Bk3	R: (Mental) calculation **C: Reflection. Symmetry** *E: Motion in space. Rotation around an axis by* 180°	*Lesson Plan 89*

Activity		***Notes***
1	**Addition practice** T dictates simple additions of 3-digit numbers. Ps write the answers (if done mentally) or the whole addition in their *Ex. Bks*. e.g. 111 + 222, 301 + 215, 834 + 121, etc. Ps can suggest additions too. (T keeps a note of them.) Review with whole class. Write problem calculations on BB. *4 min*	Individual work, monitored Ps nod heads when ready for next one. At a good pace Agreement, self-correction, praising
2	**Missing numbers** Listen carefully and think what values you would put in this table. *Nigel had £12.45. After buying a book, Nigel had more than £6.45 but less than £6.50 left. How much could the book have cost?* What should we do first? (Change the values to pence as the values in the table are in pence.) What is the smallest amount of money Nigel could have left? (£6.46 = 646 p.) Ps suggest where to write it in the table. How could we work out how much he spent if he had this amount left? (£12.45 = 1245 p, 1245 p – 646 p = <u>599 p</u>) P come out to BB to do calculation and write result in table. Class agrees/disagrees. Ps come to BB to fill in next 3 columns explaining reasoning (without calculation). Class agrees/disagrees. Are there any more possible values? No, because the largest amount that Nigel could have left is £6.49 = 649 p)	Whole class activity Table drawn on BB or use enlarged copy master or OHP Discussion on method of solution. Ps suggest what to do at each stage BB: 1245 – 646 or $\begin{array}{r}1245\\-\ 646\\\hline 599\end{array}$ = 1245 – 645 – 1 = 600 – 1 = <u>599</u> Reasoning, agreement, praising

BB:

Spent (p)	599	598	597	596	
Had left (p)	646	647	648	649	

Answer: The book could have cost £5.96, £5.97, £5.98 or £5.99.

Who can write a rule for the table? Who agrees? Who can think of a different one? etc. (T might need to help with this.)

Rule: $H + S = 1245$,
or $S = 1245 - R$,
or $R = 1245 - S$,
and $645 < R < 650$

8 min

3 **Sums and differences**

Listen carefully and think how you would solve it.

a) *What is the <u>sum</u> of the sum and the difference of 876 and 528?*

Ps suggest what to do first and how to continue. Calculations done at side of BB. Class agrees/disagrees.

BB: $\begin{array}{r}876\\+\ 528\\\hline S:\ 1404\end{array}$ $\quad\begin{array}{r}876\\-\ 528\\\hline D:\ 348\end{array}$ $\quad\begin{array}{r}1404\\+\ 348\\\hline S+D:\ 1752\end{array}$

or (876 + 528) + (876 – 528) = 876 + 876
= 2 × 876
= 1600 + 140 + 12
= <u>1752</u>

or $\begin{array}{r}876\\+\ 876\\\hline 1752\end{array}$

b) *What is the <u>difference</u> between the sum and difference of 876 and 528?*

Again, Ps suggest how to solve it. (Sum and difference already known from part a)).

BB: (876 + 528) – (876 – 528) = 1404 – 348 = <u>1056</u>

or (876 + 528) – (876 – 528) = 528 + 528 =<u>1056</u>

13 min

Notes:
Whole class activity
(or individually in *Ex. Bks* if Ps wish)
Do not intervene unless Ps are struggling.
Discussion, reasoning, agreement, praising
Extra praise if P thinks of this 'clever' method of solution.
Discussion, reasoning, agreement, praising
BB: $\begin{array}{r}1404\\-\ 348\\\hline S-D:\ 1056\end{array}$ or $\begin{array}{r}528\\+\ 528\\\hline 1056\end{array}$
or 2 × 528 = 1000 + 40 + 16

Bk3

Lesson Plan 89

Activity		*Notes*

4 See *Y2 LP 116–119*

Symmetry 1

T has various items, pictures, shapes, etc. stuck to (or drawn on) BB, some symmetrical, some not. Which of these are symmetrical?

Ps come to BB to point and explain. Revise symmetry, mirror image, mirror line, line of symmetry, reflection. Allow Ps to explain where they can. T mentions the criteria missed.

(Do not mention rotational symmetry at this stage unless a P notices it or asks about it. Sress that 'mirror line' is equivalent to 'line of symmetry'.)

Notes: Whole class discussion/revision

(e.g. pictures from Y1b and Y2b or cut out of magazines or drawn on BB: butterfly, leaf, flower, domino, clown, random shapes, etc.)

BB: symmetry, symmetrical

line of symmetry or mirror line

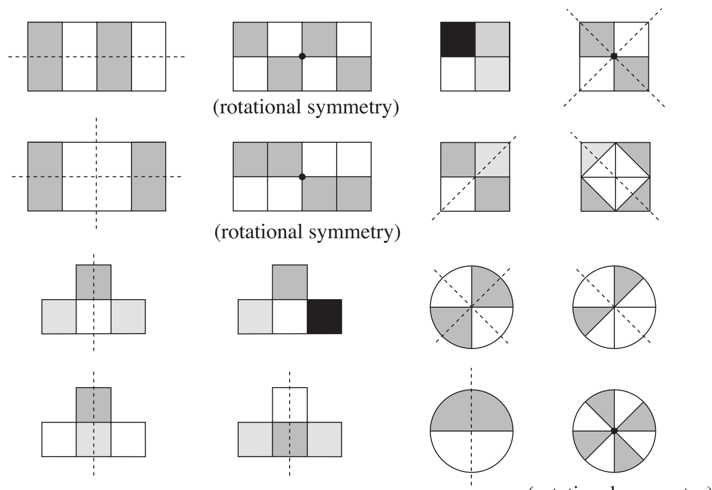
17 min

5

Symmetry 2

These shapes have been coloured in different ways. Which of them are symmetrical? Ps come to BB to draw in the mirror lines (lines of symmetry). Class agrees/disagrees. If problems, check with a mirror.

BB:



Extension

Discuss the shapes which have rotational symmetry. Demonstrate what it means. Ps might notice that some shapes have both line and rotational symmetry.

Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Feedback for T

Ps could have mirrors and copies of shapes on desks too.

BB: Rotational symmetry

T could copy these shapes onto OHTs, stick a drawing pin through the centre and rotate on top of original shapes.

22 min

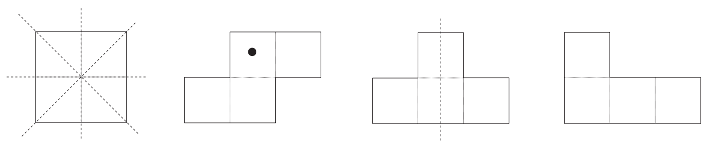
6

Symmetry 3

What do these shapes have in common? (All have area 4 square units)

Which of them are symmetrical? Ps come out to point and draw in the mirror lines (lines of symmetry).

BB:



- Ps come out to point to lines which are parallel.
- Ps come out to show the perpendicular lines and right angles.
- Which has the shortest perimeter? (The square has a perimeter of 8 units. All the others have perimeters of 10 units.)

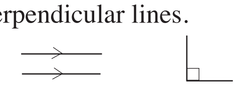
Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Ps might notice that the shape 2nd from left has rotational symmetry around centre point.

Exra praise if Ps remember how to show parallel and perpendicular lines.

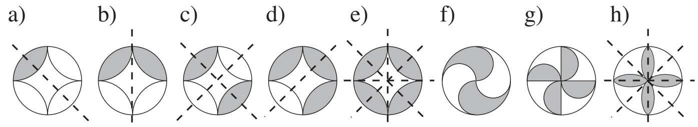
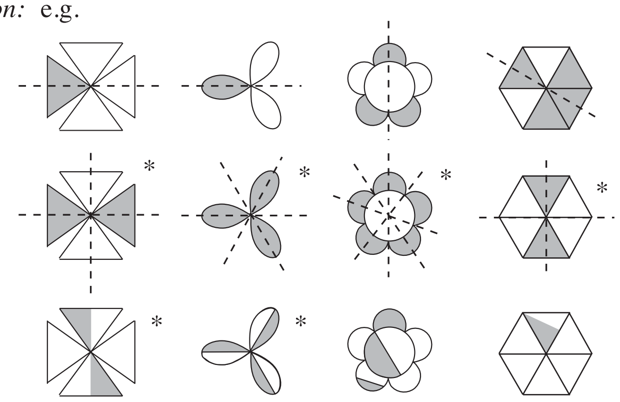


parallel perpendicular

25 min

Bk3

Lesson Plan 89

Activity		*Notes*
7	***Book 3, page 89*** Q.1 Read: *Write below each pattern the number of mirror lines it has.* Ps may use mirrors as a check. Ps draw the lines using pencils and rulers and write the appropriate numbers in the boxes. Review at BB with whole class. Ps come to BB to show their solutions. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:*  1, 1, 2, 1, 4, 0, 0, 4	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP Ps should draw lightly at first so that errors can be erased easily. Discussion, agreement, self-correction, praising Feedback for T Extra prase if Ps find them all
Extension	Which of the shapes have rotational symmetry? (c, e, f, g, h)	(T could have copies of these 5 shapes on OHTs as a check.)
	30 min	
8	***Book 3, page 89*** Q.2 Read: *Colour each shape so that it has:* *a) exactly one mirror line* *b) more than one mirror line* *c) no mirror lines.* Deal with one part at a time. Review after each part. Ps who finish first colour the shapes on the BB or OHP. Ps show alternative solutions. Class decide whether they are valid. Mistakes discussed and corrected *Solution:* e.g. a) b) c) 	Individual work, monitored, helped, corrected (Or whole class activity if T prefers) Drawn on BB or use enlarged copy master or OHP Discussion, agreement, self-correction, praising Exra praise for creative, correct solutions. Feedback for T **Extension** Ps can point out the shapes which have rotational symmetry. (*)
	35 min	

Bk3

Lesson Plan 89

Activity		Notes

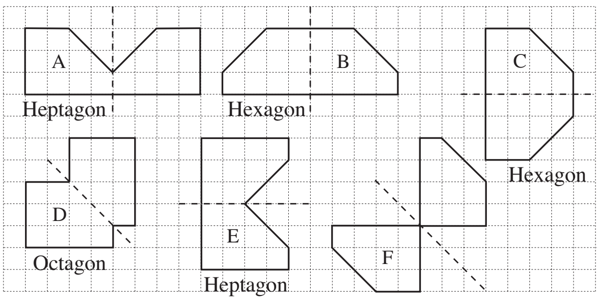
9 — ***Book 3, page 89***

Q.3 Read: *Reflect the shape in different ways. The broken lines are the mirror lines.*

Ps could each have a cut-out copy of the pentagon to try out the reflections (and/or check with a mirror). T could have a large model for demonstration.

