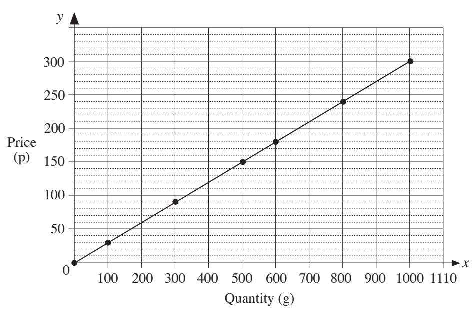
This table shows the price of different quantities of cherries.

BB:

Quantity (g)	100	300	800	600	500	1000
Price (pence)	30	90	240	180	150	300

Let's show the data in this graph. Ps come to BB to choose a column in the table, put RH finger on matching quantity on x-axis and LH finger on appropriate price on y-axis, then P moves fingers along grid lines until they meet. P draws a dot at that point. Class agrees/disagrees.

BB:



Do you think that the quantity and price are in direct proportion to one another? (Yes, because if the quantity increases by 3 times, etc. then the price also increases by 3 times, etc. so we can join up the dots.)

Extension

What is the price of 200 g (700 g) of cherries?
What quantity of cherries would you get for £1.20 (£2.70)?

45 min

Notes: Whole class activity

Table and graph drawn on BB or use enlarged copy master or OHP

Ps could have copies on desks too.

Initial discussion on table and relationship of rows to x-axis and y-axis on graph. Elicit that there is a horizontal grid line at every 10 p.

At a good pace

Demonstration, agreement, praising

Discussion, reasoning, agreement

Reading from graph or by calculation. Praising only.

Bk3

R: Calculation
C: Perimeter and area of a rectangle
E: Volume of cuboids. Distance on a map (km)

Lesson Plan
114

Activity | *Notes*

1

Complete the table

A spider can run 165 cm in 1 minute. Let's complete the table to show how far the spider can run in several minutes.

BB:

Time (minutes)	1	2	3	4	5	6	7	8	9	10	0
Distance (cm)	165	330	495	660	825	990	1155	1320	1485	1650	0

Ps come to BB to choose a column and fill inthe missing value, explaining reasoning. Class agrees/disagrees.

Ps might notice connections between the columns to make the calculations easier , e.g.

$165 \times 4 = 165 \times 2 \times 2$; $165 \times 3 = 165 \times 2 + 165$;

$165 \times 9 = 165 \times 10 - 165 = 1650 - 165 = 1485$

5 min

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Ps may do calculations in *Ex. Bks* first before coming out to BB.

Reasoning, agreement, praising

Extra praise if Ps notice by themselves

Elicit the rule: $D = T \times 165$
$T = D \div 165$
$D \div T = 165$

2

Drawing lines

In your *Ex. Bks* (or on sheets of paper):

a) draw a line 3 cm long and write its lengh below it in mm. (30 mm)

b) draw a line 3 times as long and write its length in mm. (90 mm)

c) draw a line which is 2 thirds of the length of the line in a). Write its length in mm. (20 mm)

Review parts b) and c) with whole class. Ps explain how they worked out the length. Mistakes corrected.

BB: b) 3×30 mm = <u>90 mm</u>

c) 2 thirds of 30 mm = 30 mm $\div 3 \times 2 = 10$ mm $\times 2$ = <u>20 mm</u>

9 min

Notes:

Individual work, monitored, helped but class kept together.

(T reminds Ps how to measure acurately if necessary by demonstrating with BB ruler.)

BB: 30 mm

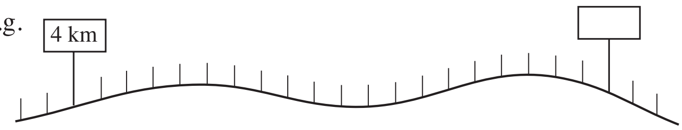
Reasoning, agreement. praising

3

Distance

Along a road there are yellow markers at every 50 m and a white sign at regular intervals. How far apart are the white signs?

BB: e.g.



Ps come to BB to count the markers and write an operation. Agree that the white signs are 1000 m apart, so probably show every km. (4 km to <u>5 km</u>)

T elicits or reminds Ps that 'kilo' means 'thousand' (from Ancient Greek), so 'kilometre' means 'thousand metres'.

What other unit of distance do you see on road signs in this country? (miles)

Is a mile shorter or longer than a kilometre? (longer) T writes on BB.

13 min

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP

(19 markers but 20 spaces)

Agreement, praising

BB: 20×50 m = 2×500 m = <u>1000 m</u>

1000 metres = 1 <u>kilo</u>metre

Discussion, agreement

5 km $\approx$ 3 miles

or 3 miles $\approx$ 1 and 2 thirds km

Bk3		*Lesson Plan 114*

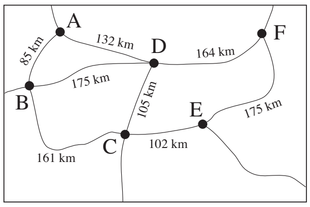
Activity — *Notes*

4

Distances on a map

Ps have a copy of map on desks. (If using copy master, Ps could suggest names for the towns.)

a) T says two places at a time. BB: e.g.
Ps find them on the map and read out (or total) the distance along the roads between them.



b) Now look at this map. What is different about it? (Same places but no roads) What does the scale mean? (1 mm on this map means 2 km in real life.) What would 10 mm (25 mm, 150 mm) on this map mean in real life? (20km, 50 km, 300 km)

Imagine you are a bird and can fly through the air in a straight line from one town to the next and do not have to stick to the roads. How far apart in real life are, e.g. A and D (C and E, etc.) 'as the crow flies'?

Ps find letters on the map, draw a straight line between them and measure from the centre of one town to the centre of the next one in mm. Then they calculate the <u>actual</u> distance by multiplying by 2 and changing mm to km. Ps write actual distances below lines.

Why are the distances not exactly the same as the map in a)? (Roads in first map are not straight, so the more winding the road, the further you have to travel.) Elicit that the shortest distance between two points is always a straight line.

Notes:

Whole class activity

Use enlarged copy masters or OHP (or a simple local map, amending scale to miles if necessary)

Differentiated questions

Ps can say the places too!

Individual drawing and measuring but T keeps class together

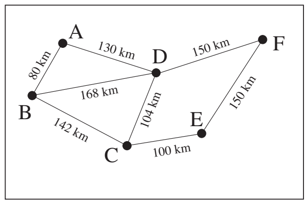
Agreement, praising

T might choose only 2 or 3 pairs of towns, depending on ability of Ps.

Accept small variation in measurements.

e.g.

Scale: 1 mm → 2 km

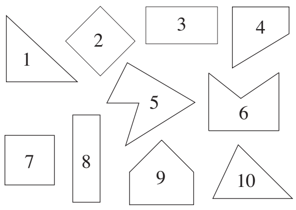


20 min

5

Quadrilaterals

T has various shapes stuck (or drawn) on BB, e.g. BB:



What questions can you think of to ask about these shapes?

e.g.

a) Which of these shapes are quadrilaterals? (2, 3, 4, 7, 8)
(Elicit that a quadrilateral has 4 straight sides.)

b) Which of these shapes are rectangles? (2, 3, 7, 8)
(Elicit that rectangles are quadrilaterials with opposite sides equal and parallel and with square corners or right angles.)

c) Which of these shapes are squares? (2, 7)
(Elicit that a square is a <u>regular</u> rectangle i.e. all sides of equal length)

- Who can come and point to a vertex (corner), side, right angle?
- Who can show us pairs of perpendicular (parallel) lines? etc.

Notes:

Whole class activity

Shapes cut from coloured paper and stuck to BB or use enlarged copy master or OHP

Give Ps the chance to think of questions about the shapes first.

Ps can shout the numbers of the shapes in unison, or come to BB to point and explain.

Elicit that they are all plane (flat) shapes, so have only 2 dimensions: height and width

(Ps might mention that they all have just 1 face.)

Extra praise for 'clever' questions!

Feedback for T

24 min

Bk3

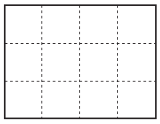
Lesson Plan 114

Activity		*Notes*

6

Area and volume

a) Study this rectangle. e.g. BB:



What is the length of its perimeter?

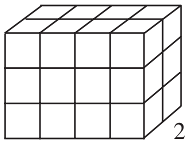
Ps dictate what T should write.

BB: $P = 3+4+3+4 = 2 \times (3+4) = 2 \times 7 = \underline{14}$ (units)

What is its area? Ps dictate what T should write.

BB: $A = 3+3+3+3 = 4+4+4 = 3 \times 4 = \underline{12}$ unit squares

b) Study this cuboid. e.g. BB:



What is the area of all its faces?
(i.e. area of its surface)

What is its volume?
Ps dictate what T should write.

BB: $A = 4 \times 3 + 2 \times 3 + 4 \times 3 + 2 \times 3 + 4 \times 2 + 4 \times 2$
$= (4 \times 3) \times 2 + (2 \times 3) \times 2 + (4 \times 2) \times 2$
$= (4 \times 3 + 2 \times 3 + 4 \times 2) \times 2$
$= (12+6+8) \times 2$
$= 26 \times 2$
$= \underline{52}$ (unit squares)

$V = (4+4+4) \times 2$
$= 4 \times 3 \times 2 = 12 \times 2$
$= \underline{24}$ (unit cubes)

Notes:

Whole class activity

T has rectangle drawn on BB and large cuboid made from unit cubes for demonstration.

Revisen perimeter and area of a rectangle and surface area and volume of a cuboid.

Ps could have $4 \times 3 \times 2$ cuboids on desks too.

T leads Ps through calculation if Ps are unsure.

At each stage T demonstrates which face is being noted.

Stress importance of units:

BB: *Perimeter:* <u>units</u>
Area: unit <u>squares</u>
Volume: unit <u>cubes</u>

Agreement, praising

29 min

7

Book 3, page 114

Q.1 *What are the perimeter and area of each of these diagrams if:*

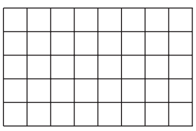
i) the perimeter is measured in these units and the area in these square units. . . . ?

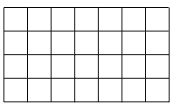
Deal with one part at a time. Ps work out number of unit lengths and units squares by counting or calculating in *Ex. Bks*.

Make sure that in part ii) Ps know that the unit length is 2 segments long, i.e. twice as long as in i), and the unit square is comprised of 4 small squares, i.e. 4 times as big as in i).

Review at BB with whole class after every part. Ps come to BB or dictate results to T. Mistakes discussed and corrected.

Solution:

a) 

b) 

	a)	b)
i)	$P = (8+5) \times 2$ $= \underline{26}$ units $A = 8 \times 5 = \underline{40}$ units	$P = (7+4) \times 2$ $= \underline{22}$ units $A = 7 \times 4 = \underline{28}$ units
ii)	$P = (4 + 2$ and a half$) \times 2$ $= \underline{13}$ units $A = 4 \times 2$ and a half $= \underline{10}$ units	$P = (3$ and a half $+ 2) \times 2$ $= \underline{11}$ units $A = 3$ and a half $\times 2$ $= \underline{7}$ units

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

T explains task with reference to diagrams on BB.

Ps can do calculations in *Ex. Bks* if necessary.

Discussion, reasoning, agreement, self-correction, praising

Feedback for T

Ps could colour each unit square a different colour, then count them as a check.

35 min

Bk3

Lesson Plan 114

Activity		*Notes*

8

Book 3, page 114

Q.2 Read: *Measure the sides of each rectangle in mm and write the lengths beside them.*

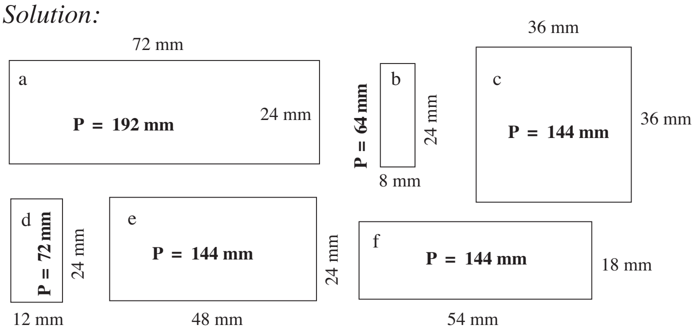
Calculate the perimeter of each rectangle in mm and write it inside the shape.

T could ask several Ps for estimates of the sides and write the responses on the BB. Let's see who is nearest!

Set a time limit. Ps measure and label sides and calculate the perimeters, doing calculations in *Ex. Bks.* if necessary.

Review at BB with whole class. Mistakes corrected. Compare with estimates. Extra praise for closest estimate.

Solution:



Ps also give perimeters in cm and mm (or just cm, e.g. 19.2 cm)

Extension

Ps calculate the area of one or two of the rectangles.

e.g. b) $A = 8\text{ mm} \times 24\text{ mm} = (160 + 32)$ mm squares

$= \underline{192}$ mm squares (or mm^2)

Notes:

Individual work, monitored, helped

Use enlarged copy master or OHP for discussion and demonstration only.

Whole class estimation first. In good humour!

Differentiation by time limit

Ps measure rectangles in letter order.

Discussion, reasoning, agreement, self-correction, praising

If problems, write calculation on BB: e.g.

d) $P = (12 + 24) \times 2$

$= 36 \times 2$

$= 60 + 12 = 72$ (mm)

Whole class activity

Ps choose the rectangles and come to BB or dictate to T.

T reminds Ps of short way to write 'mm squares'.

40 min

9

Book 3, page 114

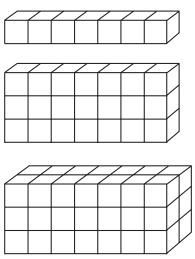
Q.3 Read: *How many unit cubes does each of these cuboids contain? This is their volume.*

Ps could have models already made up on desks, or T has large models to show to class.

Ps count unit cubes and write multiplications in their *Pbs*.

Review at BB with whole class. Ps come to BB, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:



a) Volume = $\boxed{7}$ unit cubes

b) Volume = $7 \times 3 = \underline{21}$ unit cubes

c) Volume = $7 \times 3 \times 2 = \underline{42}$ unit cubes

Extension

What is the <u>surface area</u> of each cuboid? (Elicit or explain that surface area is the number of unit squares which cover it.)

T writes what Ps dictate (or Ps come to write on BB). Refer to each face on the model as it is dealt with.

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correction, praising

Feedback for T

Solution to Extension:

a) $A = 7 \times 4 + 1 \times 2$

$= 28 + 2$

$= \underline{30}$ unit squares

b) $A = (7 \times 3 + 1 \times 3 + 7 \times 1) \times 2$

$= (21 + \overset{31}{3} + 7) \times 2$

$= \underline{62}$ unit squares

c) $A = (7 \times 3 + 2 \times 3 + 7 \times 2) \times 2$

$= (21 + \overset{41}{6} + 14) \times 2$

$= \underline{82}$ unit squares

45min

Bk3

R: Calculation
C: Quantities (mass, capacity, length)
E: Exchange of units

Lesson Plan 115

Activity | *Notes*

1

Missing values

Let's see how much you remember. Who can fill in these values?

Ps come out to BB to fill in numbers, saying the whole equation. Class points out errors.

BB: a) 1425 m = $\boxed{1}$ km $\boxed{425}$ m b) 1840 g = $\boxed{1}$ kg $\boxed{840}$ g

1007 m = $\boxed{1}$ km $\boxed{7}$ m 1016 g = $\boxed{1}$ kg $\boxed{16}$ g

c) 1618 mm = $\boxed{1}$ m $\boxed{618}$ mm d) 1276 ml = $\boxed{1}$ litre $\boxed{276}$ ml

1010 mm = $\boxed{1}$ m $\boxed{10}$ mm 1042 ml = $\boxed{1}$ litre $\boxed{42}$ ml

e) 1328 mm = $\boxed{1}$ m $\boxed{328}$ mm = $\boxed{1}$ m $\boxed{32}$ cm $\boxed{8}$ mm

157 cm = $\boxed{1}$ m $\boxed{57}$ cm = $\boxed{1}$ m $\boxed{570}$ mm

1 km 65 m = $\boxed{1065}$ m

Notes:

Whole class activity

Written on BB or SB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Revise relationships:

BB:

1 litre = 100 cl = 1000 ml
1 cl = 10 ml

1 km = 1000 m

1 m = 100 cm = 1000 mm
1 cm = 10 mm

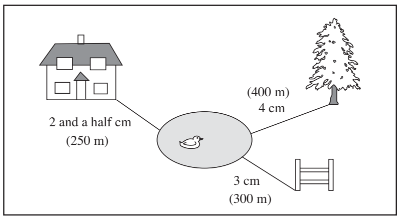
1 kg = 1000 g

6 min

2

Scale

Ps have 'maps' on desks. BB:
T has large copy for demonstration only.



How long are the paths?

Ps measure each path and write its length beside it (in cm).

Ps dictate measurements for T to write on enlarged map on BB.

If 1 cm on the map means 100 m in real life, what are the real distances?

Ps come to BB to write real distances in metres (or class shouts out in unison as T points to each).

Notes:

Whole class activity, but individual work in measuring.

Use copy master (or any similar simple 'map' prepared by T)

Encourage accurate measuring

Agreement, praising

BB: *Scale*: 1 cm → 100 m

2.5 cm → 250 m
3 cm → 300 m
4 cm → 400 m

10 min

3

Book 3, page 115

Q.1 Read: *A, B, C and D are places on a map.*
1 mm on the map means 20 m in real life.

What would 10 mm on the map be in real life? (200 m)
What would 60 m in real life be on the map? (3 mm)

a) Read: *Measure each line on the map in mm and write its length beside it.*

Review at BB with whole class. Mistakes corrected.
As each is dealt with, Ps also calculate real distance and write on their maps. T writes on BB map what Ps dicate.

b) Read: *In how many ways can you get from A to D?*
What distance is each route?

Do first route on BB, with Ps' help, as a model for Ps to follow. Rest done as individual work, with necessary calculations done in *Ex. Bks*.

Review with whole class. Ps come to BB to show and write their routes. Class agrees/disagrees. Mistakes corrected.

Which is the shortest (longest) route? (ABD, ABCD)

Notes:

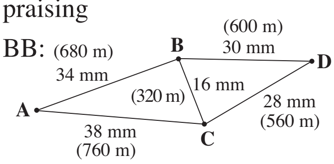
Whole class activity to start

Drawn on BB or use enlarged copy master or OHP for demonstration only!

Individual work, monitored, (helped)

Agreement, self-correction, praising

BB:



Reasoning, agreement, self-correction, praising

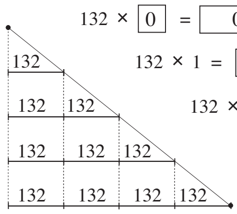
Solution:

ABD:	64 mm	1280 m
ABCD:	78 mm	1560 m
ACBD:	84 mm	1680 m
ACD:	66 mm	1320 m

18 min

Bk3

Lesson Plan 115

Activity		*Notes*
4	***Book 3, page 115*** Q. 2 Read: *Study the diagram. Fill in the missing numbers.* T explains the diagram. (e.g. Think of a giant stepping along the number line 132 units at a time. The top dot shows where he starts (i.e. he has not moved yet!) The line segment below the dot shows 1 step, the line below that shows 2 steps, etc. and the dot at the bottom RHS shows where he finished.) Fill in the missing numbers so that the equations show how far the Giant has gone after different numbers of steps. Review at BB with whole class. Mistakes discussed/corrected. *Solution:*  $132 \times \boxed{0} = \boxed{0}$ $132 \times 1 = \boxed{132}$ $132 \times 2 = \boxed{264}$ $132 \times 3 = \boxed{396}$ $132 \times 4 = \boxed{528}$ Ps point out relationships, (e.g. $132 \times 4 = 132 \times 2 \times 2$) and that each line is 132 more than the line above. *22 min*	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP Whole class discussion about meaning of diagram first. Reasoning, agreement, self-correction, praising Discussion, praising
5	**Mass** T has various small packets at front of class (e.g. spices, herbs, cornflour, baking powder, etc.). Ps come out to choose one and read out its mass in grams. Agree that 1 gram is very light in weight! T shows a hollow 1 cm glass cube and fills it with water (or shows the '1' rod from Cuisennaire). This amount of water is <u>1 millilitre</u> and its mass is 1 gram*. BB: 1 cm cube of water (1 cc) → 1 ml → 1 gram How many grams are in 1 kilogram? (1000) Remind Ps that 'kilo' and 'milli' are Ancient Greek words. Elicit their meaning. (BB) BB: 1 <u>kilo</u>gram = <u>1000</u> grams 1000 g = 1 kg This cube (T shows) has edge of length 10 cm. How many 1 cm cubes do you think it can hold? ($10 \times 10 \times 10 = 100 \times 10 = 1000$ cm cubes) If a 1 cm cube holds 1 millilitre of water, how much water do you think 1000 cm cubes can hold? (1000 ml or 1 litre) T shows litre jug. If I filled this jug with water, what would the mass of the water be? (1000 g) What other unit of capacity do you know? (centilitre: 'centi' means hundredth) Elicit relationship to litre and ml. [*Note for T: using pure water at 4°C] *27 min*	Whole class activity Pass items round class so that Ps can get an idea of what 50 g, 100 g, etc. feels like. [Revision/comparison of units of length, capacity and mass] BB: <u>kilo:</u> thousand <u>milli</u>: thousandth T could have strips of 10 and layers of 100 cubes already prepared as confirmation. BB: 1 cc → 1 ml → 1 g 1000 cc → 1000 ml → 1000 g 1 litre → 1 kg 1 litre = 100 cl 1 cl = 10 ml
6	**Capacity** Work out the capacity of these containers in your *Ex. Bks*. Remember to write the unit too! Review with whole class. Ps explain reasoning. a) It can be filled with four 50 litre cans. (200 litres) b) It can be filled with twenty 16 litre cans. (320 litres) c) It can be filled with five 25 litre cans and five 15 litre cans. (200 litres) d) It can be filled with twelve 9 litre and fifteen 4 litre jugs. (168 litres) *31 min*	Individual work, monitored, helped Ps could show answers on scrap paper or 'slates' on command. Reasoning (in detail) , agreement, self-correcting, praising

Bk3		*Lesson Plan 115*
Activity		***Notes***
7	***Book 3, page 115*** Q.3 Read: *Do the calculations in your Ex. Bks. Fill in the missing numbers.* Set a time limit. Review at BB with whole class. Ps come to BB to explain reasoning and show calculations in detail. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a) 24×70 ml = <u>1680</u> ml = <u>168</u> cl = <u>1</u> litre <u>68</u> cl b) 125×6 cl = 750 cl = <u>7</u> litres <u>50</u> cl = <u>7</u> litres <u>500</u> ml c) 174×9 cl + 135×3 cl = <u>19</u> litres <u>71</u> cl = <u>19</u> litres <u>710</u> ml *36 min*	Individual work, monitored, helped (or whole class activity) Written on BB Differentiation by time limit. Reasoning, agreement, self-correction, praising Show calculations in detail, e.g. a) $\begin{array}{r} 240 \times 7 \\ \hline 1680 \\ {\scriptstyle 2} \end{array}$ b) $\begin{array}{r} 125 \times 6 \\ \hline 750 \end{array}$ c) $\begin{array}{r} 174 \times 9 \\ \hline 1566 \end{array}$ $\begin{array}{r} 135 \times 3 \\ \hline 405 \end{array}$ $\begin{array}{r} 1566 \\ +\ 405 \\ \hline 1971 \end{array}$
8	***Book 3, page 115*** Q.4 Read: *What is the mass of:* *a) 8 tablespoons of flour if 1 tablespoon of flour weighs 15 g?* *b) 7 tablespoons of sugar if 1 tablespoon of sugar weighs 23 g?* *c) 4 tablespoons of salt if 1 tablespoon of salt weighs 28 g?* *d) 2 tablespoons of flour, 3 tablespoons of sugar and 4 tablespoons of salt?* Set a time limit. Calculations done in *Ex. Bks* or on scrap paper. Review at BB with whole class. Ps explain reasoning in detail. Mistakes discussed and corrected. *Solution:* a) 8×15 g = 80 g + 40 g = <u>120 g</u> b) 7×23 g = 140 g + 21 g = <u>161 g</u> c) 4×28 g = 80 g + 32 g = <u>112 g</u> d) 2×15 g + 3×23 g + 4×28 g = 30 g + 69 g + 112 g = <u>211 g</u> *41 min*	Individual work, monitored, helped (or whole class activity, with responses shown in unison on command) T could have tablespoons to show to class. Differentiation by time limit. Reasoning, agreement, self-correction, praising
9	**Revision practice** What is the mass of, e.g.: a) 1 ml (3 ml, 51 ml, etc.) of water? (1 g, 3 g, 51 g, etc.) b) 1 cl (6 cl, 10 cl, etc.) of water? (10 g, 60 g, 100 g, etc.) c) 1 litre (1 and a half litres, half a litre, 5 litres, etc.) of water? (1000 g or 1 kg, 1500 g or 1 and a half kg, 500 g or half a kg, 5000 g or 5 kg, etc.) *45 min*	Whole class activity T chooses Ps at random. At a good pace If Ps answer incorrectly, the next P corrects it. In good humour! Praising, encouragement only

Bk3

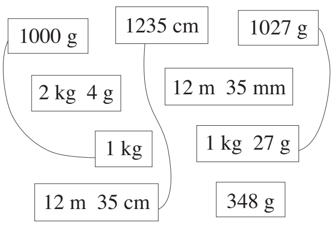
R: Mental and written operations

C: Calculations with quantities. Time.

E: Leap year

Lesson Plan 116

Activity		*Notes*
1	**Equal values** Let's join up the equal quantities. BB: Ps come to BB to draw joining lines, or rearrange cards, explaining reasoning. Class agrees/disagrees.	Whole class activity Written on BB or use enlarged copy master or OHP, or flash cards stuck to BB. At a good pace
Extension	Who can think of values equal to those which are not joined up? (e.g. 12 m 35 mm = 12 m 3 cm 5 mm = 1203 cm 5 mm; 2 kg 4 g = 2004 g; 348 g = 0.348 kg)	Agreement, praising Feedback for T



4 min

2	**Missing numbers** Let's write in the missing numbers. Nod your head if you agree with the answer and put your hands on your head if you disagree! **A**, come and fill in the first missing number. Is **A** correct? Show me . . . now! **B**, what do you think it should be? Why? etc.	Whole class activity (Or other pre-agreed actions) Written on BB or SB or use enlarged copy master or OHP Responses given in unison At a good pace Reasoning, agreement, praising Details given where necessary: 3 hours = 1 eighth of a day 21 hours = 7 eighths of a day Feedback for T

BB:

a) 1 third of a year = $\boxed{4}$ months; 1 quarter of a year = $\boxed{3}$ months

1 year 3 months = $\boxed{15}$ months; $\boxed{\text{1 half}}$ of a year = 6 months

1 year = $\boxed{4}$ seasons; $\boxed{\text{2 thirds}}$ of a year = 8 months

b) 1 quarter of a day = $\boxed{6}$ hours; 1 eighth of a day = $\boxed{3}$ hours

3 days = $\boxed{72}$ hours; 3 quarters of a day = $\boxed{18}$ hours

$\boxed{2}$ days = 48 hours; $\boxed{\text{7 eighths}}$ of a day = 21 hours

10 min

3	**Open sentences** Let's complete these sentences. Ps come to BB to fill in missing items, then read the sentence aloud. Class points out errors. Ps copy important statements into *Ex. Bks*.	Whole class activity Written on BB or SB or use enlarged copy masters or OHP At a good pace. Agreement, praising

BB:

a) 1 year = 4 seasons; 1 year = 12 months

1 year = 365 days, or 1 leap year = 366 days

Leap years are the years divisible by 4.

Only every 4th whole hundred is a leap year.

The year 2000 was a leap year.

The year 2000 was the last year of the 20th century.

The first year of the 21st century is 2001.

The first day of the 21st century is 1st January 2001.

Years are counted from the birth date of Jesus Christ.

Notes: T might discuss other systems apart from the Christian one: (Hindu, Jewish, Muslim, etc.) Tell or elicit that: a century is 100 hundred years ('cent' means 'hundred'); the 20th century is the 2nd thousand years or the 200th decade (1 decade = 10 years)

b) 31 day months: January, March, May, July, August, October, December

30 day months: April, June, September, November

28 or 29 day months: February

Notes: Ps list on BB, rest of class in *Ex. Bks*. Encourage neat written work.

c) 1 week = 7 days; 1 day = 24 hours

1 hour = 60 minutes; 1 minute = 60 seconds

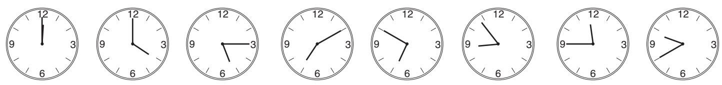
1 year = 52 weeks + 1 or 2 days

Notes: T could show short notation for minute and second.

BB: 1' = 1 minute

1" = 1 second

18 min

Bk3		*Lesson Plan 116*
Activity		***Notes***
4	**Find the mistake** Which of these statements are correct? Let's find the mistakes and correct them. Ps come to BB to write a tick or a cross and correct mistakes, explaining reasoning. Class agrees/disagrees. BB: a) 37 minutes + 63 minutes = 1 hour. ✗ (e.g. 37 min + 23 min) b) 1 minute – 26 seconds = 34 seconds ✔ d) 65 minutes + 12 minutes < 1 hour ✗ (e.g. > 1 hour) e) 86 seconds – 26 seconds > 1 minute ✗ (e.g. = 1 minute) *21 min*	Whole class activity Written on BB or SB or OHT At a good pace Reasoning, agreement, praising Ps write corrected statements in *Ex. Bks*. Feedback for T
5	**Telling the time?** a) T sets a model (or real) clock to certain times (or draws hands on clock face on BB or OHT). Ps say the time in different ways. Who can write the time on the BB? Who can write it in another way? Talk about am and pm and the 24 hour clock.  12:00 4:00 5:15 7:10 6:50 8:58 11:45 9:40 00:00 16:00 17:15 19:10 18:50 20:58 23:45 21:40 b) T (or Ps) says a time. Ps show the time on their model clocks on command. How would a 24 hour clock show this time? etc. *26 min*	Whole class activity T chooses Ps at random At a good pace Agreement, praising e.g. ten past seven, 7.10 a.m Mention midnight and midday as being neither am nor pm. Use copy master *Y2 LP 103/1* e.g. 9.40 am would be 09:40 Agreement, praising
6	***Book 3, page 116*** Q.1 Read: *Write each of these times in a different way. Follow the example.* T explains task using completed part a). Review at BB with whole class. Mistakes discussed and corrected. Ps could show the times on their model clocks. *Solution:* a) 13:45 = 1.45 pm b) 16:30 = 4.30 pm c) 20:12 = 8.12 pm d) 22:58 = 10.58 pm e) 23:04 = 11.04 pm e) 00:00 = midnight *30 min*	Individual work, monitored, helped T has digital and analogue clocks to demonstrate and explain. Reasoning, agreement, self-correcting, praising In what other ways could we say these times? (e.g. 'a quarter to one', 'half past four', etc.)
7	***Book 3, page 116, Q.2*** Read: *How many hours and minutes have passed from:* *a) 08:20 to 10:10 b) 07:45 to 09:15* *c) 10:42 to 14:10 d) 18:20 one day to 08:30 the next day?* **C**, how would you work out part a)? Who would do the same? Who would do it a different way? Ps come to BB to explain and demonstrate on model clock. e.g. 08:20 to 10:10 : 2 hours – 10 minutes = 1 hour 50 minutes or 1 hour + 40 min + 10 min = 1 hour 50 minutes. *Solution:* a) 08:20 to 10:10 = 1 h 50 min b) 07:45 to 09:15 = 1 h 30 min c) 10:42 to 14:10 = 3 h 28 min d) 18:20 to 32:30 = 14 h 10 min *35 min*	Whole class activity (or individual work if Ps wish, in which case Ps could have model clocks on desks to help them). Reasoning, agreement, praising Details of reasoning given. e.g. d) 18:20 to 19:00 = 40 min 19:00 to 24:00 = 5 h 00:00 to 08:30 = 8 h 30 min 18:20 to 08:30 = 13 h 70 min = 14 h 10 min

Bk3

Lesson Plan 116

Activity		*Notes*
8	***Book 3, page 116*** Q.3 Read: *Fill in the missing numbers.* Parts a), c) and e) could be done orally round class. Parts b) and d) could be done as individual work, monitored and reviewed. (Or all done as individual work if Ps wish but reviewed after each part, or all done as a whole class activity if short of time.) *Solution:* a) i) 7 hours = 420 min ii) 15 hours = 900 min iii) 4 h 45 min = 285 min iv) 15 h 10 min = 910 min b) i) 68 min = 1 h 8 min ii) 75 min = 1 h 15 min iii) 135 min = 2 h 15 min iv) 301 min = 5 h 1 min c) i) 10 wks 5 dys = 75 dys ii) 25 wks 3 dys = 178 dys iii) 50 wks 2 dys = 352 dys iv) 52 wks 1 day = 365 dys d) i) 3 min = 180 seconds ii) 8 min = 480 seconds iii) 5 min 15 sec = 315 sec iv) 20 min 42 sec = 1242 sec e) i) 121 sec = 2 min 1 sec ii) 250 sec = 4 min10 sec iii) 372 sec = 6 min12 sec iv) 360 sec = 6 min 0 sec *41 min*	Part individual work, part whole class activity (or wholly one or the other) T could have SB or OHT already prepared with answers and uncover each as it is dealt with. Reasoning, agreement, self-correction where relevant, praising At a good pace If problems, write details of calcualtions on BB. Elicit that 365 days = 1 year Feedback for T
9	***Book 3, page 116*** Q.4 Deal with one part at a time. Ps read problems themselves and discuss strategy for solution with neighbour. Set a time limit. Ps suggest operations. T writes on BB what Ps dictate. Deal with all cases. a) Read: *If the taps are turned on full for 1 minute, 7 litres of water runs into the bath.* *How much water would have run into the bath after 2 hours?* e.g. 1 min: 7 litres; 2 hours = 2 × 60 min = 120 min 120 min: 7 × 120 = 700 + 140 = 840 (litres) *Answer:* After 2 hours, 840 litres of water would have run into the bath. What would have happened in real life? (Overflow!) b) Read: *A car travels 22 m in 1 second. How far has the car gone after 1 minute?* e.g. 1 sec: 22 m; 1 min = 60 sec 60 sec: 22 m × 60 = 220 m × 6 = 1200 m + 120 m = 1320 m = 1 km 320 m *Answer:* The car has gone 1 km 320 m after 1 minute. *45 min*	Individual or paired work in planning/writing the operation Whole class activity in calculating Reasoning, agreement, praising Or calculation done as vertical multiplication. Ps say answer in unison. Discussion. (Capacity of a normal sized bath is about 180 litres) Reasoning, agreement, praising Or vertical multiplication Ps say answer in unison.

Bk3	R: Calculations **C: Division. Properties of division** *E: Divisibility*	*Lesson Plan* *117*

Activity		*Notes*
1	**Written exercises** T dictates operations. Ps write them down and do the calculations in *Ex. Bks*. Review at BB with whole class. Ps explain their methods of calculation. Who made a mistakes? What kind of mistake? etc. Confirm order of operations (operations inside brackets first, then multiplication, then subtraction). BB: a) $413 - \overset{381}{127 \times 3} = \underline{32}$ b) $\overset{1239}{413 \times 3} - 127 = \underline{1112}$ c) $(\overset{286}{413 - 127}) \times 3 = \underline{858}$ d) $\overset{1239}{413 \times 3} - \overset{381}{127 \times 3} = \underline{858}$ *5 min*	Individual work, monitored, helped T also has questions written on BB or SB or OHT. Reasoning, agreement, self-correction, praising Details of calculations written on BB if problems, e.g. a) $\begin{array}{r} 127 \times 3 \\ \hline 381 \\ \hline \end{array}$ $\begin{array}{r} 413 \\ -381 \\ \hline 32 \\ \hline \end{array}$
2	**Missing numbers** Let's fill in the missing numbers so that the statements are true. Ps do calculations in *Ex. Bks* or on slates first, then dictate to T or come to BB, explaining reasoning. Class points out errors. BB: a) $248 \times 4 = 496 \times \boxed{2}$ b) $74 \times \boxed{8} = 148 \times 4$ c) $93 \times \boxed{9} = 279 \times 3$ d) $132 \times 3 = 132 \times 2 + \boxed{132}$ e) $152 \times 4 = 152 \times 3 + \boxed{152}$ f) $108 \times 6 = 108 \times 7 - \boxed{108}$ g) $311 \times 4 = 311 \times 6 - \boxed{622}$ h) $142 \times 3 = 71 \times 6 + \boxed{0}$ i) $913 - 378 < \overset{\text{e.g.}}{\boxed{a}} < 137 \times 4$ (a: 536, 537, . . . 546, 547) j) $524 + 476 \geq \overset{\text{e.g.}}{\boxed{b}} \geq 250 \times 4$ ($b = 1000$) *13 min*	Whole class activity Written on BB or SB or OHT or use enlarged copy master Reasoning, agreement, praising Ps show calculations in detail if necessary. Feedback for T i) 12 possible whole numbers (536 to 547) i) and j): any letter or symbol would do.
3	**Number line** a) T has class number line 0 to 100. Ps come out to mark on it: i) multiples of 4 in *blue* (0, 4, 8, 12, 16, 20, 24, . . .) We could also say that 0, 4, 8, etc. are <u>divisible</u> by 4, i.e. they have no remainder when divided by 4. ii) multiples of 5 in *green* (0, 5, 10, 15, 20, . . .) We could also say that 0, 5, 10, etc. are <u>divisible</u> by 5, i.e. they have no remainder when divided by 5. b) Let's say the numbers which are marked in *blue* <u>and</u> *green*. (0, 20, 40, 60, 80, 100, . . .) What can you tell me about these numbers? (Multiples of 20 or divisible by 20) *17 min*	Whole class activity Use class number line with sticky coloured dots or draw on BB and use coloured chalk. At a good pace Ps say each set of multiples in unison. In unison Agreement, praising

Bk3

Lesson Plan 117

Activity		*Notes*

4

True or false?

T reads a statement twice. Ps write 'T' for true or 'F' for false on scrap paper or slates and show on command. Ps who answer incorrectly try to give counter examples.

a) Every number divisible by 4 is even. Show me . . . now! (T)
b) 0 is divisible by 4 and 5. Show me . . . now! (T)
c) 4 is divisible by 0. Show me . . . now! (F)
d) All whole tens are divisible by 5. Show me . . . now! (T)
e) Every number divisible by 5 is a whole ten. Show me . . . now! (F)
f) There is a whole ten which is not divisible by 5. (F)
g) There are numbers divisible by 5 which are not whole tens. (T)

Notes:
Whole class activity
Responses shown in unison
Discussion, agreement, praising
b) $0 \div 4 = 0$, $0 \div 5 = 0$ because $0 \times 4 = 0$, etc.
c) No number can be divided by zero!
e) e.g. 15 is not a whole 10
f) Relate to d)
g) e.g. 25

21 min

5

What is the rule?

Study this table and think what the rule could be. Ps come out to fill in missing numbers and class agrees/disagrees but does not state the rule until the end.

BB:

a	0	1	2	3	4	5	9	13	17	18	20	24
b	0	1	2	0	1	2	**0**	**1**	**2**	**0**	**2**	**0**

A, what do you think the rule is? Who agrees? Who thinks something else? etc. *Rule*: *b* is the remainder after dividing *a* by 3.

Notes:
Whole class activity
Drawn on BB or use enlarged copy master or OHP
Give Ps time to think.
At a good pace
Agreement, praising
Discussion, agreement, checking with values in table.

25 min

6

Book 3, page 117, Q.3

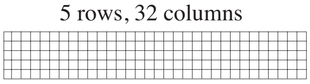
Q.1 Read: *Write multiplications and divisions about the diagrams.*

Deal with one part at a time. Elicit the number of squares in each row and column. Ps work out the total, then write operations.

Review at BB with whole class. Elicit that the total number of squares is the <u>area</u> of the rectangle. Deal with all cases. Mistakes discussed and corrected.

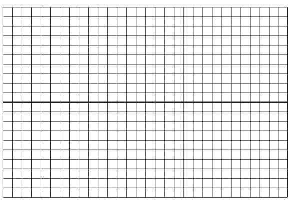
Solution: e.g.

a) 5 rows, 32 columns



$5 \times 32 = 32 \times 5 = 160$
$160 \div 5 = 32$, $160 \div 32 = 5$

b)



20 rows, 30 columns

$20 \times 30 = 30 \times 20 = 600$
$600 \div 30 = 20$, $600 \div 20 = 30$
$2 \times 10 \times 30 = 2 \times 300 = 600$
$600 \div 2 = 300$, $600 \div 300 = 2$
$6 \times 100 = 100 \times 6 = 600$
$600 \div 6 = 100$, $600 \div 100 = 6$
etc.