Review at BB with whole class. Ps show solutions on BB. T checks using large model. Mistakes discussed and corrected.

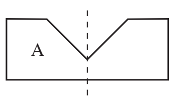
Solution:

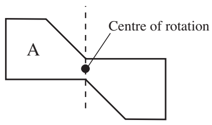


> Individual work, monitored, helped, corrected
>
> Draw on BB or use enlarged copymaster or OHP
>
> Discussion, agreement, self-correction, praising
>
> Ps will probably not see F as a combined shape.

Extension

- Discuss the names of the combined shapes. (Ps should already know hexagon (6 sided polygon). T helps with heptagon (7-sided polygon) and octagon (8-sided polygon).
- Compare reflections with rotations of 180° (half a turn).
  Agree that they they do not give the same result here.
  e.g. Reflection Rotation





> Whole class activity
>
> BB: Hexagon: 6 sides
> Heptagon: 7 sides
> Octagon: 8 sides
>
> T demonstrates on BB and Ps try out on desks too.
>
> Discussion, agreement

41 min

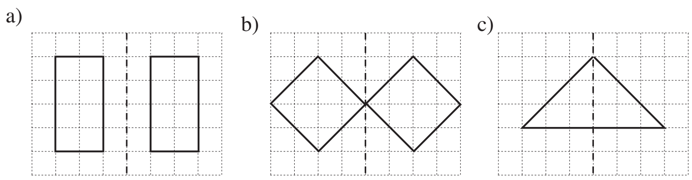
10 — ***Book 3, page 89***

Q.4 Read: *Draw the mirror image of each shape.*

Elicit that this is the same as reflecting the shape.
Ps can again check their drawing with mirrors.

Review at BB with whole class. Mistakes corrected.

Solution:



What can you tell me about the different diagrams? e.g.

a) the shape and the mirror image are separate. Here the two rectangles are in a symmetrical position (i.e. the same distance away from the mirror line)

b) the shape and the mirror image touch at only one point.

c) the shape coincides with the mirror image to form a symmetrical triangle.

> Individual work, monitored, helped, corrected
>
> Draw on BB or use enlarged copy master or OHP
>
> Discussion, agreement, self-correction, praising
>
> T could have large models to demonstrate the reflections.
>
> T could show rotations of 180° (half a turn) too. Agree that in b) reflection and rotation by a half turn give the same result.
>
> Whole class discussion
>
> Ps express themselves in own words. T repeats in mathematical language.
>
> Praising only

45 min

Bk3

R: Calculations

C: Line symmetry

E: Reflection. (Rotational symmetry)

Lesson Plan 90

Activity		*Notes*

1 Missing numbers

Johnny, Charlie and Leslie are collecting 1 p coins. Johnny has 126 more than Charlie but 126 less than Leslie. How many coins could they each have?

Let's show it in a table. Ps come to BB to choose a column and fill in the missing numbers. Calculations done mentally or at side of BB or in *Ex. Bks*. Praise if Ps notice that some calculations have already been done in previous columns. Class points out errors.

BB:

C	**541**	415	289	**1014**	888	762
J	667	**541**	415	1140	**1014**	888
L	793	667	**541**	1266	1140	**1014**

How many operations did we need to do? (8, not 12)

6 min

Notes:

Whole class activity

Table drawn on BB or use enlarged copy master or OHP

Use names of Ps in class if possible.

At a good pace

Reasoning, agreement, praising

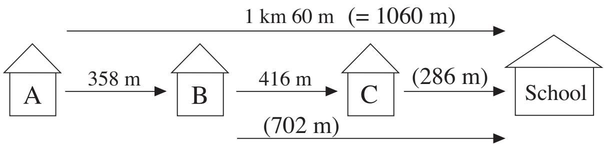
Feedback for T

Ps might notice pattern of positions of both 541 and 1014 in the table.

2 Problem

Listen carefully and study the diagram. Think how you would work out the answers to the questions.

BB:



Anne's house is 1 km 60 m from her school.

a) How far is Bob's house from the school?

b) How far is Carol's house from the school?

What should we do first? (Change 1 km 60 m to metres.)

BB: 1 km 60 m = 1000 m + 60 m = 1060 m

What should we do next? Ps come to BB to explain reasoning (or dictate to T what to write on the BB). Class agrees/disagrees or suggests alternative method.

Solution:

a) Distance of B's house from School = 1060 m – 358 m = <u>702m</u>

$$\begin{array}{r} 1060 \\ -\ 358 \\ \hline 702 \end{array}$$

b) Distance of C's house from School = 702m – 416 m = <u>286 m</u>

$$\begin{array}{r} 702 \\ -\ 416 \\ \hline 286 \end{array}$$

or 1060 m – (358 m + 416 m)
= 1060 m – 774 m
= <u>286 m</u>

$$\begin{array}{r} 358 \\ +\ 416 \\ \hline 774 \end{array} \qquad \begin{array}{r} 1060 \\ -\ 774 \\ \hline 286 \end{array}$$

12 min

Notes:

Whole class activity

(or individual work in *Ex. Bks* if Ps wish)

Diagram drawn on BB or use enlarged copy master or OHP (or 'houses' stuck to BB)

T repeats while referring to diagram.

Use names of Ps in class.

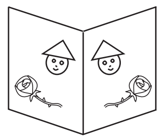
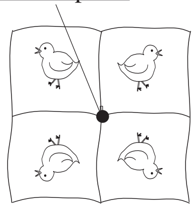
Ps suggest how to start and how to continue.

Ps do calculations in *Ex. Bks* and dictate results to T.

Reasoning, agreement, praising

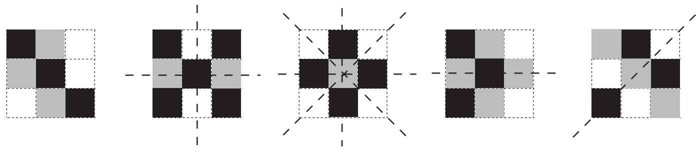
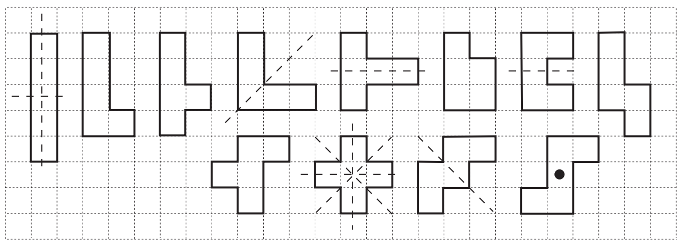
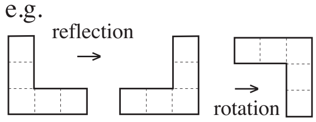
Accept either method.

Feedback for T

Bk3		*Lesson Plan 90*
Activity		***Notes***
3	**Symmetry 1** Ps each have 2 rectangular sheets of <u>thin</u> paper and 4 pieces of carbon paper (1 piece half the size of the rectangle and the other 3 pieces a quarter of the size). a) <u>Line symmetry</u> Fold one sheet in half and put the large piece of carbon paper inside like this. (T demonstrates with large pieces to show which side of the carbon paper should be face down.) Now draw 2 simple pictures on the paper. (e.g. face and flower) Make sure that Ps press hard while drawing. Now take out the carbon paper, unfold your sheet and hold it up to the window. What can you see? (One half is a reflection or mirror image of the other half.) T shows an example to class and pierces key points (e.g. the left eye) on the sheet to confirm the reflection. Agree that holes on both sides are in the eye nearest the fold. Elicit that the fold is the <u>mirror line</u> or <u>line of symmetry</u> and that the shapes are in <u>symmetrical positions</u> on either side of the line. Agree that the sheet (i.e. the whole pattern) has <u>line symmetry</u>. b) <u>Rotational symmetry</u> Fold the other sheet of paper in four and put the small pieces of carbon paper inside the layers face down like this. Now draw a simple picture on the paper (e.g. chick, triangle, boat). Make sure that Ps press very hard while drawing. Now take out the pieces of carbon paper, unfold your sheet and hold it up to the window. What can you see? (4 pictures, each a reflection of the other.) Elicit that there are 2 lines of symmetry (the fold lines) crossing at the centre of the sheet (<u>centre point</u>). T shows an example to class. Discuss the positions of each picture relative to the others. Elicit that LH pair are mirror images of RH pair (top pair are mirror images of bottom pair). T has copy of example on an OHT. T pins both to BB through centre points and rotates the OHT by half a turn. Ps agree that the shapes line up exactly. The sheet (pattern) has <u>rotational symmetry.</u> *18 min*	Whole class discussion but individual preparation All paper prepared before lesson and put on Ps' desks. T gives instructions and demonstrates at the same time. Check position of carbon paper before drawing begins. T chooses Ps to show their drawings to class. e.g.  Discussion, agreement BB: <u>Line symmetry</u> T instructs and demonstrates. Check position of carbon paper before drawing begins. T chooses Ps to show their drawings to class. Discussion, agreement, praising BB: <u>Centre point</u> e.g.  BB: <u>Rotational symmetry</u>
4	**Symmetry 2** a) Ps point out symmetrical things in the classroom, indicating where the lines of symmetry (mirror lines) are (or T points to things and Ps say whether they are symmetrical or not). Ps also show the mirror line or centre point where relevant. b) T places one or more pairs of <u>congruent</u> plane (2-D) shapes on BB, some in symmetrical positions and some not. Elicit meaning of congruent (exactly the same). Ps say whether the patterns have line symmetry (and draw the line of symmetry) or rotational symmetry (and draw the centre point) or that the shapes are <u>not</u> in symmetrical positions. *24 min*	Whole class activity Involve several Ps Agreement, praising BB: <u>congruent</u> Discussion, agreement, praising Or Ps could stick the shapes on the BB to show symmetry relative to mirror lines drawn by T.