Notes:
Individual work, monitored helped
Drawn on BB or use enlarged copy master or OHP
Discussion, reasoning, agreement,self-correcting, praising
Revise correct mathematical terms and encourage Ps to use them:
'factors, product, dividend, divisor, quotient, divisible by'

30 min

Bk3

Lesson Plan 117

Activity		*Notes*
7	*Book 3, page 117* Q.2 Read: *Write two divisions about each diagram.* Set a time limit. Review at BB with whole class. Deal with all cases. Mistakes corrected. When reviewing each part, ask Ps to say the divisions in different ways in context, e.g. a) 'Half of 10 p is 5 p', or 'A 10 p coin can be exchanged for two 5 p coins.', or 'One fifth of 10 p is 2 p.' or 'A 10 p coin can be exchanged for five 2 p coins.' *Solution:* e.g. a) i) 1 1 1 1 1 / 1 1 1 1 1 $10 \div 2 = 5$ $10 \div 5 = 2$ ii) 10 10 10 10 10 / 10 10 10 10 10 $100 \div 2 = 50$ $100 \div 5 = 20$ iii) 100 100 100 100 100 / 100 100 100 100 100 $1000 \div 2 = 500$ $1000 \div 5 = 200$ b) i) 5 5 5 5 5 / 5 5 5 5 5 $50 \div 10 = 5$ $50 \div 5 = 10$ ii) 50 50 50 50 50 / 50 50 50 50 50 $500 \div 10 = 50$ $500 \div 50 = 10$ iii) 200 200 200 200 200 / 200 200 200 200 200 $2000 \div 10 = 200$ $2000 \div 200 = 10$	Individual work, monitored, helped Coins stuck or drawn on BB or use enlarged copy master or OHP. Differentiation by time limit Discussion, agreement, self-correction, praising Ps who finish quickly can think of other divisions too. e.g. $100 \div 10 = 10$ $1000 \div 100 = 10$ $50 \div 2 = 25$ $500 \div 5 = 100$ $2000 \div 5 = 400$ etc. T (or P) points to divisions, Ps say matching multiplications at speed round class.
	35 min	
8	***Book 3, page 117*** Q.3 Read: *Do the divisions. Check them in your head with multiplications.* Let's see how many of these you can do in 3 minutes! Sit up with your arms folded when you have finished. Review orally round class. Ps change pencils and mark/correct own work. P says whole division, then checks with reverse multiplication. e.g. '$1800 \div 90 = 20$, because $20 \times 90 = 1800$' Evaluate number correct out of 24 and discuss mistakes made. Elicit relationships and connections. Encourage Ps to use correct mathematical terms. *Solution:* a) $18 \div 6 = \underline{3}$; $180 \div 60 = \underline{3}$ $180 \div 6 = \underline{30}$; $1800 \div 60 = \underline{30}$ $1800 \div 6 = \underline{300}$; $1800 \div 600 = \underline{3}$ b) $18 \div 9 = \underline{2}$; $180 \div 90 = \underline{2}$ $180 \div 9 = \underline{20}$; $1800 \div 90 = \underline{20}$ $1800 \div 9 = \underline{200}$; $1800 \div 900 = \underline{2}$ c) $54 \div 6 = \underline{9}$; $540 \div 6 = \underline{90}$; $540 \div 60 = \underline{9}$ d) $32 \div 8 = \underline{4}$; $320 \div 8 = \underline{40}$; $320 \div 80 = \underline{4}$ e) $72 \div 9 = \underline{8}$; $720 \div 9 = \underline{80}$; $720 \div 90 = \underline{8}$ f) $56 \div 7 = \underline{8}$; f) $560 \div 7 = \underline{80}$; f) $560 \div 70 = \underline{8}$	Individual work, monitored, helped Differentiation by time limit. Checking, agreement, self-correction, praising Stars, stickers, etc. awarded Discussion, agreement, e.g. 'If dividend increases by 10 times and divisor increases by 10 times, then quotient stays the same.' 'If dividend stays the same but divisor increases by 10 times, then quotient decreases by 10 times.'
	40 min	
9	***Book 3, page 117, Q.4*** Read: *Divide the amount into 4 equal parts.* First elicit total amount. (840) T chooses 4 Ps to come and take an equal amount and show to class. Class checks they all have the same amount. What fraction of the money do they each have? (1 quarter) Who can write it as a division? T shows details. Ps write in *Pbs*. Repeat for other amounts. (e.g. $390 \div 3$, $1206 \div 6$)	Whole class activity T has model money stuck to BB BB: 100 100 100 100 100 100 100 100 10 10 10 10 1 quarter of 840 = $\underline{210}$ $840 \div 4 = 800 \div 4 + 40 \div 4$ $= 200 + 10 = \underline{210}$ Praising only
	45 min	

Bk3	R: Calculations **C: Division: divisor (factor) and multiple** *E: Division with remainders. Caroll diagrams*	*Lesson Plan 118*
Activity		***Notes***
1	**What is missing?** Let's see if you can work out what is missing without calculating the products. Ps come to BB to write missing items or dictate to T, explaining reasoning. Class points out errors. In d), ask Ps to give details of calculation. BB: a) $102 \times 6 = 102 \times 3 + \boxed{102 \times 3}$ $\quad 211 \times 3 = 211 \times 6 - \boxed{211 \times 3}$ b) $116 \times 3 \underset{\times 2}{<} 116 \times \boxed{6}$ $\quad 109 \times 2 \underset{\times 4}{<} \boxed{436} \times 2$ c) $128 \times 2 \underset{128}{<} 128 \times \boxed{3}$ $\quad 151 \times 4 \underset{151}{>} 151 \times \boxed{3}$ d) $\overset{790}{158 \times 5} - \boxed{1} = \overset{90}{450 \div 5} + 699$ $\quad \begin{array}{r} 158 \times 5 \\ \hline 790 \\ {\scriptstyle 2\,4} \end{array}$ $\quad \begin{array}{r} 699 \\ +\ 90 \\ \hline 789 \end{array}$ e) $\overset{1163}{676 + 487} \le \boxed{} - 126 \le \overset{1165}{233 \times 5}$ $\boxed{}$: 1289, 1290, 1291 *8 min*	Whole class activity Written on BB or SB or use enlarged copy master or OHP At a good pace Reasoning, agreement, praising Ps read inequalities in unison. Details for e) $\begin{array}{r} 676 \\ +\,487 \\ \hline 1163 \end{array}$ $\quad \begin{array}{r} 233 \times 5 \\ \hline 1165 \\ {\scriptstyle 1\,1} \end{array}$ *Check:* $\begin{array}{r} 1163 \\ +\ 126 \\ \hline 1289 \end{array}$ $\quad \begin{array}{r} 1291 \\ -\ 126 \\ \hline 1165 \end{array}$ ✔
2	**Mental practice** a) What is 1 eighth of 48 (24, 16)? Show me . . . now! (6, 3, 2) We could say: '48 divided by 8 = 6' and write it like this. $\frac{48}{8} = 6$ '24 divided by 8 = 3' and write it like this. $\frac{24}{8} = 3$ '16 divided by 8 = 2' and write it like this. $\frac{16}{8} = 2$ b) I arranged 30 eggs so that there were 5 eggs in each row. How many rows of eggs were there? Show me . . . now! (6) **A**, come and write it as an operation. Who agrees? Who could write it using the new method? c) I rearranged the 30 eggs into 10 equal rows. How many eggs were in each row? Show me . . . now! (3) **B**, come and write it as an operation. Who agrees? Who could write it using the new method? d) How many marbles would each child get if 40 marbles were shared equally among 4 (10, 8, 5, 2, 20) children? Show me . . . now! (10, 4, 5, 8, 20, 4) Ps come to BB to write each division in the two different ways. *14 min*	Whole class activity Ps show answer on scrap paper or 'slates' in unison. Agreement, praising T shows new form of notation and explains that the horizontal line means 'divided by'. In unison Agreement, praising BB: $30 \div 5 = \underline{6}$ or $\frac{30}{5} = 6$ In unison Agreement, praising BB: $30 \div 10 = \underline{3}$ or $\frac{30}{10} = 3$ In unison $40 \div 4 = 10$ or $\frac{40}{4} = 10$ etc.

Bk3

Lesson Plan 118

Activity		*Notes*

3

Complete the table

Let's exchange the 1 p coins for 5 p coins and show it in this table.
Elicit what each row of the table means. (top row: number of 1 p coins, 2nd row: number of 5 p coins, bottom row: number of 1 p coins remaining)

Ps come to BB to choose a column and fill in the missing value, explaining reasoning. e.g. $70 \div 5 = 50 \div 5 + 20 \div 5 = 10 + 4 = 14$, and there is no remainder.

BB:

1	25	70	65	36	105	109	140	280	93	97
5	5	**14**	**13**	**7**	**21**	**21**	**28**	**56**	**18**	**19**
R	0	**0**	**0**	**1**	**0**	**4**	**0**	**0**	**3**	**2**

What remainders are possible when dividing by 5? (0, 1, 2, 3, 4)

Which of the numbers in the top row are divisible by 5? (25, 70, 65, 105, 140, 280) Elicit that all numbers with a 5 or a 0 as the units digit are divisible by 5, i.e. 5 is a factor of these numbers.

What name could we give them? (They are all multiples of 5.)

Notes:

Whole class activity

Table drawn on BB or use enlarged copy master or OHP

At a good pace

Encourage Ps to break the large numbers down into known multiples of 5 or to deduce from a number already dealt with (e.g. 109 is 4 more than 105, 140 is twice 70, etc.)

Reasoning, agreement, praising

Revise vocabulary of division:

dividend (top row); divisor (5)
quotient (2nd row),
remainder (bottom row)

18 min

4

Division

T calls 12 Ps out to front of class. In how many ways can we put them into equal groups so that nobody is left out?

Let's do it logically. What is the smallest number that could be in a group? (1) If there is 1 person in each group, how many groups are there? (12) Ps at front space themselves out.

Let's write a division about it. Repeat for the other ways. Ps at front hold hands to show the groups each time.

BB

$12 \div \underline{1} = 12$	because	$12 \times 1 = 12$	(12 groups)
$12 \div \underline{2} = 6$	because	$6 \times 2 = 12$	(6 groups)
$12 \div \underline{3} = 4$	because	$4 \times 3 = 12$	(4 groups)
$12 \div \underline{4} = 3$	because	$3 \times 4 = 12$	(3 groups)
$12 \div \underline{6} = 2$	because	$2 \times 6 = 12$	(2 groups)
$12 \div \underline{12} = 1$	because	$1 \times 12 = 12$	(1 group)

We can say that:

- 12 is divisible by 1, 2, 3, 4, 6 and 12, as there is no remainder when 12 is divided by these numbers.
- 1, 2, 3, 4, 6, 12 are factors of 12, because there is no remainder when 12 is divided by them, (or because they each multiply another of the numbers to make 12 exactly).

  What are the pairs of factors which multiply together to make 12?

  BB: 1×12, 2×6, 3×4
- 12 is a multiple of 1, 2, 3, 4, 6 and 12, i.e. 12 is the result when each of these numbers is multiplied by another of the numbers.

Notes:

Whole class activity

T starts off system of demonstrating and recording. Ps continue when they understand what to do.

Reasoning:

'12 pupils ÷ 1 pupil
= 12 (groups)

12 times 1 pupil = 12 pupils'

At a good pace

T writes underlined parts on BB and Ps copy in *Ex. Bks.*

What number is:

- not a factor of 12? (e.g. 5)
- not a multiple of 4 (6)? (e.g. 9, 11)
- not divisible by 3 (12)? (e.g. 8, 22)

Praising, encouragement only

24 min

Bk3		*Lesson Plan 118*
Activity		***Notes***
5	***Book 3, page 118*** Q.1 Read *Write these numbers in the correct number set.* T explains task. Elicit that 'divisible by 8' means the same as 'multiples of 8' and 'multiples of 9' means the same as 'divisible by 9'. Ps can underline or circle each number as it is dealt with. Review at BB with whole class. Ps come to write on BB or dictate to T, explaining reasoning, e.g. 'If 17 is divided by 8 there is a remainder of 1, so 17 is not divisible by 8.' Mistakes discussed and corrected. Which numbers are multiples of 8 and 9? (0 and 72) *Solution:* 0, 5, 8, 9, 12, 16, 17, 27, 40, 44, 45, 72, 80, 81, 90, 96 a) Divisible by 8: 0 8 16 40 72 80 96; Not divisible by 8: 5 9 12 17 27 44 45 81 90 b) Multiples of 9: 0 9 27 45 72 81 90; Not multiples of 9: 5 8 12 16 17 40 44 80 96 *30 min*	Individual work, monitored, helped Tables drawn on BB or use enlarged copy master or OHP Discussion, reasoning, agreement, self-correction, praising Agreement, praising
6	***Book 3, page 118*** Q.2 Read *Write these numbers in the correct set.* Elicit that 'divisor of 36' means the same as 'factor of 36', i.e. 36 can be divided by this number exactly, with no remainder. Again, Ps underline or circle each number as it is dealt with. Review at BB with whole class. Ps come to write on BB or dictate to T, explaining reasoning. Mistakes discussed and corrected. *Solution:* 3, 9, 8, 1, 36, 12, 4, 6, 18, 11, 2, 5, 10, 53, 72, 0 Divisor of 36: 3 9 1 36 12 4 6 18 2; Not a divisor of 36: 8 11 5 10 53 72 0 *34 min*	Individual work, monitored, helped Table drawn on BB or use enlarged copy master or OHP Reasoning, agreement, self-correction, praising Feedback for T

Bk3

Lesson Plan 118

Activity		*Notes*

7

Book 3, page 118, Q.3

Read: *What is the rule? Complete the table and the graph.*

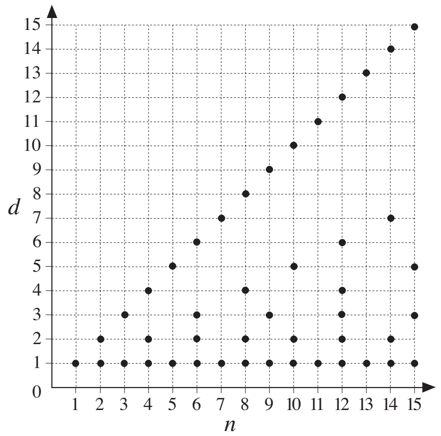
What could the letters *n* and *d* stand for? Give Ps time to think about it. Ask several Ps what they think. Elicit that *n* means 'number' and *d* means 'divisible by', so e.g. 1 is divisible by 1, 2 is divisible by 1 and 2, etc. *Rule*: *n* is divisible by *d* (or *d* is a factor of *n)*.

Ps come to BB to point to completed rows in the table and then to find them on the graph. Elicit that the dots vertically above each number on the *x*-axis show the numbers on the *y*-axis by which it is exactly divisible (or which are its factors).

Let's complete the table and graph. Ps come to BB in pairs, one to fill in a row of the table and the other to draw dots on the graph. Rest of class points out errors and complete diagrams in own *Pbs* too.

Solution:

n	*d*
1	1
2	1, 2
3	1, 3
4	1, 2, 4
5	1, 5
6	1, 2, 3, 6
7	1, 7
8	1, 2, 4, 8
9	1, 3, 9
10	1, 2, 5, 10
11	1, 11
12	1, 2, 3, 4, 6, 12
13	1, 13
14	1, 2, 7, 14
15	1, 3, 5, 15



40 min

Notes:
Whole class activity
Drawn on BB or use enlarged copy master or OHP
Discussion, ageement
Reasoning, agreement, praising
Demonstrate by moving fingers along grid lines.
At a good pace
Agreement, praising
Feedback for T
[Develops visual thinking skills.]

8

Book 3, page 118

Q.4 Read *Circle the number which you think is the odd one out. Give a reason.*

Deal with one part at a time. Give Ps time limit to think and write, then review with the whole class.

Stand up those who circled 60. T asks a P standing why they chose 60. Who thought the same? Who had different reason? Similarly for the other numbers.

Solution: e.g.

a) 50, as it is the only number which is <u>not</u> a multiple of 3, or 300, as it is the only whole hundred.

b) 553, as it is the only number <u>not</u> divisible by 5, or 560, as it is the only number divisible by 4.

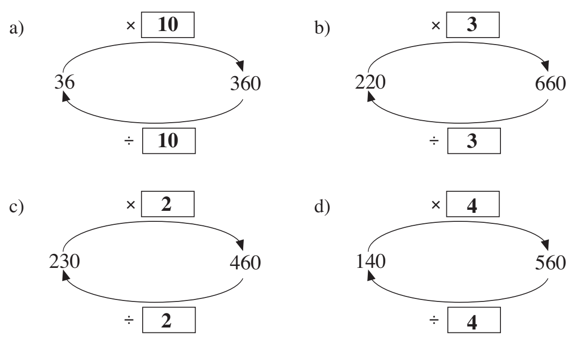
45 min

Notes:
Individual work, monitored
Set a time limit
Encourage Ps to use mathematical terms. T repeats vague reasons correctly.
Agreement, praising
Accept any number for which a valid reason is given.
Extra praise for creative (but correct) thinking!

Bk3

R: Calculations
C: Division
E: Mental procedures

Lesson Plan 119

Activity		*Notes*
1	**Puzzles** Study these puzzles. The rule is that the product of any two adjacent numbers is the number directly above them. Let's fill in the missing numbers. Ps come to BB to write numbers and explain reasoning Class agrees/disagrees. Do the top row of a) and b) only if Ps want to try it. T could give hints to Ps to help them or if Ps are struggling, show how to do it. **BB:** a) (160 000) / 200, 800 / **10**, 20, **40** / **1**, 10, **2**, 20 b) (32 000) / 400, 80 / 20, 20, **4** / **2**, **10**, 2, **2** c) 640 / 80, 8 / 20, 4, **2** / **10**, **2**, **2**, (blank) Top row: e.g. a) 2H × 8H = 2H × 8 × 1H = 16H × 10 × 10 = 16 Th × 10 = <u>160 Th</u> (160 000) b) 4H × 8T = 4H × 8 × 10 = 32H × 10 = <u>32 Th</u> (32 000) *5 min*	Whole class activity Drawn on BB or use enlarged copy master or OHP At a good pace **Bold** numbers are given. Reasoning, agreement, praising Stress logical deduction rather than trial and error or guess-work! Elicit that 1H × 10 = 1Th Extra praise if Ps can do it but do not worry if they cannot.
2	**Which statement is true?** T asks a P to read each statement, then class decides whether ot not it is true. Ps write 'T' for true or 'F' for false on slates or scrap paper and show on command (or use pre-agreed actions). T aks Ps to give an example (or counter example) for each. BB: a) All the mulitples of 3 are even numbers. (F) e.g. 9 is odd b) Not all the multiples of 3 are odd numbers. (T) e.g, 6 is even. c) Not all the numbers divisible by 4 are even. (F) <u>All</u> are even. d) A number which is a multiple of 4 is also a multiple of 2. (T) *8 min*	Whole class activity Written on BB or SB or OHT Responses shown in unison. Reasoning, agreement, praising Agree that only one counter example is needed to prove that a statement is false.
3	**Missing numbers** Study the diagrams. What do the arrows mean? Ps come to BB to fill in the missing numbers. Class checks that they are correct. Elicit that multiplication and division are opposite operations. What other pairs of operations are opposite operations? (addition and subtraction) BB:  *12 min*	Whole class activity Drawn on BB or use enlarged copy master or OHP At a good pace Agreement, checking, praising Elicit that, e.g. • 360 is a <u>multiple</u> of 36 and 10 • 36 and 10 are <u>factors</u> of 360 • 360 is <u>divisble by</u> 36 and 10 etc.

Bk3		*Lesson Plan 119*
Activity		***Notes***
4	**Find the mistakes** *Dizzie Domble* has done his homework in a hurry again! Let's mark it for him and correct his mistakes. Ps come to BB to do calculations, tick the correct operations and correct the wrong ones. Class agrees/disagrees. BB: a) $220 \div 2 = \overset{110}{\cancel{100}}$ ✗ b) $540 \div 9 = \overset{60}{\cancel{70}}$ ✗ c) $480 \div 4 = 120$ ✔ d) $426 \div 6 = 71$ ✔ e) $270 \div 3 = \underset{90}{\cancel{900}}$ ✗ f) $567 \div 7 = \underset{81}{\cancel{8}}$ ✗ *17 min*	Whole class activity Written on BB or SB or use enlarged copy master or OHP At a good pace Reasoning, checking, correcting, praising Give details if problems: e.g. $426 \div 6 = 420 \div 6 + 6 \div 6$ $= 70 + 1 = \underline{71}$ $567 \div 7 = 560 \div 7 + 7 \div 7$ $= 80 + 1 = \underline{81}$
5	**Division practice** T has BB already prepared. Who can work out the quotients? Ps come out to BB to fill in missing numbers explaining reasoning. Ps write details of calculations at side of BB if necessary. Class points out errors. What do you notice? Ps point out connections. (e.g. If dividend is increased by 10 times, then quotient also increases by 10 times.) BB: a) $48 \div 4 = (12)$ b) $96 \div 3 = (32)$ $480 \div 4 = (120)$ $960 \div 3 = (320)$ c) $186 \div 6 = (31)$ d) $128 \div 4 = (32)$ $1860 \div 6 = (310)$ $1280 \div 4 = (320)$ *21 min*	Whole class activity Written on BB or SB or OHT Reasoning, agreement, checking, praising Details, e.g. $128 \div 4 = 120 \div 4 + 8 \div 4$ $= 30 + 2 = \underline{32}$ Ps check orally with mental multiplication, e.g. $32 \times 4 = 120 + 8 = 128$ ✔
6	***Book 3, page 119*** Q.1 Read: *Do the divisions. Check them in your head with multiplications.* Review orally round class. Ps give quotients and check with a multiplication. Ps show details on BB if problems, e.g. BB: $1550 \div 5 = 1500 \div 5 + 50 \div 5 = 300 + 10 = \underline{310}$ Mistakes discussed and corrected. *Solution:* a) $189 \div 9 = \underline{21}$ b) $126 \div 3 = \underline{42}$ $1890 \div 9 = \underline{210}$ $1260 \div 3 = \underline{420}$ c) $168 \div 8 = \underline{21}$ d) $155 \div 5 = \underline{31}$ $1680 \div 8 = \underline{210}$ $1550 \div 5 = \underline{310}$ *26 min*	Individual work, monitored Ps may do calculations in *Ex Bks* if necessary. Agreement, checking, self-correcting, praising
7	***Book 3, page 119*** Q.2 Read: *a) Circle the numbers in this list which are divisible by 3.* *b) Circle the numbers in this list which are multiples of 4.* Review at BB with whole class. T has numbers written on BB and circles what Ps dictate. Ps show details on BB if problems: e.g. $1568 \div 3 = 1500 \div 3 + 60 \div 3 + 8 \div 3$ $= 300 + 20 + 2$, r 2, so 1568 is <u>not</u> divisible by 3. ✔ ✔ ✕ Mistakes discussed and corrected. *30 min*	Individual work, monitored Set a time limit. Ps do calculations in *Ex Bks*. Agreement, checking, self-correcting, praising *Solution:* Numbers circled: a) 0, 9, 60, 69, 1500, 1569 b) 0, 4, 80, 84, 1200, 1284

Bk3

Lesson Plan 119

Activity		Notes

8

Book 3, page 119, Q.3

Read: *Write the whole numbers from 0 to 20 in the correct column in the table.*

Ps come to BB one after the other to write a number in correct place in table.

Rest of Ps point out errors.

BB:

Remainder after dividing by 7						
0	**1**	**2**	**3**	**4**	**5**	**6**
0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20

Notes: Whole class activity. Drawn on BB or use enlarged copy master or OHP. At a good pace. Ps complete table in *Pbs* too. Agreement praising

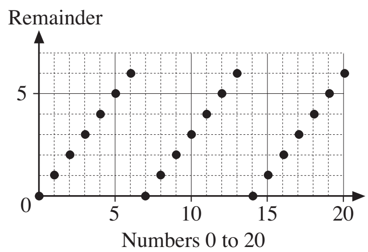
Read: *Draw dots in the graph to show the remainders.*

Who can explain what the graph means? (x-axis shows the whole numbers from 0 to 20 and y-axis shows the remainders from 0 to 7)

P comes to BB to point to the relevant number on the x-axis with right hand and to relevant remainder on y-axis with left hand, then moves both fingers along the grid lines until they meet.

P draws a large dot at the point where the grid lines meet.
Class points out errors.

BB:



Notes: Discussion, explanation with reference to graph. Involve several Ps. At a good pace. Agreement, praising. Ps could write numbers at every grid line if they have difficulty identifying the correct one.

Read: *Are these statements true? Write a tick if it is true and a cross if it is false.*

T chooses a P to read each. Ps draw a tick or a cross in *Pbs* and and show responses on command by pre-agreed actions, e.g.both hands in the air for a cross, knock on desk for a cross.

a) *If we divide a number by 7, the remainder is less than 7.* (✔)

b) *If we divide a number by 7, the remainder can be 7.* (✕)

c) *If the remainder is 0 after dividing a number by 7, the number is a multiple of 7.* (✔)

d) *If we divide a number by 7, then 7 different remainders are possible.* (If we count 0 as a remainder too.) (✔)

Notes: Read each statement twice to give Ps time to think. Responses shown in unison. Ps who respond incorrectly try to give an example. Discussion, agreement, praising. Discussion on whether zero can be counted as a remainder. $7 \div 7 = 1$, remainder 0, is not incorrect, just not needed!

38 min

9

Book 3, page 119

Q.4 Read: *Write the whole numbers from 10 to 25 in the correct number sets.*

Talk about what is required for each diagram. Elicit that:

- n means a whole number which is more than 10 and less than 25: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 (BB)
- the RH diagram is a combination of the first 2 diagrams but where the ellipses overlap, Ps should write those numbers which are multiples of both 3 and 4.

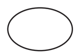
Review after each part if Ps are unsure. Mistakes corrected.

Which of the numbers is:

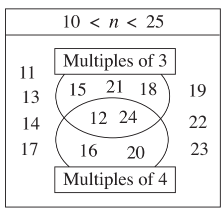
a) divisible by 3 but not by 4? (e.g. 18)
b) divisible by 4 but not by 3? (e.g. 16)
c) a multiple of 3 and 4? (e.g. 24)
d) not divisible by 3 and not divisible by 4? (e.g. 17)

Notes: Individual work, monitored, helped. Sets drawn on BB or use enlarged copy master or OHP. Discussion. Agree that numbers not multiples of 3 or 4 are written inside the square but outside the ellipses.

BB: ellipse



Solution:



Orally with whole class

45 min

Bk3	R: Calculation **C: Division** *E: Preparation for pencil and paper procedures for simple division*	*Lesson Plan 120*

Activity		*Notes*
1	**Missing numbers** T has BB already prepared. Ps come to BB to fill in the missing numbers or dictate to T, explaining reasoning. e.g. '24 divided by $\underline{4}$ equals 6 because 6 times $\underline{4}$ equals 24' (or 'because 24 divided by 6 equals $\underline{4}$'). Class points out errors. BB: a) $24 \div \boxed{} = 6$ b) $36 \div \boxed{} = 4$ c) $\boxed{} \div 5 = 8$ $240 \div \boxed{} = 6$ $360 \div \boxed{} = 4$ $400 \div \boxed{} = 8$ $240 \div \boxed{} = 60$ $360 \div \boxed{} = 40$ $400 \div \boxed{} = 80$ *4 min*	Whole class activity Written on BB or SB or OHT At a good pace Reasoning, agreement, checking, praising Feedback for T
2	**Division 1** Let's calculate the quotients. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. BB: a) $12 \div 3 = \underline{4}$ $120 \div 3 = \underline{40}$ $1200 \div 3 = \underline{400}$ b) $18 \div 6 = \underline{3}$ $180 \div 6 = \underline{30}$ $1800 \div 3 = \underline{600}$ c) $24 \div 4 = \underline{6}$ d) $35 \div 7 = \underline{5}$ e) $48 \div 6 = \underline{8}$ $240 \div 4 = \underline{60}$ $350 \div 7 = \underline{50}$ $480 \div 6 = \underline{80}$ What do you notice about how the dividends and quotients change? (If the dividend is 10 times more and the divisor is the same, then the quotient is also 10 times more.) *8 min*	Whole class activity Written on BB or SB or OHT At a good pace Reasoning, agreement, checking, praising Discussion, agreement, praising
3	**Division 2** Let's calculate the quotients for these too but think about what is happening. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. BB: a) $120 \div 4 = \underline{30}$ b) $150 \div 3 = \underline{50}$ c) $140 \div 7 = \underline{20}$ $8 \div 4 = \underline{2}$ $6 \div 3 = \underline{2}$ $7 \div 7 = \underline{1}$ $128 \div 4 = \underline{32}$ $156 \div 3 = \underline{52}$ $147 \div 7 = \underline{21}$ $1200 \div 4 = \underline{300}$ $1500 \div 3 = \underline{500}$ $1400 \div 7 = \underline{200}$ $80 \div 4 = \underline{20}$ $60 \div 3 = \underline{20}$ $70 \div 7 = \underline{10}$ $1280 \div 4 = \underline{320}$ $1560 \div 3 = \underline{520}$ $1470 \div 7 = \underline{210}$ What do you notice? (In each part, the 3rd row is the sum of the 1st and 2nd rows and the 6th row is the sum of the 4th and 5th rows; rows 4–6 are 10 times more than rows 1–3.) T shows how the divisions could be written in another way: e.g. BB: $128 \div 4 = 12T \div 4 + 8U \div 4 = 3T + 2U = \underline{32}$, or $1280 \div 4 = 12H \div 4 + 8T \div 4 = 3H + 2T = \underline{320}$ *15 min*	Whole class activiity T has BB or SB or OHT already prepared and uncovers one row at a time. At a good pace Reasoning, agreement, praising Extra praise if Ps notice connections before T asks. Discussion, agreement, praising T could begin and then Ps dictate what T should write when they understand.

Bk3

Lesson Plan 120

Activity		Notes

4

Book 3, page 120

Q.1 Read: *Peter, Rob and Sally have the same amount of money in their bank accounts. Altogether, they have £969. Circle what each of them has.*

Ps draw around each person's money (or colour with 3 different colours). Elicit that each person has £323 (3H + 2T + 3U).

Read: *Complete the calculation.*

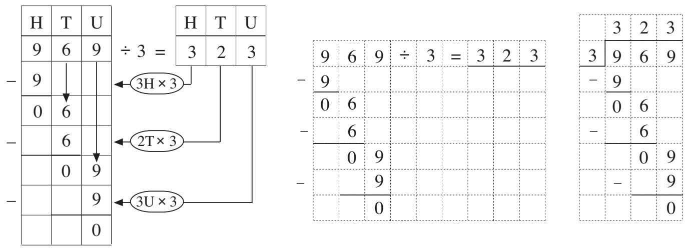
Ps fill in missing numbers in *Pbs*, then check against diagram.

Review at BB with whole class. Ps dictate what T should write. Mistakes discussed and corrected.

BB: $969 \div 3 = 900 \div 3 + 60 \div 3 + 9 \div 3 = \underline{300} + \underline{20} + \underline{3} = \underline{323}$

Let's show it in a place value table. T explains table (with Ps' help) then shows it without HTU and in the form of long division.

BB:



22 min

Notes: Individual work, monitored, helped

Money drawn or stuck on BB or use enlarged copy master or OHP

BB

Discussion, reasoning, agreement, self-correcting, praising

Whole class activity

Drawn on BB or use enlarged copy master or OHP

Either explain each step referring to relevant parts of completed tables, or build up blank tables gradually (with Ps' help if they begin to understand).

5

Book 3, page 120

Q.2 Read: *Fill in the missing numbers*

Do parts a) and b) with whole class first as a model for Ps to follow. Ps dicate what to write at each step. T writes on BB and Ps in *Pbs*.

Rest done as individual work under a time limit.

Review parts c) and d) with whole class. Ps come to BB or dicate what to write. Class agrees/disagrees. Mistakes corrected.

Solution:

a) $840 \div 4 = 800 \div 4 + 40 \div 4 = 200 + 10 = \underline{210}$

$630 \div 3 = 600 \div 3 + 30 \div 3 = 200 + 10 = \underline{210}$

b) $650 \div 5 = 500 \div 5 + 150 \div 5 = 100 + 30 = \underline{130}$

$768 \div 4 = 400 \div 4 + 360 \div 4 + 8 \div 4 = 100 + 90 + 2 = \underline{192}$

c) $840 \div 6 = 600 \div 6 + 240 \div 6 = 100 + 40 = \underline{140}$

$459 \div 3 = 300 \div 3 + 150 \div 3 + 9 \div 3 = 100 + 50 + 3 = \underline{153}$

d) $910 \div 7 = 700 \div 7 + 210 \div 7 = 100 + 30 = \underline{130}$

$960 \div 8 = 800 \div 8 + 160 \div 8 = 100 + 20 = \underline{120}$

Details of the division opposite: $4H \div 3 = \underline{1H}$, and 1H remains

$1H = 10T,\ 10T + 5T = 15T$

$15T \div 3 = \underline{5T}$

$9U \div 3 = \underline{3U}$

29 min

Notes: Whole class activity to start

Written on BB or use enlarged copy master or OHP

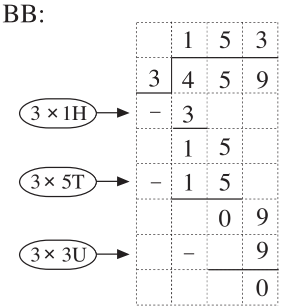
Discuss the 'clever' way that the 3-digit numbers have been broken down into numbers which are easily divisible by the divisor.

Involve several Ps.

Reasoning, agreement, checking with multiplication, self-correcting, praising

T shows vertical form for one of the divisions, explaining details of each step:

BB:



Bk3		*Lesson Plan 120*

Activity

6

Different methods of division

Let's divide £527 into 3 equal parts in different ways. First, let's estimate each part. Agree that it will be more than £100 and less than £200.

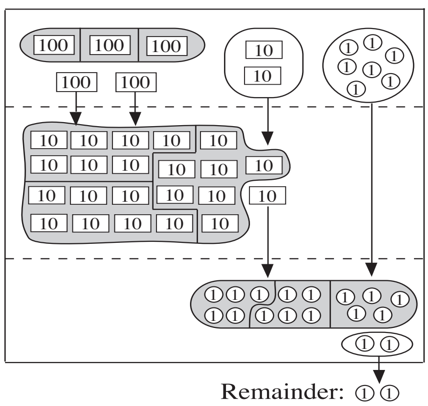
a) ***Using a model***

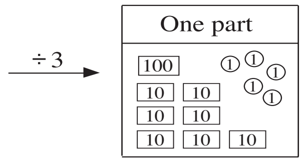
Let's start by dividing up the hundreds. 3 Ps come to BB to take 1H each and stick on their part of BB.

How many hundreds remain? (2H) How can we divide 2H among 3 people? (Change the 2H into 20T and add the 2T already there: 20T + 2T = 22T.) The 3 Ps each take 7T and stick to their part of BB.

How many tens remain? (1T) How can we divide 1T among 3 people? (Change the 1T to 10U and add the 7U already there. 10U + 7U = 17U) The 3 Ps each take 5U and stick to their part of the BB. How many units remain? (2U) Can we divide 2U among 3 people? (Not unless we divide them into fractions) So there will be a remainder of 2U.

BB: *E*: £100 < one part < £200





£527 ÷ 3 = £175, remainder £2

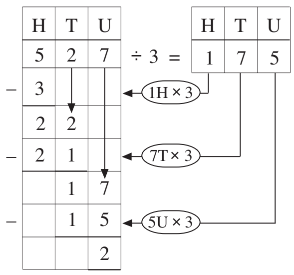
Check:

```
 1 7 5 × 3        1 7 5 × 3
 5 2 5      or      1 5
 2 1              2 1 0
                  3 0 0
 5 2 5            5 2 5
+    2
 5 2 3
```

b) ***Vertical division***

We could show it in a shorter way like this. T explains each step in relation to the diagram above.

BB:



	5	2	7	÷	3	=	1	7	5
–	3								
	2	2							
–	2	1							
		1	7						
–		1	5						
			2						

	1	7	5
3	5	2	7
–	3		
	2	2	
–	2	1	
		1	7
	–	1	5
			2

c) ***Horizontal division***

T has BB or SB or OHT already prepared. Ps come to BB to fill in missing numbers, explaining reasoning. Class agrees/disagrees.

BB: 527 ÷ 3 = 300 ÷ 3 + $\square$ ÷ 3 + $\square$ ÷ 3

= $\square$ + $\square$ + $\square$ = $\square$

r 2 r 2

T reminds Ps that 'r' (or 'R') can be written instead of 'remainder'.

Notes

Whole class activity

Table drawn on BB and model money stuck to it (or use completed enlarged copy master or OHP and T explains, referring to diagram at each step)

Discussion, agreement, praising

T leads Ps through, with Ps' help if they understand

BB: 527 ÷ 3 = ?

Calculation:

$\boxed{\text{5H} \div 3 = \text{1H, remainder 2H}}$ as 1H × 3 = 3H
2H = 20T

20T + 2T = 22T

$\boxed{\text{22T} \div 3 = \text{7T, remainder 1T}}$ as 7T × 3 = 21T
1T = 10U

10U + 7U = 17U

$\boxed{\text{17U} \div 3 = \text{5U, remainder 2U}}$ as 5U × 3 = 15U

Drawn on BB or use enlarged copy master or OHP

Uncover each part as it is dealt with.

T sets a language model for long division, e.g.

'3 divides into 5 1 time, so I write 1 in the H column in the answer. 1H times 3 = 3H, 5H – 3H = 2H = 20T. I bring down the 2T to make 22T.

3 divides into 22T 7 times, so I write 7 in the T column in the answer. 7T times 3 = 21T, 22T – 21T = 1T = 10U. I bring down 7U to make 17U.

3 divides into 17U 5 times, so I write 5 in the U column in the answer. 5U times 3 = 15U, 17U – 15U = 2U, which is the remainder.

527 ÷ 3 = 175, remainder 2'

Bk3

Lesson Plan 120

Activity		*Notes*

6

(Continued)

d) George did it this way.
Do you think that he is correct?
Can you explain what he has done?

Ask several Ps what they think.

T gives hints if no P understands, or leaves open to give Ps more time to think and reviews it in *Lesson 150*.

Agree that it is correct but very slow and George has not done it very cleverly.

BB:

3	5	2	7				
–		3	0		1	0	
	4	9	7				
–	3	0	0	1	0	0	
	1	9	7				
–	1	8	0		6	0	
		1	7				
	–	1	2			4	
			5				
		–	3			1	
			2	1	7	5	r 2

Method:

George thinks of a number divisible by 3 and writes its quotient on RHS of vertical line. Then he subtracts the multiple and continues with what is left in a similar way. When there are no more multiples of 3, he adds up all the quotients to give the final result, remembering to write what is left as the remainder.

Extension

Ps think of a more efficient way to use this method.

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP.

Ps could have copies on desks too.

Give Ps time to think and discuss with neighbours.

Praise all contributions.

T helps Ps express their explanations if necessary.

Involve several Ps

[Practice in visual analysis and creative thought.]

e.g. Use 300, then 210, then 15

38 min

7

Book 3, page 120

Q.3 Read: *Fill in the missing numbers.*

Let's see how many of these you can do in 3 minutes! You can do any necessary calculations in your *Ex. Bks* if you need to. Use whichever method you like. Start . . . now! . . . Stop!

Review at BB with whole class. Ps change pencils and mark and correct own work. Ps dictate to T, explaining reasoning. Who did the same? Who did it another way? Class checks with multiplication. Mistakes discussed.

Solution:

a) $246 \div 2 = \underline{123}$ $369 \div 3 = \underline{123}$ $484 \div 4 = \underline{121}$

$505 \div 5 = \underline{101}$ $848 \div 4 = \underline{212}$ $848 \div 8 = \underline{106}$

$693 \div \underline{3} = 231$ $864 \div \underline{2} = 432$

b) $824 \div 4 = \underline{206}$ $606 \div 3 = \underline{202}$ $618 \div 6 = \underline{103}$

$906 \div 6 = \underline{151}$ $615 \div 5 = \underline{123}$ $\underline{520} \div 5 = 104$

Notes:

Individual wok, monitored, helped

Written on BB or SB or OHT

(Or working done on squared scrap paper)

As some are quite difficult, T tells Ps that if they cannot do one to leave it and go on to the next one.

Reasoning, agreement, self-correction, praising

Write details of difficult calculations on BB: e.g.