Bk3

Lesson Plan 90

Activity		*Notes*
5	***Book 3, page 90*** Q.1 Read *Colour the unit squares using only 3 colours.* *Do not use the same colour for adjoining unit squares.* *Make every large square different.* Let Ps try without help first. Review at BB with the whole class. T could have a possible solution already prepared for discussion. Some Ps could show their solutions too. e.g.  Read: *If a pattern is symmetrical draw in the mirror line(s).* Ps come to BB to draw the mirror lines in the solution on the BB. Rest of Ps do so on their own solutions in *Pbs.* *30 min*	Individual work, monitored, helped Ps decide on the 3 colours T has a possible solution coloured on BB or use enlarged copy master or OHP Agreement, praising Discussion, agreement, praising. Ps point out the shapes which also have rotational symmetry. (2nd and 3rd from left)
6	***Book 3, page 90*** Q.2 Read: *Draw a line around 5 unit squares in different ways.* *If a shape is symmetrical, draw in any mirror lines.* T could show one example on BB if necessary. Elicit that <u>area</u> of each shape will always be 5 unit squares but the perimeter may vary. T sets a time limit. (e.g. 4 minutes) Ps come to BB to draw a shape each. Class agrees whether the shape is valid, whether it is a repeat (e.g. by rotation or reflection of congruent shapes) and whether it is symmetrical. N.B. There should be 12 different shapes but T need not show all cases if Ps have missed some – leave the problem open. *Solution*  *37 min*	Individual work, monitored, helped, corrected Grid drawn on BB or use enlarged copy master or OHP (Ps will most likely find only 3–5 shapes and may repeat some in another position) e.g.  Discussion, agreement, praising only Extra praise if Ps find all 12 cases! Ps could try to find missing cases in *Lesson 115*, or at home if they wish.

Bk3

Lesson Plan 90

Activity		*Notes*
7	***Book 3, page 90***	

Q.3 Read: *Reflect the shape in one axis first. Then reflect the shape and its mirror image in the other axis.*

Draw the mirror lines of the whole shape.

T explains task. Elicit that the vertical and horizontal solid lines are the axes and are perpendicular to each other. Remind Ps about the axes in a graph – the x-axis is horizontal, and the y-axis is vertical. Imagine that these lines are mirrors.

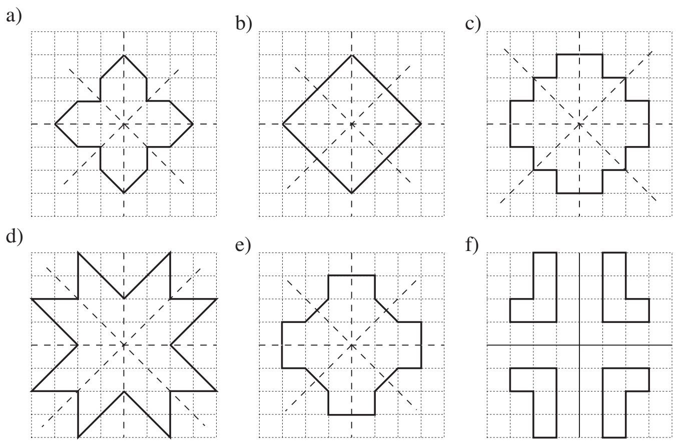
Do part a) on BB with whole class first if necessary, so that Ps understand what to do.

Deal with one part at a time. Review at BB with whole class. Ps come out to draw solution. Class agrees/disagrees. Mistakes discussed and corrected.

Agree that shapes a) to e) have both line and rotational symmetry.

Which is the odd one out? (part f), as the shapes in the 4 sections do not touch to make a 'whole' shape.) Ps might see the 4 shapes as congruent and in symmetrical positions.

Solution:



45 min

Notes:

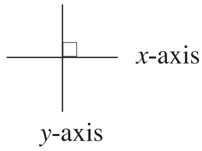
Individual work, monitored, helped, corrected

(or whole class activity if T prefers)

Drawn on BB or use enlarged copy master or OHP

Whole class discussion to start

BB:



Agreement, self-correction, praising

Whole class discussion

Agree that in part f), each pair of shapes (top, bottom, left, right) are mirror immages of the other pair and that the pattern has rotational symmetry around the centre point..

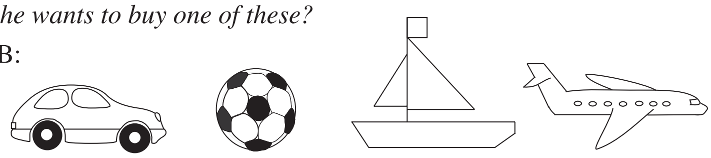
Bk3

R: Calculation

C: Shapes in symmetrical positions

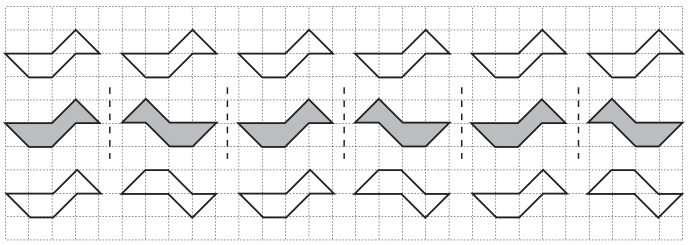
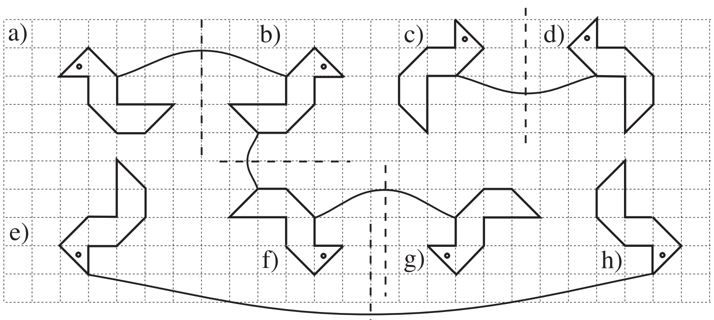
E: Challenges

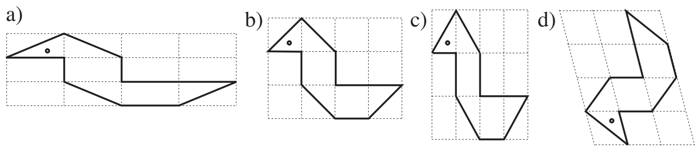
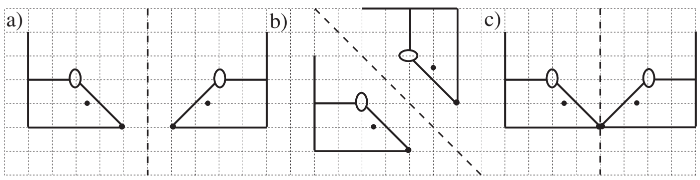
Lesson Plan 91

Activity		*Notes*
1	**Problem** *Paul has saved up £4.32. How much extra money will he need to save if he wants to buy one of these?* BB:  £6.75 £3.32 £8.54 £4.99 Ps come out to BB to choose a picture and say how much more Paul would have to save. Ps can change the money to pence and do vertical additions, or keep as £s and do the calculations horizontally. Ps give answer in a sentence. Class points out errors. e.g. *Car*: Paul has £4.32 = 432 p Car costs £6.75 = 675 p Paul needs to save 243 p = <u>£2.43</u> $\begin{array}{r} 675 \\ -\ \underline{432} \\ \underline{243} \end{array}$ *Ball:* Paul has enough money already to buy the ball and will have £4.32 – £3.32 = £1 left. or $\begin{array}{r} 432 \\ -\ \underline{332} \\ \underline{100} \end{array}$ *Boat:* Boat costs £8.54 = 854 p Paul needs to save 422 p = <u>£4.22</u>. $\begin{array}{r} 854 \\ -\ \underline{432} \\ \underline{422} \end{array}$ *Plane:* Plane costs £4.99 = 499 p. Paul needs to save 67 p. $\begin{array}{r} 499 \\ -\ \underline{432} \\ \underline{67} \end{array}$ *5 min*	Whole class activity Drawn on BB or use enlarged copy master or OHP or use pictures cut out of magazines, or real toys, with price labels. At a good pace Ps may do calculations in *Ex. Bks* first if they wish. Reasoning, agreement, praising Ps decide what method to use and dictate to T or write on BB. Feedback for T
2	**Sequence** I am thinking of a seqence. Its 1st term is 1 × 195, its 2nd term is 2 × 195, its 3rd term is 3 × 195, etc. Let's write the first 5 terms. Ps come to BB to write the terms or dictate to T, explaining reasoning. Class agrees/disagrees. Calculations can be done at side of BB. BB: 195, 390, 585, 780, 975, . . . What is the rule? (Increasing by 195) [Preparation for multiplicaton of 3-digit numbers by a 1-digit number] *10 min*	Whole class activity (Or individually in *Ex. Bks* if Ps wish) BB: e.g. $\begin{array}{r} 195 \\ +\underline{195} \\ \underline{390} \end{array}$ $\begin{array}{r} 390 \\ +\underline{195} \\ \underline{585} \end{array}$ $\begin{array}{r} 585 \\ +\underline{195} \\ \underline{780} \end{array}$ $\begin{array}{r} 780 \\ +\underline{195} \\ \underline{975} \end{array}$ Discussion, praising
3	**Written exercises** Revise order of operations (operations inside the brackets first, multiplication or division before addition or subtraction, otherwise work from left to right.) T dictates operations. Ps write them in *Ex Bks*. and solve them. Review at BB with whole class. Mistakes discussed and corrected. a) 480 – 400 ÷ 8 = (430) (480 – 400)÷ 8 = (10) b) 480 ÷ 8 – 2 = (58) 480 ÷ (8 – 2) = (80) c) 1200 ÷ 40 + 20 = (50) 1200 ÷ (40 + 20) = (20) d) 180 – 40 ÷ 10 = (176) (180 – 40) ÷ 10 = (14) *15 min*	Individual work, monitored T walks round class while reading operations. Reasoning, agreement, self-correction, praising Ps explain how they did the calculations, e.g. 1200 ÷ 40 = 120 ÷ 4 = 30 Feedback for T