$615 \div 5 = 500 \div 5 + 100 \div 5 + 15 \div 5 = 100 + 20 + 3 = \underline{123}$

(or vertical division, etc.)

43 min

8

Problem

Listen carefully and think how you would solve this problem Do the calculation in your *Ex. Bks*. and show me the result when I say.

Anne had £355 in her bank account. She spent 1 fifth of it.
How much did she spend?

Show me . . . now! (£71)

X, explain to us how you worked out the answer. Who did the same? Who did it a different way? etc. How can we check it?

BB: e.g. $355 \div 5 = 350 \div 5 + 5 \div 5 = 70 + 1 = \underline{71}$ *Check:* e.g. $71 \times 5 = 355$ ✔

Answer: Anne spent £71.

Extension

How much did she have left? (£71 ×4 = £355 – £71 = £284)

Notes:

Individual work in calculating but whole class review.

Responses shown in unison.

Reasoning, agreement, checking, self-correction, praising

Accept any correct form of division, e.g.

		7	1
5	3	5	5
–	3	5	
		0	5
		–	5
			0

45 min

Bk3

R: Mental calculation

C: Revision and practice

E: 0 and 1 in multiplication and division

Lesson Plan 121

Activity | *Notes*

1 Equal values

Which of these operations have the same result? Let's join them up.
Ps calculate mentally (or in *Ex. Bks.*), then come to BB to draw joining lines, explaining reasoning. Class checks that they are correct.

BB:

$\overset{550}{(316+234)} \div 5 = (110)$ —— $\overset{770}{(930-160)} \div 7 = (110)$

$\overset{106}{636 \div 6} + 383 = (489)$ $\overset{876}{(1120 - 244)} \div 2 = (438)$

$\overset{162}{486 \div 3} + 537 = (699)$ $\overset{224}{896 \div 4} + 265 = (489)$

5 min

Notes:

Whole class activity

Operations written on BB or SB or OHT

Discussion, reasoning, agreement, praising

Ps give details of calculations during discussion, e.g.

$486 \div 3 = 300 \div 3 + 180 \div 3 + 6 \div 3 = 100 + 60 + 2$
$= 162$

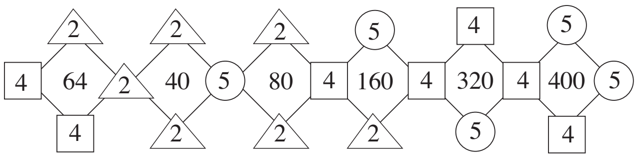
2 Puzzle

What do you think the rule is for this puzzle? T asks several Ps what they think. (The same shape stands for the same number. The number in the middle is the product of the 4 numbers around it.)

Ps suggest where to start and how to continue. (e.g. Start at the numbers around 40 because three are the same: 40 = 4 × 10 = 2 × 2 × 2 × 5, so the triangle could be '2' and the circle could be '5'.) Let's try it!

Ps write 2 all the triangles and 5 in all the circles. What should we do now? etc. Rest of class checks that solutions are correct.

BB:



10 min

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, checking, agreement, praising

Check: e.g.

4 × 5 × 4 × 2 = 20 × 8 = 160

4 × 4 × 4 × 5 = 16 × 20
= 320

Feedback for T

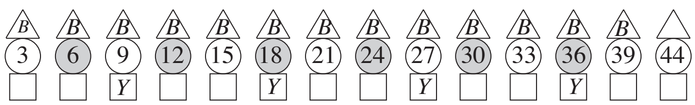
3 *Book 3, page 121*

Q.1 Read: *Colour:*

- *the triangle blue if the number is divisible by 3.*
- *the circle red if the number is divisible by 6.*
- *the square yellow if the number is divisible by 9.*

Review at BB with whole class. Ps come to BB or dictate to T. Mistakes discussed and corrected.

BB:



Who can say a true statement about any of the numbers? Who can think of another one? etc. Class decides whether it is true or not and gives an example or counter example. (e.g. 'If a number is divisible by 9, it is also divisible by 3'; or '44 is not a multiple of 3, 6 or 9'; or 'Not all numbers divisible by 3 are divisible by 6' or '3, 6 and 9 are factors of 18'.

16 min

Notes:

Individual wok, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Agreement, self-correcting, praising

Feedback for T

Involve several Ps.

Praise all contributions.

T repeats unclear or vague statements more succinctly.

If Ps are stuck, T could start a sentence and Ps could finish it.

Bk3

Lesson Plan 121

Activity		*Notes*

4

Written exercises

T dictates two operations. Ps write in *Ex. Bks*. Which of them is more? How many more? Do the calculations in whichever way you wish. Review at BB with whole class. Ps come to BB to write whole inequality, explaining reasoning. Class agrees/disagrees. e.g.

a) One fifth of 525 or 1 eighth of 472?

e.g. $525 \div 5 = 500 \div 5 + 25 \div 5 = 100 + 5 = \underline{105}$

$472 \div 8 = 400 \div 8 + 72 \div 8 = 50 + 9 = \underline{59}$

$105 - 59 = \underline{46}$

so $\overset{105}{525 \div 5} \underset{46}{>} \overset{59}{472 \div 8}$

$$\begin{array}{r} 1\,0\,\overset{10}{5} \\ -\;\;\;5_1 9 \\ \hline 4\,6 \\ \hline \end{array}$$

b) One sixth of 546 or 1 third of 963?

e.g. $546 \div 6 = 540 \div 6 + 6 \div 6 = 90 + 1 = \underline{91}$

$963 \div 3 = 900 \div 3 + 60 \div 3 + 3 \div 3 = 300 + 20 + 1$

$= \underline{321}$

$321 - 91 = 230$

so $\overset{91}{546 \div 6} \underset{230}{<} \overset{321}{963 \div 3}$

c) One seventh of 735 or 1 fifth of 735?

e.g. $735 \div 7 = 700 \div 7 + 35 \div 7 = 100 + 5 = \underline{105}$

$735 \div 5 = 500 \div 5 + 200 \div 5 + 35 \div 5 = 100 + 40 + 7$

$= \underline{147}$

$147 - 105 = \underline{42}$

so $\overset{105}{735 \div 7} \underset{42}{<} \overset{147}{735 \div 5}$

22 min

Individual work in calculating, monitored

Whole class discussion of results and methods of calculation.

T shows various written procedures for division.

e.g.

BB:

	1	4	7
5	7	3	5
−	5		
	2	3	
−	2	0	
		3	5
	−	3	5
			0

This form develops estimating skills and is good for less able Ps.

5	7	3	5			
−	5	0	0	1	0	0
	2	3	5			
−	1	0	0		2	0
	1	3	5			
−	1	0	0		2	0
		3	5			
	−	3	5			7
			0	1	4	7

5

Find the mistakes

Mr. Silly did his divisions like this. Let's check if he has calculated them correctly. Ps identify mistakes by estimation or in other ways. Ps come to BB to point and explain. Class agrees/disagrees that there is an error. Ps write the calculations again correctly.

BB: Deduction *Correct calculation:*

a) Answer: ~~15~~, r 2

	1		5
3	3	1	7
−	3		
	0	1	7
	−	1	5
			2

e.g

$3 \times 15 = 45 \neq 317$

$317 \div 3 \approx 100$

He forgot to write 0 in the tens column in the answer.

Check: $317 = 3 \times 105 + 2$

Answer: 105, r 2

	1	0	5
3	3	1	7
−	3		
	0	1	7
	−	1	5
			2

b) Answer: ~~24~~, r 3

	2	4	0
4	9	6	3
−	8		
	1	6	
−	1	6	
		0	3

$4 \times 24 < 963$

$963 \div 4 \approx 200$

He did not finish it.
He should have written 0 in the units column in the answer.

Check: $963 = 4 \times 240 + 3$

Answer: 240, r 3

	2	4	0
4	9	6	3
−	8		
	1	6	
−	1	6	
		0	3

Whole class activity

Written on BB or use enlarged copy master or OHP

Praise clever methods of deduction.

Reasoning, agreement, correcting, checking, praising

Ps write calculation correctly in any way they choose.

Show each calculation in different ways. (vertical and horizontal division or subtracting known multiples)

Praising, encouragement only

Feedback for T

Bk3

Lesson Plan 121

Activity		*Notes*

5

(Continued)

c) Answer: 1~~3~~14

	1	31	4
4	5	7	6
−	4		
	1	7	
−	1	2	
		5	
	−	4	
		1	6
	−	1	6
			0

A 3-digit dividend cannot give a 4-digit quotient.

$576 \div 4 \approx 100$

4 divides into 17
4 times, not 3 times.

Check: $576 = 4 \times 144$

Answer: 144

	1	4	4
4	5	7	6
−	4		
	1	7	
−	1	6	
		1	6
	−	1	6
			0

35 min

6

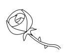
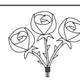
Book 3, page 121

Q.2 Read: *In a flower shop, the roses were tied in bunches of 3. Complete the table.*

Elicit that the top row of tthe able shows the number of roses and the bottom row shows the number of bunches .

Review at BB with whole class. Ps come to BB to fill in missing values or dictate to T, explaining reasoning. Class points out errors. Mistakes discussed and corrected.

Solution:

Number of 	264	**81**	**147**	453	360	531	**207**	**162**
Number of 	**88**	27	49	**151**	**120**	**177**	69	54

Extension

What is the rule? Who agrees? Who can write it another way?

e.g. BB: *Rule*: $R = B \times 3$, $B = R \div 3$, $R \div B = 3$

33 min

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Ps do calculations in *Ex. Bks.*

Discussion, reasoning, agreement, self-correction, praising

Accept any of the division or multiplication procedures, e.g.

$264 \div 3 = 240 \div 3 + 24 \div 3$
$= 80 + 8 = \underline{88}$

(or vertical division or subtracting known multiples)

7

Book 3, page 121

Q.3 Read: *A container was full of water. One eighth of the water was poured out.*

How much water was poured out if the full container held: a) 16 litres, b) 304 litres, c) 1576 litres?

Do parts a) and b) as individual work, reviewed at BB with whole class. Mistakes discussed and corrected.

Part c) done on BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees.

Solution:

a) *Plan:* Full container: 16 litres 1 eighth: 16 litres $\div$ 8

Calculation: 16 litres $\div$ 8 = <u>2 litres</u>

Answer: 2 litres of water were poured out.

b) *Plan:* Full container: 304 litres 1 eighth: 304 litres $\div$ 8

Calculation: $304 \div 8 = 240 \div 8 + 64 \div 8 = 30 + 8 = \underline{38}$

Answer: 38 litres of water were poured out.

Notes:

Individual work, monitored, helped

Diagrams drawn on BB or use enlarged copy master or OHP

Ps do calculations in *Ex. Bks* if no room in *Pbs*.

Discussion, reasoning, agreement, self-correction, praising

Alternative calculation for

b):

		3	8
8	3	0	4
−	2	4	
		6	4
	−	6	4
			0

Bk3

Lesson Plan 121

Activity		*Notes*

7

(Continued)

b) *Plan:* Full container: 1576 litres   1 eighth: 1576 litres ÷ 8

Calculation: 1576 ÷ 8 = 1600 ÷ 8 – 24 ÷ 8 = 200 – 3

= <u>197</u>

or

		1	9	7
8	1	5	7	6
–		8		
		7	7	
	–	7	2	
			5	6
		–	5	6
				0

or

8	1	5	7	6			
	–	8	0	0	1	0	0
		7	7	6			
	–	6	4	0		8	0
		1	3	6			
		–	8	0		1	0
			5	6			
		–	5	6			7
				0	1	9	7

Answer: 197 litres of water were poured out.

Notes: Whole class activity

Ps come to BB to show different methods of doing the calculation.

Class decides whether they are correct or suggests alternative methods.

Reasoning, agreement, praising

Ps write plan, horizontal method of calcuation and answer in *Pbs*.

Extension

Ps calculate how many litres were left for each part.

a) 14 litres b) 266 litres c) 1379 litres

Notes: Individual work in *Ex. Bks*. Monitored and reviewed with whole class.

39 min

8

Book 3, page 121

Q.4 Read: *Share the amount equally among the groups of people. Complete the table.*

Talk about the table first. Make sure that Ps know what each row means. Relate to the mathematical terms for division.

Let's see how much of the table you can complete in 4 minutes! You can do the columns in any order. You may do the calculations in your *Ex. Bks*. Start . . . now! . . . Stop!

Review at BB with whole class. Ps come to BB or dicate results to T, explaining reasoning. Who had the same answer but worked it out in a different way? Who thinks something different? etc. How can we check it? (By multiplication and addition – done orally or on BB.) Mistakes discussed and corrected.

Solution:

Total amount	501	374	895	764	**771**	**995**	**984**	**753**	Dividend
Number of people	5	3	7	4	6	9	8	2	Divisor
Amount each	100	**124**	**127**	**191**	128	110	123	376	Quotient
Amount remaining	1	**2**	**6**	**0**	3	5	0	1	Remainder

Details of calculations: e.g. 110 × 9 + 5 = <u>995</u>, or

	1	2	4
3	3	7	4
–	3		
	0	7	
–		6	
		1	4
	–	1	2
			2

	1	2	7
7	8	9	5
–	7		
	1	9	
–	1	4	
		5	5
	–	4	9
			6

	1	9	1
4	7	6	4
–	4		
	3	6	
–	3	6	
		0	4
	–		4
			0

1	2	8	× 6
7	6	8	
1	4		

768 + 3 = <u>771</u>

1	2	3	× 8
9	8	4	
1	2		

3	7	6	× 2
7	5	2	
1	1		

752 + 1 = <u>753</u>

Notes: Individual work, monitored, helped

Table drawn on BB or use enlarged copy master or OHP

Differentiation by time limit and by choice of columns.

Discussion, reasoning, checking, agreement, self-correcting, praising

Accept any correct form of calculation.

Check: e.g.

124 × 3 + 2 = 372 + 2

= <u>374</u>

45 min

Bk3	R: Calculation **C: Contextual problems for division** *E: To one from more. (To more from more.)*	*Lesson Plan 122*
Activity		***Notes***
1	**True or false?** T has these number cards stuck to BB. $\boxed{0}$ $\boxed{8}$ $\boxed{12}$ $\boxed{20}$ $\boxed{24}$ $\boxed{36}$ If I put them in a box and took one out without looking, would these statements be true or false? Write 'T' for true or 'F' for false and show me your answer when I say. a) It is certain that the number will be a multiple of 4. Show me . . . now! (T) All the numbers are multiples of 4. b) It is possible that the number will be divisible by 3. Show me . . . now! (T) e.g. 0, 12, 24 and 36 are divisible by 3 c) It is not certain that the number will be divisible by 2. Show me . . . now! (F) e.g. all multiples of 4 are divisible by 2 d) It is impossible that the number will be a multiple of 5. Show me . . . now! (F) e.g. 20 is a multiple of 5 e) It is possible that the number will be a multiple of 8. Show me . . . now! (T) e.g. 8 and 24 are multiples of 8 f) It is certain that the number will be divisible by 6. Show me . . . now! (F) e.g. 8 and 20 are not divisible by 6 *5 min*	Whole class activity Responses written on scrap paper or slates and shown on command in unison. Ps explain the reason for their decisions, giving examples or counter examples as appropriate. Agreement, praising Feedback for T
2	**Secret numbers** I am going to think of some numbers and give you clues about them. You can write notes in your *Ex. Bks* (or on slates or scrap paper) to help you if you wish. Show me the numbers when I say. Which number could I be thinking of? a) It is greater than 20, less than 30 and a multiple of 4 and 8. Show me . . . now! (24) b) It is less than 30 and is divisible by 3 and 9. Show me . . . now! (0, 9, 18, 27) c) It is a 2-digit number greater than 80 and a multiple of 2 and 5. Show me . . . now! (90) d) It is less than 40 and divisible by 2 and 3. Show me . . . now! (0, 6, 12, 18, 24, 30, 36) *10 min*	Individual trial in *Ex. Bks* first Give Ps time to think and write. Responses written on scrap paper or slates and shown on command in unison. Ps explain reasoning and class agrees/disagrees or points out possible numbers not listed. Praising, encouragement only Ps could make up some statements too!
3	***Book 3, page 122*** Q.1 Read: *a) How much money could Neil have? He has more than £50 but less than £100. He could change his money exactly into £2 coins or £5 notes.* *b) How many pupils can be in this class? There are less than 30 pupils. The pupils can sit in groups of 2 or 3 or 4 without any pupils being left out.* Ps read problems themselves then write possible numbers in *Pbs*. Review with whole class. Ps give their answers, explaining their reasoning. Who agrees? Who thinks something else? etc. *Solution:* a) If divisible by 5, numbers must have units digit 5 or 0, but if also divisible by 2, they cannot have units digit 5. Possible amounts: £60, £70, £80 or £90 b) Number in class must be a multiple of 2, 3 and 4: Possible numbers: 12 or 24 *15 min*	Individual work, monitored, helped Discussion at BB, reasoning, agreement, self-correcting, praising Encourage Ps to explain using mathematical terms. Agree that 24 is probably more likely in real life.

Bk3

Lesson Plan 122

Activity		*Notes*

4

Missing values

Listen carefully and think what equation you would write to find the missing whole numbers.

a) *What is the dividend if the divisor is 6, the quotient is 9 and the remainder is 5?*

A, come and show us what you would write. Who agrees? Who thinks something else? etc.

BB: e.g. $\square \div 6 = 9$, remainder 5

so $\square = 9 \times 6 + 5 = 54 + 5 = \underline{59}$

b) *What is the quotient if the dividend is 45, the divisor is 7 and the remainder is 3?*

B, come and show us what you would write. Who agrees? Who thinks something else? etc.

BB: e.g. $45 \div 7 = \square$, remainder 3

so $\square = (45 - 3) \div 7 = 42 \div 7 = \underline{6}$

Extension

c) *What is the quotient if the dividend is 45, the divisor is 7 and the remainder is 6?*

C, come and show us what you would write. Who agrees? Who thinks something else? etc.

BB: e.g. $45 \div 7 = \square$, remainder 6

so $\square = (45 - 6) \div 7 = 39 \div 7 = ?$

Agree that 7 is not a factor of 39 (or 39 is not divisible by 7), so the quotient cannot be a whole number.

Notes:

Whole class, activity

T repeats each part slowly.

Reasoning, agreement, checking, praising

Check:

		9
6	5	9
–	5	4
		5

Check:

		6
7	4	5
–	4	2
		3

Ask several Ps what they think.

Discussion, agreement, praising

20 min

5

Written exercises

T dictates a division. Ps write it in *Ex. Bks* and do the calculation in any way they wish. Deal with one at a time.

Review at BB with whole class. Ps come to BB to show their working. Who agrees? Who did it a different way? etc. Ps who made a mistake corcle their error and write the calculation again correctly.

BB:

a) $695 \div 3$ e.g. $600 \div 3 + 90 \div 3 + 3 \div 3 + 2 \div 3$

$= 200 + 30 + 1 + 0$, remainder 2 $= \underline{231, \text{r } 2}$

b) $862 \div 4$ e.g.

4	8	6	2			
–	8	0	0	2	0	0
		6	2			
	–	4	0		1	0
		2	2			
	–	2	0			5
			2	2	1	5

Answer: 215, r 2

c) $976 \div 3$ e.g. Answer: 325, r 1

	3	2	5
3	9	7	6
–	9		
	0	7	
–		6	
		1	6
	–	1	5
			1

d) $584 \div 5$ e.g. Answer: 116, r 4

	1	1	6
5	5	8	4
–	5		
	0	8	
	–	5	
		3	4
	–	3	0
			4

e) $816 \div 9$ Answer: 90, r 6

		9	0
9	8	1	6
–	8	1	
		0	6

Notes:

Individual work, monitored, helped

(T could have BB or SB or OHT already prepared and uncover each division as it is dealt with.)

Discussion, reasoning, agreement, checking by comparing with other methods and by multiplication,

e.g.

d) $116 \times 5 + 4 = 584$ ✔
580
3

e) $9 \times 90 + 6 = 810 + 6$
$= 816$ ✔

Self-correction, praising

Accept any correct method of calculation.

Feedback for T

25 min

Bk3

Lesson Plan 122

Activity		*Notes*

6 **Problems**

Listen carefully and think about what plan you would write to solve these problems. You can make notes in your *Ex. Bks.* if you wish.

Notes: Whole class activity

T repeats slowly and a P repeats in own words.

Reasoning, agreement, praising

a) *Sue has 3 times as much money in her bank account as Larry has. How much does Larry have if Sue has £642?*

X, come and write your plan on the BB. Why did you write it? Who agrees with **X**? Who would do it a different way? etc.

Plan: Sue: £642 Larry: £642 ÷ 3

Ps dictate calculation to T or come to BB. Class agrees/disagrees.

Answer: Larry has £214 in his bank account.

Notes: BB: e.g. a)

$$\begin{array}{r|rrr} & 2 & 1 & 4 \\ \hline 3 & 6 & 4 & 2 \\ - & 6 & & \\ \hline & 0 & 4 & \\ & - & 3 & \\ \hline & & 1 & 2 \\ & - & 1 & 2 \\ \hline & & & 0 \end{array}$$

b) *Harry was given £6 48 p by his Grandad. He put half the money in his piggy bank. Then he spent 1 quarter of what he had left to buy flowers for his Granny. How much did he spend on the flowers?*

Y, come and write your plan on the BB. Why did you write it? Who agrees with **Y**? Who would do it a different way? etc.

Plan: Was given: £6 48 p = 648 p Saved: 648 p ÷ 2

Had left: 648 p ÷ 2 Spent: 648 p ÷ 2 ÷ 4

Ps dictate calculation to T or come to BB. Class agrees/disagrees.

Answer: Harry spent 81 p on flowers.

Notes: e.g.

b) 648 p ÷ 2 = 324 p

324 p ÷ 4 = <u>81 p</u>

or 648 p ÷ 2 ÷ 4

= 648 p ÷ 8 = <u>81 p</u>

Ps say answer in a sentence.

c) *Three friends took 9 minutes to cycle a distance of 540 m. How long did it take 1 child to cycle 540 m?*

T asks several Ps what they think. Agree that if they all cycled at the same speed, the time would be the same for each child, so no calculation is needed.

BB: 3 children: 540 m in 9 minutes
1 child: 540 m in 9 minutes (all cycling at same speed)
2 children: 540 m in 9 minutes

Answer: One child took 9 minutes to cycle 540 m.

Notes: T advises Ps to think carefully about this problem and to picture it in their heads.

Discussion, agreement, praising

Extra praise if Ps deduce correct answer without help from T.

30 min

7 ***Book 3, page 122***

Q.2 Read: *Is it possible to answer the question with the data given? If it is, solve it.*

Deal with one part at a time. Set a time limit.

Review with whole class. T chooses a P to read the question. Stand up if you could solve it! How did you solve it? etc. Solutions shown on BB. Mistakes corrected.

Notes: Individual worked, monitored, helped

Questions could be written on BB or SB or OHT.

Discussion, reasoning, agreement, self-correcting, praising

Solution:

a) *10 kg of bananas costs £9.40. What is the price of 1 kg of bananas?* (£9.40 = 940 p; 940 p ÷ 10 = <u>94 p</u>)

Notes: Price per kg is the same for <u>any</u> quantity of bananas.

b) *Steve bought 10 different bars of chocolate and paid £12.00 altogether. What was the price of 1 bar of chocolate?* (Cannot be solved. Different bars might have different prices.)

c) *Karen is 9 years old. She weighs 27 kg. What did she weigh when she was 1 year old?* (Cannot be solved. There is no direct proportion between age and mass.)

d) *3 men worked steadily and painted a 540 m fence in 9 days. How many days would it have taken 1 man to paint the same fence?* (3 men → 9 days, 1 man → 9 d × 3 = <u>27 d</u>)

Notes: <u>Inverse proportion</u>: The fewer the workmen, the longer it takes to do the same job – 1 third less men take 3 times more days.

36 min

Bk3

Lesson Plan 122

Activity		*Notes*

8

Book 3, page 122

Q.3 Read: *Write the data. Make a plan. Estimate, calculate, check and write the answer.*

Deal with one part at a time. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes corrected.

T reminds Ps about direct proportion.

a) *A spider has 8 legs. How many spiders have 864 legs?*

Data: 1 spider: 8 legs; ? spiders: 864 legs

Plan: $864 \div 8$

Estimate: ≈ 100

Calculation: $864 \div 8 = 800 \div 8 + 64 \div 8 = 100 + 8 = \underline{108}$

Answer: 108 spiders have 864 legs.

b) *A flower has 5 petals. How many flowers have 685 petals?*

Data: 1 flower: 5 petals; ? flowers: 685 petals

Plan: $685 \div 5$

Estimate: ≈ 100

Calculation: e.g. $685 \div 5 = 500 \div 5 + 150 \div 5 + 35 \div 5$
$= 100 + 30 + 7 = \underline{137}$

or using vertical division:

	1	3	7
5	6	8	5
–	5		
	1	8	
–	1	5	
		3	5
	–	3	5
			0

Answer: 137 flowers have 685 petals.

Notes:

Individual work, monitored, helped

Discussion, reasoning, agreement, self-correction, praising

BB: <u>Direct proportion</u>

$$\begin{array}{lcl} & 1 \text{ spider} \rightarrow 8 \text{ legs} & \\ \times 108 & & \times 108 \\ & 108 \text{ spiders} \rightarrow 864 \text{ legs} & \end{array}$$

Check: $108 \times 8 = 864$ ✔

$$\begin{array}{lcl} & 1 \text{ flower} \rightarrow 5 \text{ petals} & \\ \times 137 & & \times 137 \\ & 137 \text{ flowers} \rightarrow 685 \text{ petals} & \end{array}$$

Check: $\begin{array}{r} 137 \times 5 \\ \hline 685 \text{ ✔} \\ {\scriptstyle 13} \end{array}$

Feedback for T

42 min

9

Direct proportion

Listen carefully and think how you would work out the answer to this problem

3 tickets cost £6.30. How much do 5 tickets cost?

T asks several Ps what they think. If nobody knows, T leads Ps through solution using direct proportion:

BB:

$$\begin{array}{rcl} & 3 \text{ tickets} \rightarrow £6.30 & \\ \div 3 & & \div 3 \\ & 1 \text{ ticket} \rightarrow £2.10 & \\ \times 5 & & \times 5 \\ & 5 \text{ tickets} \rightarrow £10.50 & \end{array}$$

T gives other problems for Ps to calculate mentally as consoldation. Ps write problems in form given above. e.g.

- If 5 pencils cost 55 p, how much will 7 pencils cost ? (77p)
- If 10 m of ribbon cost 80 p, how much can you buy for 48p? (6 m)

Notes:

Whole class activity

Discussion, reasoning, agreement, praising

Ps come to BB to write and explain.

Agree that if two things are in <u>direct proportion</u>, if one increases (decreases) by a certain number of times, then the other increases (decreases) by the same number of times.

Ps could think of a problem too!

45min

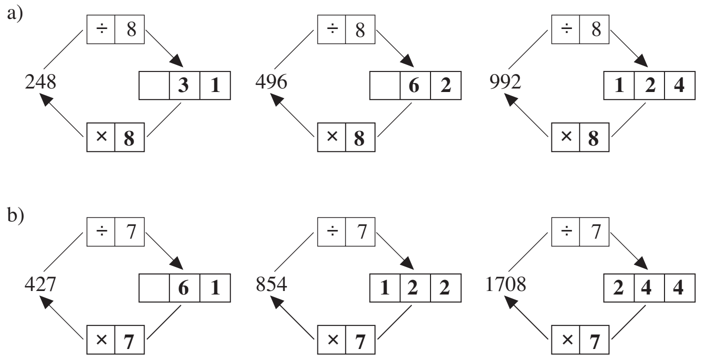
Bk3	R: Calculation **C: Probability: simple experiments** *E: Estimation of chance (probability)*	*Lesson Plan* *123*

Activity		*Notes*

1 **Missing numbers and signs 1**

What is missing from these diagrams? Ps come to BB to write in missing numbers and operation signs, explaining reasoning. (Ps can do calculations in *Ex. Bks* first before coming to BB.) Class agrees/ disagrees. What do you notice?

BB:



6 min

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Agree that:

- if the dividend increases by 2 times, the quotient also increases by 2 times.
- division is the inverse operation of multiplication.

What is the inverse operation of addition? (subtraction)

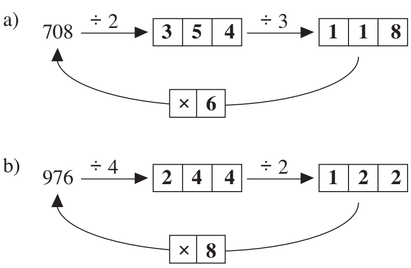
2 **Missing numbers and signs 2**

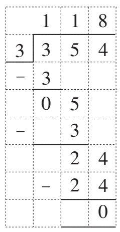
Let's write the missing numbers and operation signs in these diagrams.

P can do calculations in *Ex. Bks* first before coming to BB.

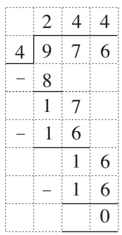
What do you notice? (Dividing by 2 and then dividing by 3 is the same as dividing by 6, etc.)

BB:





e.g.



10 min

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Ps write details of calculations at side of BB.

Accept any correct method.

Feedback for T

3 **Order of operations**

T has BB already prepared. First revise order of operations. (Operations inside brackets first, then multiplication or division (L to R), then addition or subtraction (L to R). If only multiplication or division, or only addition or subtraction, operations done from L to R.)

Deal with one part at a time. Which operation should we do first? Ps come to BB to point, explaining choice. Class agrees/disagrees.

Copy the operations in your *Ex. Bks* and calculate the results. Review with whole class. Mistakes discussed and corrected.

BB:

a) $624 \div 8 - 6 =$ $[78 - 6 = \underline{72}]$

$624 \div (8 - 6) =$ $[624 \div 2 = \underline{312}]$

$624 \div 6 - 8 =$ $[104 - 8 = \underline{96}]$

b) $116 \times 8 \div 4 =$ $[928 \div 4 = \underline{232}]$

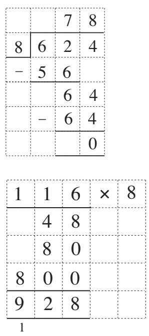
$116 \times (8 \div 4) =$ $[116 \times 2 = \underline{232}]$

$116 \div 4 \times 8 =$ $[29 \times 8 = \underline{232}]$

c) $1600 \div 8 \div 2 =$ $[200 \div 2 = \underline{100}]$

$1600 \div (8 \div 2) =$ $[1600 \div 4 = \underline{400}]$

$1600 \div 2 \div 8 =$ $[800 \div 8 = \underline{100}]$



18 min

Notes:

Whole class discussion to start

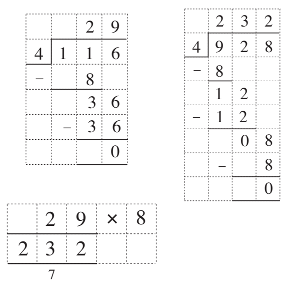
Written on BB or SB or OHT or use enlarged copy master

Agreement, praising

Individual work in calculating, monitored, helped

Reasoning, agreement, self-correcting, praising

If problems, Ps write calculations on BB, e.g.



Bk3

Lesson Plan 123

Activity		*Notes*

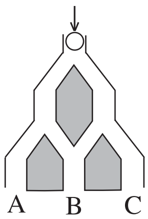
4

Probability

This is a diagram of a game. If I put a marble in the top, where could it fall? Ps come to BB to show the different ways. (Or T and/or Ps have models of the game and Ps note the different ways.)

Let's write down all the possible ways it could fall. T starts but Ps continue when they understand. Elicit that there are 4 possible ways but in 2 of them the marble will come out at B.

BB:



A B C

Possible ways

Left → Left → A
Left → Right → B
Right → Left → B
Right → Right → C

4 possible ways

Listen carefully to what I say and show me whether you think it is possible, impossible or certain by writing 'P', 'I' or 'C'.

a) *The marble can get to A and B at the same time.* (I)

b) *If I dropped the marble 20 times, it will come out at A 2 times.* (P)

c) *The marble will come out at A, B or C.* (C)

If we dropped the marble 4 times, how many times might it come out at A? (most liikely 1 time) Why do you think so? Ps explain in own words and T repeats by referring to the 4 possible ways above. We say that it has 1 chance out of 4 possible ways, or that it has a probability of 1 in 4.

Repeat for B and C. (Expected outcomes: B: 2 in 4, C: 1 in 4)

If we dropped the marble 8 (20, 40, 100) times, how many times do you think it might come out at A (B, C)? Ask several Ps what they think and why. Write summary on BB. Relate to direct proportion.

NOTE:

If T has this game in the classroom, do the experiment of dropping the marble 20 times, noting where it comes out in a tally chart. as opposite, then compare the results with the expected outcome.

e.g.

	Tally of 20 drops	Totals
A	~~||||~~	5
B	~~||||~~ ~~||||~~ |	11
C	||||	4
		20

Extension

Talk about the fact that the more times you do the experiment, the closer you will get to the expected outcome (result). If you did the experiment 1000 times, what would you expect the outcome to be?

25 min

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP

Or T has real game in classroom for demonstration or Ps work in pairs with one game per pair.

Ps dictate to T and T writes on BB.

Responses written on scrap paper or slates (or use flash cards from *Y2 LP 154/2*) and shown in unison.

Ps who responded correctly explain to those who did not.

Discussion, explanation, agreement, praising

BB: Probability

A: 1 in 4 = 2 in 8 = 5 in 20
B: 2 in 4 = 4 in 8 = 10 in 20
C: 1 in 4 = 2 in 8 = 5 in 20

If there are enough games for 1 between two, Ps could work in pairs and make own tally chart, then add to data from other pairs to give a class total.

[A computer simulation would be ideal for 1000 times.]

About: A: 250, B: 500, C: 250

Praising, encouragement only

5

Book 3, page 123 Q.1

Let's do another experiment! If possible, T has 3 opaque bags of marbles to match those described in the question.

Read: *I have 3 bags of marbles. Bag A contains 10 marbles, Bag B contains 20 marbles and Bag C contains 30 marbles. One marble in each bag is red.*

A P comes to front of class for each part and reads the statement. Allow time for thought, then Ps show flash cards (or slates) on command. P at front demonstrates statement and checks correct response.

Solution:

a) i) Possible, not certain; ii) Impossible ; iii) Possible but not certain, as we don't know if the bag contains *blue* marbles; b) Bag A

30 min

Notes:

Whole class activity

(Or individual work, monitored and reviewed with whole class)

T could have bags drawn or stuck on BB and labelled.

BB: A B C
10 20 30

Cards shown in unison. Agreement, checking, praising

BB: Probability of *red*

A	B	C
1 in 10	1 in 20	1 in 30

Bk3

Lesson Plan 123

Activity		*Notes*

6

Book 3, page 123

Q.2 a) Read: *Toss a £1 coin and a £2 coin at the same time. Do this 15 times.*

i) Keep a note of how each coin lands in this table. Total each row.

T explains task. Ps have real or model coins and work in pairs, taking turns to toss the coins. Ps tick appropriate box es in the table. Ps count the number of ticks in each row and write the totals in the *Pupil Total* column.

(Keep class together at each toss if Ps are unsure what to do.)

Elicit that the number of Heads and number of Tails <u>for each coin</u> should add up to 15. e.g.

	Tosses	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Pupil Total	Class Total
£1	*Head*	✔			✔		✔			✔	✔			✔		✔	7	
	Tail		✔	✔		✔		✔	✔			✔	✔		✔		8	
£2	*Head*	✔		✔		✔				✔	✔		✔		✔	✔	8	
	Tail		✔		✔		✔	✔	✔			✔		✔			7	
																Number of tosses	15	

Read: *ii) Collect and write the Class data in the right hand column.*

Ps dictate results to T who writes in similar class table on BB. Ps calculate the Class totals and write in RH column in *Pbs*.

e.g. BB:

	Pairs' results																	Class Total
£1	*Head*	7	8	9	7	6	4	11	8	10	7	4	6					87
	Tail	8	7	6	8	9	11	4	7	5	8	11	9					93
£2	*Head*	8	8	7	8	5	9	9	8	7	8	10	7					94
	Tail	7	7	8	7	10	6	6	7	8	7	5	8					86
	e.g. 12 pairs, 15 tosses, so 180 tosses																Number of tosses	180

What do you notice? (Number of Heads and Tails for each coin add up to number of tosses. Numbers are nearly equal.)

b) Read: *i) Write your own data in this table.*

ii) Collect and write the Class data in the RH column.

Ps complete own table, then dictate results to T who writes in a similar table on BB (or Ps come to BB). Ps work out Class totals together and T writes in RH column in table e.g.

£1 and £2	Pairs' results															Class Total
Head and Head	4	3	2	5	3	4	6	5	4	4	4	4				48
Head and Tail	3	4	5	4	4	2	3	4	3	4	3	3				42
Tail and Head	4	3	3	2	3	5	5	4	4	4	5	5				47
Tail and Tail	4	5	5	4	5	4	1	2	4	3	3	3				43
															Number of tosses	180

What do you notice? (All add up to number of tosses. Almost equal numbers for each – about 1 quarter of the total number of tosses.) Who can explain it?

(4 possible outcomes: HH, HT, TH and TT. The chance of each one happening is 1 chance out of 4, so we would expect the number of times we tossed, e.g. HH, to be about <u>1 quarter</u> of the number of tosses. The same is true for HT, TH and TT.)

Notes

Paired work, monitored, helped

Tables drawn on BB or use enlarged copy master or OHP

Make sure that Ps know which side is Heads and which is Tails. Model coins could identify Heads/Tails with either a picture or initial letter. (If no £1 and £2 coins, use different colours of card coins.)

T could have copy of Ps' table on BB and do one toss and fill in one column as a model for Ps to follow.

Agreement, praising

(Sample data for a pair is shown.)

Whole class activity

Or 1 P from each pair comes to BB to fill in their column.

At speed.

(Sample data are shown.)

Calculation done in *Ex. Bks* using addition or multiplication and addition

Agreement, checking, praising

Discussion, agreement, praising

Individual work, monitored, helped

Sample Pupil data:

£1		£2	Pupil Total	Class Total
Head	and	Head	4	
Head	and	Tail	3	
Tail	and	Head	4	
Tail	and	Tail	4	
		Number of tosses	15	

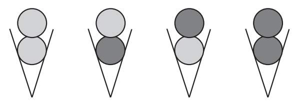
Ps fill in RH column in table in *Pbs* too.

Whole class discussion

e.g. using sample data

BB: 1 quarter of 180 = <u>45</u>

HH: 48 ≈ 45

Bk3		*Lesson Plan 123*
Activity		***Notes***
6 **Extension**	b) (Continued) What is the probability of tossing 1 Head and 1 Tail on any coin? Ask several Ps what they think. Refer to Class data in table. (We would expect to toss a head and a tail 2 times (HT and TH) out of 4, so the probability is 2 in 4, or 2 quarters or 1 half.) e.g. using sample data: BB: 2 Heads: $48 \approx 45 = $ 1 quarter of 180 1 Head + 1 Tail: $42 + 47 = 89 \approx 90 = $ 1 half of 180 2 Tails: $43 \approx 45 = $ 1 quarter of 180 *42 min*	Whole class activity Discussion, agreement, demonstration, praising T repeats Ps explanations or suggestions in a clear way, checking that it is true for the class data. If we did the experiment lots more times, the data would be closer to what we expect!
7	***Book 3, page 123*** Q.3 Read: *You asked for a 2-scoop ice-cream, saying 'Chocolate or strawberry please'. Colour the ice-creams to show what you could be given.* Review at BB with whole class. Ps come to BB to show their colouring. Who agrees? Who did it a different way? etc. Elicit that there are 4 possible outcomes: SS, SC, CS, CC. Discuss the importance of the word 'Or' as it allows a mixture of the two flavours, or all strawberry or all chocolate. How many different possibilities would there be if if we had asked for: • 2 chocolate scoops (1 case: CC) • a strawberry <u>and</u> a chocolate scoop (2 cases: SC, CS) • 2 strawberry scoops (1 case: SS) *45 min*	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP Discussion, agreement, self-correction, praising *Solution:*  SS SC CS CC Elicit that the probability of: 2C (2S) is 1 in 4 or 1 quarter 1C + 1S (in any order) is 2 in 4 or 2 quarters or 1 half

Bk3

R: Calculation

C: Probability. Simple experiments

E: Combinatoric problems. Estimation of chance

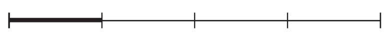
Lesson Plan 124

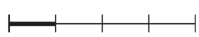
Activity | *Notes*

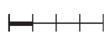
1

Division 1

Let's see what happens to the quotient if we change the dividend but keep the same divisor. Ps come to BB to fill in the missing quotients (using any method of calculation) and to colour over 1 quarter of the line segments.

BB: a) $1664 \div 4 = \boxed{\mathbf{416}}$ 

b) $832 \div 4 = \boxed{\mathbf{208}}$ 

c) $416 \div 4 = \boxed{\mathbf{104}}$ 

d) $208 \div 4 = \boxed{\mathbf{52}}$ 

e) $104 \div 4 = \boxed{\mathbf{26}}$ 

What do you notice? (If the dividend is halved and the divisor stays the same, the quotient will also be halved, etc.)

5 min

Whole class activity

Written/drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Details of difficult calculations written on BB, e.g.

		4	1	6
4	1	6	6	4
−	1	6		
		0	6	
	−		4	
			2	4
		−	2	4
				0

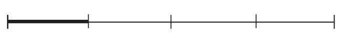
		2	0	8
	4	8	3	2
	−	8		
		0	3	2
		−	3	2
				0

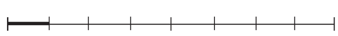
2

Division 2

Let's see what happens to the quotient if we change the divisor but keep the same dividend. Ps come to BB to fill in the missing quotients (using any method of calculation) and to colour over appropriate part of the line segments.

BB: a) $976 \div 2 = \boxed{\mathbf{488}}$ 

b) $976 \div 4 = \boxed{\mathbf{244}}$ 

c) $976 \div 8 = \boxed{\mathbf{122}}$ 

What do you notice? (If the divisor is doubled and the dividend stays the same, the quotient will be halved, etc.) Extra praise if Ps notice this and reason by deduction rather than doing the calculation.

9 min

Whole class activity

Written/drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Details of difficult calculations written on BB, e.g.

		1	2	2
	8	9	7	6
	−	8		
		1	7	
	−	1	6	
			1	6
		−	1	6
				0

3

Written exercises

T has BB already prepared. Quickly revise order of operations.

Deal with one part at a time. T dictates operations and Ps write in *Ex. Bks*. Circle the operation sign you will do first. If you have time, do the calculations too using the method you like best.

Review with whole class. Ps come to BB or dictate to T. Mistakes discussed and corrected. Ps repeat order of operations once more.

BB:

a) $624 \div 4 + 356 =$ [$156 + 356 = \underline{512}$]

$624 + 356 \div 4 =$ [$624 + 89 = \underline{713}$]

$(624 + 356) \div 4 =$ [$980 \div 4 = \underline{245}$]

b) $624 - 372 \div 4 =$ [$624 - 93 = 531$]

$(624 - 372) \div 4 =$ [$252 \div 4 = \underline{63}$]

$624 \div 4 - 372 \div 4 =$ [$156 - 93 = \underline{63}$]

c) $372 + 591 \div 3 =$ [$372 + 197 = \underline{569}$]

$(372 + 591) \div 3 =$ [$963 \div 3 = \underline{321}$]

$372 \div 3 + 591 \div 3 =$ [$124 + 197 = 321$]

20 min

Individual work, monitored, helped

Written on BB or use enlarged copy master or OHP.

Uncover each part as it is dealt with. Set a time limit.

Reasoning, agreement, self-correction, praising

Ps give details of calculations. Accept any correct method.

BB: e.g.

a)

		1	5	6
	4	6	2	4
	−	4		
		2	2	
	−	2	0	
			2	4
		−	2	4
				0

	1	1	
	1	5	6
+	3	5	6
	5	1	2

Bk3

Lesson Plan 124

Activity		*Notes*

4

Book 3, page 124

Q.1 Read: *Throw a dice 20 times. Keep a tally in the table.*
Write the total for each row.

What can you see in the LH column of the table? (The 6 different faces of a dice, showing the numbers 1 to 6)

What is a tally? P comes to BB to explain: ~~||||~~ means '5'.

Ps have dice on desks and work in pairs, taking turns to throw the dice. Ps keep a tally in *Pbs* and write the totals for each row in the *Pupil Total* column.

(Keep class together at each throw only if Ps are unsure.)

Ps check that the number of '1's, '2's, etc. add up to 20.

	Tally of 20 throws	Pupil Totals	Class Totals
⚀	|||	3	
⚁	||||	4	
⚂	|||	3	
⚃	|||	3	
⚄	||	2	
⚅	~~||||~~	5	
		(20)	

Read: *Collect the class data and write them in the RH column.*

Ps come to BB to write their results in similar class table on BB. Class calculates the totals together and T writes in RH column, e.g.

BB:

	Pair data															Class Totals
⚀	3	2	3	4	4	3	3	4	4	3	3	5	4	1	4	50
⚁	4	3	3	2	3	4	4	3	2	4	5	3	4	3	3	50
⚂	3	3	3	2	4	4	1	3	3	4	4	3	5	4	3	49
⚃	3	3	4	4	2	3	4	3	3	4	3	3	4	5	4	52
⚄	2	4	3	4	3	3	4	5	3	3	2	3	2	5	5	51
⚅	5	5	4	4	4	3	4	2	5	2	3	3	1	2	1	48
e.g. 15 pairs, 20 throws each pair												Total number of throws				300

What do you notice? (Totals for '1', 2', etc. add up to the total number of throws [sample data: 15 × 20 = <u>300</u>]; almost equal numbers for each – about 1 sixth of the total number of throws) Who can explain it?

(6 possible outcomes: 1, 2, 3, 4, 5 and 6. The chance of each one happening is 1 chance out of 6, so we would expect the number of times we threw, e.g. 3, to be about <u>1 sixth</u> of the total number of throws. The same is true for each of the other numbers.)

T (or P) reads each question and Ps write answer in *Pbs*. Review with whole class. Ps explain reasoning. Class agrees/disagrees.

a) Read: *How many times would you expect to throw a 4 if you threw a dice:*
- *i) 600 times* (100 times, as 600 ÷ 6 = <u>100</u>)
- *ii) 1200 times ?* (200 times, as 1200 ÷ 6 = <u>200</u>)

b) Read: *What would be the probability of throwing:*
- *i) a 6* (1 out of 6 times, or 1 sixth)
- *ii) at least 5* (2 out of 6 times, or 2 sixths = 1 third)
- *iii) an even number?* (3 out of 6 times, or 3 sixths = 1 half)

28 min

Notes

Paired work, monitored, helped

Tables drawn on BB or use enlarged copy masters or OHP

T could have copy of Ps' table on BB, throw the dice a few times and demonstrate how to fill in the table.

Agreement, praising

(Sample data for a pair is shown opposite.)

Whole class activity

Or Ps dictate results to T who writes in appropriate column.

At speed

Ps fill in RH column in table in *Pbs* too and calculate its total in *Ex. Bks*.

Agreement, praising

(Sample data for 15 pairs shown opposite.)

Whole class discussion

Involve several Ps.

e.g. using the sample data:

BB: 1 sixth of 300 = 300 ÷ 6
= <u>50</u>

Each of the totals = or ≈ 50

N.B. Actual class data might not be quite as close. Stress that the more times the dice is thrown, the closer the data will be to what is expected.

[A computer simulation would be very useful here.]

(Or answers can be shown on slates on command.)

'At least 5' means ≥ 5, i.e. 5, 6

There are 3 even numbers: 2, 4, 6

Bk3

Lesson Plan 124

Activity		*Notes*

5

Book 3, page 124

Q.2 Read: *Throw two dice at the same time 36 times.*
Keep a tally in these tables.

Ps have two different coloured dice on desks (e.g. 1 *red*, 1 *white*)

Ps first colour the dice in the tables to match their own dice, e.g. LH dice *red*, RH dice left as *white*. What do you think the tables mean? Why do you think we have chosen the number of throws as 36? What are the possible results?

T explains if Ps do not have correct ideas. (LH columns show the possible numbers which can be thrown on the *red* dice (1–6); middle column shows the possible numbers which can be thrown on the *white* dice for every number thrown on the *red* dice, e.g. if a '1' is thrown on the *red* dice, the numbers 1, 2, 3, 4, 5 or 6 could be thrown on the *white* dice [as LH table]. Each of the 6 possible numbers on the *red* dice has its own table showing the 6 possible numbers which could be thrown on the *white* dice. i.e. 6 tables, each with 6 possible outcomes, so 36 different possible ways in which the two dice could land.)

Let's have a practice first! T throws 2 large dice (in same colours as Ps' dice). P comes out to see which numbers are facing up, finds the appropriate table and row and draws a tally mark. Repeat for more throws until Ps understand what to do.

Ps work in pairs, taking turns to throw the 2 dice, or both Ps have 2 dice and throw together, making 2 tally marks at a time (i.e. Ps throw 18 times each). Ps check that they have <u>36</u> tally marks, e.g.

<table>
<tr><td></td><td>?</td><td></td><td></td><td>?</td><td></td><td></td><td>?</td><td></td><td></td><td>?</td><td></td><td></td><td>?</td><td></td><td></td><td>?</td><td></td></tr>
<tr><td>1</td><td>1</td><td>||</td><td>2</td><td>1</td><td>|||</td><td>3</td><td>1</td><td></td><td>4</td><td>1</td><td>||</td><td>5</td><td>1</td><td>|</td><td>6</td><td>1</td><td>|</td></tr>
<tr><td>1</td><td>2</td><td></td><td>2</td><td>2</td><td></td><td>3</td><td>2</td><td>||</td><td>4</td><td>2</td><td>||</td><td>5</td><td>2</td><td></td><td>6</td><td>2</td><td>|</td></tr>
<tr><td>1</td><td>3</td><td>||</td><td>2</td><td>3</td><td></td><td>3</td><td>3</td><td>||</td><td>4</td><td>3</td><td></td><td>5</td><td>3</td><td>|</td><td>6</td><td>3</td><td>|</td></tr>
<tr><td>1</td><td>4</td><td></td><td>2</td><td>4</td><td>||</td><td>3</td><td>4</td><td>|</td><td>4</td><td>4</td><td>||</td><td>5</td><td>4</td><td></td><td>6</td><td>4</td><td></td></tr>
<tr><td>1</td><td>5</td><td>|</td><td>2</td><td>5</td><td>|</td><td>3</td><td>5</td><td></td><td>4</td><td>5</td><td>|</td><td>5</td><td>5</td><td>||</td><td>6</td><td>5</td><td>|</td></tr>
<tr><td>1</td><td>6</td><td>|</td><td>2</td><td>6</td><td>|</td><td>3</td><td>6</td><td>|</td><td>4</td><td>6</td><td>|</td><td>5</td><td>6</td><td></td><td>6</td><td>6</td><td>|</td></tr>
</table>

Read: *Collect the Class data. Rub out your tally marks and write the Class data in the tables.*

T points to each row in turn. Ps stand up if they threw that combination of numbers and tell T their total. Ps keep a mental cumulative total (e.g. $1 + 2 + 0 + 3 + 0 + 2 + , \ldots + 1 = 15$)

Ps agree on total and T writes Class data in tables on BB. Ps rub out their tally marks in *Pbs* and replace with the Class data, e.g.

<table>
<tr><td></td><td>?</td><td></td><td></td><td>?</td><td></td><td></td><td>?</td><td></td><td></td><td>?</td><td></td><td></td><td>?</td><td></td><td></td><td>?</td><td></td></tr>
<tr><td>1</td><td>1</td><td>14</td><td>2</td><td>1</td><td>12</td><td>3</td><td>1</td><td>12</td><td>4</td><td>1</td><td>15</td><td>5</td><td>1</td><td>15</td><td>6</td><td>1</td><td>13</td></tr>
<tr><td>1</td><td>2</td><td>15</td><td>2</td><td>2</td><td>15</td><td>3</td><td>2</td><td>13</td><td>4</td><td>2</td><td>15</td><td>5</td><td>2</td><td>14</td><td>6</td><td>2</td><td>15</td></tr>
<tr><td>1</td><td>3</td><td>15</td><td>2</td><td>3</td><td>14</td><td>3</td><td>3</td><td>17</td><td>4</td><td>3</td><td>15</td><td>5</td><td>3</td><td>15</td><td>6</td><td>3</td><td>14</td></tr>
<tr><td>1</td><td>4</td><td>17</td><td>2</td><td>4</td><td>18</td><td>3</td><td>4</td><td>18</td><td>4</td><td>4</td><td>16</td><td>5</td><td>4</td><td>15</td><td>6</td><td>4</td><td>17</td></tr>
<tr><td>1</td><td>5</td><td>13</td><td>2</td><td>5</td><td>16</td><td>3</td><td>5</td><td>12</td><td>4</td><td>5</td><td>14</td><td>5</td><td>5</td><td>16</td><td>6</td><td>5</td><td>15</td></tr>
<tr><td>1</td><td>6</td><td>16</td><td>2</td><td>6</td><td>15</td><td>3</td><td>6</td><td>18</td><td>4</td><td>6</td><td>15</td><td>5</td><td>6</td><td>15</td><td>6</td><td>6</td><td>16</td></tr>
</table>

What do you notice? (About equal numbers each time) Why? (Each combination has an equal chance of being thrown, so we would expect each of them to be thrown 15 out of 540 times.)

[N.B. With the actual data, the number of expected times will be the same as the number of pairs of Ps.]

Notes

Whole class discussion to start

Tables drawn on BB or use enlarged copy masters or OHP

Discussion involving several Ps.

Explanation, referring to tables on BB.

BB: $6 \times 6 = \underline{36}$ ways

Demonstration at BB first as a model for Ps to follow.

Paired work, monitored, helped

(Sample pair data shown opposite)

Agree that each combination has an equal chance of being thrown, so we would <u>expect</u> each to be thrown once out of 36 times. Why did it not happen? (Experiment not done enough times.)

Whole class collecting of class data. At a good pace.

Agreement, praising

(Sample Class data for 15 pairs are shown opposite.)

Total number of throws: e.g.

$15 \times 36 = 10 \times 36 + 5 \times 36$
$= 360 + 180 = \underline{540}$

Expected outcome of each:

36 throws $\rightarrow$ 1 time
15×36 throws $\rightarrow$ 15 times

Agree that the more times the two dice are thrown, the closer the data will get to what is expected.

Bk3

Lesson Plan 124

Activity		*Notes*

5

Q.2 (Continued)

Read: *Use the Class data to complete this table.*

Deal with one column at a time. T points to column in table, P comes to BB to show which rows have that sum and write the total in table. Which rows show the sum of both dice as:

- 1 (None , as it is impossible!)
- 2 (Only 1 row is possible: 1 + 1. Ps write value in table.)
- 3 (2 rows: 1 + 2 and 2 + 1. Ps write total in table.)

. . .

- 13 (None, as it is impossible)

BB: e.g. using values from sample data

Sum of both dice	1	2	3	4	5	6	7	8	9	10	11	12	13
Number of cases	—	14	27	42	59	78	92	73	61	48	30	16	—

Ways of making each sum:	2	3	4	5	6	7	8	9	10	11	12
	1+1	1+2	1+3	1+4	1+5	1+6	2+6	3+6	4+6	5+6	6+6
		2+1	2+2	2+3	2+4	2+5	3+5	4+5	5+5	6+5	
			3+1	3+2	3+3	3+4	4+4	5+4	6+4		
				4+1	4+2	4+4	5+3	6+3			
					5+1	5+2	6+2				
						6+1					
	[1]	[2]	[3]	[4]	[5]	[6]	[5]	[4]	[3]	[2]	[1]

What do you notice? (Not all the same: The more ways there are of making the sum, the more times times it happened; numbers are almost symmetrical on either side of '7'; etc.)

[A computer simulation for 100 (1000) times would be very good T could show to class in *Lesson 155*.]

Notes:

Whole class activity

Table drawn on BB or use enlarged copy master or OHP

At a good pace

(e.g.in sample data:

14 times out of 540 throws

15 + 12 = 27 times out of 540 throws

Additions written on BB.
T can check with a calculator.

Discuss what outcomes would be <u>expected</u> for each sum e.g.

'2': 36 throws → 1 time
15 × 36 throws → 15 times

'5': 36 throws → 4 times
15 × 36 throws → 60 times

'7': 36 throws → 6 times
15 × 36 throws → 90 times

Agree that the more throws, the closer the data will get to expected data.

40 min

6

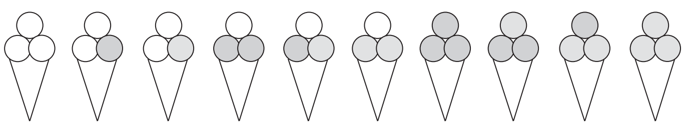
Book 3, page 124

Q.3 Read: *How could a 3-scoop ice-cream be made from vanilla or strawberry or lemon?*

T tells class that the scoops can be in any position. Elicit that the use of the word OR means that they can be mixed or all the same flavour.)

Review at BB with whole class. Ps come to BB to show their colouring. Who agrees? Who did it a different way? etc.

Solution:



Elicit that there are <u>10</u> possible outcomes:

VVV	VSS	SSS	LLL
VVS	VSL	SSL	
VVL	VLL	SLL	

What chance would there be of being given a cone containing

- 3 different flavours? (1 chance out of 10 or 1 tenth)
- all the same flavour? (3 chances out of 10 or 3 tenths)

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, agreement, self-correction, praising

Different Ps show different ways of colouring.

T writes possibilities in logical order on BB.

Whole class activity

Agreement, praising

Ps can think of questions too!

45 min

Bk3	R: Calculation **C: Roman numerals** *E: Puzzles*	*Lesson Plan 125*

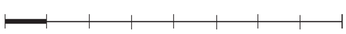
Activity		*Notes*

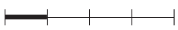
1

Division 1

Let's see what happens to the quotient if we reduce the dividend <u>and</u> the divisor. Ps come to BB to fill in the missing quotients (using any method of calculation) and to colour over appropriate parts of the line segments.

BB:

a) 856 ÷ 8 = $\boxed{107}$ 

b) 428 ÷ 4 = $\boxed{107}$ 

c) 214 ÷ 2 = $\boxed{107}$ 

What do you notice? (If the dividend is halved and the divisor is halved the quotient stays the same.)

5 min

Notes: Whole class activity

Written/drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

If problems, Ps write details of calculations on BB.

Feedback for T

2

Division 2

Let's see what happens to the quotient if we reduce the dividend and increase the divisor. Ps come to BB to fill in the missing quotients (using any method of calculation) and to colour over appropriate part of the line segments.

BB:

a) 864 ÷ 2 = $\boxed{432}$

b) 432 ÷ 4 = $\boxed{108}$

c) 216 ÷ 8 = $\boxed{27}$

What do you notice? (If the dividend is halved and the divisor is doubled the quotient will be reduced by 1 quarter, etc.)

10 min

Notes: Whole class activity

Written/drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

If problems, Ps write details of calculations on BB.

Feedback for T

3

Roman numerals

T has BB already prepared (with strips of card stuck to BB).
Who remembers the meaning of Roman numerals? (BB)

Are the equations correct? (No) Who can make them correct by moving only one strip of card?

Ps come to BB to reposition one 1 strip, explaining reasoning. Class agrees or disagrees.

BB: a) V + I = III ✗ (V – II = III or V – I ≠ III)
b) LIV + I = LII ✗ (LIV – I = LIII or LIV – I ≠ LII)

14 min

Notes: Whole class activity (or individual trial if Ps wish)

BB: I = 1, V = 5, X = 10, L = 50, C = 100, D = 500, M = 1000

Reasoning, agreement, correcting, praising

4

Sequences

Copy these sequences in your *Ex. Bks* and continue them for as many terms as you can. Set a time limit. Deal with one at a time.

Review at BB with whole class. Ps dictate terms to T or come to BB to write them. What is the rule? Who agrees? Who thinks something else? etc. Revise the 'rules', e.g. CD = D – C, MC = M + C, etc.

BB:

a) X, XX, XXX, (XL, L, LX, LXX, LXXX, XC, C, CX, . . .) [+ 10]

b) C, CC, CCC, CD, (D, DC, DCC, DCCC, CM, M, MC, . . .) [+ 100]

c) MM, MCMXCIX, MCMXCVIII, (MCMXCVII, MCMXCVI, . . .) [– 1]

20 min

Notes: Individual trial, monitored, or a) and b) done as individual work and c) with whole class

T has BB or SB or OHT already prepared and uncovers each as it is dealt with.

Discussion, reasoning, agreement, self-correction, praising

T points to a Roman numeral and class reads it in unison.

Bk3

Lesson Plan 125

Activity		*Notes*
5	**Writing Roman numerals** Let's write these numbers as Roman numerals. Ps come to BB to write each number as an addition of appropriate numbers, then change the numbers to Roman numerals (with help of T and class if necessary). e.g. BB: a) 596 = [500 + 90 + 6 = 500 + (100 – 10) + (5 + 1) = D + XC + VI = DXCVI] b) 178 = [100 + 70 + 8 = 100 + (50 + 20) + (5 + 3) = C + LXX + VIII = CLXXVIII] c) 945 = [900 + 40 + 5 = (1000 – 100) + (50 – 10) + 5 = CM + XL + V = CMXLV d) 1002 = [1000 + 2 = M + II = MII] *25 min*	Whole class activity Written on BB or SB or OHT At a good pace T helps with the bonding if necessary. Agreement, praising Ps write in *Ex. Bks* too. Elicit that the Romans never used more than 3 of the same symbol. e.g. 3 = III but 4 = IV, 80 = LXXX but 90 = XC Feedback for T
6	***Book 3, page 125*** Q.1 Read: *Write these numbers as Roman numerals. Follow the example.* Who can come and explain the example and complete it? Who agrees? Who thinks something else? etc. Let's see if you can do the same with parts b) to d). Review at BB with whole class. Ps come to BB to write and explain reasoning. Class points out errors. Mistakes discussed and corrected. *Solution:* a) 743 = (500 + 200) + (50 – 10) + 3 = DCC + XL + III = DCCXLIII b) 287 = 200 + (50 + 30) + (5 + 2) = CC + LXXX +VII = CCLXXXVII c) 934 = (1000 – 100) + 30 + (5 – 1) = CM + XXX + IV = CMXXXIV d) 1099 = 1000 + (100 – 10) + (10 – 1) = M + XC + IX = MXCIX *30 min*	Individual work, monitored, helped T has example written on BB or SB or OHT. Whole class explanation of part a). Agreement, praising Reasoning, agreement, self-correction, praising T points to Roman numerals and chooses Ps to say them. At speed. Praising, encouragement only NOTE: If you think Ps will struggle, do these sequences with the whole class beforehand. 4, 40, 400 (IV, XL, CD) 9, 90, 900 (IX, XC, CM)
7	***Book 3, page 125*** Q.2 Deal with one part at a time. Ps may do calculations in *Ex. Bks* or on scrap paper if needed. Review each part at BB with whole class. Ps come out to BB to explain reasoning. Class agrees/disagrees. Mistakes corrected. a) Read: *Change the Roman numerals to Arabic numbers.* BB: DIX = 509; MCMXLV = 1945; CMIV = 904; CDXVI = 416; MCXI = 1111; CMXCIX = 999 b) Read: *Write the Arabic numbers in decreasing order.* BB: 1945 > 1111 > 999 > 904, > 509 > 416	Individual work, monitored, helped Part a) written on BB or SB or OHT Reasoning, agreement, self-correcting, praising Feedback for T

Bk3

Lesson Plan 125

Activity		*Notes*
7	(Continued) c) Read: *Subtract the 5th number from the 3rd number. Write the difference as Roman numerals.* Counting from left to right: 999 – 509 = 490 = <u>CDXC</u> d) Read: *Divide the 2nd number by 11. Write the quotient as Roman numerals.* BB: 1111 ÷ 11 = 1100 ÷ 11 + 11 ÷ 11 = 100 + 1 = 101 = <u>CI</u> 37 min	T could show calculation for part d) in other ways, e.g. $\begin{array}{cccccc} & & & 1 & 0 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 \\ & - & 1 & 1 & & \\ & & & 0 & 1 & 1 \\ & & & - & 1 & 1 \\ & & & & & 0 \end{array}$ long division $\begin{array}{cccccc|ccc} 1 & 1 & 1 & 1 & 1 & 1 & & & \\ & - & & 9 & 9 & 0 & & 9 & 0 \\ & & & 1 & 2 & 1 & & & \\ & & - & 1 & 1 & 0 & & 1 & 0 \\ & & & & 1 & 1 & & & \\ & & & - & 1 & 1 & & & 1 \\ & & & & & 0 & 1 & 0 & 1 \end{array}$ known multiples
8	***Book 3, page 125*** Q.3 Read: *Above the entrance to a church, there is a Roman number: MCCCXCI* *a) When do you think the church was built?* *b) What Roman number is on the crypt if it was built 153 years before the main church?* T talks about old buildings having the year in which they were built carved into the stone in Roman numerals. Talk about churches in particular and how often parts were added on over the years. Elicit or explain what a crypt is. (Cellar with an arched roof, usually found beneath churches, where people were buried.) Deal with one part at a time. Ps do any necessary calculations in *Ex. Bks* or on scrap pape and write answers in *Pbs*. Review with whole class. Ps come to BB to explain their reasoning. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a) MDCCXCI = 1000 + (500 + 200) + (100 – 10) + 1 = <u>1791</u> (Read as 'seventeen ninety one' because it is a year) b) 1791 – 153 = 1791 – 100 – 50 – 3 = 1641 – 3 = 1638. (Read as 'sixteen thirty-eight' because it is a year) 1638 = 1000 + (500 + 100) + 30 + (5 + 3) = M + DC + XXX + VIII = <u>MDCXXXVIII</u> 40 min	Individual work, monitored, helped Initial discussion about the context. (T could find out beforehand whether there is a local church with its date carved in Roman numerals and ask Ps to note it when they next pass by.) Reasoning, agreement, self-correction, praising T talks about how the digits are read if they form a <u>number</u> and how they are read if they signify a <u>year.</u> Alternative calculation for b): $\begin{array}{r} 1791 \\ -\ \ 153 \\ \hline 1638 \end{array}$
9	***Book 3, page 125, Q.4*** a) *Read: What rule has been used to make these secret codes?* Give Ps time to think and discuss with their neighbours. Ask several Ps what they think. If nobody knows, T gives a hint about Roman numerals. *Solution:* *Rule:* Take the Roman numerals in each word and add up their values in Arabic numbers. The order does not matter. CILLA → C + I + L + L = 100 + 1 + 50 + 50 = 201 SHEILA → I + L = 1 + 50 = 51 EXAMPLE → X + M + L = 10 + 1000 + 50 = 1060 IVANHOE → I + V = 1 + 5 = 6 MUM → M + M = 1000 + 1000 = 2000	Whole class activity (or individual trial first if Ps prefer, dealing with one part at a time) Words written on BB or SB or OHT At a good pace Discussion, agreement on the rule, checking, praising Extra praise if Ps deduce the rule without a hint from T.

Bk3

Lesson Plan 125

Activity		*Notes*
9	(Q.4 continued) b) Read: *Use the rule to find the secret numbers and the missing signs.* Ps come to BB to underline the Roman numerals in each word, then to change them to Arabic numbers and add them up. Class points out errors.	Whole class activity (or individual trial first if Ps prefer) Words written on BB or SB or OHT At a good pace Discussion, reasoning, agreement, praising

Solution:

i) E$\underline{\text{L}}$EPHANT → L = $\underline{50}$

$\underline{\text{C}}$RO$\underline{\text{C}}$O$\underline{\text{DIL}}$E → C + C + D + I + L
= 100 + 100 + 500 + 1 + 50
= $\underline{751}$

$\underline{\text{C}}$A$\underline{\text{DILL}}$A$\underline{\text{C}}$ → C + D + I + L + L + C
= 100 + 500 + 1 + 50 + 50 + 100
= $\underline{801}$

ii) 100 ← BA$\underline{\text{LL}}$ > BA$\underline{\text{LI}}$ → 51

100 ← $\underline{\text{C}}$AT = PA$\underline{\text{C}}$K → 100

0 ← PEN < P$\underline{\text{I}}$N → 1

	c) Read: *Use the rule to write a secret code for 2101.* Ps work individually or in pairs. Review with whole class. Ps explain reasoning. Class agrees whether their code is valid. Agree that : 2101 = 2000 + 100 + 1 = MM + C + I Many codes are possible, e.g. $\underline{\text{M}}$ATHE$\underline{\text{M}}$AT$\underline{\text{IC}}$S $\underline{\text{M}}$U$\underline{\text{M}}$ $\underline{\text{C}}$AN KN$\underline{\text{I}}$T $\underline{\text{C}}$O$\underline{\text{M}}$E $\underline{\text{I}}$NTO $\underline{\text{M}}$Y HOUSE	Individual or paired trial, monitored If Ps are struggling, T gives hint about using more than one word. Reasoning, agreement, praising Extra praise for creativity! (If short of time, this can be set as voluntary homework.)

45 min

Bk3

R: Calculation

C: Roman numerals

E: Puzzles

Lesson Plan 126

Activity | *Notes*

1 Missing numbers

Which numbers are missing from the boxes?

Ps come to BB to write them in, explaining reasoning. Difficult calculations can be written at side of BB. Class points out errors.

BB:

$$1872 \xrightarrow{\div 2} \boxed{936} \xrightarrow{\div 3} \boxed{312} \xrightarrow{\div 4} \boxed{78} \xrightarrow{\div 6} \boxed{13}$$

$$1872 \xrightarrow{\div 3} \boxed{624} \xrightarrow{\div 4} \boxed{156} \xrightarrow{\div 6} \boxed{26} \xrightarrow{\div 2} \boxed{13}$$

$$1872 \xrightarrow{\div 4} \boxed{468} \xrightarrow{\div 6} \boxed{78} \xrightarrow{\div 2} \boxed{39} \xrightarrow{\div 3} \boxed{13}$$

$$1872 \xrightarrow{\div 6} \boxed{312} \xrightarrow{\div 2} \boxed{156} \xrightarrow{\div 3} \boxed{52} \xrightarrow{\div 4} \boxed{13}$$

What do you notice? (The dividend, divisors and final quotient are the same in all cases, so the order of divisions does not matter; dividing by 2 and then by 3 is the same as dividing by 6, etc.)

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP

Ps could calculate in *Ex. Bks* (or on scrap paper or slates) first before coming to BB if they wish.

Reasoning, agreement, praising

Details written on BB: e.g.

		4	6	8
4	1	8	7	2
	– 1	6		
		2	7	
	–	2	4	
			3	2
		–	3	2
				0

		3	1	2
6	1	8	7	2
	– 1	8		
		0	7	
		–	6	
			1	2
		–	1	2
				0

6 min

2 Problems

Listen carefully, picture the story in your head and show me the plan you would write to solve it. If you have time, work out the answer too.

T reads problem. Ps write a plan and show on command. Who had time to work it out? Come and show us. Who agrees? etc.

a) *Linda had £936 in her bank account. After she had spent the day shopping, she had only 1 sixth of her money left.*

i) *How much did she have left?*

BB: Had: £936 Had left: 1 sixth of £936 = <u>£936</u> ÷ <u>6</u>

= £156

ii) *How much did she spend?*

BB: Spent: <u>£936 – £156</u> = £780 (or <u>£156</u> × <u>5</u>) = £780

Answer: Linda spent £780 and had £156 left.

b) *A tube 10 m 24 cm long was cut into 4 equal pieces. What was the length of each piece?*

BB: Length of tube: 10 m 24 cm = 1024 cm

Each piece: 1 quarter of 1024 cm = <u>1024 cm</u> ÷ <u>4</u>

= 256 cm = 2 m 56 cm

Answer: Each piece had length 2 m 56 cm.

c) *Ann made up 5 litres 40 cl of orange squash. How many 5 cl glasses could she fill with the orange squash?*

BB: Made: 5 litres 40 cl = 540 cl Each glass: 5 cl

Number of glasses: <u>540 cl</u> ÷ <u>5 cl</u> = 108

Answer: Ann could fill 108 glasses with orange squash.

d) *A baker made 5 kg 200 g of bread dough. How many rolls could the baker make if he used 80 g of dough for each roll?*

BB: Made: 5 kg 200 g = 5200 g Each roll: 80 g

Number of rolls: <u>5200 g</u> ÷ <u>80 g</u> = 520 g ÷ 8 g = 65

Answer: The baker could make 65 rolls.

Notes:

Individual work in writing the plan, but whole class calculating and expressing the answer.

Plans written on scrap paper or slates and shown in unison on command.

(Accept plans, shown underlined, without units but make sure that Ps know what the units should be.)

At a good pace

Reasoning, agreement, praising

Details of calculations written on BB, e.g.

a)

	1	5	6
6	9	3	6
–	6		
	3	3	
–	3	0	
		3	6
	–	3	6
			0

b)

		2	5	6
4	1	0	2	4
	–	8		
		2	2	
	–	2	0	
			2	4
		–	2	4
				0

c)

	1	0	8
5	5	4	0
–	5		
	0	4	0
	–	4	0
			0

d)

		6	5
8	5	2	0
–	4	8	
	0	4	0
	–	4	0
			0

Bk3

Lesson Plan 126

Activity		*Notes*
Extension	e) *The fence around a square garden, not including the gate, is 52 m 80 cm. The gate is 2 m 40 cm. What is the length of each side of the garden?* BB: Fence: 52 m 80 cm Gate: 2 m 40 cm Fence + Gate: 52 m 80 cm + 2 m 40 cm Length of each side: $\underline{(52\text{ m }80\text{ cm} + 2\text{ m }40\text{ cm})} \div \underline{4}$ $= 52\text{ m} \div 4 + 80\text{ cm} \div 4 + 240\text{ cm} \div 4$ $= 13\text{ m} + 20\text{ cm} + 60\text{ cm}$ $= 13\text{ m} + 80\text{ cm} = 13\text{ m }80\text{ cm}$ *Answer:* Each side of the garden is 13 m 80 cm long. *16 min*	Or $\underline{(5280\text{ cm} + 240\text{ cm})} \div \underline{4}$ $= 1320\text{ cm} + 60\text{ cm}$ $= 1380\text{ cm}$ $= \underline{13\text{ m }80\text{ cm}}$ or $\begin{array}{r} 5280 \\ +\ \ 240 \\ \hline 5520 \end{array}$ $\begin{array}{r} 1380 \\ 4\,\overline{)\,5520} \\ -4 \\ \hline 15 \\ -12 \\ \hline 32 \\ -32 \\ \hline 00 \end{array}$
3	**Sequences** T has first few terms of a sequence written on BB. Ps come to BB to write following terms. Class agrees/disagrees. What is the rule? a) IV, XV, XXVI, (XXXVII, (XLVIII, LIX, LXX, LXXXI, XCII, CIII, CXIV, . . .) [difference between terms is 11] b) I, II, IV, VIII, (XVI, XXXII, LXIV, CXXVIII, CCLVI, DXII, MXXIV, . . .) [each following term is twice the previous term] c) MCCLV, MCLV, MLV, (CMLV, DCCCLV, DCCLV, DCLV, DLV, CDLV, . . .) [difference between terms is 100] *20 min*	Whole class activity At a good pace T decides how many terms Ps should write. Discussion, agreement on the rules. Agree that it is easier to change the numerals to Arabic numbers first to find the rule. Praising, encouragement only
4	**Dates** Let's write our birthdays using Roman numerals for the month and Arabic numbers for the day. I will do mine first. T does first line, then Ps follow the model and come to the BB to write their birthday. BB: e.g. a) 18 October 18.X. 18.10. b) 25 December 24.XII. 25.12. c) 7 April 7. IV. 07.04. d) 30 July 30.VI. 30.07. What is missing from these dates? (The year of birth) Who would like to try to write the year they were born in Roman numerals? *24 min*	Whole class activity At a good pace Involve as many Ps as possible. Discuss the 3rd column, which shows the days as a 2-digit numbers. This is how a computer might show the date. e,g. 1994 = MCMXCIV Praising only!
5	**Find the mistakes** Which statements are incorrect? Correct them by moving only 1 strip. Ps come to BB to work out statements, tick the correct ones and rearrange the wrong ones. Ps explain their reasoning. Class agrees/ disagrees or suggests another possibility. BB: Corrections: a) I – III = II ✗ I = III – II or I – II ≠ II b) VI + V = XI ✔ c) II – II = III ✗ II + I = III d) VI – IV = IX ✗ VI + IV = X or V + IV = IX T points to a correct statement and chooses a P (or Ps) to read it aloud. *28 min*	Whole class activity T has strips of card or felt or lolly sticks stuck to BB to form the statements shown. At a good pace Reasoning, agreement, correcting, praising Ps can choose the statements and Ps too but must also say whether the reading is correct.

Bk3

Lesson Plan 126

Activity

Notes

6

Book 3, page 126

Q.1 Read: *Correct the equations.*

Try to do it by moving only one line! Ps write out equations again correctly. Deal with one at a time.

Review at BB with whole class. Deal with all cases. P reads corrected equation in Arabic numbers and another P writes it on the BB in Roman numerals. Class agrees whether or not it is correct. Mistakes discussed and corrected.

Solution: e.g. Correction if moving only one line:

a) VII + V = III   VII – IV = III

b) XII + III = X   XII – III = IX

c) XI + XXX = X   XL – XXX = X

Notes: Individual work, monitored

T has BB or SB or OHT already prepared

(or card or felt strips or lolly sticks stuck to BB to form the equations shown and Ps come to BB to rearrange them)

Reasoning, agreement, self-correcting, praising

(Or done in a straightforward way without restriction.)

Feedback for T

32 min

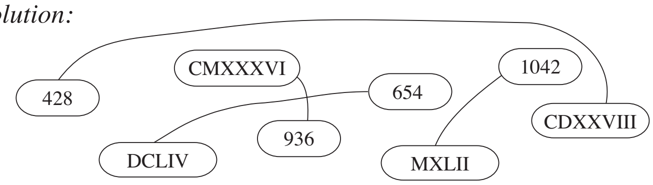
7

Book 3, page 126

Q.2 Read: *Join up the equal values.*

Review at BB with whole class. Ps come to BB or dictate to T. If problems, show breakdown of Roman numbers on BB.

Solution:



Notes: Individual work, monitored

Written on BB or use enlarged copy master or OHP

Agreement, self-correcting, praising

Feedback for T

35 min

8

Book 3, page 126

Q.3 Read: *Do the calculations. Write the operations using Roman numerals.*

Ps do all the calculations first as individual work, reviewed at BB with whole class. Mistakes corrected.

Writing as Roman numerals could be done with the whole class. Ps dictate to T or come to BB (with help of class).

Let's read the statements together.

Solution:

a) $\begin{array}{r} 127 \\ +\,348 \\ \hline 475 \end{array}$ CXXVII + CCCXLVIII = CDLXXV

b) $\begin{array}{r} 671 \\ -\,558 \\ \hline 113 \end{array}$ DCLXXI – DLVIII = CXIII

c) $\begin{array}{r} 235 \\ \times\,3 \\ \hline 705 \end{array}$ CCXXXV × III = DCCV

d) 847 ÷ 7 = 700 ÷ 7 + 140 ÷ 7 + 7 ÷ 7 = 100 + 20 + 1 = 121

DCCCXLVII VII = CXXI

Notes: Individual work in calculating, monitored, helped

Whole class activity in changing to Roman numerals (or individual trial if Ps wish)

Written on BB or use enlarged copy master or OHP

Agreement, praising

In unison. In good humour!

Alternative calculation for part d):

$$\begin{array}{r|l} & 121 \\ \hline 7 & 847 \\ & -7 \\ & \overline{\;14} \\ & -14 \\ & \overline{\;\;07} \\ & \;\;-7 \\ & \overline{\;\;\;\;0} \end{array}$$

40 min

Bk3

Lesson Plan 126

Activity		Notes
9	***Book 3, page 126, Q.4***	Whole class activity (or individual work if Ps wish)
	a) Read: *Which Roman numerals could be written instead of the shapes to make the statements true?*	Written on BB or SB or OHT
	How could we do it? T asks several Ps what they think. (Change the Roman numerals to Arabic numbers first, then find the possible Arabic numbers and change back to Roman numerals.)	Discussion on strategy for solution
	Ps come to BB to write Arabic numbers and then say the possible numbers the shapes could represent. Class agrees/disagrees.	Reasoning, agreement, praising
	Solution:	
	i) CDLXXIX < $\square$ < CDLXXXIII 479 483 $\square$: 480, 481, 482 : CDLXXX, CDLXXXI, CDLXXXII	
	ii) CMXCVIII < $\bigcirc$ < MIV 998 1004 $\bigcirc$: 999, 1000, 1001, 1002, 1003 : CMXCIX, M, M1, MII, MIII	
	b) Read: *Correct the equations*.	(Or individual work, where Ps make own equations on desks and rearrange strips (sticks). T chooses Ps to show solutions to class.)
	T has strips of card or felt or lolly stick stuck to BB to form the equations. Who can correct the equation by moving only two strips?	
	Ps come to BB to show their solution and class agrees/disagrees. Who can think of another way? etc.	Or done in a straightforward way without restriction on how amendments can be made.
	Solution: Correction: e.g. i) VII – II = II VII – V = II or VII – II =V ii) XII + VIII = X XII + III = XV iii) V – XV= X + 1 IV = XV – X – I	Agreement, praising Extra praise for creative solutions.