Bk3

Lesson Plan 91

Activity		*Notes*
4	**Making symmetrical shapes** Ps have coloured sheets of paper on desks. T shows Ps how to make symmetrical patterns by folding sheets in two (four) , tearing a random pattern along unfolded edges, then opening out again. T chooses Ps to show their shapes. Elicit that the fold lines are the lines of symmetry, that shapes made by folding sheet in 2 have line symmetry (symmetry across a line) and those made by folding in 4 have rotational symmetry (symmetry around the centre point) *20 min*	Whole class demonstration first, then individual work, monitored Praising only T (or class) chooses the most original shapes Elicit that the centre point is where the fold lines cross.
5	***Book 3, page 91*** Q.1 Read: *Colour the row in which the ducks are mirror images of each other.* T also asks Ps to draw the mirror lines. Review at BB with whole class. P comes out to point and explain. Class agrees/disagrees. How have the other rows been made? Ask several Ps what they think. T repeats their reasoning using mathematical terms. *Solution:*  *25 min*	Individual work, monitored, helped Drawn on BB or use enlarged copy master or OHP Discussion, agreement, self-correction. praising T could have cut-out ducks to show the transformations. *Row 1*: Translation (moved 5 units to the right each time) *Row 2*: Reflection *Row 3*: Rotation by half a turn then reflection (extra praise if Ps realise this by themselves)
6 **Extension**	***Book 3, page 91, Q.2*** Read: *Complete the drawings so that each duck is exactly the same as the first duck.* T tells Ps that the ducks must be the same shape (congruent) but can face in different directions. (Elicit that the position of the eye indicates where the duck is facing.) Ps come to BB to complete shapes. Class agrees/disagrees or helps P at front if necessary. Read: *Join up the pairs which are mirror images of each other.* Ps come to BB to draw joining lines. Class agrees/disagrees. Check by drawing the mirror lines . (a–b, b–f, c–d, f–g, e–h) *Solution:*  *35 min*	Whole class activity Draw on BB or use enlarged copy master or OHP T (and Ps) could have ducks cut out of card for ease of manipulation. Ps can draw ducks in *Pbs* too if they wish. Discussion, agreement, praising only (If Ps are struggling, let them manipulate a cut-out duck. Once the correct position has been agreed, Ps draw round the duck.) Discuss other transformations. e.g a) to c): rotation by a quarter turn to the right, etc. Ps explain in own words and T repeats using mathematical terms. Praising only

Bk3		*Lesson Plan 91*
Activity		***Notes***
7	***Book 3, page 91*** Q.3 Read: *Draw the duck on these grids.* Review at BB with whole class. Mistakes corrected. *Solution:*  • Which duck is <u>similar</u> to the ducks in Q.2? (b), as it is the same shape but a bigger size.) • What has happened to the other ducks? (a) has been <u>stretched</u> horizontally, c) has been stretched vertically and d) has been stretched diagonally) *41 min*	Individual work, monitored, helped, corrected Drawn on BB or use enlarged copy master or OHP Discussion, agreement, self-correction. praising BB: <u>similar</u> Discussion, agreement, praising T could show <u>stretching</u> with a piece of elasticated material.
8	***Book 3, page 91*** Q.4 Read: *Draw the mirror image of the mouse.* Deal with one part at a time. Elicit that the dashed lines are the mirror lines. Review at BB with whole class. How could we check it? (With a mirror or by choosing any point on the mouse, e.g. the nose or the ear, and counting the units from each point to the mirror line. Elicit that if they are true reflections, the distances should be equal.) *Solution:* 	Individual work, monitored, helped, corrected Drawn on BB or use enlarged copy master or OHP Discussion, agreement, self-correction. praising
Extension	T could have a cut-out card mouse stuck to BB and give Ps instructions such as: • rotate it by half a turn to the left (1 right angle to the right, etc.) • reflect it in the *y*-axis (i.e. vertical axis) • reflect it in the *x*-axis (i.e. horizontal axis) • rotate it so that its nose points NE (SW, etc.) *45 min*	Whole class activity (or Ps each have a cut-out mouse on desks) Ps come out to transform mouse. Class agree/disagrees. At agood pace Ps can give instructions too!

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Bk3

R: Calculation

C: Similarity. Parallel and perpendicular lines

E: Estimation

Lesson Plan 92

Activity		*Notes*
1	**Operations** Let's do the calculations and compare the results. BB: $965 \overset{842}{-} 123 - 542 = (300)$ (=) $965 - (123 \overset{665}{+} 542) = (300)$ $965 \overset{1507}{+} 542 - 123 = (1384)$ (=) $965 + (542 \overset{419}{-} 123) = (1384)$ $(965 \overset{1507}{+} 542) - 123 = (1384)$ (>) $965 - (542 \overset{419}{-} 123) = (546)$ Ps come to BB to do calculations, writing difficult ones at side of BB. Class points out errors. Ps then come out to compare the results, writing the correct sign between each pair. Ps might be able to explain the equalities but do not worry it if they cannot. Ps might also point out the sets of brackets which are not really needed. (LH bottom, RH middle) *5 min*	Whole class activity Already prepared on BB or SB or OHT. At a good pace Ps can do calculations in *Ex. Bks* if they wish. Reasoning, agreement, praising BB: e.g. $\begin{array}{r}1507\\-\ 123\\\hline 1384\end{array}$ $\begin{array}{r}542\\-123\\\hline 419\end{array}$ $\begin{array}{r}965\\+419\\\hline 1384\end{array}$ $\begin{array}{r}965\\-419\\\hline 546\end{array}$ Discussion, agreement, praising
2	**Inequalities** Which numbers could we write instead of the rectangles? BB: a) $478 \overset{790}{+} 312 - 105 < 312 \overset{790}{+} 478 - \square$ ($685 < 790 - \square$, so $\square < 790 - 685 = 105$ or Ps might notice that 790 is the same on both sides, so the numbers subtracted on RHS must be less than 105. $\square$: 104, 103, . . .) BB: b) $149 < 200 \times \square - 850 < 151$ (Add 850 to all parts: $999 < 200 \times \square < 1001$, but $999 < \underline{1000} < 1001$ so $200 \times \square = 1000$, $\square = \underline{5}$) *10 min*	Whole class activity Already written on BB or SB or OHT Ps suggest method of solution and what calculations to do. Reasoning, agreement, checking, praising Extra praise for clever explanations. or $149 < \underline{150} < 151$, so $200 \times \square - 850 = 150$ $200 \times \square = 1000$ $\square = \underline{5}$ T gives hints if necessary
3	**Find the mistake** *Daffy Duck* had to write the same number in 6 different ways but he has made one mistake in each part. Can you find it? BB: a) 3H + 6T + 5U 300 + 60 + 5 $3 \times 100 + 6 \times 10 + 5 \times 1$ 36T + 5U 3H + 65U CCC<u>XL</u>V (CCCLXV) b) 9H + 8U <u>98U</u> (908U) $9 \times 100 + 0 \times 10 + 8 \times 1$ CMVIII 900 + 8 The next whole number less than 909. Deal with one part at a time. First elicit what the numbers should be. (365 and 908) Ps come to BB to underline the mistake and write it correctly. Class agrees/disagrees. *16 min*	Whole class activity T has BB or SB or OHT already prepared Give Ps time to work out descriptions mentally Reasoning, agreement, correcting, praising Feedback for T

Bk3

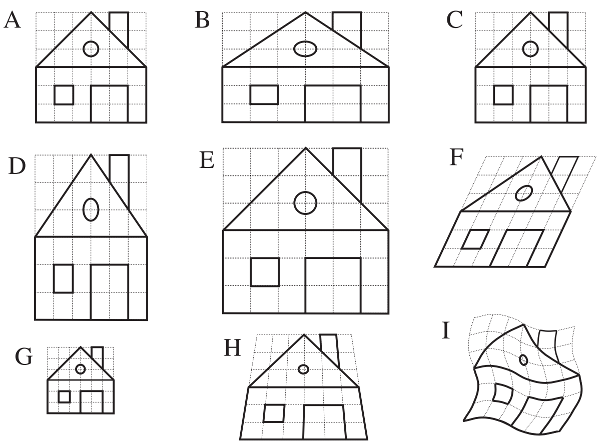
Lesson Plan 92

Activity		*Notes*

4 **Shapes and lines**

Look carefully at the houses on the different grids. Which parts of the drawings are missing? Ps come out to BB to draw them in. Class points out errors.