45 min

Bk3	R: Calculation **C: Money problems** *E: Negative balance*	*Lesson Plan* *127*

Activity		*Notes*

1

Mental practice

Listen carefully and try to do the calculation in your head if you can. T asks Ps at random. Class points out errors. If problems, details of calculation written on BB.

a) How many £2 coins would I get for:

£68 (34), £126 (63), £448 (224), £314 (157), £723 (361 but £1 is left unchanged), etc.

How do we know whether a number is exactly divisible by 2? (If it is even) What possible remainder can there be if it is odd? (1)

b) How many £5 notes would I get for:

£75 (15), £120 (24), £545 (109), £380 (76), £733 (146 but £3 is left unchanged), etc.

How do we know whether a number is exactly divisible by 5? (If it has 5 or 0 in its units column) What possible remainder can there be if it does <u>not</u> have 5 or 0 in the units column? (0, 1, 2, 3, 4)

Notes:

Whole class activity

At speed

Ps gve details of difficult calculations on BB, e.g.

a)

$$\begin{array}{cccc} & 3 & 8 & 1, \text{ r } 1 \\ 2 & 7 & 3 & 3 \\ - & 6 & & \\ & 1 & 6 & \\ - & 1 & 6 & \\ & & 0 & 3 \\ & & & 2 \\ & & & 1 \end{array}$$

b)

$$\begin{array}{cccc} & 1 & 4 & 6, \text{ r } 3 \\ 5 & 7 & 3 & 3 \\ - & 5 & & \\ & 2 & 3 & \\ - & 2 & 0 & \\ & & 3 & 3 \\ & & 3 & 0 \\ & & & 3 \end{array}$$

Reasoning, agreement, praising

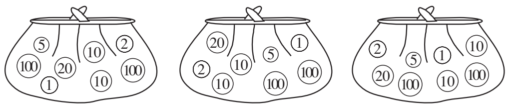
Feedback for T

8 min

2

Money

a) How much money is in the purses altogether?

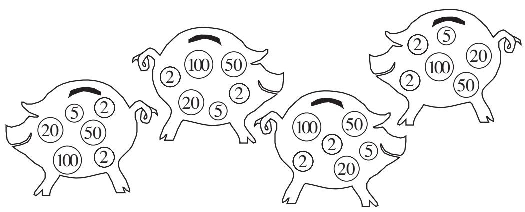


A, come and show us how you would do it. Who agrees? Who would do it another way? etc. Ps explain reasoning and write calculations in different ways on BB. e.g.

BB:

$$\begin{array}{cccc} & {}^{1} & {}^{2} & \\ & 2 & 4 & 8 \\ & 2 & 4 & 8 \\ + & 2 & 4 & 8 \\ \hline & 7 & 4 & 4 \end{array} \qquad \begin{array}{ccccc} 2 & 4 & 8 & \times & 3 \\ \hline & 2 & 4 & & \\ 1 & 2 & 0 & & \\ 6 & 0 & 0 & & \\ \hline 7 & 4 & 4 & & \end{array} \qquad \begin{array}{ccccc} 2 & 4 & 8 & \times & 3 \\ \hline 7 & 4 & 4 & & \\ {}_{1} & {}_{2} & & & \end{array}$$

b) How much money is in the piggy banks altogether?



B, come and show us how you would do it. Who agrees? Who would do it another way? etc. Ps explain reasoning and write calculations in different ways on BB. e.g.

BB:

$$\begin{array}{cccc} & {}^{3} & {}^{3} & \\ & 1 & 7 & 9 \\ & 1 & 7 & 9 \\ & 1 & 7 & 9 \\ + & 1 & 7 & 9 \\ \hline & 7 & 1 & 6 \end{array} \qquad \begin{array}{ccccc} 1 & 7 & 9 & \times & 4 \\ \hline & 3 & 6 & & \\ 2 & 8 & 0 & & \\ 4 & 0 & 0 & & \\ \hline 7 & 1 & 6 & & \\ {}_{1} & & & & \end{array} \qquad \begin{array}{ccccc} 1 & 7 & 9 & \times & 4 \\ \hline 7 & 1 & 6 & & \\ & {}_{3} & {}_{3} & & \end{array}$$

Notes:

Whole class activity

Purses drawn or stuck on BB or use enlarged copy master or OHP

Reasoning, agreement, checking, praising

Feedback for T

Piggy banks drawn or stuck on BB or use enlarged copy master or OHP

Reasoning, agreement, checking, praising

Feedback for T

13 min

Bk3

Lesson Plan 127

Activity		*Notes*

3 **Problems**

Listen carefully, picture the story in your head and show me the plan you would write to solve it. If you have time, work out the answer too.

T reads problem. Ps write a plan and show on command. Who had time to work it out? Ps come to BB or dictate to T. Who agrees? etc.

a) *Paul bought a matchbox car for £3.96 and 4 tennis balls at £1.98 each. How much did he spend altogether?*

BB: Spent: $\underline{£3.96 + 4 \times £1.98}$ = 396 p + 4 × 198 p
= 396 p + 792 p
= 1188 p = $\underline{£11.88}$

Answer: Paul spent £11.88 altogether.

b) *Joe's Granny went shopping with £15 in her purse. She bought 6 kg of gooseberries at £1.46 per kilogram. How much money did she have left?*

BB: Had left: $\underline{£15 - 6 \times £1.46}$ = 1500 p – 6 × 146 p
= 1500 p – 876 pp
= 624 p = $\underline{£6.24}$

Answer: She had £6.24 left.

c) *In the market 1 kg of strawberries cost £2.75 but in the fruit shop they cost £3.88 per kilogram.*
If you wanted to buy 4 kg strawberries, how much more would they cost in the fruit shop than in the market?

BB: Difference: $\underline{(£3.88 - £2.75) \times 4}$ = (388 p – 275 p) × 4
= 113 p × 4
= 452 p = $\underline{£4.52}$

Or $\underline{£3.88 \times 4 - £2.75 \times 4}$ = 388 p × 4 – 275 p × 4
= 1552 p – 100 p
= 452 p = $\underline{£4.52}$

Answer: They would cost £4.52 more in the fruit shop.

Individual work in writing the plan, but whole class calculating and expressing the answer.

Plans written on scrap paper or slates and shown in unison on command.

Reasoning, agreement, praising

Details of calculations : e.g.

a)
$$\begin{array}{r} 198 \times 4 \\ \hline 792 \\ {\scriptstyle 3\,3} \end{array} \qquad \begin{array}{r} 792 \\ +\,396 \\ \hline 1188 \end{array}$$

b)
$$\begin{array}{r} 146 \times 6 \\ \hline 876 \\ {\scriptstyle 2\,3} \end{array} \qquad \begin{array}{r} 1500 \\ -\,876 \\ \hline 624 \end{array}$$

c) Can be done in two ways:
$$\begin{array}{r} 388 \\ -\,275 \\ \hline 113 \end{array} \qquad \begin{array}{r} 113 \times 4 \\ \hline 452 \\ {\scriptstyle 1} \end{array}$$

or
$$\begin{array}{r} 388 \times 4 \\ \hline 1552 \\ {\scriptstyle 3\,3} \end{array} \qquad \begin{array}{r} 275 \times 4 \\ \hline 1100 \\ {\scriptstyle 3\,2} \end{array} \qquad \begin{array}{r} 1552 \\ -\,1100 \\ \hline 452 \end{array}$$

20 min

4 ***Book 3, page 127***

Q.1 Read: *Make a plan. Do the calculation, check it and write the answer in a sentence.*

Deal with one question at a time. Ps read problem themselves, and solve it. Review at BB with whole class after completion. Ps explain reasoning and show calculation and check. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) *Tim has £648, 6 times the amount Laura has. How much does Laura have?*

Plan: Laura: £648 ÷ 6 *Calculation:*
$$\begin{array}{r|r} & 108 \\ \hline 6 & 648 \\ & -\,6 \\ \hline & 048 \\ & -\,48 \\ \hline & 0 \end{array}$$

Check:
$$\begin{array}{r} 108 \times 6 \\ \hline 648 \end{array} \checkmark$$

Answer: Laura has £108.

Individual work, monitored, helped

If Ps are less able, deal with one part of the solution at a time. (Ps write a plan, then whole class discussion; then Ps do calculation and check, then whole class discussion, then Ps write answer in a sentence, then review.)

Vertical calculations can be done on grid sheets or in *Ex. Bks*, or Ps use horizontal calculations, e.g.

648 ÷ 6 = 600 ÷ 6 + 48 ÷ 6
= 100 + 8 = $\underline{108}$

Bk3

Lesson Plan 127

Activity		*Notes*

4 (Continued)

b) *Gordon has £648. Lenny has twice as much. How much does Lenny have?*

Plan: Lenny: £648 × 2   *Calculation:*

$$\begin{array}{cccccc} & 6 & 4 & 8 & \times & 2 \\ \hline 1 & 2 & 9 & 6 & & \\ & & \scriptstyle 1 & & & \end{array}$$

Check:

$$\begin{array}{cccc} & \scriptstyle 1 & & \\ & 6 & 4 & 8 \\ + & 6 & 4 & 8 \\ \hline 1 & 2 & 9 & 6 \end{array} \checkmark$$

Answer: Lenny has £1296.

Notes:

Or

648 × 2 = 600 × 2 + 48 × 2
= 1200 + 80 + 16
= <u>1296</u>

Check can also be done using division

28 min

5 **Extracting data**

Listen carefully to the problem and note down the data.

On the 16th November in 1998, six of us went to the cinema. Tickets cost £2.50 before 6.00 pm and £2.90 after 6.00 pm. How much more would we spend if we bought the dearer tickets?

What data were we given? T writes what Ps dictate.

BB: 16 November 1998   £2.50 before 6.00 pm
6 people   £2.90 after 6.00 pm

Who can come and circle the data needed to answer the question? Who disagrees? Why? etc.

Let's write a plan and do the calculation. T writes what Ps dictate.

BB: (£2.90 – £2.50) × 6 = £0.40 × 6 = <u>£2.40</u>

Answer: We would spend £2.40 more.

Notes:

Whole class activity

T repeats slowly or has problem written on BB or SB or OHT

Discussion, agreement that the date is not important. The actual time is not needed in the calculation, just the fact that there is a cheaper and a dearer price.

Reasoning, agreement, praising.

Ps say answer as a sentence.

32 min

6 ***Book 3, page 127***

Q.2 Read: *What data are needed? Make a plan. Calculate, check and write the answer.*

Ps read problems themselves, then circle or underline important data and cross out the data which are not needed.

Review important data first before Ps solve problems.

Review solutions at BB with whole class. Ps come to BB or dictate to T. Class agrees/disagrees or suggests alternative calculations. Mistakes discussed and corrected.

Solution:

a) *<u>3</u> boys and <u>4</u> girls were travelling on a ~~42~~-seater bus. Their tickets cost <u>£15.47</u> altogether. How much was each ticket?*

Plan: £15.47 ÷ (3 + 4)
= 1547 p ÷ 7

Calculation:

$$\begin{array}{c|cccc} & & 2 & 2 & 1 \\ \hline 7 & 1 & 5 & 4 & 7 \\ - & 1 & 4 & & \\ \hline & & 1 & 4 & \\ & - & 1 & 4 & \\ \hline & & & 0 & 7 \\ & & & & 7 \\ \hline & & & & 0 \end{array}$$

Check:

$$\begin{array}{cccccc} & 2 & 2 & 1 & \times & 7 \\ \hline 1 & 5 & 4 & 7 & & \\ & \scriptstyle 1 & & & & \end{array} \checkmark$$

Answer: Each ticket cost £2.21.

Notes:

Individual work, monitored, helped

Discussion, agreement on important data

If Ps are less able, deal with one part of the solution at a time.

Reasoning, agreement, self-correcting, praising

Vertical calculations can be done on grid sheets or in *Ex. Bks*, or Ps use horizontal calculations, e.g.

1547 p ÷ 7
= 1400 p ÷ 7 + 147 p ÷ 7
= 200 p + 21 p
= 221 p
= <u>£2.21</u>

Bk3		*Lesson Plan 127*

Activity		*Notes*
6	(Continued) Q.2 b) *John had to fill an empty <u>540 litre</u> container from a ~~1200 litre~~ container full of water. He used a <u>4 litre</u> and a <u>5 litre</u> bucket to transfer the water each time.* *How many journeys did he make?* *Plan:* 540 litres ÷ (4 litres + 5 litres) = 540 litres ÷ 9 litres *Check:* 60 × 9 = 540 ✔ *Calculation:* 9) 540 = 60; − 54; 00 *Answer:* John made 60 journeys. *40 min*	Reasoning, agreement, self-correcting, praising (Or Ps can use horizontal division and multiplication)
7	***Book 3, page 127*** Q.3 Read: *What was the balance each day? (Do the calculations in your exercise book.)* Discuss meaning of 'balance', 'Income' and 'Outgoings' in relation to a bank account or a shop. Allow Ps to say what they think is the meaning. T explains if they do not know. When doing the calculations, encourage Ps to try the additions or subtractions by keeping the units as £s rather than changing to pence. T notes any problems they encounter. Set a time limit. Review at BB with whole class. Ps come to BB to write balances and show the calculations, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. Show the negative balance on the class number line and relate to money owed or bills still to be paid. *Solution:*	Individual work, monitored helped Drawn on BB or use enlarged copy master or OHP Initial discussion about context and meaning of terms BB: <u>Income</u>: money received <u>Outgoings</u>: money paid out <u>Balance</u>: money remaining Differentiation by time limit (Or deal with one part at a time or done as whole class activity) Reasoning, agreement, self-correcting, praising Details of calculations: e.g. £6.61 − £5.14 = £1.47; £16.73 − £ 5.31 = £11.42

Day	Income	Outgoings	Balance
Monday	£3.56	£2.18	**£1.38**
Tuesday	£1.05	£3.46	**– £2.41**
Wednesday	£6.56	–	**£6.56**
Thursday	£1.43 £5.18	£3.25 £1.89	**£1.47**
Friday	£7.25 £9.48	£1.03 £4.28	**£11.42**
Saturday	–	£5.23 £2.18	**– £7.41**

Extension	If these are the balances for a shop every day during one week, what was the total balance at the end of the week? Ps suggest what to do and how to calculate, with T's help where necessary. T notes what Ps can do. Total balance: £1.38 + £6.56 + £1.47 + £11.42 – £2.41 – £7.41 = £20.83 – (£2.41 + £7.41) = £20.83 – £9.82 = <u>£11.01</u> *Answer*: At the end of the week the total balance was £11.01 [Preparation for calculation with decimals.] *45 min*	Whole class activity (or individual or paired trial if Ps wish) Ask several Ps what they think. Reasoning, agreement, praising. or BB: £ 1.38 + 6.56 + 1.47 + 11.42 = 20.83 (carries 1 1 2) £ 20.83 − 9.82 = 11.01

Bk3	R: Calculation C: **Money problems** *E: Direct proportion: from one to more*	*Lesson Plan 128*

Activity		*Notes*

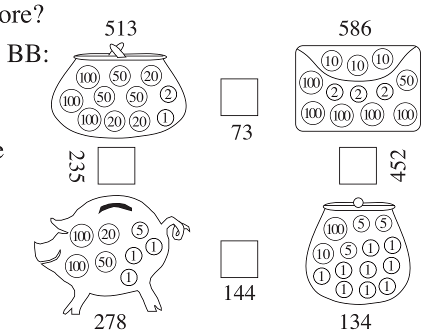
1 **Comparison**

T has BB already prepared. How much is in each purse? Which purse has more? How much more?

Ps come to BB to write amount above/below each purse and then to compare them by writing the appropriate sign and the difference.

Class points out errors.

BB:



Notes: Whole class activity

Drawn or stuck on BB or use enlarged copy master or OHP

At a good pace

Agreement, praising

Feedback for T

5 min

2 **Written exercises**

Listen carefully and work out the answer in your *Ex. Bks*. You might find it easier to change the £s to pence first. Show me the result when I say.

Ps who respond correctly explain to those who do not.

a) How much will one bar of chocolate cost if 6 of the same bar cost £6.72? Show me . . . now! (£1.12)

b) How much does one exercise book cost if 4 of them cost £3.24? Show me . . . now! (81 p or £0.81)

c) How much is 1 balloon if a packet of 8 balloons costs £5.68? Show me . . . now! (71 p or £0.71)

Ps might calculate using horizontal or vertical division. If T thinks Ps understand about division, short form could be introduced as opposite.

T works through each one, explaining each step. e.g. '6H divided by 6 is 1H, so I write 1 in the hundreds column in the answer. 7T divided by 6 = 1T and 1T remains, so I write 1 in the tens column in the answer and the remaining 1T below. 1T = 10U, 10U + 2U = 12U. 12U divided by 6 = 2U, so I write 2 in the units column in the answer.'

Notes: Individual work, monitored

T walks round class while repeating each question.

Responses written on scrap paper or slates and shown in unison.

Reasoning, agreement, self-correction, praising

BB: e.g..

	1	1	2
6	6	7	2
–	6		
	0	7	
	–	6	
		1	2
	–	1	2
			0

	1	1	2
6	6	7	2
		1	

		8	1
4	3	2	4

		7	1
8	5	6	8

12 min

3 **Direct proportion**

What is the price of 4 tickets if 7 tickets cost £9.24?

How can we solve it? (Calculate the price of 1 ticket., then calculate the price of 7 tickets) T starts the working out and Ps continue it by coming to BB or dictating to T. Class agrees/disagrees

BB:

$$\begin{array}{lll} & 7 \text{ tickets} \rightarrow 924 \text{ p} & \\ \div 7 & 1 \text{ ticket} \rightarrow 132 \text{ p} & \div 7 \\ \times 4 & 4 \text{ tickets} \rightarrow 528 \text{ p} & \times 4 \end{array}$$

	1	3	2
7	9	2	4
–	7		
	2	2	
–	2	1	
		1	4
	–	1	4
			0

	1	3	2
7	9	2	4
	2	1	

1	3	2	×	4
5	2	8		
1				

Answer: 4 tickets cost £5.28.

Elicit that the number of tickets is in direct proportion to the cost.

(If the number of tickets increases by a certain number of times, the cost increases by the same number of times.)

Notes: Whole class activity

Discussion, reasoning, agreement, praising

Ps might remember diagram used in *Lesson Plan 152/9*.

Accept any correct form of form of calculation.

BB: £9.24 = 924 p

4 tickets: 924 p ÷ 7 × 4
= 528 p
= £5.28

Extra praise if Ps try the short form of divison!

17 min

Bk3

Lesson Plan 128

Activity | *Notes*

4

Book 3, page 128

Q.1 Read: *How much money does Alan have? Complete the table.*

What unit of money is used in the table? (pence) Ps do any necessary calculations in their *Ex. Bks* and complete table.

Set a time limit. Review at BB with whole class. Ps come out to complete a column, explaining reasoning. Write details on BB if there are problems. Mistakes discussed and corrected.

Who can write the rule? Who can write it another way? etc.

Solution:

Had (p)	128	556	436	**345**	216	**434**	405
Was given (p)	342	223	578	329	**755**	149	**347**
Now has (p)	**470**	**779**	**1014**	674	971	583	752

Rule: $N = H + W$ $\quad H = N - W$ $\quad W = N - H$

Notes:
Individual work, monitored, helped
Drawn on BB or use enlarged copy master or OHP
Differentiation by time limit
Reasoning, agreement, self-correction, praising
Discussion on the rule.
Checking with values from table.
T points to amount (in pence) and Ps say it in £s.

24 min

5

Book 3, page 128

Q.2 Read: *Susie and Penny have £754 altogether in their bank accounts. How much can they each have?*
Complete the table.

Elicit that top row in the table is the number of £s that Susie has and the bottom row is the number of £s that Penny has.

Ps do necessary calculations in *Ex. Bks* and complete table.

Set a time limit. Review at BB with whole class. Ps come out to complete a column, explaining reasoning. Write details on BB if there are problems. Mistakes discussed and corrected.

Who can write the rule? Who can write it another way? etc.

Solution:

S (£)	321	**212**	**616**	276	187	**298**	**531**	639	0	**2**
P (£)	**433**	542	138	**478**	**567**	456	223	**115**	**754**	752

Rule: $754 = S + P$ $\quad S = 754 - P$ $\quad P = 754 - S$

Notes:
Individual work, monitored, helped
Drawn on BB or use enlarged copy master or OHP
Differentiation by time limit
Reasoning, agreement, self-correction, praising
Details, e.g.

$$\begin{array}{r} 7\,5\,4 \\ -\,4\,5\,6 \\ \hline 2\,9\,8 \end{array} \quad \text{or} \quad \begin{array}{r} 7\,5\,4 \\ -\,4\,5\,4 \\ \hline 3\,0\,0 \end{array}$$

and 300 − 2 = <u>298</u>

Extra praise if Ps find easy way of calculating.
Discussion on the rule.
Checking with values from table.

33 min

6

Book 3, page 128

Q.3 Deal with one part at a time. Ps read problems themselves, do the calculations in their *Ex. Bks* and write the answer as a sentence in their *Pbs*. Review at BB with whole class. Ps explain reasoning and write calculation on BB. Mistakes discussed and corrected.

a) *Kim has 4 times the amount of money that Leslie has. Leslie has £176. How much do they have altogether?*

BB: L: £176 K: 4 × £176

L + K = 176 + 4 × 176
= 5 × £176 or = £176 + £704
= <u>£880</u> = <u>£880</u>

Answer: They have £880 altogether.

Notes:
Individual work, monitored, helped
Reasoning, agreement, self-correction, praising
Deal with both ways of calculating. Details written on BB: e.g.

$$\begin{array}{r} 1\,7\,6 \times 5 \\ \hline 8\,8\,0 \\ {\scriptstyle 3\;3} \end{array}$$

or

$$\begin{array}{r} 1\,7\,6 \times 4 \\ \hline 7\,0\,4 \\ {\scriptstyle 3\;2} \end{array} \qquad \begin{array}{r} {\scriptstyle 1} \\ 1\,7\,6 \\ +\,7\,0\,4 \\ \hline 8\,8\,0 \end{array}$$

Bk3

Lesson Plan 128

Activity		Notes

6

(Continued)

Q.3 b) *Andrea has £6.42. She bought some flowers for £2.35. The money she has left is 1 third of the money her sister has. How much does her sister have?*

BB: A: £6.42 – £2.35 S: A × 3

S: (£6.42 – £2.35) × 3 = £4.07 × 3 = <u>£12.21</u>

Answer: Andrea's sister has £12.21.

c) *Eve had £5.64. She bought some sweets with 1 quarter of her money. How much did she have left?*

BB: Had: £5.64 Spent: £5.64 ÷ 4

Had left: £5.64 – £5.64÷ 4 = £5.64 – £1.41 = <u>£4.23</u>

or £5.64 ÷ 4 × 3 = £1.41 × 3 = <u>£4.23</u>

Answer: Eve had £4.23 left.

Notes:

Details: e.g.

$$\begin{array}{r} 642 \\ -\ 235 \\ \hline 407 \end{array} \qquad \begin{array}{r} 407 \times 3 \\ \hline 1221 \end{array}$$

Accept any correct method of calculation, e.g.

$$\begin{array}{r} 141 \\ 4\,)\,564 \\ -\,4 \\ \hline 16 \\ -\,16 \\ \hline 04 \\ -\,4 \\ \hline 0 \end{array} \qquad \begin{array}{r} 564 \\ -\ 141 \\ \hline 423 \end{array} \quad \text{or} \quad \begin{array}{r} 141 \times 3 \\ \hline 423 \\ {}_1 \end{array}$$

38 min

7

Book 3, page 128

Q.4 Read: *What is the price of 7 tickets if 4 tickets cost £9.24?*

Review at BB with whole class. Mistakes corrected. Agree that the number of tickets and the price are in direction proportion to one another

Solution:

4 tickets cost: £9.24

1 ticket costs: £9.24 ÷ 4 = £2.31

7 tickets cost: £2.31 × 7

= <u>£16.17</u>

$$\begin{array}{r} 231 \\ 4\,)\,924 \\ -\,8 \\ \hline 12 \\ -\,12 \\ \hline 04 \\ -\,4 \\ \hline 0 \end{array} \qquad \begin{array}{r} 231 \times 7 \\ \hline 1617 \\ {}_2 \end{array}$$

or 3 tickets:
£2.31 × 3 = £6.93

$$\begin{array}{r} 924 \\ +\ 693 \\ \hline 1617 \\ {}_1 \end{array}$$

Notes:

Individual work, monitored, helped

Ps could show results on scrap paper or slates on command.

Reasoning, agreement, self-correction, praising

BB: £9.24 = 924 p

1617 p = £16.17

41 min

8

Book 3, page 128 Q.5

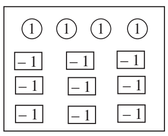
Read: *Calculate the balance.*

How can we solve it? T asks several Ps what they think. (e.g. count the positive amounts, then the negative amounts, and subtract them, or pair up positive and negative amounts on a one-to-one basis and see what is left over.) What do you think is the easiest method?

Ps come to BB to explain reasoning and to write the balance. Class agrees/disagrees. Ps write balance in in *Pbs* too.

Solution:

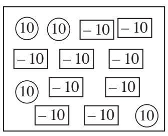
a)



– 5

(4 × 1 + 9 × – 1)
(+ 4 and – 9)

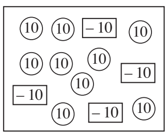
b)



– 50

(4 × 10 + 9 × – 10)
(+ 40 and – 90)

c)



50

(9 × 10 + 4 × – 10)
(+ 90 and – 40)

Notes:

Whole class activity
(or individual work, one at a time if Ps wish)

Drawn on BB or use enlarged copy master or OHP

Discussion on strategy for solution.

Reasoning, agreement, praising

Refer to class number line.

Remind Ps that <u>positive</u> numbers are greater than zero (to right of 0 on number line) and <u>negative</u> numbers are less than zero (left of 0 on number line) and that positive numbers are usually written without the '+' sign in front of them, i.e. +6 = 6

45 min

Bk3

R: Mental and written calculation
C: Revision: Enlargement, reduction
E: Puzzles

Lesson Plan 129

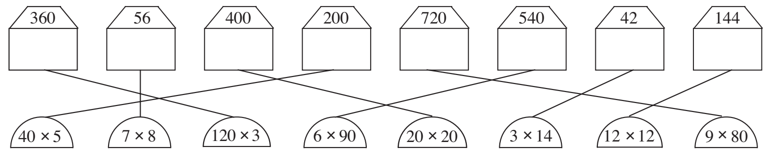
Activity | *Notes*

1

Equal values

Let's match up the mouseholes to the houses. Ps come to BB to draw joining lines (or stick mouseholes inside appropriate houses) saying the whole equation. (e.g. '120 times 3 equals 360') Class agrees/disagrees.

BB:



5 min

Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP, or items cut out and stuck to BB

At a good pace

Agreement, praising

Feedback for T

2

Boom!

Let's count down from 91 and say 'boom' instead of the numbers which are divisible by 3.

'91, Boom, 89, 88, Boom, 86, 85, Boom, 83, 82, Boom, 80, . . .

T advises Ps to break down 'difficult 'numbers into smaller bonds, e.g. 87 = 60 + 27, if they are unsure whether it is a multiple of 3.

8 min

Notes: Whole class activity

At speed in order round class.

If a P makes a mistake, next P corrects it.

In good humour!

Praising, encouragement only

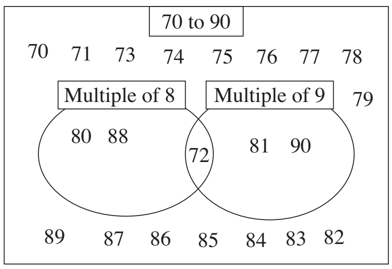
3

Sets

Let's write the whole numbers from 70 to 90 in the set diagram.

Ps come to BB to write numbers in order in correct set, explaining reasoning. Class agrees/disagrees.

BB:



13 min

Notes: Whole class activity

Use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Feedback for T

4

Magic square

This is a <u>magic square</u>. Who remembers what its rules are? (The sums of each row, column and diagonal are the same.)

What is the 'magic sum'? T asks several Ps what they think. P comes to BB to explain how he/she deduced it from completed column.

(BB: 230 + 270 + 310 = <u>810</u>)

Where should we go next? (e.g. 2nd row as only one number missing) Ps come out to fill in missing number, explaining reasoning. Class checks that they are correct. Continue in similar way until complete.

If Ps wish, let them try it themselves first in *Ex. Bks*. When they have found a row or column, they come to BB to show it and class checks that they are correct. Calculations done at side of BB if necessary.

17 min

Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

Ps have copy of copy master or draw and write in *Ex. Bks*.

BB <u>Magic square</u>

300	**230**	280
250	**270**	290
260	**310**	**240**

Reasoning, checking, agreement, praising

Bk3

Lesson Plan 129

Activity		*Notes*

5

Construction

Let's draw a table according to my instructions. T reads instructions and a P comes out to draw on BB or OHP while Ps draw on square grid or in *Ex. Bks* (using rulers).

a) Draw a table with height 2 units and width 4 units. Label it A.

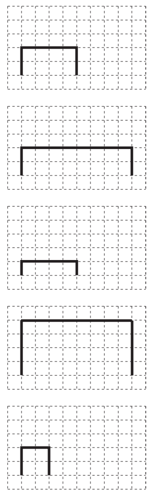
b) Now draw a table which is the same height as A but twice the width. Label it B.

c) Now draw a table which is the same width as A but half its height. Label it C.

d) Now draw a table which is twice the height and twice the width of A. Label it D.

e) Now draw a table which is the same height as A but half the width. Label it E.

A B C D E



Which tables are <u>similar</u>? Who remembers how to write it?

21 min

Notes:

Individual work, monitored, helped but class kept together.

Use BB with square grid or grid on copy master or OHP

T repeats each instruction slowly while walking round class.

Class points out any errors made by Ps working at BB.

Agreement, correction, praising

BB: <u>Similar</u> shapes:

A ~ D
B ~ C

(same shape, same or different size)

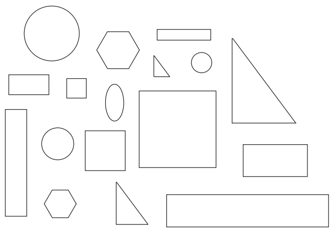
6

Similar shapes

T has various shapes stuck to BB. Which of these shapes are similar?

Ps come to BB to choose similar shapes. Class agrees/disagrees.

e.g. BB:



Ps say the names of the groups of shapes.

Agree that only the ellipse (or oval) does not have a similar shape.

25 min

Notes:

Whole class activity

Use copy master, with shapes enlarged onto coloured paper, cut out and stuck to BB at random

At a good pace

Point out the two different kinds of rectangles.

Agreement, praising

7

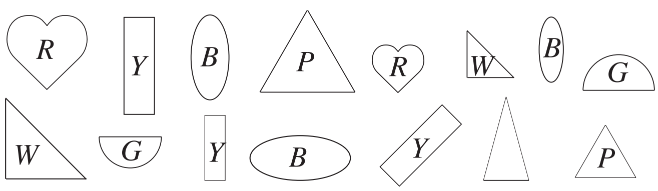
Book 3, page 129

Q.1 Read: *Colour similar shapes in the same colour.*

Review at BB with whole class. Ps come to BB to colour shapes (or write initial letter of colour to save time).

Class agrees/disagrees. Mistakes corrected. (Only one triangle remains uncoloured because it does not have a similar shape.)

Solution:



30 min

Notes:

Individual work, monitored, helped

Use enlarged copy master or OHP, or shapes enlarged onto coloured paper, cut out and stuck to BB

Discussion, agreement, self-correction, praising

Feedback for T

Bk3

Lesson Plan 129

Activity		*Notes*

8

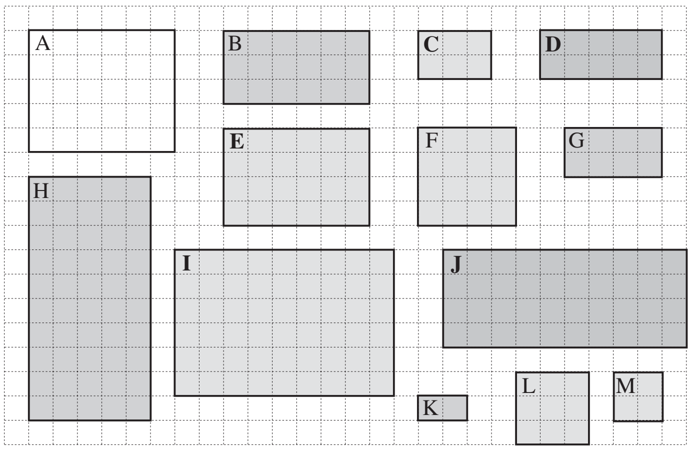
Book 3, page 129

Q.2 Read: *Colour similar rectangles in the same colour.*

Some of these rectangles look similar. How can we make sure that they are similar? (Count the units along each side,)
Elicit that there are rectangles with sides in the ratio of:
1:1 (squares), 2:1, 3: 2, etc.

Review at BB with whole class. Ps come to BB or dictate to T who writes similarities on BB. Class agrees/disagrees. Mistakes corrected. Agree that only *Shape A* does not have a similar shape. Who could draw one? P comes to BB. Class decides whether or not it is similar.

Solution:



36 min

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Initial discussion to draw Ps' attention to the different ratio of lengths of sides.

Discussion, agreement, self-correction, praising

BB:

B ~ G ~ H ~ K (2:1)
C ~ E ~ I (3:2)
D ~ J (5:2)
F ~ L ~ M (1:1)

Extension

Ps calculate the perimeter and area of each rectangle.

e.g.

K: $P = (2 + 1 + 2 + 1)$ units
$= 6$ units

$A = (2 \times 1)$ unit squares
$= 2$ unit squares

9

Book 3, page 129

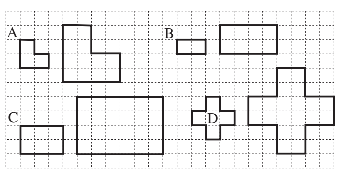
Q.3 Read: *Enlarge each shape to twice its size.*

Ps could have copies of copy master on desks if diagrams in *Pbs* are too small. Agree that each side of a shape should be twice as long. Deal with one part at a time.

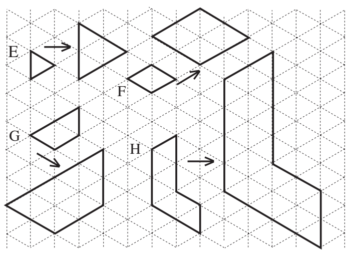
Review at BB with whole class. Ps show their solutions on BB. Class checks that they are correct.

Solution:

a)



b)



42 min

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, agreement, self-correction, praising

Extension

T points to some shapes and Ps say the perimeter and area (part a) in unit squares and part b) in unit triangles)

Class agrees/disagrees.

Praising

10

Book 3, page 129

Q.4 Read: *Lengthen this line to 3 times its length.*

What is the length of the line in your *Pbs*? (Ps measure in cm)
Agree that it is 5 cm long. Ps lengthen it as instructed and write its total length in cm below the line. Agree that it should be 3×5 cm = 15 cm long. How many mm is 15 cm? (150 mm)

What fraction of the new line is the original line? (1 third)

45 min

Notes:

Ps have cm rulers on desks.

Individual work, monitored

Agreement, self-correcting, praising

Bk3

R: Mental and written calculation

C: Revision: enlargement, reduction. Plans and maps

E: Problems and puzzles

Lesson Plan 130

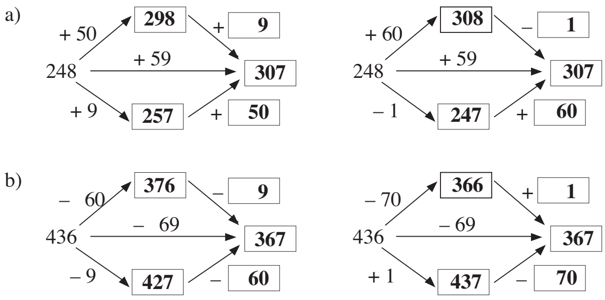
Activity | *Notes*

1 Missing numbers

Study the diagrams. Think about what is happening. Ps do the calculations mentally or in *Ex. Bks*.

Ps come to BB to fill in missing numbers, explaining reasoning. Class agrees/disagrees. Which method do you think is easier? Why?

BB:



5 min

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, praising

Details of calculations: e.g.

a)

	1	1	
	2	4	8
+		5	9
	3	0	7

b)

	4	$^{10}3$	$^{10}6$
−	$_1$	6_1	9
	3	6	7

2 Multiplication and division tables

Ps stand. They have multiplication squares on desks in case they need it.

T says a multiplication or division. Ps say product or quotient. If a P answers correctly he/she sits down but if not, next P corrects it.

T notes which facts certain Ps do not know and keeps coming back to ask them again. T asks Ps to note unknown facts too and to learn them by heart. (T could ask them at any time during the school day!)

10 min

Notes:

Whole class activity

At speed. T calls Ps in order or at random.

Praising, encouragement only

In good humour!

T notes which Ps need to use their multiplication tables.

3 Comparison

Which side is more? How many more? Ps come to BB to work out LHS and RHS, explaining reasoning in detail, then to write in the missing sign and how many more. Class checks that they are correct.

BB:

a) $\overset{60}{600 \div 10} \ \underset{5}{\boxed{<}} \ \overset{65}{5 \times 13}$ b) $\overset{90}{180 \div 2} \ \underset{13}{\boxed{>}} \ \overset{77}{7 \times 11}$

c) $\overset{20}{140 \div 7} \ \underset{8}{\boxed{<}} \ 100 - \underset{(28)}{\overset{72}{6 \times 12}}$ d) $\overset{250}{1000 \div 4} \ \boxed{=} \ \underset{(250)}{\overset{39}{13 \times 3} + 211}$

T chooses Ps to read the completed statements (or class reads in unison).

15 min

Notes:

Whole class activity

Ps do calculations in *Ex. Bks* if they wish (or at side of BB)

Reasoning, agreement, praising. Details, e.g.

a)

1	3	×	5
6	5		
	1		

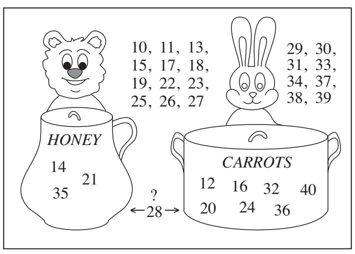
d)

		2	5	0
4	1	0	0	0
	−	8		
		2	0	
	−	2	0	
			0	0

4 Sorting numbers

Barry Bear is collecting numbers divisible by 7. *Flossie Rabbit* is collecting the multiples of 4. Let's help them by writing the numbers from 10 to 40 in the correct set.

BB:



Ps come to BB to write numbers. Class points out errors. Agree that numbers belonging to neither set should be written outside.

Discuss the number 28, which belongs in both sets. Who should have it? What can we do to prevent a quarrel?

(Write 28 in both sets.) In what other way could we show it? (Draw a Venn diagram.) Allow Ps to draw it if they can (with T's help).

20 min

Notes:

Whole class activity

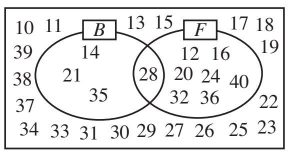
Drawn on BB or use enlarged copy master or OHP

At speed

Agreement, praising

Discussion, agreement

BB: Venn diagram e.g.



Praising, encouragement only!

Bk3

Lesson Plan 130

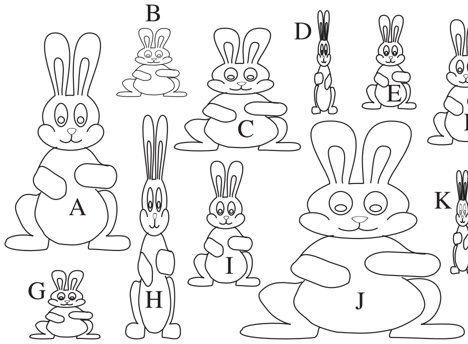
Activity		*Notes*

5

Similarity and congruence

T has pictures of different forms and sizes stuck on BB. e.g.

BB:



- Which are <u>similar</u>? (i.e. have the same shape but are the same or a different size). Ps come to BB to point. Class agrees/disagrees. How can we write it mathematically? Ps write with T's help.
- Which are exactly the same? Ps come to BB to point. Class agrees/disagrees. What do we call shapes which are exactly the same as each other? (<u>congruent</u>) Who remembers how we can write it mathematically? T shows if nobody remembers.

Agree that congruent shapes are also similar to each other but similar shapes are not necessarily congruent.

Notes:

Whole class activity

Use enlarged copy master or OHP, or any other suitable pictures.

Ask Ps to describe the pictures and elicit that there are 3 different forms. Encourage them to use mathematical terms, e.g.