BB:



- Who can show us lines which are parallel (perpendicular)?
  Ps come out to point. Class agrees/disagrees or suggests others.
- Which houses are <u>congruent</u> (exactly the same)? (A 'is congruent to' C) We could write it mathematically like this. T shows the sign.
- Which houses are <u>similar</u>? (i.e. the same shape but different size) (A (or C) 'is similar to' E and G) We could write it like this.
- What have we done to House A to make the other houses? Elicit that:
  A (or C) was <u>enlarged</u> (made bigger) to make E,
  A (or C) was <u>reduced</u> (made smaller) to make G,
  A (or C) was <u>stretched</u> horizontally to make B,
  A (or C) was <u>stretched</u> vertically to make D.

  Discuss the cases of F, H and I. T could liken *House I* to the reflection we sometimes see in the ripples of a pond or lake.

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP

Discussion, agreement, praising

At a good pace

Involve majority of Ps

Ps could have sheets of copy master on desks too.

T reminds Ps of notation to show parallel (perpendicular) lines.

BB: <u>Congruent</u> $A \cong C$

BB: <u>Similar</u> $A \sim E \sim G$
or $C \sim E \sim G$

Ps explain in own words.
T repeats using mathematical terms where appropriate.

T could introduce the terms <u>skewed</u> to the right (F) and <u>distorted</u> (out of shape) for H and I.

25 min

5 ***Book 3, page 92***

Q.1 Read: *Colour in the same colour shapes which are similar to:*
i) rectangle 1, ii) rectangle 2, iii) rectangle 3.
Use a different colour for each set of shapes.

Elicit that <u>similar</u> rectangles are the same shape but can be different sizes. Class can agree on a colour for each set.

Deal with one set at a time. Review at BB with whole class. Discuss how to check whether shapes are similar. Elicit that, e.g.

Rectangle 1: longer sides are twice the length of shorter sides (or are in the ratio 1 to 2, or 1:2)

Rectangle 2: longer sides are 1 and a half times as long as the shorter sides (or are in the ratio 2 to 3, or 2:3)

Rectangle 3: All sides are equal so it is a square (or in ratio 1:1).

- Which is the odd one out? (13) Why? (Longer sides are 3 times length of shorter sides, or are in the ratio 1:3)
- Which rectangles are <u>congruent</u>? Ps show and write on BB.

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correction, praising

Solution:

i) $1 \sim 4 \sim 5 \sim 10 \sim 12 \sim 15$
ii) $2 \sim 6 \sim 11$
iii) $3 \sim 8 \sim 9 \sim 14 \sim 16 \sim 17$

Ps explain in own words.
T tells it as a <u>ratio.</u>

Agreement, praising

Ps might notice that '7' is missing. Let's draw it ~13.

BB: $1 \cong 12 \cong 15$; $2 \cong 6$

32 min

Bk3		*Lesson Plan 92*
Activity		***Notes***

6

Book 3, page 92, Q.2

Read: *This is a plan of a garden.*

What can you see in the garden? (e.g. flower bed with 2 bushes in the middle, pond with 3 stones in the middle, 3 trees, a hedgehog)

T explains about the scale and the different ways it can be shown. Discuss the meaning of the diagram similar to a metre stick. Elicit that the 'stick' measures 4 cm and means 4 m in real life.)

Do part a) with the whole class, discussing the compass directions and agreeing that the arrow is pointing North, so the entrance must face North.

Rest done as individual work, one part at a time, and reviewed at BB with whole class. Mistakes corrected. In part c), make sure that Ps realise that the 9 m East is measured from where Hedgehog is <u>now</u>, and <u>not</u> from the point where he turned to face East, otherwise he will walk into the trees!

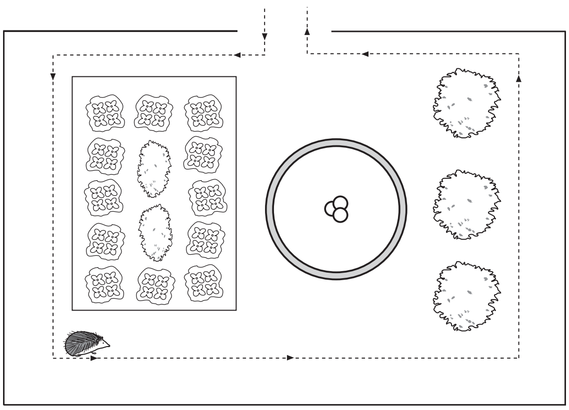
Solution:

a) N

b) i) Length of garden in real life: L = 12 m

ii) Width of garden in real life: W = 8 m

c)



Extension

What is the <u>total</u> length of Hegehog's route in real life?

BB: 1 m + 4.5 m + 6.5 m + 1 m + 9 m + 6.5 m + 4.5 m + 1 m
= 12 m + 10 m + 12 m = <u>34 m</u>

40 min

Notes:

Ps have rulers on desks

Whole class introduction, involving several Ps

Use enlarged copy master for demonstration/discussion only.

BB: *Scale*: 1 cm → 1 m
or 4 cm → 4 m

Revise compass directions if necessary.

Individual work, monitored, helped

T could ask class to describe Hedgehog's route so far:

'Hedgehog has gone 1 m South, then 4.5 m West, then 8 m South, then 1 m East'

T can draw correct position of route on OHT (only as demonstration – it will not be the correct length)

Individual work in measuring and calculating

Agreement, checking, self-correcting, praising

7

Estimation

T has a large local map on wall or drawn on BB (or part of a map copied onto an OHT).

Discuss what it shows and what its scale is. (Choose a simple map scale if possible and write scale on the BB, e.g. Scale: 1 cm → 10 m)

T chooses 2 places on map (e.g. towns, islands, lakes) Two Ps come out to point to them. Rest of Ps estimate the distance between them in real life. Ask several Ps what they think. T (or P) checks by measuring and converting to real-life distances.

45 min

Notes:

Whole class activity

Use map showing places familiar to Ps

(or T could make a fantasy map with animals, castles, dragons, etc. stuck on it)

Class applauds the Ps with the closest estimates.

Bk3	R: Calculation **C: Similarity. Enlargements and reductions** *E: Complex shapes*	*Lesson Plan 93*

Activity		*Notes*
1	**Problems 1** Listen carefully and think about how you would solve these problems. Tell me what operation or equation you would write. a) *Pete had £715 in his bank account. After buying a computer he had £319 left in his account. How much was the computer?* **A**, come and write the equation or operation you think is needed. Who agrees? Who would do it another way? etc. BB: e.g. £715 – $\square$ = £319 or $\begin{array}{r} 715 \\ -\,319 \\ \hline \text{£}\ (396) \end{array}$ *Answer:* The computer cost £396. b) *Rob has £715 left in his bank account after spending £319 while on holiday. How much money did Rob have in his account <u>before</u> he* went *on holiday?* **B**, come and write the equation or operation you think is needed. Who agrees? Who would do it another way? etc. BB: e.g. $\square$ – £319 = £715 or $\begin{array}{r} 715 \\ +\,319 \\ \hline \text{£}\ (1034) \end{array}$ *Answer:* Rob had £1034 in his account before his holiday. c) *Sarah had £319 in her bank account. Her grandparents gave her some money and she now has £715. How much money did Sarah's grandparents give her?* **C**, come and write the equation or operation you think is needed. Who agrees? Who would do it another way? etc. BB: e.g. £319 + $\square$ = £715 or $\begin{array}{r} 715 \\ -\,319 \\ \hline \text{£}\ (396) \end{array}$ *Answer:* Sarah's grandparents gave her £396. *6 min*	Whole class activity Ps only need to write the equations or operations at first. Once the class has agreed it is correct, Ps come to BB to do the calculation or T writes what Ps dictate. At a good pace Reasoning, agreement, praising Ps say answer as a sentence in unison. T uses the words reductant, subtrahend, difference. If problems, show details of calculations in a place-value table. Feedback for T
2	**Problems 2** Listen carefully and think about how you would solve these problems. Show me the operation when I say. (On scrap paper or 'slates') Write the answer too if you have time. Ps who respond correctly exlain to those who do not. Ps dictate calculation to T (or come to BB). Class says answer as a sentence. a) *If you have only 50 p coins in your purse, how many would you need to pay £4 50 p?* Show me . . . now! (450 ÷ 50 = $\square$) (or $\square$ × 50 = 450) BB: £4 50 p = 450 p, 450 p ÷ 50 p = 45 p ÷ 5 p = <u>9</u> (times) *Answer:* I would need nine 50 p coins to pay £4.50. b) *Tim had £4.20. He spent 60 p per day. For how many days did his money last?* Show me . . . now! (420 ÷ 60 = $\square$) (or $\square$ × 60 = 420) *Answer:* Tim's money would last for 7 days. c) *Vicky has £4.80. Her money must last for 6 days. If she spends the same amount each day, what is the most that she can spend daily?* Show me . . . now! (480 ÷ 6 ≥ $\square$) or ($\square$ × 6 ≤ 480) *Answer:* She can spend at most 80 p each day. *15 min*	Individual work in writing but reviewed with whole class T reads questions while walking round the class. Responses given in unison Reasoning, agreement, self-correcting, praising (Or done in *Ex. Bks* and mistakes corrected after review.) BB: £4.20 = 420 p 420 p ÷ 60 p = 42 p ÷ 6 p = <u>7</u> (times) BB: £4.80 = 480 p 480 p ÷ 6 = <u>80 p</u>

Bk3

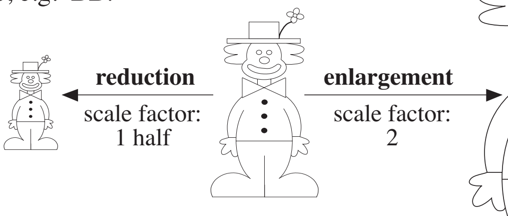
Lesson Plan 93

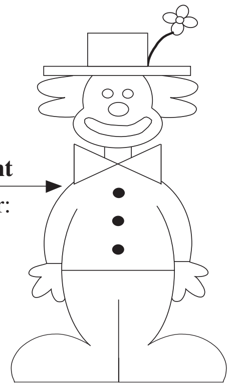
Activity		*Notes*

3

Enlargement and reduction

T has 3 different sizes of the same drawing or picture, e.g. BB:





Elicit that the pictures are the same shape but are increasing in size.

Which picture is biggest? (RH) We say that the RH picture is an enlargement of the middle picture (or the middle picture has been enlarged to make the RH picture).

Which picture is the smallest? (LH) We say that the LH picture is a reduction of the middle picture (or the middle picture has been reduced to make the LH picture).

How can we find out by how much they have been enlarged or reduced? (Measure them.) Discuss the parts of the pictures which could be measured. (e.g. distance from bottom of feet to top of hat, or width of bow, or length of one foot, or height of hat, etc.)

Ps choose what to measure. T (or P) measures using appropriate unit.

T explains that :

- if length is twice as much, then the picture has been enlarged by 2 times (or scale factor 2)
- if length is half as long, then the picture has been reduced by 1 half (or scale factor 1 half).

Notes:

Whole class activity to start

Use copy master, enlarged, coloured, cut out and stuck to BB (or any picture/drawing enlarged by 2 times and reduced by a half)

Ps come to BB or OHP to point.

Agreement, praising

Ps might also notice that, e.g.

- RH is enlargement of LH by scale factor 4
- LH is reduction of RH by scale factor 1 quarter

T gives hints if Ps do not suggest measuring.

Write measurements on BB

e.g. Width of bow tie:
12.5 mm : 25 mm : 50 mm

T gives a measurement for middle picture and elicits what the similar measurement would be in the reduction and the enlargement.

20 min

4

Book 3, page 93

Q.1 Read: *Colour any large shape which is similar to the small shaded shape inside it..*

Do part a) with the whole class first to determine how to tell whether a shape is similar. (Count the units of matching sides and see if they are in the same ratio, e.g. in a), sides in larger shape are all twice as long as matching sides in smaller shape.)

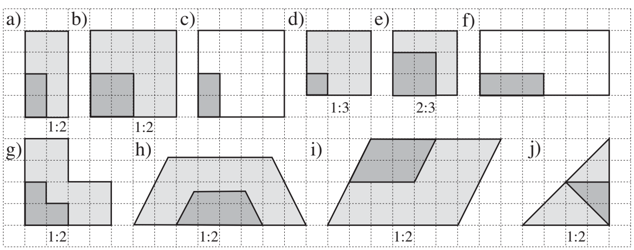
T sets a time limit. Review at BB with whole class. Ps explain their reasoning. T helps with mathematical terms if necessary.

Discuss why c) and f) are not similar and by how much the similar shapes have been enlarged.

Extension

Compare the enlargement of lengths of sides with the enlargement of area.

Solution:



Notes:

Individual work, monitored helped

Drawn on BB or use enlarged copy master or OHP

Discussion, agreement, self-correction, praising

Whole class analysis of results

e.g.

a) sides enlarged by scale factor 2, i.e. in the ratio 1:2;
area enlarged by scale factor 4, i.e. ratio 1:4

d) sides enlarged by scale factor 3, i.e. in the ratio 1:3;
area enlarged by scale factor 9, i.e. in the ratio 1:9

j) reposition small triangle to see enlargement more easily

28 min

Bk3

Lesson Plan 93

Activity		*Notes*

5

Book 3, page 93

Q.2 Read: *Colour similar shapes in the same colour.*

T sets a time limit. Review at BB with whole class. Ps come to BB or dictate to T. Class agrees/disagrees.

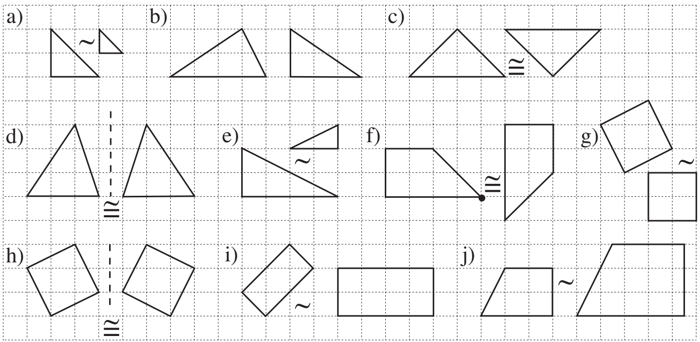
Which shapes are <u>congruent</u>? [c), d), f) and h)]

Which are in symmetrical positions? [d) and h) Who can draw the lines of symmetry?

Extension

How can we move one congruent shape on top of the other? Ps suggest directions.

Solution:



Notes:

Individual work, monitored helped, corrected

Drawn on BB or use enlarged copy master or OHP

Discussion, agreement, self-correction, praising

Feedback for T

Remind Ps of the notation:

<u>similar</u> ~ <u>congruent</u> ≅

T could have copies of the shapes cut out from card to verify how to move one congruent shape to the same position as the other, e.g.

d), h) reflection in mirror line

f) rotation 1 quarter of a turn to the right around point shown, then move E1, S1

34 min

6

Book 3, page 93

Q.3 Read: *a) Write the letters of similar shapes below.*
b) Draw over parallel lines in the same colour.
c) Mark right angles with red squares.

Deal with one part at a time. T reminds Ps about arrow notation to show sets of parallel lines. Ps can use it if they wish.

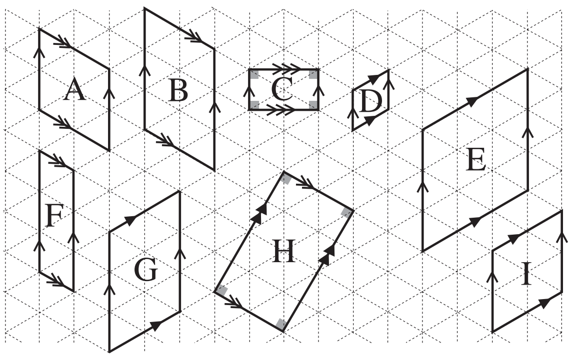
Elicit that right angles are formed from <u>perpendicular</u> lines.

Review at BB with whole class. Mistakes discussed/corrected.

Solution:

a) A ~ D ~ E ~ I, B ≅ G, C ~ H

b) and c):



Extension

Discuss the shapes. T elicits or tells:

- All the shapes have opposite sides parallel, so they are all <u>parallelograms</u>.
- C and H have right angle corners, so are also <u>rectangles</u>.
- A, D, E and I have sides of equal length, so are also <u>rhombi.</u>

Notes:

Individual work, monitored helped, corrected

Drawn on BB or use enlarged copy master or OHP

Discussion, agreement, self-correction, praising

Feedback for T

What else do you notice about the shapes?

Extra praise if Ps notice these common properties themselves.

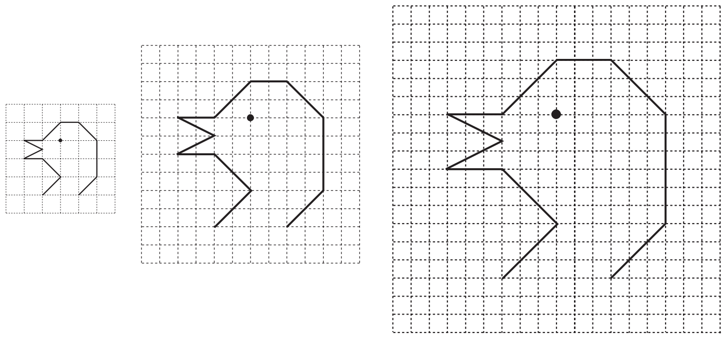
BB:

<u>parallelogram:</u> quadrilateral with opposite sides parallel

<u>rectangle:</u> parallelogram with square corners

<u>rhombus</u>: parallelogram with all 4 sides of equal length

40 min

Bk3		*Lesson Plan 93*
Activity		***Notes***
7	***Book 3, page 93*** Q.4 Read: *a) Copy this bird's head in your exercise books.* *b) Elarge it to 2 times and 3 times its size.* Elicit that to make it 2 (3) times bigger, each line of the drawing should be 2 times (3 times) as long If we had started with the larger drawing, by how much would we have reduced it to make the smaller drawing? (1 half, 1 third) *Solution:* 	Individual work, monitored helped, corrected Ps use *Ex. Bks* or grid sheets T has enlargements already prepared on BB or SB or OHT for demonstration (or use enlarged copy master) Discussion, agreement, self-correction, praising Elicit that all three drawings are <u>similar</u> (the same shape).

45 min

Bk3

R: Calculations
C: Enlargements and reductions
E: Ground plans, maps

Lesson Plan 94

Activity		*Notes*

1 Problems

Listen carefully and think what operations you would write to solve the problem. Show me it when I say. (On scrap paper or 'slates')
Write the answer too if you have time. (Data can be noted in *Ex. Bks*.)