A is an enlargement of I.
K is a reduction of H.
H has been stretched vertically.
G has been stretched horizontally.

BB: <u>Similar shapes</u>

$D \sim H \sim K$
$A \sim E \sim F \sim I$
$B \sim C \sim G \sim J$

<u>Congruent shapes</u>

$D \cong K$
$F \cong I$
$B \cong G$

Agreement, praising

26 min

6

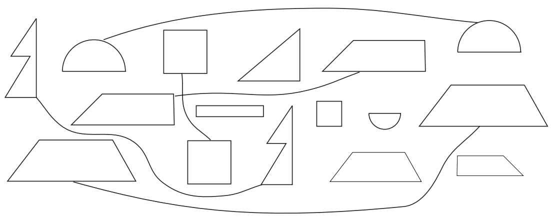
Book 3, page 130

Q.1 Read: *Join up the shapes which are congruent.*

Review at BB with whole class. Ps come to BB to draw joining lines. Class agrees/disagrees. Mistakes corrected.

T points to a shape and Ps say its mathematical name. (square, rectangle, quadrilateral, triangle, semi-circle, pentagon)

Solution:



Extension

Who can point to parallel lines (perpendicular lines, right angles)? Who remembers how we show them? BB:

Notes:

Individual work, monitored helped

Drawn on BB or use enlarged copy master or OHP

Discussion, agreement, self-correction, praising

(Or Ps point to shapes and say the names they know.)

How can we check that two shapes are congruent? (Cut one out or trace over one and see if it covers the other <u>exactly</u>.) T demonstrates with pairs of prepared shapes from this (or previous) question.

Agreement, praising

30 min

7

Book 3, page 130

Q,2 Read: *This is a plan of a school. Measure each side of the rectangles in the plan.*

T explains the plan, indicating the 4 rectangles (*Rectangle 1* being the whole site) and elicits the meaning of the scale.

Do you think we need to measure each side of every rectangle? (No, we only need to measure a long and a short side, as opposite sides are equal.) Let's say that the length is the long side and the width is the short side of a rectangle.

What unit should we use to measure? (mm)

Notes:

Ps have cm rulers on desks.

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP for demonstration only

Initial discussion about plan

BB:

<u>Scale</u>: 1 mm → 1 m
on map → in real life

Bk3

Lesson Plan 130

Activity		*Notes*

7

(Continued)

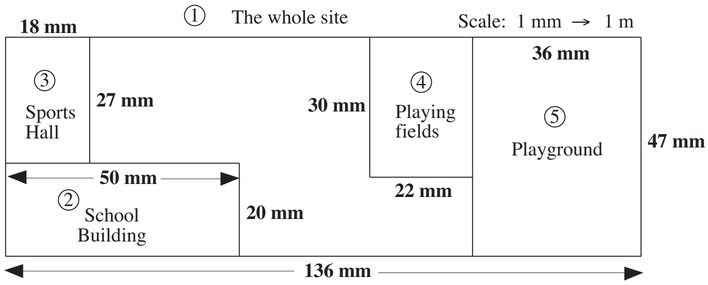
Deal with one rectangle at a time. T shows it on plan on BB and Ps measure the length and width and write it on their plans. Ps dictate to T what to write on plan on BB.

Read: *Calculate the lengths in real life. Write both sets of data in the table.*

Ps come to BB to fill in a column in the table on BB. Class agrees/disagrees. Ps write data in tables in *Pbs* at same time.

Agree that calculation is not necessary as the numerical value is the same – only the unit changes!

Solution:



Rectangle		①	②	③	④	⑤
On plan:	Length (mm)	**136**	**50**	**27**	**30**	**47**
	Width (mm)	**47**	**20**	**18**	**22**	**36**
In real life:	Length (m)	**136**	**50**	**27**	**30**	**47**
	Width (m)	**47**	**20**	**18**	**22**	**36**

40 min

Notes:

Individual work, monitored

Keep class together for each rectangle if Ps are unsure.

Agreement, self-correcting, praising

At a good pace

BB: e.g. 10 mm → 10 m
100 mm → 100 m

Extensions

1. Ps calculate the real perimeter and area of some of the rectangles. e.g.

   $P3 = (18\text{ m} + 27\text{ m}) \times 2$
   $= 45\text{ m} \times 2 = \underline{90\text{ m}}$

   $A4 = 22\text{ m} \times 30\text{ m}$
   $= 660$ square metres
   (or 600 m^2)

2. How far are the playing fields from the sports hall?

   100 m – (18 m + 22 m)
   = 100 m – 40 m =$\underline{60\text{ m}}$

Or Ps can think of questions!

8

Book 3, page 130

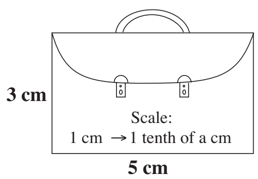
Q.3 Read: *This is an enlarged drawing of Flea's briefcase. Measure its sides, then calculate what they would be in real life. Write both sets of data in the table.*

Ps write lengths on diagram. Review with whole class. Mistakes corrected.

Ps fill in table. Review at BB with whole class. Ps dictate results or come to BB. Mistakes discussed and corrected.

Elicit that 1 tenth of a cm is 1 mm. Ps convert real life lengths to mm.

Solution:



On plan:	Length (cm)	**5**	
	Height (cm)	**3**	
In real life:	Length (cm)	**5 tenths**	(= 5 mm)
	Height (cm)	**3 tenths**	(= 3 mm)

Compare the scales in this and in previous question.
(The school's plan was drawn to a <u>smaller</u> scale and *Flea*'s plan was drawn to a <u>larger</u> scale so that we could see and cope with them more easily.)

45 min

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP for demonstration only

Discussion, agreement, self-correction, praising

[Extension – for very able Ps
Flea's umbrella fits diagonally in his case. What length could it be in real life? (5.8 mm)]

Whole class discussion on reasons for using larger and smaller scales.

Bk3	R: Mental and written calculation **C: Revision: similarity, enlargement, reduction (perimeter, area)** *E: Problems, puzzles*	*Lesson Plan 131*

Activity — ***Notes***

1

Number sets

Let's write these numbers in the correct place on both diagrams.

BB: 16, 27, 25, 53, 46, 57, 60, 35, 31, 47, 14, 58, 54

Remainder after dividing by 5

0	1	2	3	4
25, 60	16, 46	27, 57	53, 58	14, 54
35	31	47		

Remainder after dividing by 6

0	1	2	3	4	5
60, 54	25, 31	14	27, 57	16, 46	53, 35
				58	47

5 min

Whole class activity

Written/drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Reasoning:

e.g. $57 = 11 \times 5 + 2$

or $57 \div 6 = 9$, remainder 3

or '60 is exactly divisible by 5 because it has zero as the units digit',

2

Writing numbers

Write these numbers as digits in your *Ex. Bks*. T dictates:

a) 5H + 6T + 4U (564) b) 1Th + 5H + 2T (1520)

c) 36T + 5U (365) d) 15H + 6U (1506)

e) 7H + 28T (980) f) 1Th + 3T + 43U (1073)

Review at BB with whole class. Ps change pencils and mark/correct own work. Ps give details if problems. Who had all correct? Who made a mistake? What kind of mistake? Who did the same? etc.

What other questions could we ask about the numbers? e.g.

- List them in increasing order.
- What is the nearest 10 (100)?
- How could we put them in sets? (Ps suggest different ways.)

10 min

Individual work, monitored, helped

T could have BB or SB or OHT already prepared and uncover each as it is dealt with.

Details,: e.g.

36T + 5U = 3H + 6T + 5U
= 365

Agreement, self-correcting, evaluation, praising

Praise all contributions.

Class decides which ones they would like to do.

3

Missing digits

Which digits are missing from these addition sums? Ps come to BB to fill them in, explaining reasoning. Class checks that they are correct.

BB:

a) $\begin{array}{r} 648 \\ +\mathbf{281} \\ \hline 929 \end{array}$ $\begin{array}{r} \mathbf{303} \\ +345 \\ \hline 648 \end{array}$ $\begin{array}{r} 999 \\ +\mathbf{889} \\ \hline 1888 \end{array}$ $\begin{array}{r} \mathbf{55} \\ +995 \\ \hline 1050 \end{array}$

b) $\begin{array}{r} \mathbf{5}53 \\ +46\mathbf{0} \\ \hline \mathbf{1}0\mathbf{1}3 \end{array}$ $\begin{array}{r} 35\mathbf{8} \\ +\mathbf{18}5 \\ \hline 543 \end{array}$ $\begin{array}{r} 5\mathbf{1}8 \\ +\mathbf{5}3\mathbf{0} \\ \hline 1048 \end{array}$ $\begin{array}{r} 3\mathbf{3}8 \\ +617 \\ \hline \mathbf{9}5\mathbf{5} \end{array}$

18 min

Whole class activity

(or Ps copy in *Ex Bks* and complete individually if they wish)

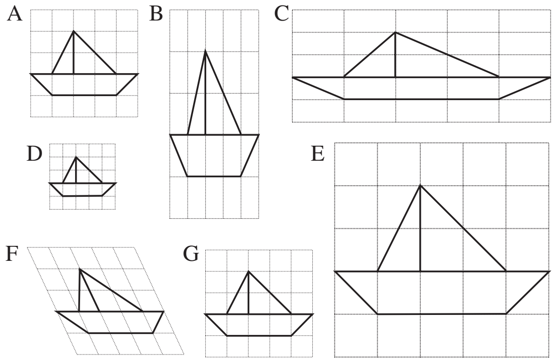
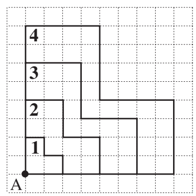
Written on BB or use enlarged copy master or OHP

Agreement, checking, praising

Feedback for T

Bk3

Lesson Plan 131

Activity		*Notes*
4	**Similar shapes** T has grids on BB or OHT and *Ship A* already drawn (or use blank grid and a P comes out to draw a ship). Let's draw the ship on the other grids. Ps come to BB to choose a grid and draw the ship. Class points out when they go wrong. BB:  Which ships are <u>similar</u> to A? Ps dictate to T or come out to point. Which ship is <u>congruent</u> to A? (G, as it can cover A exactly)	Whole class activity Drawn on BB OHT or use enlarged copy master or OHP (Ps could have copies of grids on desks too if they wish) At a good pace Agreement, praising Discussion about the different shapes. Involve several Ps. BB: <u>Similar shapes</u> A ~ D ~ E ~ G <u>Congruent shapes</u> A ≅ G
Extension	We started with *Ship A*. Compare the other ships with *Ship A*. (Encourage Ps to use words such as enlarged, reduced, stretched horizontally/vertically, <u>skewed</u>.) *25 min*	T repeats unclear or vague descriptions precisely. Praising, encouragement only
5	***Book 3, page 131,*** *Q.1* Read: *A is a common vertex (corner) of 4 similar shapes.* Who can come and show me the 4 similar shapes? Ps come to BB to trace each one with their fingers. Let's label them 1, 2, 3 and 4. How many vertices does each one have? (6) Explain that A is the only vertex shared by all 4 shapes. Imagine them one on top of the other. a) Read: *How many times has the smallest shape been enlarged to make the others?* Ps come to BB to point to one shape at a time, count the unit squares along a side and compare with *Shape 1*. Elicit that the *Shape 1* has been enlarged: <u>Ratio</u> <u>2</u> times to make *Shape 2* 1 : 2 <u>3</u> times to make *Shape 3* 1 : 3 <u>4</u> times to make *Shape 4*. 1 : 4 b) Read: *What are their perimeters in units?* Who can explain why the perimeter of *Shape 1* (P_1) is 8 units? P comes to BB to show that (2 + 1 + 1 + 1 + 1 + 2 = 8) units Let's see if you can work out the perimeters of the other shapes. Review at BB with whole class. Ps dictate to T and demonstrate if necessary. Mistakes corrected. c) Read: *What are their areas in square units?* T shows that the area of *Shape 1* (A_1) is 3 squares. Let's see if you can work out the areas of the other shapes. Review at BB with whole class. Ps dictate to T and demonstrate if problems. Mistakes discussed and corrected. What do you notice? *31 min*	Whole class activity to start Drawn on BB or use enlarged copy master or OHP BB:  At a good pace. Agreement, praising T talks about the <u>ratio</u> of the enlargements. Individual work, monitored, helped Reasoning, agreement, self-correction, praising BB: b) P_1 = 8 units, P_2 = <u>16</u> units P_3 = <u>24</u> units, P_4 = <u>32</u> units c) A_1 = 3 □s, A_2 = <u>12</u> □s A_3 = <u>27</u> □s, A_4 = <u>48</u> □s If P increases by 2 times, A increases by 2 × 2 times, etc.

Bk3

Lesson Plan 131

Activity		*Notes*

6

Book 3, page 131*, Q.2*

Read: *A is a common vertex (corner) of 4 similar triangles.*

Who can come and show me the 4 similar triangles? Ps come to BB to trace each one with their fingers. Let's label them 1, 2, 3 and 4.

How many vertices does each one have? (3) Elicit that A is the only vertex shared by all 4 triangles.

a) Read: *How many times has the smallest triangle been enlarged to make the others?*

Ps come to BB to point to one triangle at a time, count the unit unit triangles along a side and compare with *Triangle 1*.

Elicit that the *Triangle 1* has been enlarged: <u>Ratio</u>

<u>2</u> times to make *Triangle 2* 1 : 2
<u>3</u> times to make *Triangle 3* 1 : 3
<u>4</u> times to make *Triangle 4*. 1 : 4

b) Read: *What are their perimeters in units?*

P explains why the perimeter of *Triangle 1* (P_1) is 3 units.

Write the perimeters of the other triangles in your *Pbs*.

Review at BB with whole class. Ps dictate to T and demonstrate if necessary. Mistakes corrected.

c) Read: *What are their areas in square units?*

T shows that the area of *Triangle 1* (A_1) is 3 triangles.

Write the areas of the other triangles in your *Pbs*.

Review at BB with whole class. Ps dictate to T and demonstrate if problems. Mistakes discussed and corrected. What do you notice?

Extension

If we had started with *Triangle 4* and <u>reduced</u> it to make the other triangles, what would the ratio of reduction be?

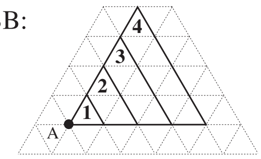
BB: *Triangle 4* to *Triangle 3* 1 : 3 quarters
Triangle 4 to *Triangle 2* 1 : 1 half
Triangle 4 to *Triangle 1* 1 : 1 quarter

Notes:

Whole class activity to start

Drawn on BB or use enlarged copy master or OHP

BB:



At a good pace. Agreement, praising

T talks about the <u>ratio</u> of the enlargements.

Individual work, monitored, helped

Reasoning, agreement, self-correction, praising

BB:

b) $P_1 = 3$ units, $P_2 = \underline{6}$ units
$P_3 = \underline{9}$ units, $P_4 = \underline{12}$ units

c) $A_1 = 1$ △, $A_2 = \underline{4}$ △s
$A_3 = \underline{9}$ △s, $A_4 = \underline{16}$ △s

If *P* increases by 2 times, *A* increases by 2 × 2 times,
If *P* increases by 3 times, *A* increases by 3 × 3 times,
etc.

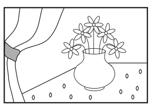
Discussion, agreement, praising

38 min

7

Book 3, page 131

Q.3 Read: *This is a reduced photocopy of a painting.*



Discuss the meaning of the scale (BB) and elicit that the actual painting will be 2 × 10 = 20 times larger.

Deal with one part at a time. Make sure that Ps know that:

w_1 = width of photocopy w_2 = width of painting
h_1 = height of photocopy h_2 = height of painting

Ps measure or calculate and write results in *Pbs*.

Review at BB with whole class. Mistakes discussed/corrected

If possible, T could have a frame made out of card (or real wooden frame) in the correct dimensions to show to class.

Solution:

a) $w_1 = 45$ mm, $h_1 = 30$ mm; b) $w_2 = 90$ cm, $h_2 = 60$ cm;

c) Length of wood: (90 cm + 60 cm) × 2 = 150 cm × 2
= <u>300 cm</u> (= 3 m)

d) Area of glass: 90 cm × 60 cm = 900 cm × 6 cm
= <u>5400 cm squares</u> (5400 cm^2)

Notes:

Individual work, monitored, helped but class kept together at each part

Use enlarged copy master for demonstration only

BB: <u>Scale</u>: 10 mm → 20 cm
1 mm → 2 cm
1 mm → 20 mm

Discussion, reasoning, agreement, self-correcting, praising

Show actual frame (and picture too) if possible.

T might need to help with the calculation in d).

BB: 5400 = 5Th + 4H

Ps colour the picture if they wish.

45 min

Bk3

R: Mental and written calculation
C: Revision: perimeter, area
E: Problems. Challenges

Lesson Plan
132

Activity		*Notes*

1

Sequences

T says first 4 terms of a sequence. Ps write them in *Ex. Bks*. Let's see how far you can continue the sequence in 2 minutes*!*

Start . . now! . . . Stop!

Everyone stand up! Ps say one term each and T writes on BB. Ps sit down when they have made a mistake or have come to the end of their terms. Last P standing gives his/her remaining terms. Class applauds the winner(s).

What is the rule? Ps explain the rule they used, e.g. difference between terms is increasing by 2:

BB: 1, 4, 9, 16, (25, 36, 49, 64, 81, 100, 121, 144, 169, . . .)
3 5 7 9 11 13 15 17 19 21 23 25 . . .

or ordinal numbers (which position they are in) multiplied by themselves:

BB: 1st term: 1×1, 2nd term: 2×2, 3rd term: 3×3, etc.

Ps check all the terms on the BB, giving details of difficult calculations.

e.g. $12 \times 12 = 12 \times 10 + 12 \times 2 = 120 + 24 = 144$, etc.

T explains that the numbers in the sequence are called <u>square numbers</u> because they are made by multiplying a number by itself. Their factors can form the sides of a square. (T demonstrates some on BB.)

5 min

Notes:
Whole class activity
Differentiation by time limit

Quick evaluation of terms
Agreement, praising

Discussion, checking, agreement, praising

Ps dictate differences to T

If no P has used this rule, give them the chance to think of it (with a hint if necssary).

Discussion, checking, agreement, praising

BB: <u>Square numbers</u>

1 $\boxed{\mathbf{1}}$ 1   7 $\boxed{\mathbf{49}}$ 7   10 $\boxed{\mathbf{100}}$ 10

2

Missing digit

Which digits are missing from these addition sums? Ps come to BB to fill them in, explaining reasoning. Class checks that they are correct.

BB:

a) $\begin{array}{r} 853 \\ -\,\mathbf{721} \\ \hline 132 \end{array}$ b) $\begin{array}{r} \mathbf{783} \\ -\,175 \\ \hline 608 \end{array}$ c) $\begin{array}{r} \mathbf{73}5 \\ -\,43\mathbf{9} \\ \hline 296 \end{array}$ d) $\begin{array}{r} \mathbf{7}38 \\ -\,5\mathbf{19} \\ \hline 219 \end{array}$ e) $\begin{array}{r} 12\mathbf{21} \\ -\,496 \\ \hline \mathbf{7}25 \end{array}$

T revises methods of subtraction in detail if necessary. (BB)

10 min

Notes:
Whole class activity
(or Ps copy in *Ex Bks* and complete individually if they wish)

Written on BB or use enlarged copy master or OHP

Agreement, checking, praising

Feedback for T

3

Problems

Listen carefully and picture the problem in your head. You can do the calculation mentally or write it in your *Ex. Bks* if you need to. Show me the answer when I say.

a) *A giraffe is about twice as tall as an ostrich. If a giraffe is about 500 cm tall, about how tall is an ostrich?*
Show me . . . now! (250 cm) [BB: 500 cm ÷ 2 = 250 cm]

b) *A fully grown swan is about 1 m 60 cm in length. The smallest bird in Europe is about 8 cm long. How many times longer is a swan?*
Show me . . . now! (20) [BB: 160 cm ÷ 8 cm = 20 (times)]

c) *A bison weighs about 1800 kg, which is about 3 times the mass of a horse. What does a horse weigh?*
Show me . . . now! (600 kg) [BB: 1800 kg ÷ 3 = 600 kg]

d) *An ant takes 1 minute to go 356 cm. How far can it go in 4 minutes?*
Show me . . . now! (1424 cm or 14 m 24 cm)

18 min

Notes:
Whole class activity
(T could have pictures of relevant animals and birds to show to class)

Responses shown on scrap paper or slates in unison.

Ps who respond correctly explain to those who do not.

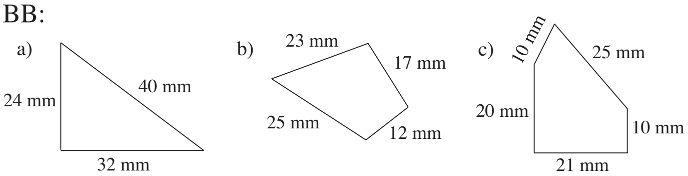
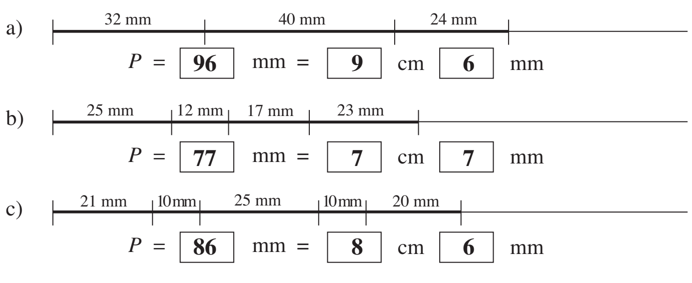
(Or in b) or c) T could give only the facts and ask Ps to think of a question for class to answer.)

Reasoning, agreement, praising

BB:
d) $\begin{array}{r} 356 \times 4 \\ \hline 1424 \\ {\scriptstyle 2\;2}\;\; \end{array}$
or
3 m 56 cm $\times$ 4 = 12m + 2 m + 24 cm = 14 m 24 cm

Bk3

Lesson Plan 132

Activity		*Notes*
4	**Written exercises** Do these calculations in your *Ex. Bks*. T dictates and writes on BB: a) 37 × 3 = (111) b) 101 × 11 = (1111) c) 143 × 7 = (1001) 37 × 6 = (222) 202 × 11 = (2222) 286 × 7 = (2002) 37 × 9 = (333) 303 × 11 = (3333) 143 × 14 = (2002) Review at BB with whole class. Ps dicate results and explain reasoning. Class agrees/disagrees. Mistakes corrected. What do you notice? (Extra praise if Ps notice the relationships without hint from T.) *22 min*	Individual work, monitored Or T could have BB or SB or OHT already prepared and uncover each as it is dealt with Discussion, reasoning, agreement, self-correcting, praising Accept any correct form of calculation. Feedback for T
5	***Book 3, page 132*** Q.1 Read: *Measure the sides of the triangle, quadrilateral and pentagon. Write the lengths on the diagrams.* T reminds Ps how to measure accurately with a ruler. Deal with one shape at a time. Ps measure the sides in mm and write the lengths on the diagram in their *Pbs*. Review at BB with whole class. Ps dictate what T should write. Class agrees/disagrees. Mistakes checked and corrected. BB:  Read: *Measure and mark the sides on the horizontal lines.* What do you think the *P* stand for? (Perimeter) Imagine that the perimeters of the shapes have been cut at a vertex (corner) and pulled out into a straight line. Agree that it does not matter at which vertex the cut is made, as the length will be the same. Ps do part a) under T's directions first. (e.g. Measure 32 mm along the line and make a short vertical mark, then write 32 mm below it. Repeat for the 40 mm and 24 mm sides.) What is the total length of the triangle's perimeter? Ps measure and check by adding the 3 lengths. Ps write in *Pbs*, T on BB. Parts b) and c) done as individual work if T thinks Ps understand. Review at BB with whole class. Ps dictate their results or come to write on BB. Class agrees/disagrees. Mistakes corrected. *Solution:*  *28 min*	Individual work, monitored, helped (especially with use of ruler) Demonstration with BB ruler Drawn on BB or use enlarged copy master for demonstration only Agreement, self-correction, praising Discussion about the task, the perimeter and the order of marking. Individual work but class kept together at each step Reasoning, agreement, self-correction, praising Individual work, monitored, helped Agreement, self-correction, praising Write details on BB if necessary: a) $P = (32 + 40 + 24)$ mm b) $P = (25 + 12 + 17 + 23)$ mm c) $P = (21 + 10 + 25 + 10 + 20)$ mm

Bk3

Lesson Plan 132

Activity		*Notes*

6

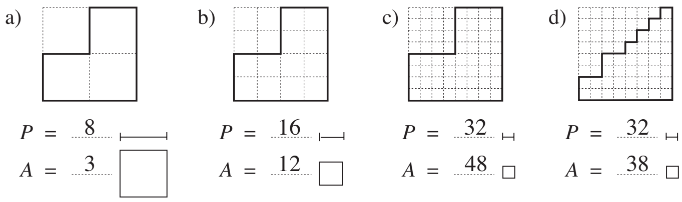
Book 3, page 132

Q.2 Read: *Count how many of the given units are in the perimeter and area of each shape.*

T explains task. Elicit that *P* means perimeter and *A* means area. Deal with one part at a time only if Ps are unsure.

Review at BB with whole class. Ps dictate to T or come to write on BB. Class agrees/disagrees.Mistakes discussed and corrected

Solution:



	a)	b)	c)	d)
P =	8	16	32	32
A =	3	12	48	38

What do you notice about the shapes? What connections can you see? e.g.

- The first 3 shapes are congruent (same form and equal size)
- All 4 shapes have the same perimeter length, but have been measured in different sizes of unit, e.g.
  using a unit half the size → 2 times as many needed
  using a unit 1 quarter the size → 4 times as many needed.
- The first 3 shapes cover the same area, but have been measured with different sizes of unit squares, e.g.
  using a unit 1 quarter of the size → 4 times as many needed
  using a unit 1 sixteenth of the size → 16 times as many needed.
- Shapes c) and d) have been measured using the same units. They have equal perimeters but c) has a larger area.

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Agreement, self-correction, praising

Whole class discussion

Involve several Ps

Praise all contributions.

T points out (or gives hints about) any not mentioned by Ps.

Ask Ps why they think c) has a larger area. (More regular)

33 min

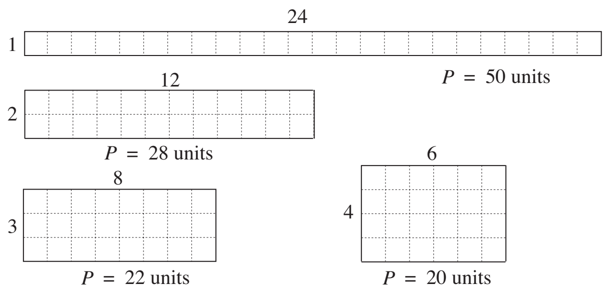
7

Area and perimeter

a) Draw different rectangles which have an area of 24 unit squares. Compare their perimeters.

Set a time limit. T chooses Ps to show different rectangles on a grid on BB or OHP. Which has the longest perimeter?

BB:



Notes:

Inividual work, monitored, helped

Ps use squared *Ex. Bks* or have squared sheets on desks.

Differentiation by time limit

Discussion on the different possible lengths of sides. Relate to the factors of 24:

1×24, 2×12, 3×8, 4×6

Agree that the longest perimeter has the least number of sides of a square touching another square, i.e. one row!

Agreement, praising

Bk3

Lesson Plan 132

Activity		Notes

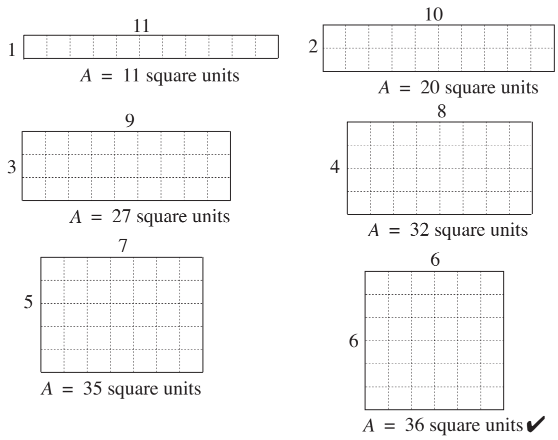
7

(Continued)

b) Draw different rectangles which have a perimeter of 24 units. Compare their areas.

Set a time limit.. T chooses Ps to show different rectangles on a grid on BB or OHP. Which has the biggest area?

BB:



Notes:

Individual work, monitored, helped

(Or T could have BB or OHT already prepared)

Discussion on the different possible lengths of sides.

Ps might notice that:
short + long side = 12 units, so possible lengths are:

1 + 11, 2 + 10, 3 + 9, 4 + 8, 5 + 7, 6 + 6

Agree that the rectangle with the largest area is the most regular, i.e. a square.

Extra praise for Ps who deduced this by themselves.

40 min

8

Book 3, page 132, Q.3

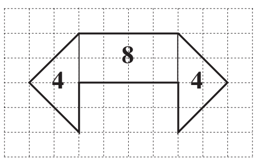
Read: *Divide up each shape into rectangles and triangles.*
Write the area of each smaller shape inside it.
Write the total area of each shape in the box.

Ps come to BB to draw the dividing lines. Other Ps come to BB to count the squares and write the area of each part, (counting the small triangles as half a square). What is the total area? Ps shout out in unison and T writes in relevant box. T might need to help with counting the parts of squares in b).

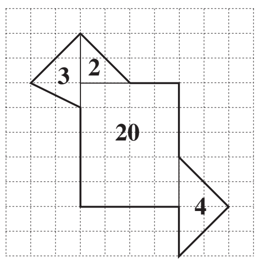
(Or part a) done as individual work and part b) with the whole class.)

Solution:

a)



b)



a) A = **16** unit squares

b) A = **29** unit squares

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Discussion, agreement, praising

Ps can work in in *Pbs* too if they wish.

[Finding the area of complex shapes]

Who can think of questions to ask about the shapes? (e.g.

- What is the length of each perimeter?
- Which shape is symmetrical?
- How many vertices do they each have? etc.)

45 min

Bk3	R: Calculation **C: Building and drawing solids** *E: 3 views. Surface area. Volume*	*Lesson Plan 133*

Activity | ***Notes***

1

Missing numbers

Which numbers could be written instead of the shapes so that the statement is true?

Ps do calculations in *Ex. Bks* first, then come out to write on BB (or dictate to T), explaining reasoning in detail. Class agrees/disagrees.

BB:

a) $\overset{389}{637 - 248} < 126 + \square < \overset{392}{98 \times 4}$

(263 < $\square$ < 266

$\square$: 264, 265)

b) $\overset{502}{287 + 215} > 802 - \bigcirc > \overset{498}{166 \times 3}$

(300 < $\bigcirc$ < 304

$\bigcirc$: 301, 302, 303) (Discuss why '>' must change to '<'.)

Details: e.g.

$$\begin{array}{r} 6\,{}^{10}3\,{}^{10}7 \\ -\ 2_1\,4_1\,8 \\ \hline 3\ 8\ 9 \end{array} \qquad \begin{array}{l} 9\ 8 \times 4 \\ \hline 3\ 9\ 2 \\ \ \ 3 \end{array} \quad \text{(or } 400 - 8 = 392\text{)}$$

$$\begin{array}{r} {}^{1}\ {}^{1}\ \ \\ 2\ 8\ 7 \\ +\ 2\ 1\ 5 \\ \hline 5\ 0\ 2 \end{array} \qquad \begin{array}{l} 1\ 6\ 6 \times 3 \\ \hline 4\ 9\ 8 \\ \ {}^{1}\ \ {}^{1} \end{array}$$

Notes: Whole class activity

Written on BB or SB or OHT

At a good pace

Reasoning, agreement, checking, praising

$$\begin{array}{r} 3\ 8\ 9 \\ -\ 1\ 2\ 6 \\ \hline 2\ 6\ 3 \end{array} \qquad \begin{array}{r} 3\ 9\,{}^{10}2 \\ -\ 1\ 2_1\,6 \\ \hline 2\ 6\ 6 \end{array}$$

$$\begin{array}{r} 8\ 0\ 2 \\ -\ 5\ 0\ 2 \\ \hline 3\ 0\ 0 \end{array} \qquad \begin{array}{r} 8\,{}^{10}0\,{}^{10}2 \\ -\ 4_1\,9_1\,8 \\ \hline 3\ 0\ 4 \end{array}$$

6 min

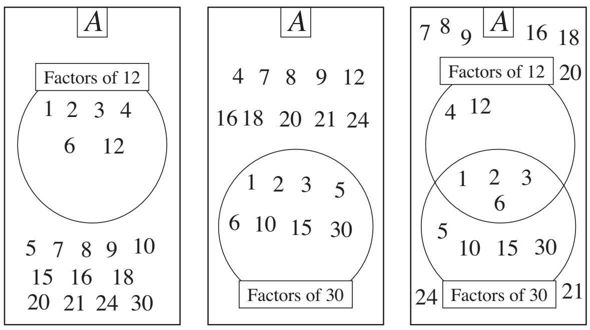
2

Number sets

Let's write these numbers in the correct place in the set diagrams.

Ps come to BB one after the other to write numbers in the sets and to underline or circle the number in the list as it is dealt with. Class points out errors.

BB: A = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 16, 18, 20, 21, 24, 30}



I will make statements about the sets and you must show me whether you think they are true or false.

a) There is at least one number which is a factor of 12 and 30. (T)

b) All the numbers which are factors of 12 are also factors of 30. (F)

c) There is a number which is a factor of 30 but not a factor of 12. (T)

Notes: Whole class activity

Written/drawn on BB or use enlarged copy master or OHP

Elicit that '*A*' in the diagrams means all the numbers inside the curly brackets.

At a good pace

Agreement, praising

Feedback for T

T repeats slowly and Ps show responses in unison (by writing 'T' or 'F' on slates or by pre-agreed actions)

e.g. 2

e.g. 4 is not a factor of 30

e.g. 5

13 min

3

Smallest numbers

Write these digits in your *Ex. Bks*. Cross out 3 of the digits so that the remaining digits make as small a number as possible without changing the order. T dictates and also writes on BB:

a) $\cancel{9}\,\cancel{8}\,7\,\cancel{9}\,8\,7$ (787) b) $\cancel{4}\,\cancel{5}\,\cancel{4}\,4\,3\,2$ (432) c) $\cancel{1}\,1\,0\,0\,3\,\cancel{4}\,\cancel{5}$ (1003)

Review at BB with whole class. Ps come to BB to cross out digits and rewrite the smallest numbers. Class agrees/disagrees. Mistakes discussed and corrected (Ps can can suggest a list of digits too!)

Notes: Individual work, monitored, helped

Do part a) with whole class first if Ps do not understand what to do.

At a good pace

Reasoning, agreement, self-correction, praising

16 min

Bk3

Lesson Plan 133

Activity		*Notes*

4

Problem

Listen carefully and picture the problem in your head. Write the data in your *Ex. Bks*. Think about what data is important and cross out the data you do not need. Do the calculation and show me the answer when I say.

A newborn grey whale is about 4 and a half metres long and weighs about 1500 kg. It drinks about 200 litres per day of its mother's milk, so its weight increases by about 20 kg each day. After how many days will the baby whale weigh 2000 kg?

Show me . . . now! (25 days)

Ps who answered correctly explain at BB. Class agrees/disagrees. Mistakes discussed and corrected.

BB: Birth weight: 1500 kg Final weight: 2000 kg

Each day: + 20 kg

(2000 kg – 1500 kg) ÷ 20 kg = 500 kg ÷ 20 kg

= 50 kg ÷ 2 kg = <u>25</u> (days)

Answer: The baby whale will weigh 2000 kg after 25 days.

Notes: Individual trial, monitored

Responses shown on scrap paper or 'slates' in unison

T repeats slowly. Give Ps time to make notes, think and calculate.

In unison

T could have problem written on SB or OHT.

Reasoning, agreement, self-correction, praising

Feedback for T

T asks Ps to say the answer in a sentence.

20 min

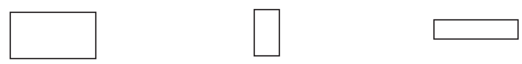
5

Drawing cuboids

Ps each have, e.g. an empty matchbox, on their desk. What shape is it? (cuboid) How many faces does it have? (6) Elicit that each face is a rectangle and that opposite faces are equal, so there are only 3 different sizes of rectangle. Let's draw them.

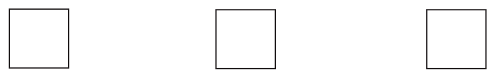
T (or P) draws around large model on BB, Ps in *Ex. Bks*. e.g.

BB: <u>Front view</u> <u>Side view</u> <u>Top view</u>



Repeat with a box shaped like a cube.

BB: <u>Front view</u> <u>Side view</u> <u>Top view</u>



Who can tell us something about the solids? Ps come to BB to point to vertices, sides, parallel and perpendicular lines on drawings and vertices, edges, faces (perpendicular and parallel) on the large models.

Notes: Whole class discussion to start

BB: <u>Cuboid</u>

Discuss the different ways to view the 3 rectangles.

Individual work in drawing, monitored, helped

Praising, encouragement only

BB: <u>Cube</u>

Elicit that a cube is a regular cuboid, that all 6 faces are equal and that each view will be a square.

Discussion, demonstration, agreement, praising only

(Revision of terms)

25 min

6

Book 3, page 133

Q.1 Read: *This solid has been built from unit cubes. Draw different views of it.*

Ps build solid from unit cubes first. Who can explain the ground plan? (Numbers refer to how many bricks high that column is.)

In the grids, draw what you would see from the different views.

Review at BB with whole class. 3 Ps come to BB to draw the 3 views. Class agrees/disagrees. Mistakes discussed/corrected.

What is its volume? (6 cubes) What is the area of is surface? Ps count or calculate. T confirms by referring to large model.

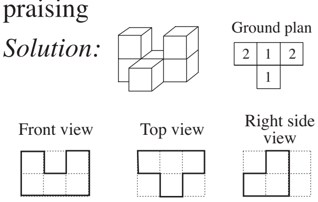
BB: A = <u>26 unit squares</u>

Notes: Individual work, monitored, helped

Use large model. Diagrams drawn on BB or use enlarged copy master or OHP.

Agreement, self-correction, praising

Solution:



30 min

Bk3

Lesson Plan 133

Activity		Notes

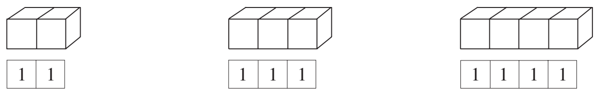
7

Book 3, page 133

Q.2 Ps have unit cubes (or multilink or Cuisennaire rods) on desks.

Start with simpler shapes first if necessary, e.g. 2, 3, and 4 cubes in a row. Ps build the solids, then come to BB to draw the ground plans on a grid. What is the volume (surface area)? Ps work out area by counting the squares or by calculation. e.g.

BB:



V = 2 cubes | V = 3 cubes | V = 4 cubes

A = $(4 \times 2 + 2 \times 1)$ squares = 10 squares | A = $(4 \times 3 + 2 \times 1)$ squares = 14 squares | A = $(4 \times 4 + 2 \times 1)$ squares = 18 squares

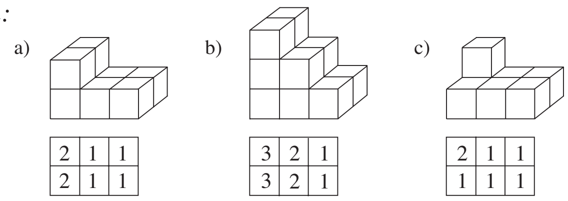
Read: *Build the solids with unit cubes. Fill in the ground plan for each one.*

Review at BB with whole class. Mistakes discussed/corrected.

Read: *How many unit cubes were needed to build each solid? This is their volume.*

Review with whole class. Ps dictate volumes and T writes on BB. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:



V = 8 cubes | V = 12 cubes | V = 7 cubes

Extension

What is the surface area of each solid? Ps count the squares and dictate findings to T. Class agrees/disagrees.

Notes:

Individual work, monitored, helped, corrected

T could have large models already prepared.models

Diagrams drawn on BB or use enlarged copy master or OHP

Discussion, agreement, praising

Individual work, monitored, helped

T has large models prepared.

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Whole class activity

Agreement, praising

a) 28 squares b) 36 squares c) 26 squares

38 min

8

Book 3, page 133

Q.3 a) Read: *Reduce this cuboid to:*

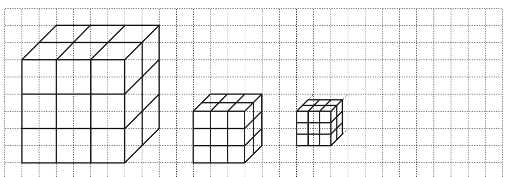
i) half its size ii) 1 third of its size.