Ps who respond correctly explain to those who do not. Ps dictate calculation to T (or come to BB). Class says answer as a sentence.

a) *Ann had £6.75. Her Dad gave her some 20 p coins. If Ann now has £8.55 how many 20 p coins did her Dad give her?*

Show me . . . now! (e.g. (855 – 675) ÷ 20 = $\boxed{}$)

BB: £8.55 = 855 p, £6.75 = 675 p

(855 p – 675 p) ÷ 20 p = 180 p ÷ 20 p = $\underline{9}$ (times)

Answer: Ann's Dad gave her nine 20 p coins.

b) *Billy had £12.20. He bought some marbles at 40 p each and had £9 left. How many marbles did he buy?*

Show me . . . now! (e.g. (1220 – 900) ÷ 40 = $\boxed{}$)

Answer: Billy bought 8 marbles.

c) *Carol had £5.84 in her piggy bank. Then she put in the same amount of money each day for 20 days and now has £15.84 in her piggy bank. How much money did Carol save each day?*

Show me . . . now! (e.g. (1584 – 584) ÷ 20 = $\boxed{}$)

Answer: Carol saved 50 p each day.

8 min

Notes:

Individual work in writing but reviewed with whole class

T reads questions while walking round the class.

Use names of Ps in class.

Responses given in unison

Reasoning, agreement, self-correcting, praising

(Or done in *Ex. Bks* and mistakes corrected after review.)

BB: e.g.
£12.20 = 1220 p, £9 = 900 p
(1220 p – 900 p) ÷ 40 p
= 320 p ÷ 40 p = $\underline{8}$ (times)

BB: e.g.
£5.84 = 584 p, £15.84 = 1584 p
(1584 p – 584 p) ÷ 20
= 1000 p ÷ 20 = $\underline{50\text{ p}}$

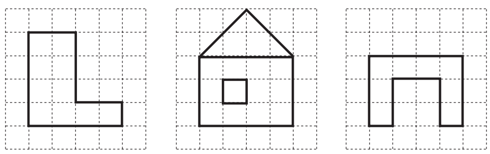
2 Enlargement and reduction

T has grids drawn on BB or OHT. T draws a simple shape on the smallest grid, or Ps come to BB to draw one.

a) Let's enlarge the shape to 2 times (3 times) its size. Ps come to BB to draw enlargements. Class points out errors.

Repeat for other shapes.

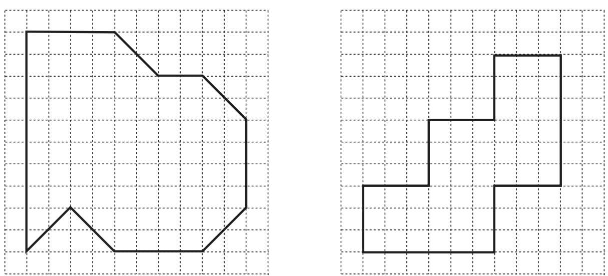
e.g. BB:



b) Let's reduce this shape to half (1 third) its size. Ps come out to draw reductions. Class points out errors.

Repeat for other shapes

e.g. BB:



16 min

Notes:

Whole class activity

Use squared BB or draw grids on BB or OHT or use enlarged copy master or OHP.

At a good pace

T helps where necessary

Agreement, praising

Feedback for T

(Or individual work if Ps wish. Each P has a copy of the grids on the copy master)

Praise creative original shapes.

Bk3

Lesson Plan 94

Activity		*Notes*

3

Book 3, page 94

Q.1 Read: *This picture is a smaller copy of a larger picture.*
Scale: 1 mm on the copy means 1 cm on the real picture.

Make sure that Ps understand the scale by referring to mm and cm on their rulers. Deal with one part at a time.

a) Read: *By how much was the real picture reduced?*

Elicit that 1 cm = 10 mm, so the real picture was reduced by <u>1 tenth</u> of its size (or by scale factor 1 tenth).

b) Read: *How long were the sides of the real picture?*

How could we find this out? (Measure the sides of the copy in *Pbs*, then multiply the lengths by 10, or measure in mm and change the units to cm)

Review with whole class. Ask several Ps what they think. (*Width* = 32 cm and *Height* = 40 cm)

c) Read: *How long is the perimeter of this copy?*

Review at BB with whole class. Mistakes corrected.

BB: perimeter = 2 × width + 2 × height
= 2 × 32 mm + 2 × 40 mm
= 64 mm + 80 mm = <u>144 mm</u> (= 14.4 cm)

d) Read: *What length of wood would be needed to make a frame for the real picture?*

Elicit that the length needed will be the same as the perimeter of the real picture.

BB: Perimeter of real picture = 10 × 14.4 cm
= <u>144 cm</u> (= 1 m 44 cm)

[or 2 × (32 cm + 40 cm) = 2 × 72 cm = <u>144 cm</u>]

Notes:

Ps have rulers on desks

Individual work, monitored, helped

BB: 1 cm = 10 mm

Discussion, agreement, self-correcting, praising

Use enlarged copy master for discussion and demonstration only!

T could have the frame already prepared from card to show to give Ps an idea of its real size.

23 min

4

Book 3, page 94

Q.2 Read: *This is an enlarged copy of the front cover of a tiny book.*
Draw the real book cover if the smaller side is 2 cm long.
What is the length of the larger side of the real book?

How do we know what length to make the longer side? Ask several Ps what they think. (Measure the shorter side on the copy, then compare it with 2 cm to find how much is has been reduced.) Ps measure and work out the scale. Agree that:

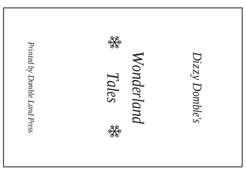
BB: *Scale*: 4 cm → 2 cm or 2 cm → 1 cm

(i.e. the real book cover is half the size of the copy)

Ps measure the length of the longer side, then complete the drawing. Ps can use corner of ruler to ensure that the lines are perpendicular.

Solution:

4 cm



6 cm

Real book cover

2 cm

3 cm

Notes:

Whole class discussion first to determine the scale of the reduction

Discussion, reasoning, agreement, praising

BB: 4 cm → 2 cm
6 cm → <u>3 cm</u>

N.B. Ps do not need to write the text!

Extension

What is the perimeter (area) of the real book cover?

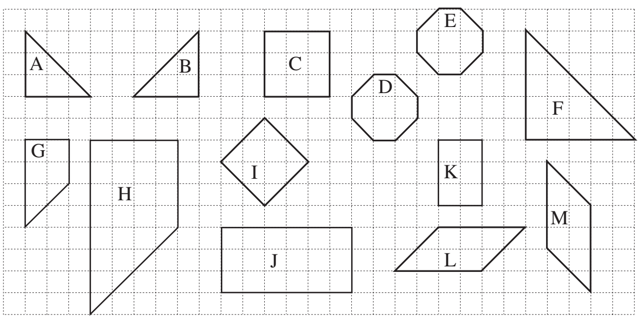
$P = 2 \times (3\text{ cm} + 2\text{ cm}) = 10\text{ cm}$

$A = 2\text{ cm} \times 3\text{ cm} = 6\text{ cm}^2$

30 min

Bk3

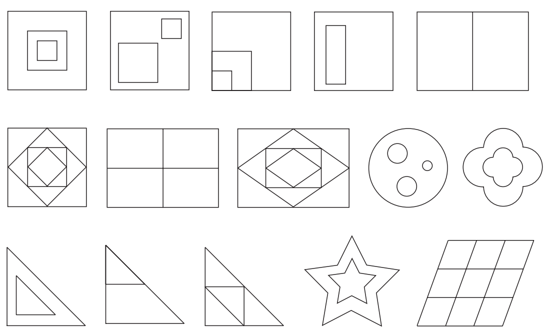
Lesson Plan 94

Activity		*Notes*
5	***Book 3, page 94***	
	Q.3 Read: *This is the ground plan of a room.* *Scale: 1 mm on the plan means 10 cm in real life.*	Whole class introduction
	T makes sure that Ps understand the scale with quick oral practice. T says a length on the plan, e.g. 2 mm (5 mm, 10 mm, etc.), Ps say what it would measure in real life (and vice versa).	T chooses Ps at random. At speed. Praising
	Discuss what the items on the plan mean. Ps come out to point to the door, windows, rug and say what they think the other items of furniture could be (e.g. bed, bedside cabinet, stool, dressing table, bookshelves, wardrobe or chest of drawers, etc)	Use enlarged copy master for discussion and demonstration only. Involve several Ps
	Deal with one part at a time. Class decides which measure is the length and which is the width of the room.	
	In part b), iii) T might need to explain what a skirting board is and show where it is (or where it would be) in the classroom.	Explanation/demonstration
	Review at BB with whole class. Discuss all results and class decides which measures are acceptable. Extra discussion about b) iii), as Ps might forget to take off the gap for the door.	Agreement, checking, self-correcting, praising
	Solution: a) In the <u>plan</u>: i) width of room: 45 mm ii) length or room: 35 mm	(Accept 1 mm more or less)
	b) In <u>real life</u>: i) width of the door: 70 cm ii) width of each window: 100 cm iii) length of skirting board: $2 \times (450\text{ cm} + 350\text{ cm}) - 70\text{ cm}$ $= 2 \times 800\text{ cm} - 70\text{ cm}$ $= 1600\text{ cm} - 70\text{ cm}$ $= 1530\text{ cm}$ (= 15 m 30 cm)	(Or do part b) iii) as a whole class activity if Ps are struggling)
	38 min	
6	**Shapes revision**	
	T has various shapes drawn on a grid. Study these shapes. BB: e.g. 	Whole class activity Drawn on BB or use enlarged copy master or OHP Involve as many Ps as possible T repeats unclear questions using correct mathematical language.
	Who can think of questions to ask about them? e.g. • Which shapes are similar (congruent, symmetrical)? • What is the name (perimeter, area) of each shape? • Which shapes are enlargements (reductions) of other shapes? • Show parallel lines (perpendicular lines, right angles.) • How would you put them in sets? etc.	Ps choose other Ps to answer their questions. Class agrees/disagrees or points out omissions. Praising, encouragement only Extra praise for clever questions
	45 min	

Bk3

R: Calculation. Plane shapes
C: Building solids from unit cubes
E: Plane symmetry. Similarity of solids