Talk about the cuboid first. Elicit lengths of edges (in number of cubes and grid units). Discuss, using a model, why the side face of the cube is shown in the diagram as shorter (2 diagonal grid units) because we cannot see it face on.

Ps do part i) in *Pbs*, counting the grid units along the edges of the original cuboid and drawing each line half as long. Review at BB with whole class. Mistakes discussed/corrected.

Do part ii) with the whole class. Ps come to BB to draw lines. Class agrees/disagrees. Discuss how long the slanting edge should be (1 third of 2 = 1 third of 6 thirds = 6 thirds ÷ 3 = 2 thirds of a diagonal unit).

Solution:



Notes:

Individual work, monitored, helped, corrected

Whole class discussion to start

T could have large model to demonstrate shortening effect.

Drawn on grid on BB or use enlarged copy master or OHP

Agreement, self-correcting, praising

Whole class activity

With T's help if necessary

Discussion, reasoning, agreement, praising

Ps draw cubes in *Pbs* too as they are dealt with.

Bk3

Lesson Plan 133

Activity		*Notes*
8	(Continued)	

Q.3 b) Read: *Enlarge this cuboid to:*

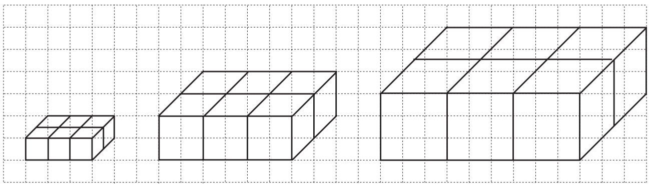
i) twice its size ii) 3 times its size.

Talk about the cuboid first. Elicit lengths of edges (in cubes and grid units). Discuss, using a model, why the side face of the cube is shown in the diagram as shorter, i.e. 1 diagonal grid unit, because we cannot see it face on.

Ps count the units along the edges of the original cuboid and draw each line twice (3 times) as long.

Review at BB with whole class. Mistakes discussed/corrected.

Solution:



Notes: Individual work , monitored, helped, corrected

Whole class discussion to start

T could have large model for demonstration.

Drawn on grid on BB or use enlarged copy master or OHP

Agreement, self-correcting, praising

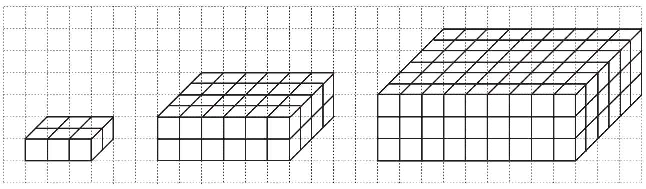
(Or part ii) done with the whole class.)

c) Read: *What is the volume of each of the 6 cuboids? Write it beside them.*

In part a), Ps count the cubes (shown by the solid lines). Agree that they are all made from $3 \times 3 \times 2 = 18$ cubes. Are the cubes in each solid the same size? (No)

Let's use the same size of cube (a unit cube) to measure the volume of the solids in part b) so that we can compare them. Agree on using a unit cube with each face the size of a grid square. T draws solid lines to show the unit cubes. Ps come to BB to count or calculate (length $\times$ width $\times$ height).

BB:



$V = 3 \times 2 \times 1$
$= 6$ (unit cubes)

$V = 6 \times 4 \times 2$
$= 48$ (unit cubes)

$V = 9 \times 6 \times 3$
$= 162$ (unit cubes)

What do you notice? (enlargement by 2 times $\rightarrow$ 8 times the volume; enlargement by 3 times $\rightarrow$ 27 times the volume)

Who can explain it? (twice as long, twice as wide, twice as high, i.e. $2 \times 2 \times 2 = 8$ times more; 3 times as long, 3 times as wide, 3 times as high, i.e. $3 \times 3 \times 3 = 27$ times more)

Notes: Whole class activity

Discussion, agreement, praising

T has 3 models already prepared + a unit cube to show

(Or T has BB or SB or OHT already prepared)

Calculations written on BB.

Agreement, praising

Details written on BB: e.g.

$$9 \times 6 \times 3 = 9 \times 18 = 9 \times 9 \times 2 = 81 \times 2 = \underline{162}$$

Discussion, agreement, praising

45 min

Bk3	R: Calculation **C: How many possible cases? (Combinatorics)** *E: Problems*	*Lesson Plan 134*

Activity | *Notes*

1

Possible numbers

T has 4 numbers cards stuck to BB: $\boxed{0}$ $\boxed{1}$ $\boxed{2}$ $\boxed{4}$

a) How many 3-digit whole tens can you make from these digits?
You cannot use a digit more than once.

Ps come to BB to rearrange the cards and write their number in a place value table Class points out duplications or repeated digits. Encourage logical listing. Agree that '0' must be in units column.

BB: e.g.

H	T	U
1	2	0
1	4	0
2	1	0
2	4	0
4	1	0
4	2	0

Agree that there are 6 possible whole tens.

What is their total? (1540)

Ps use vertical addition or:

$2 \times 100 \times (1+2+4) + 2 \times 10 \times (1+2+4)$
$= 200 \times 7 + 20 \times 7 = 1400 + 140 = \underline{1540}$

b) How many odd numbers can you make from these digits?
You cannot use a digit more than once.

Ps come to BB to rearrange the cards and write their number in a place value table. Class points out duplications or repeated digits. Encourage logical listing. Agree that '1' must be in the units column.

BB: e.g.

(4-digits)

Th	H	T	U
2	0	4	1
2	4	0	1
4	0	2	1
4	2	0	1

(3-digits)

H	T	U
2	0	1
2	4	1
4	0	1
4	2	1

(2-digits)

T	U
2	1
4	1

(1-digit)

U
1

Agree that there are 11 possible odd numbers.

6 min

Notes:

Whole class activity

(Or individual or paired work if Ps wish. Ps have number cards on desks.)

Place value tables drawn on BB

At a good pace

Reasoning, agreement, praising

Accept any correct method of calculating.

Whole class activity (or paired work in *Ex. Bks* if Ps wish)

At a good pace

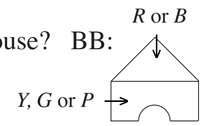
T helps with layout of listing if necessary.

Agreement, praising

2

Possible colours

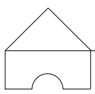
a) In how many different ways can we make this house? BB:



The roof can be either *red* or *blue* and the walls can be *yellow*, *green* or *pink*.

Let's show the different ways in this table. Ps come to BB to choose 2 colours at a time and fill in a column in the table.

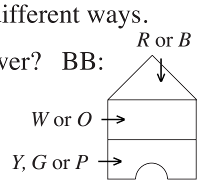
BB:



R	R	R	B	B	B				
Y	G	P	Y	G	P				

Agree that for each of the 2 colours chosen for the roof, there are 3 possible colours for the walls., i.e. $2 \times 3 = \underline{6}$ different ways.

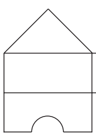
b) In how many different ways can we make this tower? BB:



The roof can be either *red* or *blue*, the top floor can be either *white* or *orange*, and the bottom floor can be *yellow*, *green* or *pink*.

Let's show the different ways in this table. Ps come to BB to choose 3 colours at a time and fill in a column in the table.

BB:



R	R	R	R	R	R	B	B	B	B	B	B
W	W	W	O	O	O	W	W	W	O	O	O
Y	G	P	Y	G	P	Y	G	P	Y	G	P

Agree that there are $2 \times 2 \times 3 = \underline{12}$ different ways.

15 min

Notes:

Whole class activity

Use elements from a construction set, or if there are not enough colours, use copy masters enlarged onto coloured paper and cut out for Ps to have on desks.

Tables drawn on BB or use enlarged copy master

At a good pace

(Or Ps dictate to T and T writes in table to save time.)

Discussion, agreement, praising

(Elicit that for each of the 2 colours chosen for the roof, there are 2 possible colours for the top floor, and for each of these there are 3 possible colours for the bottom floor.)

Feedback for T

Bk3

Lesson Plan 134

Activity		Notes

3

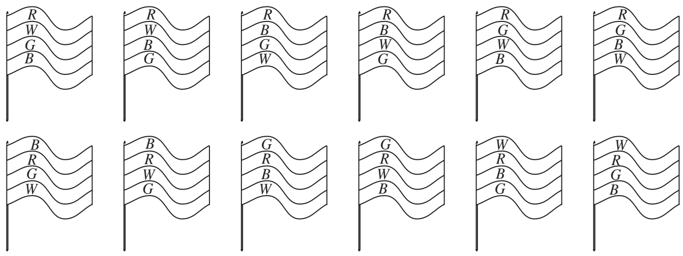
Book 3, page 134

Q.1 Read: *In how many different ways can you colour the flags red, white, green and blue?*

Use every colour only once in each flag.

Set a time limit. Review at BB with whole class. Elicit that for each of the 4 colours chosen for the top stripe there are 3 choices for the 2nd stripe, then for each of these there are 2 choices for the 3rd stripe, then for each of these there is only 1 choice for the bottom stripe, i.e. there are $4 \times 3 \times 2 \times 1 = \underline{24}$ different ways BUT the flags can be flown upside down too, so really there are only 12 ways!

Solution:



22 min

Notes:
- Individual work, monitored, helped
- Drawn on BB or use enlarged copy master or OHP
- T has spare copies of flags in case Ps ask for more than are in the *Pbs*.
- Ps dictate colours or T could have copy master already coloured to save time.
- Discussion, reasoning, agreement, self-correction, praising
- Extra praise if Ps realise there are only 12 possible flags without help from T.

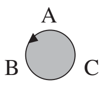
4

Book 3, page 134

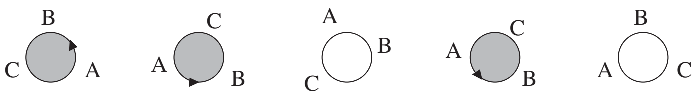
Q.2 Read: *Andrea, Becky and Carol are sitting around a circular table. Colour the tables where the girls are sitting in the same order.*

Imagine you are one of the girls. Think about who could be on each side of you! T sets a time limit.

Review at BB with whole class. Demonstrate with 3 Ps at front of class. Agree that there are only 2 possible orders: ABC and ACB, i.e. clockwise and anticlockwise.



Solution:



Extension

T chooses 3 Ps to stand in a row facing the class. In how many different orders can they be? T asks several Ps what they think and why. ($3 \times 2 \times 1 = \underline{6}$ possible orders) Ps at front demonstrate as a check.

27 min

Notes:
- Individual work, monitored
- Drawn on BB or use enlarged copy master or OHP
- (Ps could use coloured counters for A, B and C and rearrange them on desks if they wish.)
- Agreement, checking, self-correcting, praising
- Elicit that there are 3 choices for the 1st P, then 2 choices are left for the middle P, then only 1 choice is left for the last P.

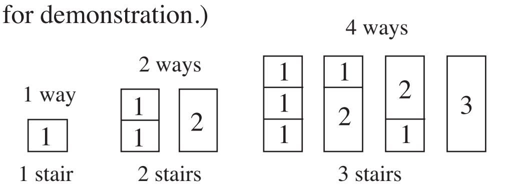
5

Book 3, page 134

Q.3 Imagine you are going upstairs. If there is only 1 stair, in how many ways can you step up it? (1 way: take 1 step). If there are 2 stairs, in how many ways could you step up them? (2 ways: 1 stair at a time or 2 stairs at once.) T draws diagrams on BB.

Repeat for 3 stairs. (T could have a set of steps at the front of the class for demonstration.)

BB:



Notes:
- Whole class activity
- Discussion, demonstration, agreement, praising
- Ps could draw the diagrams, with T's help.

Bk3

Lesson Plan 134

Activity | **Notes**

5

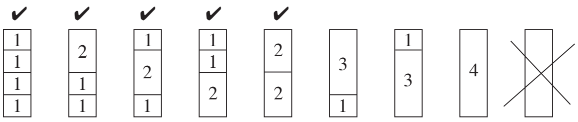
(Continued)

a) Read: *In how many different ways can you build a tower 4 units high using 1, 2, 3, or 4 unit rods? Draw the possible ways.*

If possible, Ps could have multilink strips or Cuisenaire rods on desks to help them. Elicit that each unit rod will be 1 quarter of the height of the tower.

Set a time limit. Review at BB with whole class. Ps come to BB to show solutions. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:



8 ways

b) Read: *If you could use only 1 or 2 unit rods, how many ways are possible?*

T asks several Ps what they think. Agree that there are 5 ways.

Note to T:

Building columns:

Height (units)	1	2	3	4	5	6	...
Number of ways	1	2	4	8	16	32	...

Building from only 1 or 2 unit rods:

Height (units)	1	2	3	4	5	6	...
Number of ways	1	2	3	5	8	13	... (Fibonacci sequence)

Notes:

Individual work, monitored, helped

Towers drawn on BB or use enlarged copy master or OHP

Ps either measure accurately (each unit is half a cm) or mark the units roughly, depending on ability of class.

Discussion, reasoning, agreement, self-correction, praising

Whole class discussion

Ps come to BB to tick the possible ways.

Agreement, praising

34 min

6

Book 3, page 134

Q.4 Read: *Alan, Brian and Charlie go to a summer camp. There are only 2 bedrooms in their hut. One room has 2 beds and the other has 3 beds. Show on the diagram the different ways they could share rooms.*

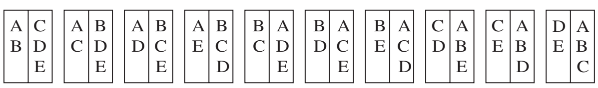
Study the diagram and tell me what information is missing from this story. (Two other children, D and E, are also sharing the hut.)

Ps choose names for them (e.g. David and Eddie).

One way they could share rooms is given. Show as many other ways as you can.T sets a time limit. Encourage a logical listing.

Review at BB with whole class. Ps dictate to T who writes on BB. Agree that there are 10 ways (the order in a room does not matter).

Solution:



Notes:

Individual work, monitored, helped

(or whole class activity with 5 Ps at front of class acting out the different ways)

Drawn on BB or use enlarged copy master or OHP

Discussion, agreement, self-correcting, praising

Extension

If the rooms were allocated randomly, what chance would David and Eddie have of sharing the same room? (4 in 10, or 4 tenths = 2 fifths)

40 min

7

Revision

- T says an operation (+, –, ×, ÷) Ps say only result.
- How many: g are in 2.5 kg (cm in 30 km, cl in 5 litres 2 cl, etc.)
- T gives instructions. Stand vertically (horizontally). Hold your arms parallel (at right angles). Turn to face N, SW, NE. etc.
- T writes numbers (draws shapes) randomly on BB. Ps think of questions to ask about them. (names, sets, similarity, congruence, etc.)

Notes:

Whole class activity

Some examples given but T can choose appropriate tasks according to revision needs of class.

Praising, encouragement only

45 min

Bk3

R: Calculation

C: Combinatorics. Probability

E: Problems

Lesson Plan 135

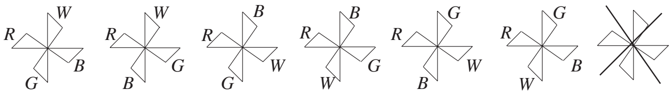
Activity		*Notes*
1	***Book 3, page 135***	

Q.1 a) Read: *Colour the windmills red, white, yellow and green so that each one is different from the others.*

What do windmills do? (Turn) Remember this when you are colouring. Make sure that the colours are in different orders in the same direction. Encourage logical working.

Review at BB with whole class. Ps come to BB to colour or write R, W, Y and G on diagram. Class points out missed cases or duplicates. Agree that there are 6 different cases.

Solution:



b) Read: *Mr. Silly does not know his compass directions. He paints the letters N, E, S and W on the compass at random. What chance does he have of painting the compass correctly?*

T asks several Ps how they would solve it. T gives hint about similarity to part a) if nobody knows.

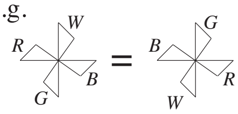
Elicit that *Mr. Silly* had the same task as in a) but he was writing 4 letters in a circle rather than using 4 colours. So there would be 6 possible ways he could do it randomly. Only one way would be correct: NESW clockwise.

Solution: The chance of NESW is 1 in 6, or 1 sixth. (If there is no arrow on the face to help him!)

Notes:

Whole class introduction

T could have a 'real' windmill to show to class and to demonstrate that the order matters. Show by rotation that, e.g.



Then individual colouring, monitored, helped

Discussion, agreement, self-correction, praising

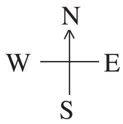
Whole class activity

Compass drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, praising

Allow Ps to explain if they can, then T repeats in a clearer way if necessary.

BB



(The arrow would point to North.)

8 min

---

2 **Probability 1**

If I toss a coin once, what is the chance (probability) of me getting:

a) a head (1 half) b) a tail? (1 half)

Who can explain it? (There are only 2 possible cases, a head or a tail, and each has an equal chance of landing face up.)

We say that the probability of a certain event happening is 1 and the probability of an impossible event happening is 0. Events which are possible but not certain have a probability between 1 and 0, i.e. are fractions!

How many heads (tails) would we expect to get if we tossed a coin 4 (6, 20, 100, 1000, 53) times? (2, 3, 10, 50, 500, 26 or 27 times)

Extension Who has heard someone say that an event has a 50 per cent chance of happening? Who knows what it means? (50 'per cent' means 50 out of 100) Who knows how to write it? T shows if nobody knows. (BB: 50%) Discuss meaning of 50% and 100% as 1 half and 1 whole.

[A computer simulation would be good for 100 and 500 tosses, or T could use a calculator to generate random numbers.]

Notes:

Whole class activity

T asks several Ps.

T repeats clearly if necessary

BB:

Event	Probability
Certain	1
Impossible	0
Possible but not certain	$0 < P < 1$

T chooses Ps at random

Discuss the case of 53, which is odd.

Discussion. Allow Ps to try to explain first. (Ps might have heard of the expression, a 'fifty-fifty chance'. Relate it to 50% for, 50% against.)

15 min

Bk3

Lesson Plan 135

Activity		*Notes*

3

Probability 2

a) If I throw a dice once, what is the chance (probability) of me getting a 1 (2, 3, 4, 5, 6)? (1 sixth)

Who can explain it? (Because there are 6 possible cases: 1, 2, 3, 4, 5 or 6 and each has an equal chance of landing face up.)

b) What is the probability of getting:

i)	a number greater than 2	(4 sixths = 2 thirds)
ii)	an odd number	(3 sixths = 1 half)
iii)	a number not less than 3	(4 sixths = 2 thirds)
iv)	the number 7	(0) Impossible, not on dice.
v)	the number 3 and a half	(0) Impossible, not on dice.
vi)	a number less than 10?	(1) Certain, all 6 numbers < 10.

Notes:
Whole class activity
T chooses Ps at random.
Reasoning, agreement
T repeats more clearly if necessary.

Ps could show answers on scrap paper or slates in unison.

Ps responding correctly explain to those who do not.

Praising, encouragement only!

Feedback for T

20 min

4

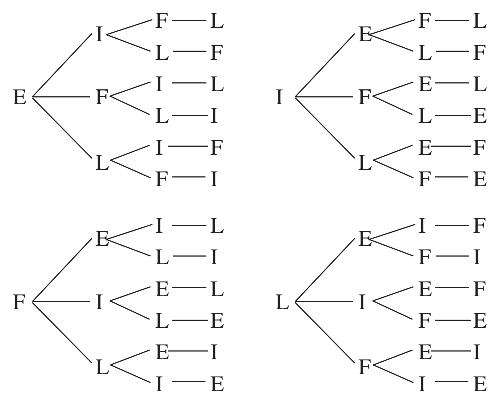
Book 3, page 135

Q.2 Read: *Write the letters E, I, F and L in every possible order.*

T writes tthe 4 letters on BB. Let's make it easier for ourselves by first drawing a tree diagram. T starts and Ps continue at BB when they understand (with T's help).

Let's start with the letter E. What could the 2nd letter be? (I, F or L) If the 2nd letter is I, what could the 3rd letter be? (F or L) etc.

BB: **E, I, F, L**



Elicit that there are 24 cases. Who can explain it?

(For each of the 4 possible letters chosen first, there are 3 possible letters left as 2nd choice, and for each of these there are 2 possible letters left as 3rd choice and for each of these there is only 1 possible letter left, i.e. $4 \times 3 \times 2 \times 1 = \underline{24}$)

Read: *Circle the meaningful words.*

Review at BB with whole class. Ps dictate to T or come to BB to point to them on tree diagram. Agree that there are only 2 meaningful words: FILE and LIFE.

Read: *If a computer printed the 4 letters randomly, what chance would there be of it printing a meaningful word?*

Ask several Ps what they think. Agree that the chance of a getting a meaningful word is 2 in 24 times, or has a probability of 2 twenty-fourths (= 1 in 12 times or 1 twelfth)

Who remembers how to write fractions using only numbers?

Notes:
Whole class introduction

BB: Tree diagram

Ps shout out what T should write.

T writes letters on BB and Ps list the orders in their *Pbs* as each letter is dealt with.

Use enlarged copy master/OHP

Discussion, agreement, praising

Solution:

EIFL	IEFL	FEIL	LEIF
EILF	IELF	FELI	LEFI
EFIL	IFEL	FIEL	LIEF
EFLI	IFLE	FILE	LIFE
ELIF	ILEF	FLEI	LFEI
ELFI	ILFE	FLIE	LFIE

T repeats more clearly if necessary.

Praising

Individual work, monitored

Agreement, praising

(Or give Ps time to think and then Ps show answer in unison on command.)

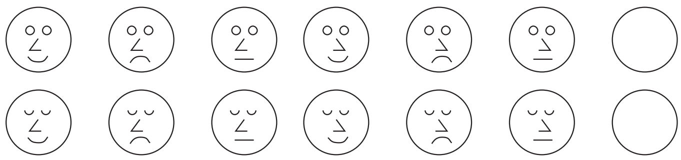
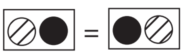
Reasoning, agreement, praising

BB: $\dfrac{2}{24} = \dfrac{1}{12}$ T shows if no one knows.

28 min

Bk3

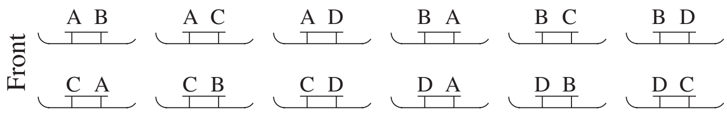
Lesson Plan 135

Activity		*Notes*
5	***Book 3, page 135*** Q.3 Read: *How many different faces can you draw if you choose from these features?* Encourage methodical working. Review at BB with whole class. Ps come to BB one after the other to draw a different face. (or T has solution already prepared and uncovers each case as Ps describe it.) Mistakes discussed and corrected. *Solution:* (2 × 2 × 3 = <u>12</u> cases)  Read: *If a machine painted features on 120 faces at random, how many faces would you expect to be smiling?* Ps write answer in *Pbs*. **X**, what did you write? Why? Who agrees? Who thinks something else? etc. Mistakes corrected. (Probability of a smiling face is 4 out of 12 times, i.e. 4 twelfths or 1 third. 1 third of 120 faces = 120 faces ÷ 3 = <u>40</u> faces Who can think of other probability questions about the faces? *35 min*	Individual work., monitored, helped Drawn on BB or use enlarged copy master or OHP At a good pace Discussion, agreement, self-correction, praising (2 pairs of eyes, 2 kinds of nose, 3 kinds of mouth) (Or whole class activity) Discussion, reasoning, agreement, self-correcting, praising BB: $\frac{4}{12} = \frac{1}{3}$ e.g. probability of a sleeping face is 1 half; of a sleeping sad face is 1 twelfth.
6 **Extension**	**Problems** Listen carefully, picture the story in your head and show me the answer when I say. Ps who respond correctly explain to those who do not. a) *Each of these 3 boxes contains 2 marbles. The marbles are either striped or plain. I have made sure that the contents of each box is different. What could the boxes contain?* Ps suggest what T should draw on BB. (Agree that  as position in the box does not matter.) *We cannot see inside the boxes and they all look the same from the outside. What chance would you give that if we opened a box there will be a striped marble and a black marble inside?* Show me . . . now! (1 third, as only 1 case possible out of 3) b) *Every day, a Princess has a ride in a carriage drawn by 2 horses. She has 2 black and 2 white horses in her stable but her groom chooses 2 horses <u>at random</u> each day.* *What is the probability that today her carriage will be drawn by a white horse and a black horse?* Show me . . . now! (2 quarters or 1 half or 50%) Agree that 2 cases are possible out of 4 possible outcomes, each of which is equally likely to occur. Who can think of another probability question to ask? *40 min*	Whole class activity T has 3 boxes already prepared. BB:  Discussion, agreement Give Ps time to think Reasoning, agreement, praising T repeats slowly and Ps repeat in own words. Reasoning, agreement, praising BB: BB <u>BW</u> <u>WB</u> WW Discussion, agreement (e.g. probability of 2 black horses is 1 quarter)

Bk3

Lesson Plan 135

Activity		*Notes*
7	***Book 3, page 135***	
	Q.4 Read: *Andrew, Betty, Cliff and Dorothy went sledging with one 2-seater sledge. Show the different ways they can take turns on the sledge.*	Individual work, monitored, helped (or whole class activity if time is short)
	Encourage logical listing. Review at BB with whole class. Ps dictate to T or come to BB one after the other to write initial letters on the sledges. Mistakes/omissions put right.	Drawn on BB or use enlarged copy master or OHP
	Elicit that there are 12 possible cases. (4×3)	At a good pace
	Solution: (If position matters, e.g. front of sledge is on LHS)	Discussion, agreement, self-correcting, praising



	If they draw lots for each turn, what chance would you give for these events happening?	Ps write answers on scrap paper or 'slates' and show in unison on command.
	a) Two girls are on the sledge? (2 twelfths = 1 sixth) b) Betty is sitting in front? (3 twelfths = 1 quarter = 25%) c) Cliff is sitting at the back? (3 twelfths = 1 quarter = 25%)	Ps responding correctly explain to others.
	Who can think of other probability questions to ask?	Praise all contributions.
	e.g. What is the probability that Andrew is on the sledge? P = 6 twelfths = 1 half (= 50%)	Agreement, praising

45 min

Bk3	R: Calculation C: **Numbers up to 1000** *E: Quantities up to 1000*	*Lesson Plan 136*

Activity | *Notes*

1 Building a cube

Let's build a cube with edges 10 units (cm) using these unit cubes.

How many cubes will be in each row? (10)
T makes one in front of Ps. (Ps make on desks.)

How many rows will be in each layer? (10)
T has one already prepared. (Ps make on desks)

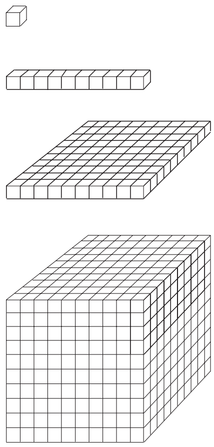
How many layers will there be? (10)

T shows finished cube. Ps hold up their cubes.

Who can write a multiplication about it?
Who agrees? Who thinks something else?

BB: $10 \times 10 \times 10 = 100 \times 10 = \underline{1000}$ cubes.

How many edges (vertices, faces) does it have?
(12, 8, 6) What shape is each face? (a square)



5 min

Notes: Whole class activity

T has already prepared rows, layers and a finished 10 cm cube from multilink cubes.

(If possible, Ps have multilink cubes on desks and work in pairs to make the cube too, or build with Cuisennaire rods.)

Praising

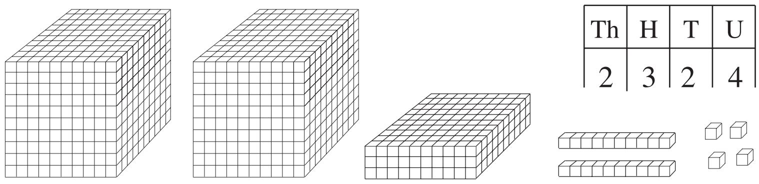
Reasoning, agreement, praising

Ps come out to point to an edge, vertex, face

2 Place value

How many unit cubes are shown? Let's write it in the place value table.

BB:



Th	H	T	U
2	3	2	4

In what other ways could we write the number? e.g.

BB: 2 thousands + 3 hundreds + 2 tens + 4 units
2 Th + 3H + 2T + 4U
$2 \times 1000 + 3 \times 100 + 2 \times 10 + 4 \times 1 = 2324$
Two thousand, 3 hundred and twenty four
(MMCCCXXIV)

8 min

Notes: Whole class activity

T has real models already prepared or drawn on BB or use enlarged copy master or OHP.

Ps come to BB to count and write the digits, then to write the number in other ways.

Class points out errors.

Agreement, praising

Ps write the table and different forms in their *Ex. Bks*.

Extra praise if a P thinks of using Roman numerals!

3 Money

How much is in each pile? Ps come to BB to say the amount and write a multiplication about it. Class agrees/disagrees.

BB:

1000	$1 \times 1000 = 1000$	5000 1000	$6 \times 1000 = 6000$
1000 1000	$2 \times 1000 = 2000$	5000 1000 1000	$7 \times 1000 = 7000$
1000 1000 1000	$3 \times 1000 = 3000$	5000 1000 1000 1000	$8 \times 1000 = 8000$
1000 1000 1000 1000	$4 \times 1000 = 4000$	5000 1000 1000 1000 1000	$9 \times 1000 = 9000$
1000 1000 1000 1000 1000	5 1000 = 5000	5000 5000	$10 \times 1000 = 10\,000$

Extension

If this was real money, what unit could it be? (Cannot be £s as largest banknote is £50. T talks about countries which use 1000, 5000 and 10 000 unit bank notes. If possible, T could have notes/coins to show.)

13 min

Notes: Whole class activity

Amounts drawn or stuck on BB or use enlarged copy master or OHP

Ps write the operations in *Ex. Bks* as they are dealt with.

Reasoning, agreement, praising

T points to an amount and class reads it in unison.

Discussion, demonstration

T (Ps) could tell of own experiences on holiday abroad.

Bk3

Lesson Plan 136

Activity		*Notes*

4

Book 3, page 136

Q.1 Read: *Which numbers do the pictures show?*
Write them in the place-value table.

Do part a) with whole class first to show Ps what to do.

Then Ps do parts b) and c) in *Pbs*. Review at BB with whole class. Ps come out to BB or dicate to T. Class agrees/disagrees. Mistakes discussed and corrected.

How can we write each number using multiplication and addition? Ps come to BB. Class points out errors.

BB:
$$3742 = 3 \times 1000 + 7 \times 100 + 4 \times 10 + 2 \times 1$$
$$5474 = 5 \times 1000 + 4 \times 100 + 7 \times 10 + 4 \times 1$$
$$6426 = 6 \times 1000 + 4 \times 100 + 2 \times 10 + 6 \times 1$$

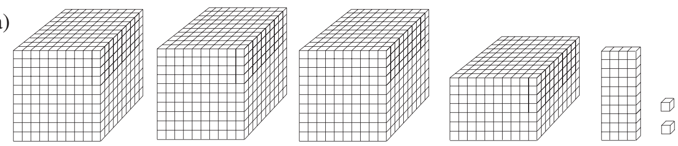
Extension

If Ps wish, calculate the total amount. Ps come to BB to do the additions, explaining reasoning in detail. Discuss what do with the 15 thousand. (Add another column – TTh = ten thousand)

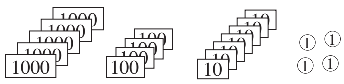
T reads total and class repeats it: 'fifteen thousand, six hundred and forty-two'

Solution:

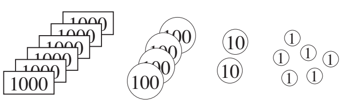
a)



b)



c)



		Th	H	T	U
a)		3	7	4	2
b)		5	4	7	4
c) +		6	4	2	6
	1	5	6	4	2
		1	1	1	

Notes:

Whole class activity to start

Drawn (stuck) on BB or use enlarged copy master or OHP

Ps come to BB to reason and write the numbers.

Individual work, monitored, helped

Discussion, reasoning agreement, self-correcting, praising

At a good pace

Whole class activity

Discussion, reasoning, checking, agreement, praising

In unison

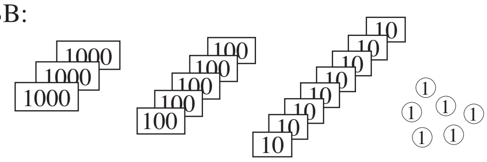
20 min

5

4-digit numbers

a) Who can write the number shown by the pictures? (3586)
Let's write it in different ways. T starts a row and Ps come to BB to complete it. Ps write the different forms in their *Ex. Bks* too.

BB:



Th	H	T	U
3	5	8	6

$$3000 + 500 + 80 + 6$$
$$= 3 \times 1000 + 5 \times 100 + 8 \times 10 + 6 \times 1$$
$$= 3\text{Th} + 5\text{H} + 8\text{T} + 6\text{U}$$
$$= \underline{3586}$$

T asks several Ps to read out the number. T points to a digit and Ps say its place value.

Notes:

Whole class activity

Drawn (stuck) on BB or use enlarged copy mster or OHP

At a good pace

Discussion, agreement, correcting, praising

Feedback for T

Bk3

Lesson Plan 136

Activity		*Notes*
5	(Continued) b) Let's do these additions. Ps come to BB to write the results. Class points out errors. BB: e.g. 1000 + 400 + 30 + 5 = (1435) 1000 + 800 + 3 = (1803) 6000 + 400 + 30 + 5 = (6435) 5000 + 800 + 3 = (5803) 1000 + 70 + 8 = (1078) 1000 + 400 + 60 = (1460) 9000 + 70 + 8 = (9078) 7000 + 400 + 60 = (7460) Let's write one or two of them in a place-value table. Ps choose the numbers and dictate to T or come to BB. Class agrees/disagrees. T (or P) points to a digit, Ps say its value in unison.	Whole class activity T has BB or SB or OHT already prepared. At a good pace Ps say the whole addition while writing the numbers. Agreement, praising e.g. BB:

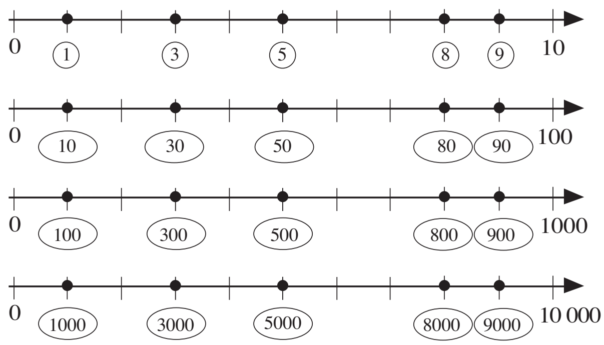
Th	H	T	U
1	4	3	5
9	0	7	8
5	8	0	3

25 min

6 **Number line 1**

a) Study these number lines. What numbers should be below the dots?
Ps come to BB to say and write the number. Class points out errors.

BB:



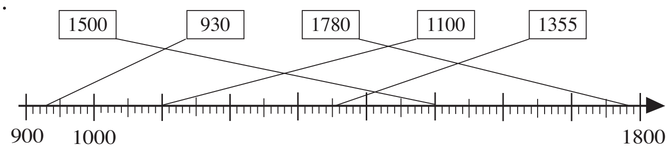
Notes: Whole class activity
Drawn on BB or use enlarged copy master or OHP
At a good pace
T might need to help with writing numbers on the 'thousands' number line.
Agreement, praising

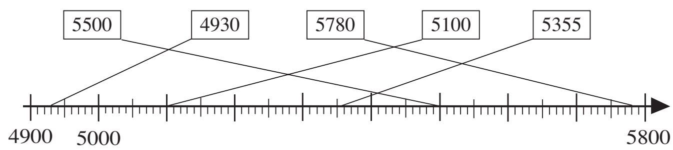
b) T says a number and Ps come to BB to show roughly where it would be on the appropriate number line. Class agrees/disagrees.
e.g. 8.5, 67, 320, 5800, 8326 ($\approx$ 8330 $\approx$ 8300)

Notes: Agreement, praising
T or class helps with difficult numbers (by approximating).

c) Let's join up the the numbers to the correct point on the number line.
Ps come to BB to choose a number and point to where it should be on the number line. Class agrees/disagrees. T draws the joining line.

BB:





Notes: Drawn on BB or use enlarged copy master or OHT
At a good pace
Agreement, praising
Continue with other numbers (suggested by Ps) if time.

31 min

Bk3

Lesson Plan 136

Activity		*Notes*

7

Book 3, page 136

Q.2 Read: *Write the digits in the place-value table, then write the number.*

Review at BB with whole class. Ps come to BB to write results in table or dictate to T. Class agrees/ disagrees. Mistakes corrected.

T points to a number. Class reads it in unison.

Solution:

	Th	H	T	U	Number
2 thousands + 6 hundreds + 3 tens + 8 units	2	6	3	8	2638
7 thousands + 3 hundreds + 5 units	7	3	0	5	7305
6 × 1000 + 3 × 100 + 9 × 10 + 7 × 1	6	3	9	7	6397
4 × 1000 + 0 × 100 + 6 × 10 + 4 × 1	4	0	6	4	4064
8000 + 500 + 40 + 9	8	5	4	9	8549
9000 + 50 + 4	9	0	5	4	9054

Notes: Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, agreement, self-correction, praising

Feedback for T

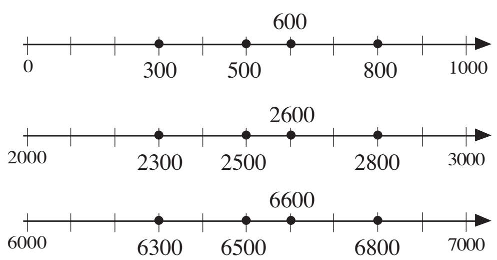
35 min

8

Number line 2

Which numbers are marked on the number lines? Ps come to BB to write and say the number. Class agrees/disagrees.

Solution:



Ps come out to mark other numbers on the number lines.

Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Agreement, praising

Discuss the similarities.

Chosen by T or by Ps.

40 min

9

Book 3, page 136

Q.3 Read: *Practise calculation.*

Elicit that there are 26 calculations. Let's see how many you can do in 3 minutes! Start . . . now! . . . Stop!

Review orally round class. Ps stand up. Ps change pencils and mark/correct own work. Ps sit down when they have made a mistake or have reached the end of their answers. Class applauds Ps still standing at end of review.

Solution:

a) $4 + 5 = \underline{9}$ $40 + 50 = \underline{90}$ $400 + 500 = \underline{900}$ $4000 + 5000 = \underline{9000}$

$9 - 2 = \underline{7}$ $90 - 20 = \underline{70}$ $900 - 200 = \underline{700}$ $9000 - 2000 = \underline{7000}$

b) $3 \times 8 = \underline{24}$ $3 \times 80 = \underline{240}$ $3 \times 800 = \underline{2400}$

$6 \times 9 = \underline{54}$ $6 \times 90 = \underline{540}$ $6 \times 900 = \underline{5400}$

$7 \times 4 = \underline{28}$ $70 \times 4 = \underline{280}$ $700 \times 4 = \underline{2800}$

c) $45 \div 5 = \underline{9}$ $450 \div 5 = \underline{90}$ $4500 \div 5 = \underline{900}$

$56 \div 7 = \underline{8}$ $560 \div 7 = \underline{80}$ $5600 \div 7 = \underline{800}$

$27 \div 3 = \underline{9}$ $270 \div 3 = \underline{90}$ $2700 \div 3 = \underline{900}$

Notes: Individual work, monitored

Differentiation by time limit

Agreement, self-correcting, praising

Mistakes discussed

Ps point out relationships.

Feedback for T

45 min

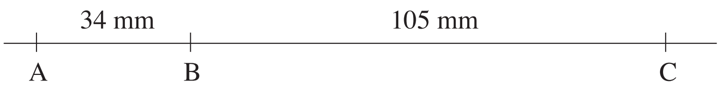
Bk3

R: Calculation

C: Revision: Quantities (length, capacity, mass)

E: Problems. Numbers up to 10 000

Lesson Plan 137

Activity		*Notes*
1	**Measuring** Listen carefully and follow my instrucitions. a) Draw a long, straight, horizontal line with your ruler. b) Draw a short vertical line on the LHS of your line and label it A. c) Measure 34 mm to the right of A and mark that point B. d) Measure 10 and a half cm to the right of B and mark that point C. e) Calculate the distance from A to C. Check it by measuring. Ps show result on scrap paper or slates on command. P who answered correctly explains to those who did not. BB:  *5 min*	Individual work, monitored, helped, corrected Ps have sheets of plain paper and rulers on desks. T reads and repeats each instruction while walking round class. Reasoning, agreement, self-correcting, praising T (or P) draws diagram on BB to demonstrate solution. BB: AC = AB + BC = 34 mm + 105 mm = 139 mm = <u>13 cm 9 mm</u>
2	**Revision of Length** Let's list the units of length in increasing order. Ps dictate to T. Elicit the relationship between them. BB: 1 mm $\underset{\times 10}{<}$ 1 cm $\underset{\times 100}{<}$ 1 m $\underset{\times 1000}{<}$ 1 km Let's fill in the missing numbers. Ps come to BB. Class agrees/disagrees. BB: 1 km = $\boxed{1000}$ m 1 m = $\boxed{100}$ cm = $\boxed{1000}$ mm Ps suggest places which are approximately 1 km away from school. Ps suggest items in the classroom which measure 1 m (1 cm, 1 mm) or demonstrate with hands/arms/fingers. Class agrees/disagrees. *8 min*	Whole class activity Agreement, praising T has BB or SB or OHT already prepared. At a good pace Discussion, agreement, checking, praising T has places (items) already in mind. In good humour!
3	***Book 3, page 137*** Q.1 Read: *Fill in the missing numbers.* Deal with one part at a time if necessary. Set a time limit. Review at BB with whole class. Ps dictate to T. Mistakes discussed and corrected. Details written on BB if problems. *Solution:* a) i) 1 km = <u>1000</u> m ii) 1 km 564 m = <u>1564</u> m iii) 2 km = <u>2000</u> m iv) 4 km 105 m = <u>4105</u> m v) 7 km = <u>7000</u> m vi) 8 km 16 m = <u>8016</u> m b) i) 1 m = <u>1000</u> mm ii) 1 m 45 cm = <u>145</u> cm <u>0</u> mm iii) 5 m = <u>5000</u> mm iv) 3 m 70 cm 2 mm = <u>3702</u> mm v) 8 m = <u>8000</u> mm vi) 5 m 6 cm 3 mm = <u>5063</u> mm *13 min*	Individual work, monitored, helped T has BB or SB or OHT already prepared. Reasoning, agreement, self-correction, praising Details, e.g. 8 km 16 m = 8000 m + 16 m = <u>8016 m</u> Feedback for T
4	**Mental practice** a) T says a length. Ps say it in mm. Class points out errors. e.g. 17 cm (170 mm), 420 cm (4200 mm), 4 cm 50 mm (90 mm), etc. b) T says a length in mm. Ps change it to other units. e.g. 353 mm (35 cm 3 mm), 240 mm (24 cm 0 mm), 1258 mm (125 cm 8 mm or 1 m 25 cm 8 mm), 9001 mm (900 cm 1 mm or 9 m 1 mm) *17 min*	Whole class activity T chooses Ps at random At speed. In good humour! Agreement, praising Details written on BB if necessary. Feedback for T

Bk3

Lesson Plan 137

Activity		*Notes*

5

Revision of Mass

Let's list the units of mass (weight) in increasing order. Ps dictate to T. Elicit the relationship between them.

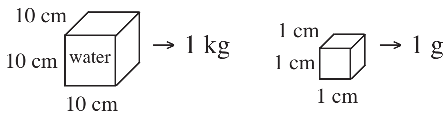
BB: $1\text{ g} \underset{\times 1000}{<} 1\text{ kg} \underset{\times 1000}{<} 1\text{ tonne}$

Let's fill in the missing numbers. Ps come to BB. Class agrees/disagrees.

BB: 1 kg = $\boxed{1000}$ g   1 tonne = $\boxed{1000}$ kg

Remind Ps of their relationship to units of length. If a glass cube with edges 10 cm (1 cm) is filled with water, the water it contains weighs 1 kg (1 g) , or has mass 1 kg (1 g)

BB:



Ps suggest instances when each unit of mass would be used (or T suggests items and Ps say what unit they would use to measure their mass, e.g. feather, elephant, grapes, potatoes, sweets, etc.)

21 min

Notes:
- Whole class activity
- Agreement, praising
- T might need to remind Ps about a tonne.
- Agreement, praising
- T has BB or SB or OHT already prepared.
- Discussion. Allow Ps to explain if they can.
- Agreement, praising.
- In good humour!
- T could have 1 g and 1 kg weights for Ps to hold.

6

Book 3, page 137

Q.2 Read: *Change the weights to the given units.*

Deal with one part at a time if necessary. Set a time limit.

Review at BB with whole class. Ps dictate to T. Mistakes discussed and corrected. Details written on BB if problems.

Solution:

a) 1028 g =	1 kg 28 g	b) 1 kg 26 g =	1026 g
2300 g =	2 kg 300 g	3 kg 157 g =	3157 g
3005 g =	3 kg 5 g	8 kg 60 g =	8060 g
416 g =	0 kg 416 g	9 kg 2 g =	9002 g

25 min

Notes:
- Individual work, monitored, helped
- T has BB or SB or OHT already prepared.
- Reasoning, agreement, self-correction, praising.
- Details, e.g.
  9 kg 2 g = 9000 g + 2 g
  = 9002 g
- Feedback for T

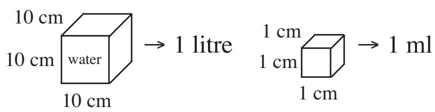
7

Revision of Capacity

What is capacity? (How much liquid a container can hold.)

Let's list the units of capacity in increasing order. Ps dictate to T. Elicit the relationship between them. Remind Ps of their relationship to units of length.

BB: $1\text{ ml} \underset{\times 10}{<} 1\text{ cl} \underset{\times 100}{<} 1\text{ litre}$



Let's fill in the missing numbers. Ps come to BB. Class agrees/disagrees.

BB: 1 litre = $\boxed{100}$ cl   1 cl = $\boxed{10}$ ml   1 litre = $\boxed{1000}$ ml

Ps suggest instances when each unit would be used (or T has containers of various sizes and Ps say which units they would use to measure their capacity, e.g. medicine spoon, egg cup, glass, cup, jug, bottle, bucket, etc.)

28 min

Notes:
- Whole class activity
- Agreement, praising
- Allow Ps to explain if they can.
- Agreement, praising
- T has BB or SB or OHT already prepared.
- At a good pace
- Discussion, agreement, praising.
- Feedback for T

Bk3

Lesson Plan 137

Activity		**Notes**

8

Book 3, page 137

Q.3 Read: *Change the capacities to the the given units.*

Elicit that the 'ℓ' means 'litre'. Set a time limit.

Review at BB with whole class. Ps dictate to T. Mistakes discussed and corrected. Details written on BB if problems.

Solution:

a) 75 cl = <u>750</u> ml
138 cl = <u>1380</u> ml
205 cl = <u>2050</u> ml
3 ℓ 26 cl = <u>3260</u> ml

b) 736 ml = <u>73</u> cl <u>6</u> ml
502 ml = <u>50</u> cl <u>2</u> ml
1028 ml = <u>102</u> cl <u>8</u> ml
4342 ml = <u>434</u> cl <u>2</u> ml

Notes: Individual work, monitored, helped

T has BB or SB or OHT already prepared.

Reasoning, agreement, self-correction, praising.

Who can give some of the capacities in other ways? e.g.

a) 138 cl = 1 litre 38 cl
105 cl = 1 litre 5 cl

b) 1028 ml = 1 litre 2 cl 8 ml
4342 ml = 4 litres 34 cl 2 ml

32 min

9

Book 3, page 137, Q.4

Read: *What is the capacity of the container if we could fill it with:*

a) forty 65 cl jugs of water

b) sixteen 8 litre buckets of water

c) six hundred and forty 5 cl glasses?

Deal with one part at a time. Ps come to BB to write the operations and do the calculations, explaining reasoning in detail. Class agrees/ disagrees. Ps give answer in a sentence.

BB: e.g.

a) 65 cl × 40 = 650 cl × 4 = 2600 cl
= <u>26 litres</u>

	6	5	0	×	4
2	6	0	0		
	2				

Answer: The capacity is 26 litres.

b) 8 litres × 16 = 80 litres + 48 litres = <u>128 litres</u>

Answer: The capacity is 128 litres.

c) 5 cl × 640 = 10 cl × 320 = 3200 cl
= <u>32 litres</u>

or

	6	4	0	×	5
3	2	0	0		
	2				

Answer: The capacity is 32 litres.

Notes: Whole clas activity

(or individual work if Ps prefer)

At a good pace

Reasoning, agreement, praising

Accept any correct method of calculation.

e.g. 650 × 4 = 2400 + 200
= 2600 (cl)

36 min

10

Problem

Lisen carefully, note down the data and decide which data are needed to solve the problem. You can solve it if you have time.

A female elephant is 1 and a half metres long and weighs 1200 kg. She feeds her baby with milk for 27 days and loses 350 kg in weight during the 27-days. What does she weigh at the end of the 27 days?

Ps dictate all the data and T writes on BB. Ps decide which data are important and which are not. Ps come to BB to write a plan and do the calculation, explaining reasoning. Class points out errors.

BB: *Data*: 1 and a half m, <u>1200 kg</u>, 27 days, <u>350 kg</u>

Plan: 1200 kg – 350 kg *C:* 1200 – 350 = 900 – 50 = <u>850</u>

Answer: She weighs 850 kg at the end of the 27 days.

Notes: Whole class activity

T repeats slowly and Ps repeat in own words.

Ps write data (and solve if they wish) in *Ex. Bks*.

Discussion, reasoning, agreement, praising

or

1	2	0	0
–	3	5	0
	8	5	0

40 min

Bk3		*Lesson Plan 137*
Activity		***Notes***
11	***Book 3, page 137*** Q.4 Read: *Tick the bigger quantity.* Set a time limit. Review at BB with whole class. For each part, Ps read out their answer as an inequality, then explain their reasoning to class. Who disagrees? Why? etc. Mistakes discussed and corrected How much more is the bigger side? Ps dictate to T. *Solution:* a) 3 quarters of 240 cm $<$ 5 sixths of 240 cm ✔ (180 cm) 20 cm (200 cm) Details: 240 cm ÷ 4 × 3 = 60 cm × 3 = 180 cm 240 cm ÷ 6 × 5 = 40 cm × 5 = 200 cm b) 5 eighths of 1600 g ✔ $>$ 1 half of 1600 g (1000 cm) 200 g (800 cm) Details: 1600 g ÷ 8 × 5 = 200 g × 5 = 1000 g 1600 g ÷ 2 = 800 g c) 3 sixths of 3000 ℓ $<$ 3 fifths of 3000 ℓ ✔ (1500 ℓ) 300 ℓ (1800 ℓ) Details: 3000 litres ÷ 6 × 3 = 500 litres × 3 = 1500 litres 3000 litres ÷ 5 × 3 = 600 litres × 3 = 1800 litres	Individual work, monitored Differentiation by time limit T has BB already prepared. Reasoning, agreement, self-correction, praising Extra praise if Ps reasoned without working out each side: e.g. 3 quarters $<$ 5 sixths 5 eighths $>$ 1 half 3 sixths $<$ 3 fifths (as 1 sixth $<$ 1 fifth)
Extension	Which is more? BB: 2 thirds of 180 minutes 4 sixths of 180 minutes When I say, raise your left hand for the LHS and right hand for the RHS. Show me . . . now! (Both hands or no hands up as 2 thirds = 4 sixths!) *45 min*	In good humour! Agreement, praising BB: 120 minutes = 2 hours

Bk3

R: Calculation
C: Revision: Divisibility. Decimal number system
E: Number systems – preparation

Lesson Plan 138

Activity		*Notes*

1 Base 9

Let's play a game. Let's see how clever you are!

In *Tenland* they count like us in tens and they have these money units. In *Nineland*, they count in nines. What units do you think will be used?

BB: Tenland

1 [10] [100] [1000]
(10×10, $10 \times 10 \times 10$)

Nineland

1 [9] [81] [729]
(9×9, $9 \times 9 \times 9$)

Let's exchange the amounts in the tables. Ps come to BB to choose an amount and to write it using the other set of money units, explaining reasoning. (Ps can do any necesary calculations in *Ex. Bks.*) Class agrees/disagrees. Elicit the possible digits in each case.

BB:

Tenland 1000	100	10	1		Nineland 729	81	9	1	
			7	→				(7)	
			8	→				(8)	
			9	→			(1	0)	
		(1	0)	←			1	1	
		1	1	→			(1	2)	
		2	7	→			(3	0)	
		(3	0)	←			3	3	
	1	0	0	→		(1	2	1)	
	1	2	1	→		(1	4	4)	
	(7	3	0)	←	1	0	0	1	*
	(7	5	5)	←	1	0	2	8	*

$$\begin{array}{r} 729 \\ 18 \\ +\ \ 8 \\ \hline 755 \end{array}$$

* Optional

10 digits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

9 digits: 0, 1, 2, 3, 4, 5, 6, 7, 8

8 min

Notes:

Whole class activity

T has 'unit' cards already prepared.

T sticks 10-units on BB.

Ps predict what the 9-units will be before T sticks on BB.

Tables drawn on BB or use enlarged copy master or OHP.

At a good pace

Reasoning, agreement, praising.

For Ts only!

BB:

$9 = 1 \times 9 + 0 \times 1 = \boxed{10_9}$

$10 = 1 \times 9 + 1 \times 1 = \boxed{11_9}$

$27 = 3 \times 9 + 0 \times 1 = \boxed{30_9}$

$30 = 3 \times 9 + 3 \times 1 = \boxed{33_9}$

$100 = 1 \times 81 + 2 \times 9 + 1 \times 1 = \boxed{121_9}$

$121 = 1 \times 81 + 4 \times 9 + 4 \times 1 = \boxed{144_9}$

$730 = 1 \times 729 + 0 \times 81 + 0 \times 9 + 1 \times 1 = \boxed{1001_9}$

$755 = 1 \times 729 + 0 \times 81 + 2 \times 9 + 1 \times 1 = \boxed{1021_9}$

2 Base 2 (Binary)

In *Twoland*, they count in twos. What units do you think will be used?

BB: Twoland

1 [2] [4] [8] [16] [32] [64] [128] [256] . . .
(2×2, $2 \times 2 \times 2$, $2 \times 2 \times 2 \times 2$, . . . , . . . , . . . , . . .)

Let's exchange the amounts in the tables. Ps come to BB to choose an amount and to write it using the other set of money units, explaining reasoning. (Ps can do any necesary calculations in *Ex. Bks.*) Class agrees/disagrees. What do you notice? (Only 2 possible digits)

BB:

Tenland 1000	100	10	1		Twoland 256	128	64	32	16	8	4	2	1	
			1	→									(1)	
			2	→								(1	0)	
			3	→								(1	1)	
			4	→							(1	0	0)	
			(5)	←							1	0	1	
			(9)	←						1	0	0	1	
		1	5	→						(1	1	1	1)	
		(1	6)	←					1	0	0	0	0	
		(3	0)	←					1	1	1	1	0	
	2	9	7	←	1	0	0	1	0	1	0	0	1	*
				←										*

* Optional

Only 2 digits: 0, 1

16 min

Notes:

Whole class activity

T has 'unit' cards already prepared.

Ps predict what the 2-units will be beforeT sticks on BB.

Tables drawn on BB or use enlarged copy master or OHP.

At a good pace

Reasoning, agreement, praising.

For Ts only!

BB:

$2 = 1 \times 2 + 0 \times 1 = \boxed{10_2}$

$3 = 1 \times 2 + 1 \times 1 = \boxed{11_2}$

$4 = 1 \times 4 + 0 \times 2 + 0 \times 1 = \boxed{100_2}$

$5 = 1 \times 4 + 0 \times 2 + 1 \times 1 = \boxed{101_2}$

$9 = 1 \times 8 + 0 \times 4 + 0 \times 2 + 1 \times 1 = \boxed{1001_2}$

. . .

Ps write a *Twoland* number in bottom row and exchange it.

Bk3

Lesson Plan 138

Activity		*Notes*

3

Other bases

A pupil at a school in one of the 'Numberlands' wrote this in a letter:

BB: *I am 111 years old and I am in class 11A.*

Which Land could he live in? Twoland? Threeland? Let's investigate. How could we do it? (Try out the digits in different Numberlands, then work out their value so that we can compare them more easily) Let's do it logically. Which land shall we start in? (e.g. *Twoland*)

T writes labels above the place-value tables and Ps dictate what the headings should be. Ps come to BB to write the two sets of digits in the correct columns and then to write the values beside the arrows.
Discuss which 'Numberland' is most realistic. e.g.

If the letter comes from

Twoland:	the pupil is	7 years old	and is in	class 3A ✔
Threeland:	the pupil is	13 years old	and is in	class 4A ?
Fourland:	the pupil is	21 years old	and is in	class 5A ✗
Fiveland:	the pupil is	31 years old	and is in	class 6A ✗
Sixland:	the pupil is	43 years old	and is in	class 7A ✗
Sevenland:	the pupil is	57 years old	and is in	class 8A ✗
Eightland:	the pupil is	73 years old	and is in	class 9A ✗
Nineland:	the pupil is	91 years old	and is in	class 10A ✗
Tenland:	the pupil is	111 years old	and is in	class 11A ✗

N.B. Continue only as far as Ps want to! (Ps could have copies of copy master on desks if they wish.)

Agree that *Twoland* is probably the most realistic.

Notes:

Whole class activity

T has BB already prepared.

Discussion on method of solution.

Involve several Ps.

Tables drawn on BB or use enlarged copy master or OHP

At a good pace

BB: Twoland

8	4	2	1	
	1	1	1	→ 7
		1	1	→ 3

Threeland

27	9	3	1	
	1	1	1	→ 13
		1	1	→ 4

Fourland

64	16	4	1	
	1	1	1	→ 21
		1	1	→ 5

Fiveland

125	25	5	1	
	1	1	1	→ 31
		1	1	→ 6

etc.

20 min

4

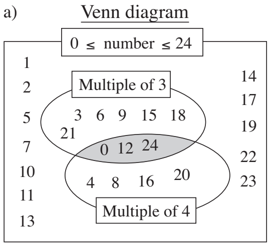
Book 3, page 138

Q.1 Read: *Write the whole numbers not less than 0 and not greater than 24 in the correct sets.*

Elicit that the numbers to be written are 0 to 24.
Deal with one part at a time. Set a time limit.

Review at BB with whole class. Ps dictate to T or come to BB. Class agrees/disagrees. Mistakes discussed and corrected.

Solution: a) Venn diagram



b) Carroll diagram

	Multiple of 3	Not a multiple of 3
Multiple of 4	0 12 24	3 6 9 15 18 21
Not a multiple of 4	4 8 16 20	1 2 5 7 10 11 13 14 17 19 22 23

Read: *What can you say about the numbers in the shaded areas?*

Give Ps time to think and write a sentence in *Pbs*. Ps read their sentences to class. Class decides whether they are true. e.g.

'They are multiples of 3 and also of 4.' 'They are multiples of 12.'
'They are divisible by 3 and 4.' 'They are divisible by 12.'

Extension

Ps choose another set and say a statement about the numbers.
Ps say other numbers which belong in each set.

Notes:

Individual work, monitored helped

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

T tells class the names of the two types of diagrams for showing sets of numbers and labels the diagrams.

Individual work, monitored, helped (or whole class activity if Ps prefer)

Reasoning, agreement, praising

T repeats unclear statements more precisely if necessary.

Whole class activity
Orally round class.

30 min

Bk3

Lesson Plan 138

Activity

5

Book 3, page 138

Q.2 a) Read: *List the numbers which have a hundreds digit greater than 7, a tens digit less than 3, and a units digit which is odd and not greater than 3.*

Elicit that:

- it is a 3-digit number,
- the hundreds digit can be 8 or 9,
- the tens digit can be 0, 1 or 2
- the units digit can be 1 or 3.

Review at BB with whole class. Ps dictate numbers to T. Class agrees/disagrees. Mistakes corrected.

BB: 801, 803, 811, 823, 821, 823
901, 903, 911, 923, 921, 923

b) Read: *What is their sum?*

Discuss easy methods of addition. (Add them in 4 lots of 3 then add the 4 totals, or use multiplication and addition, or add all the 8 hundred numbers and then all the 9 hundred numbers, then add the two totals.)

Review at BB with whole class. Ps dictate their results to T . Class agrees/disagrees. Mistakes corrected.

BB: e.g.

$$\begin{array}{r} 801 \\ 803 \\ +\,811 \\ \hline 2415 \end{array} \quad \begin{array}{r} 813 \\ 821 \\ +\,823 \\ \hline 2457 \end{array} \quad \begin{array}{r} 901 \\ 903 \\ +\,911 \\ \hline 2715 \end{array} \quad \begin{array}{r} 913 \\ 921 \\ +\,923 \\ \hline 2757 \end{array} \quad \begin{array}{r} {\scriptstyle 2\,1\,2} \\ 2415 \\ 2457 \\ 2715 \\ +\,2757 \\ \hline 10344 \end{array}$$

c) Read: *Which of them are divisible by 3?*

T points to each of the 12 numbers in turn and class decides whether it is divisible by 3. (By calculation or by reasoning. Only 801 needs to be calculated.)

BB: e.g.

801 = 600 + 180 + 21 (all terms are divisible by 3)

803 = 801 + 2, so is not divisible by 3,

811 = 801 + 10, so is not divisible by 3, etc.

901 = 900 + 1, so is not divisible by 3, etc.

Solution: 801, 813, 903, 921 are divisible by 3.

Notes

Whole class discussion to start

Involve several Ps

Agreement, praising

Individual work, monitored, helped

Agreement, self-correcting praising

Whole class discussion to start

Ps suggest ways to calculate Praise all contributions.

Individual work, monitored

Reasoning, agreement, self-correcting, praising

Let's read the total toegether!

'ten thousand, 3 hundred and forty-four'

Whole class activity

Ps shout out in unison (or use pre-greed actions)

T gives hints if Ps do not think of easy reasoning.

At a good pace

Agreement, praising

35 min

6

Book 3, page 138,

Q.3 Read: *List all the 3-digit numbers in which:*

a) the sum of the 3 digits is 5,

b) the product of the 3 digits is 4,

c) the sum of the 3 digits is 4.

Deal with one part at a time. Set a time limit. Encourage a logical listing. T could start each list and Ps continue it.

Review at BB with whole class. Ps dictate numbers to T. Class checks that they are correct. Mistakes corrected.

Solution:

a) 113, 131, 311; 104, 140, 401, 410; 122, 212, 221; 203, 230, 302, 320; 50 [15]

Notes

Individual work, monitored, helped

(or whole class activity if T prefers)

Whole class discussion on strategy for listing.

Agreement, correction, praising

b) 114, 141, 411, 122, 212, 221 [6]

c) 103, 130, 301, 310; 112, 121, 211; 202, 220; 400 [10]

40 min

Bk3		*Lesson Plan 138*
Activity		***Notes***
7	***Book 3, page 138, Q.4*** Read: *Make two 3-digit numbers using the numbers 0, 1, 3, 4, 5 and 8 so that:* *a) their sum is the least possible.* Elicit that the numbers should be the two smallest possible, so the 2 smallest digits should be the hundreds and the 2 largest the units. e.g. 108 and 345 BB: 108 + 345 = <u>453</u> *b) their sum is the greatest possible.* Elicit that the numbers should be the two largest possible, so the 2 largest digits should be the hundreds and the 2 smallest the units. e.g. 841 and 530 BB: 841 + 530 = <u>1371</u> *c) their difference is the least possible.* Elicit that the numbers should be as close to each other as possible on the number line. i.e. 501 and 483 BB: 501 – 483 = <u>18</u> *d) their difference is the greatest possible.* Elicit that the numbers should be as far apart from each other as possible on the number line. i.e. 854 and 103 BB: 854 – 103 = <u>751</u>	Whole class activity (or individual trials first if Ps wish) Discussion about strategies for solution (guided by T) Involve several Ps. Ps suggest numbers and T writes on BB. Who agrees? Who thinks someting else? etc. Other solutions are possible in parts a) and b). Agreement, checking, praising Feedback for T

45 min

Bk3

R: Calculation

C: Puzzles

E: Challenges

Lesson Plan 139

Activity | **Notes**

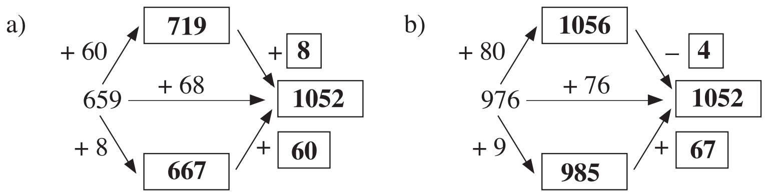
1

Book 3, page 139, Q.1

Read: *Fill in the missing numbers.*

Ps come to BB to fill in numbers, explaining reasoning. Calculations can be done at side of BB. Class points out errors.

Solution:



Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Agree that:

a) $60 + 8 = 8 + 60 = 68$

b) $80 - 4 = 9 + 67 = 76$

Extension

If the arrows pointed in the opposite direction, what would the signs and numbers be?

Notes: Whole class discussion

Agreement, praising

6 min

2

Book 3, page 139

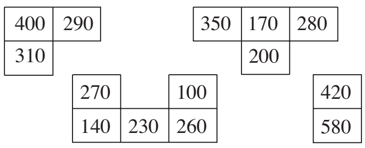
Q.2 Read: *Colour the shapes on the grid and fill in the missing numbers if the sum of the numbers in each shape is 1000.*

Set a time limit. Calculations can be done in *Ex. Bks*.

Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes corrected.

Solution:

400	290	350	170	280	170
310	260	510	200	430	420
440	270	930	100	120	580
350	140	230	260	280	390



Notes: Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Check:

		270	
	350	140	
400	170	230	
290	280	260	420
+ 310	+ 200	+ 100	+ 580
1000	1000	1000	1000
1	2	2	1

12 min

3

Book 3, page 139

Q.3 Read: *Colour a route through the maze so that the sum of the numbers passed is:*

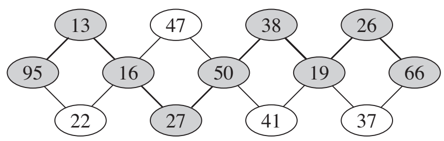
a) 350, b) 1200.

Deal with one part at a time. Set a time limit. Calculations can be done in *Ex. Bks* or on scrap paper or slates.

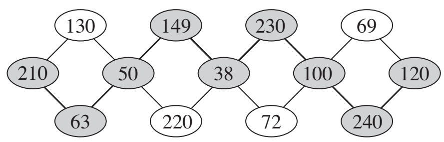
Review at BB with whole class. Ps dictate to T or come to BB. Class shouts out running totals as a check. Mistakes corrected.

Solution:

a) 350



b) 1200



Notes: Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Agreement, checking, self-correcting, praising

20 min

Bk3

Lesson Plan 139

Activity		*Notes*

4

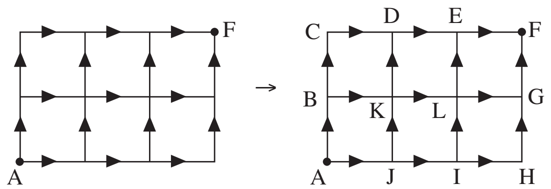
Puzzle

In how many ways can Andrew get from his house to Frank's house? He has to cycle along the roads as there are no shortcuts.

The roads in their area are a one-way system, so Andrew can only cycle in the direction shown by the arrows.

How can we solve it? Ps suggest ways. (e.g. colour over each route in a different colour, or label each crossroads or vertex.) Let's label the crossroads on this diagram. Ps suggest the letters. e.g.

BB:



Copy the diagram in your *Ex. Bks* and see how many different routes you can find.

Review at BB with whole class. **X**, which routes did you find? Who found the same? Who found others? P dictates to T or come to BB.

T shows any routes not covered. Agree that there are 10 possible routes and that each route is 5 'units' long (2 units up and 3 units across but in different combinations).

Notes:

Whole class discussion on strategy, then individual (or paired) trial, monitored, helped

Grid drawn on BB or use enlarged copy master or OHP

Use names of Ps in class.

Use a 2 by 2 grid first if Ps are not very able.

Set a time limit.

Discussion, agreement, self-correcting, praising

BB: <u>Possible routes</u>

ACF, ABGF, ABKDF, ABLEF,
AHF, AJDF, AJKGF, AJKLEF,
AIEF, AILGF

25 min

5

Book 3, page 139

Q.4 Read: *How many routes lead from A to G, H I and J if you can only move down to the left or to the right? Write the letters of each route in order.*

Let's see how many ways you can find in 3 minutes!

Review a BB with whole class. Ps dictate to T. Class agrees/ disagrees. Omissions added and mistakes corrected.

Solution:

A to G: 1 route (ABDG)

A to H: 3 routes (ABDH, ABEH, ACEH)

A to I: 3 routes (ACFI, ACEI, ABEI)

A to J: 1 route (ACFJ)

Notes:

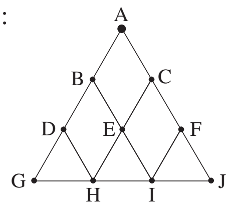
Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion at BB

Agreement, praising

BB:



30 min

6

Probability

We know that there are 400 pupils in a school. Which of these statements is Certain, Possible but not certain, or Impossible?

a) *There are at least 2 pupils whose birthday is on the first of January.*

Show me . . . now! (P)

(365 days in a year, so 365 Ps could have different birthdays and the remaining 35 must have birthdays on one of these 365 days, which <u>could</u> be the 1st January)

b) *There are 2 pupils whose birthdays are on the same day.*

Show me . . . now! (C) (The 366th <u>must</u> be the same as another P.)

c) *Each P has a different birthday.*

Show me . . . now! (I) (400 Ps but only 365 days in a year)

Notes:

Whole class activity

Ps write 'C', 'P' or 'I 'on scrap paper or slates or have flash cards on desks, or use pre-agreed actions.

Responses shown in unison

Ps responding correctly explain reasoning to class.

T repeats unclear reasoning in a more precise way if necessary

Agreement, praising. In good humour!

35 min

Bk3

Lesson Plan 139

Activity		*Notes*

7

Problems

Listen carefully to the problems. Solve them in your head or make notes in your *Ex. Bks*. Show me the answer when I say.

a) *If I add 3 to a quarter of a number, I get half of that number. What is the number?*

Show me . . . now! (12) P responding correctly explains reasoning.

(1 quarter + 1 quarter = 1 half, so 3 must be 1 quarter of the number, so the number must be $3 \times 4 = \underline{12}$)

b) *I multiplied 2 by a number, then multiplied the product by the same number and I got 128. What did I multiply by?*

Show me . . . now! (8) P responding correctly explains reasoning.

($2 \times \square \times \square = 128$, $\square \times \square = 128 \div 2 = 64$, $\square = 8$)

c) *Write the number 2 using 5 1s. Operations and brackets are allowed.*

Show me . . . now! P responding correctly explains reasoning.

e.g. $(1 + 1 - 1 + 1) \times 1 = 2$, but other statements possible.

Notes:

Whole class activity

T repeats slowly

Responses given in unison

Reasoning, agreement, checking, praising

Check: $3 + \underline{12} \div 4 = \underline{12} \div 2$

$3 + 3 = \underline{6}$

Accept trial and error methods but stress logical reasoning.

Check:

$2 \times 8 \times 8 = 2 \times 64 = \underline{128}$

Deal with all cases.

Class applauds most creative (correct) description.

40 min

8

Book 3, page 139

Q.2 Read: *You are visiting a wildlife park and want to see all the animals. This is a map of the park.*

Set the scene. Talk about the animals, the map and the meaning of the scale. Ps tell of own visits to a zoo or park.

T could ask simple questions mentally to reinforce the scale. (What is 10 mm on the map in real life? What would 10 m in real life be on the map?

a) Read: *Measure each line on the map and write the length beside it.*

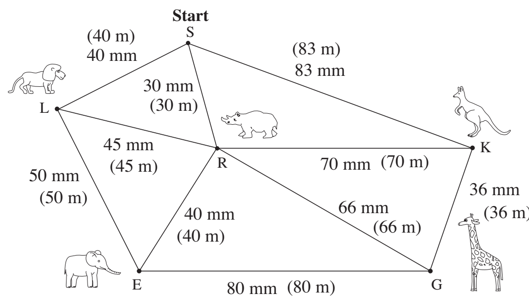
Encourage accurate measuring (to nearest mm).

Review at BB with whole class. (Accept ±1mm.) Ps dictate to T or come to BB.

b) Read: *Calculate the distances in real life and write in brackets beside the lines.*

Review at BB with whole class. Ps dictate to T. (BB)

BB:



We will finish this question another day. You can try it at home before then if you want to.

Notes:

Whole class introduction to a 'Travelling Salesman' problem

Drawn on BB or use enlarged copy master for demonstration only!

Discussion about context. Encourage contributions from several Ps.

Individual work in measuring, monitored, corrected

Agreement, praising

T asks questions about the distances as mental practice.

e.g. If you are at the elehant enclosure, what is your shortest route back to the start? (ERS)

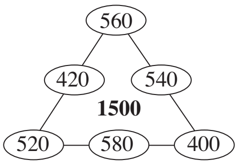
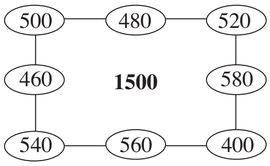
Activity can be completed in *Lesson 175*.

45 min

Bk3

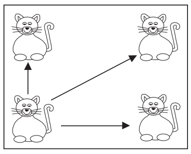
R: Calculation
C: Puzzles
E: Challenges

Lesson Plan 140

Activity		*Notes*
1	**True or false?** Decide whether the statement is true or false. If it is true, hold your ears and if it is false, clap your hands when I say. I thought of a number. I added 800 and the result was a whole number less than 1000. Are these statements true or false? a) My number is less than 200. Show me . . . now! (True) b) It is certain that my number is less than 199. (False) c) It is certain that my number is 199. (False) d) My number cannot be more than 199. (True) e) My number could be 200. (False) *5 min*	Whole class activity Ps stand up. Ps who respond incorrectly have to sit down. In good humour! Responses shown in unison. Possible, but not certain Possible, but not certain Class applauds Ps still standing.
2	***Book 3, page 140*** Q.1 Read: *Write the missing numbers in the puzzles if the sum of the 3 numbers along each side is 1500.* *Choose from these numbers.* Deal with one part at a time. Set a time limit. Review at BB with whole class. Ps come to BB to write numbers, explaining reasoning. Who agrees? Who thinks something else? etc. Class checks the sums of each line. *Solution:* a) 420, 400, 520, 540, 560, 580  b) 540, 560, 580, 480, 500, 520, 400, 460  *13 min*	Individual trial first, monitored helped Drawn on BB or use enlarged copy master or OHP Calculations done mentally Discussion, agreement, checking, self-correcting, praising (or done as a whole class activity)
3	***Book 3, page 140*** Q.2 Read: *Bunny can only escape from the maze by passing through numbers which add up to 1200.* *Draw possible paths he could take. Use a different colour for each one.* Make sure that Ps draw lines to show the paths and do not colour in the boxes as some numbers need to be used more than once! Set a time limit. Review at BB with whole class. Ps come to BB to show their paths. Class keeps a running total of the numbers passed. *Solution:* e.g. $160 + 180 + 270 + 590 = 1200$ $160 + 340 + 340 + 360 = 1200$ $430 + 230 + 240 + 300 = 1200$ $430 + 322 + 240 + 108 = 1200$ *20 min*	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP Discussion, reasoning, checking, agreement, self-correction, praising Feedback for T

Bk3

Lesson Plan 140

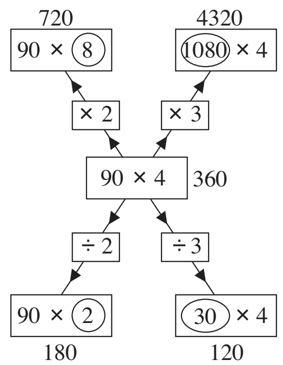
Activity		*Notes*
4	**Problem 1** Help me to solve this problem. *There are 4 corners in a room. A cat is sitting in each corner. 3 cats are sitting opposite each cat. On each cat's tail a cat is sitting. What is the least number of cats that could be in the room?* What should we do first? (Draw a diagram) T and Ps go through the text several times and try to make a drawing. Agree that the least number of cats there could be is 4, as the cats could be sitting on their own tails! BB:  *25 min*	Whole class activity Problem written on BB or SB or OHP. Diagram drawn on BB or use cats cut from enlarged copy master, coloured and stuck on BB (or cut from magazines). Discussion, reasoning, agreement, praising In good humour!
5	**Problem 2** Listen carefully and show me the answer when I say. You can discuss it with your neighbour if you wish. *In a box there are 10 blue and 20 red pencils. How many pencils will we need to take out of the box with our eyes shut to be certain that we have at least:* a) *a red and a blue pencil?* Show me . . . now! (21) (The first 20 pemcils might all be red.) b) *3 red pencils?* Show me . . . now! (13) (The first 10 pencils might all be blue.) c) *2 red and 3 blue pencils?* Show me . . . now! (23) (The first 20 pencils might all be red.) d) *2 pencils the same colour?* Show me . . . now! (3) (The first 2 pencils might be different but the 3rd must be red or blue.) *30 min*	Whole class activity T repeats each question slowly to give Ps time to think. Responses written on scrap paper or 'slates' and shown in unison. Ps who responded correctly explain thir reasoning to those who did not (with T's help). Reasoning, agreement, praising
6	**Problems 3** Help me to solve these problems. *What is the last digit:* a) *of the product of the first 10 positive even numbers?* Ps suggest what to do. If they want to multiply the 5 even numbers, T encourages them to think of an easier way. BB: $2 \times 4 \times 6 \times 8 \times \underline{10} \times 12 \times 14 \times 16 \times 18 \times 20 = ?$ Elicit that any number multiplied by 10 has a units digit of zero! b) *of the product of the first 10 positive odd numbers?* Ps suggest what to do. T helps but them to write them on BB, but after the first 3, asks them to think of an easy way. BB: $\underbrace{1 \times 3 \times 5}_{15} \times 7 \times 9 \times 11 \times 13 \times 15 \times 17 \times 19 = ?$ Once the product has reached 15, the units digit of any following product must be 5, as we are multiplying by odd numbers! *35 min*	Whole class activity Ps suggest how to solve it. T gives hints if necessary. Reasoning, agreement, checking Extra praise if Ps notice these strategies without help.

Bk3

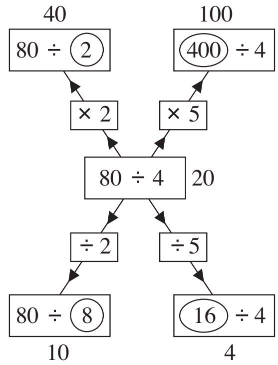
Lesson Plan 140

Activity		*Notes*
7	***Book 3, page 140**, **Q4*** Read: *Fill in the missing numbers.* T chooses two teams of volunteers. Ps come out one after the other from each team to do a step of their puzzle, explaining reasoning.. T times them with a stop watch Rest of class checks that they are correct. The team with correct solution or with the quickest time is the winner. Let's give them a clap! *Solution:*	Whole class activity (or individual work if Ps wish) Drawn on BB or use enlarged copy master or OHP At a good pace Ps say the whole operation to class as they are writing in the missing numbers. Reasoning, agreement, correcting, praising T goes through each solution again quickly, referring to diagrams.

a)



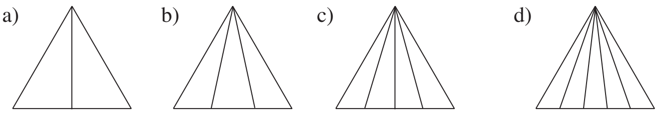
b)



40 min

8	***Book 3, page 140*** Q.4 Read: *How many triangles can you see in each diagram?* Set a time limit for a) and b). Review at BB with whole class. For parts c) and d), T asks several Ps how many triangles they can see. Who agrees? Who thinks there are more? etc. Ps with correct answer come to BB to point to the triangles. Class agrees/disagrees. *Solution:*	Parts a) and b) done as individual work, monitored Parts c) and d) done with the whole class. Drawn on BB or use enlarged copy master or OHP Discussion, agreement, praising

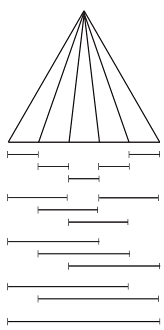
a) b) c) d)



2 + 1 = <u>3</u>   3 + 2 + 1 = <u>6</u>   4 + 3 + 2 + 1 = <u>10</u>   5 + 4 + 3 + 2 + 1 = <u>15</u>

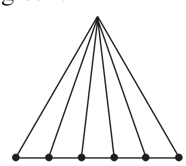
For part d), T shows how the counting could be done more easily by redrawing the <u>base</u> of each triangle.

BB: d)



Note to :

We are choosing 2 out of 6 possible vertices for each base, but each pair can be reversed, so the number of triangles is



$$\frac{6 \times 5}{1 \times 2} = \frac{30}{2} = 15$$

45 min