Lesson Plan
95

Activity		*Notes*
1	**Missing numbers** Let's fill in the digits missing from these calculations. BB: a) i) $342 + \mathbf{247} = 589$ ii) $546 + \mathbf{830} = 1376$ iii) $403 + \mathbf{540} = 943$ iv) $999 + \mathbf{889} = 1888$ v) $3\mathbf{1}2 + \mathbf{9}46 = \mathbf{1}25\mathbf{8}$ vi) $1\mathbf{3}8 + \mathbf{1}03 = 24\mathbf{1}$ b) i) $956 - \mathbf{342} = 614$ ii) $743 - \mathbf{591} = 152$ iii) $\mathbf{838} - 526 = 312$ iv) $\mathbf{697} - 479 = 218$ v) $85\mathbf{6} - \mathbf{2}34 = 6\mathbf{2}2$ vi) $7\mathbf{5}1 - 59\mathbf{9} = \mathbf{1}52$ Ps come out to fill in missing digits, explaining reasoning to class. Class checks that they are correct. *8 min*	Whole class activity Written on BB or OHP or use enlarged copy master At a good pace **Bold** numbers missing Reasoning, checking, agreement Details of difficult calculations given where needed Ps may do the calculations in *Ex. Bks* first before showing on BB. Praising, encouragement only
2	**Tables practice relay** T says a multiplication or division. P says the result, then gives another multiplication or division to the next P. Class points out errors. *11 min*	Whole class activity At speed round class In good humour!
3	**Shapes** What kind of shapes can you see in the diagram? (squares, rectangles, triangles, flowers (from 4 semicircles), stars, circles, parallelograms) BB:  • Which shapes are similar? (e.g. Ps might point out that each unit parallelogram is similar to the large parallelogram and also to each 4-unit parallelogram) • Which shapes are congruent? (T has BB ruler or measuring tape ready in case of disagreement) • Which shapes are enlargements (reductions)? Ps come out to point and explain. Class agrees/disagrees or suggests other examples. *16 min*	Whole class activity Drawn on BB or use enlarged copy master or OHP At a good pace Revise what a parallelogram is (quadrilateral with opposite sides parallel, so squares and rectangles are also parallelograms) Discussion, reasoning, agreement, praising Encourage Ps to use mathematical terms Feedback for T

Bk3

Lesson Plan 95

Activity		*Notes*

4 **Similarity of solids**

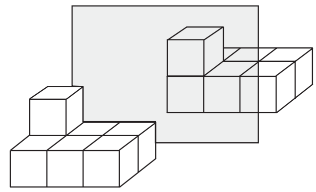
T shows some congruent solids built from unit cubes. T places them in symmetrical positions. If these solids are mirror images of each other where would the mirror be? Ps come out to place mirror and check that the mirror image is in the same position as the second solid.

If I put one solid in this position and placed the mirror here, where would the mirror image be? Ps come out to place 2nd solid in correct position. Class agrees/disagrees. Check against mirror image.

Elicit that the solids are in <u>symmetrical positions</u> on either side of the mirror.

Notes: Whole class activity

T has solids already prepared

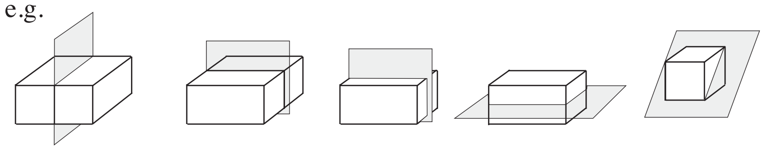


T shows 2 congruent cuboids. How could we place the mirror between them so that they are in symmetrical positions. Ps come out to demonstrate different ways. Class describe what they can see.

If I cut one cuboid in half and put the mirror here, what do you notice? (The half cuboid and its mirror image seem to make a whole cuboid.) In what other ways could we do it? T does what Ps dictate.

We say that the cuboids have <u>plane symmetry</u> (i.e. are symmetrical on each side of a plane (flat surface). Repeat with cubes.

e.g.



Notes: Demonstration, discussion, agreement, praising

Cuboids made from unit cubes or plasticine or any material which can be cut in half easily.

BB: <u>Plane symmetry</u>

Extra praise if Ps point out the diagonal plane of symmetry without help.

Everyone stand up. Can you hold your hands in a symmetrical position? Show me . . . now! T chooses Ps to show their different positions. Other Ps come out to show where the plane of symmetry (a mirror or piece of card) would be.

Notes: In unison

(e.g. palms facing, palms touching, etc.)

22 min

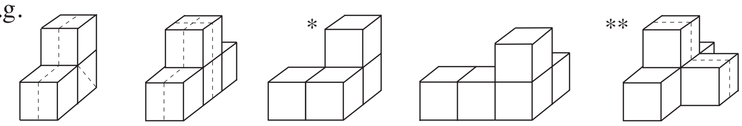
5 **Building solids**

Ps have unit cubes on desks. T has large models already prepared for demonstration.

Let's build different solids using 3 (4, 5) unit cubes. T chooses Ps to show their solids and to describe them to class.

T has 4 or 5 prepared models. Which of these could be cut into two equal parts so that each part is a mirror image of the other? Ps come out to show where they would cut them. Who agrees? Who can think of another way? etc.

e.g.



(2 ways) (2 ways) (no ways) (no ways) (1 way)

Notes: Individual (or paired) work in building solids, monitored

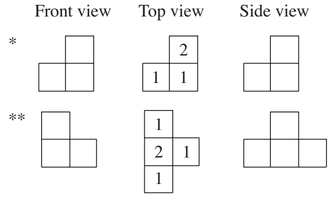
Demonstration, praising

Discussion, agreement, praising only

Ps must imagine the cuts.

T confirms by splitting them in half and checking with a mirror. (Models pre-cut)

T chooses a couple of the solids. What would they look like if we drew them from the front (top, side)? Remind Ps about how to draw a ground plan as seen from above, showing the number of cubes in each column. Now we can see more easily whether the solid is symmetrical and where the plane of symmetry would be. Ps come out to draw them.



Extension Discuss and elicit the surface area (in unit squares) and volume (in unit cubes) of one or two of the solids.

Notes: Discussion, reasoning, agreement, praising

28 min

Bk3

Lesson Plan 95

Activity		*Notes*

6

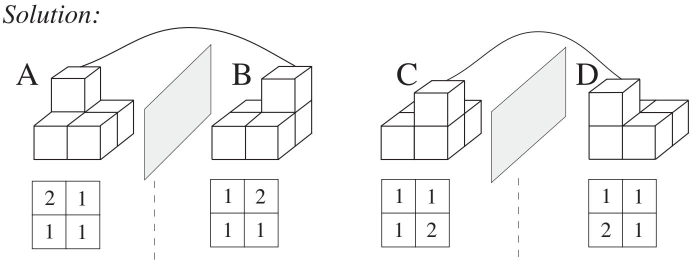
Book 3, page 95

Q.1 Read: *These solids have been built from unit cubes. Join up the solids which are mirror images of each other.*

If you are not sure, build the solids first with unit cubes, then think where you would put the mirror. Use the ground plans to help you.

Review at BB with whole class. Ps come to BB to join up mirror images and draw where they would put the mirror. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:



Discuss surface area and volume. (The same for all 4 solids)

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP (or T has large models made up for demonstration)

Agreement, self-correction, checking with models and large mirror, praising

Show that any two could be joined up if we were allowed to move them.

Area = 20 unit squares

Volume = 5 unit cubes

33 min

7

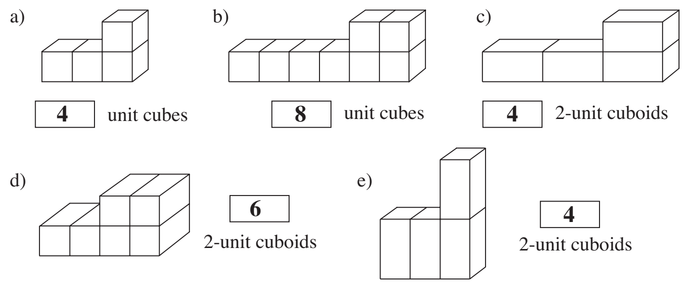
Book 3, page 95

Q.2 Read: *Build these solids. How many units did you use for each one?*

Deal with one part at a time. Ps show models to class.

Review at BB with whole class. Mistakes corrected.

Solution:



Notes:

Ps have unit cubes on desks

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP (or T has large models made up for demonstration)

Agreement, self-correction, praising

Extensions

- How did we get from:

  a) to b)? (stretching horizontally → to twice its length)

  b) to c)? (replacing 1-unit cubes with 2-unit rods, b) $\cong$ c))

  a) to e)? (stretching vertically ↑ to twice it height)

- What is the volume and area of each solid? Let's write it in a table.

BB:	a)	b)	c)	d)	e)
Volume (unit cubes)	4	8	8	12	8
Area (unit squares)	18	32	32	36	30

- If we enlarged a) to twice its size (by scale factor 2) what would it look like? Elicit that it should be twice the length, twice the width and twice the height. T shows model. Agree that it is <u>similar</u> to a). Discuss and compare its volume (8 times more) and area (4 times more) with those of a).

Notes:

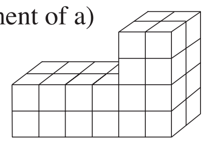
Whole class activity

Discussion, agreement, praising

T has table already drawn on BB or OHT

Ps come to BB to fill in the values. Class agrees/disagrees

Enlargement of a) by scale factor 2:



V = 32 unit cubes

A = 72 unit squares

39 min

Bk3

Lesson Plan 95

Activity		*Notes*

8

Book 3, page 95

Q.3 Read: *Write how many unit cubes have been used to build each of these cuboids.*

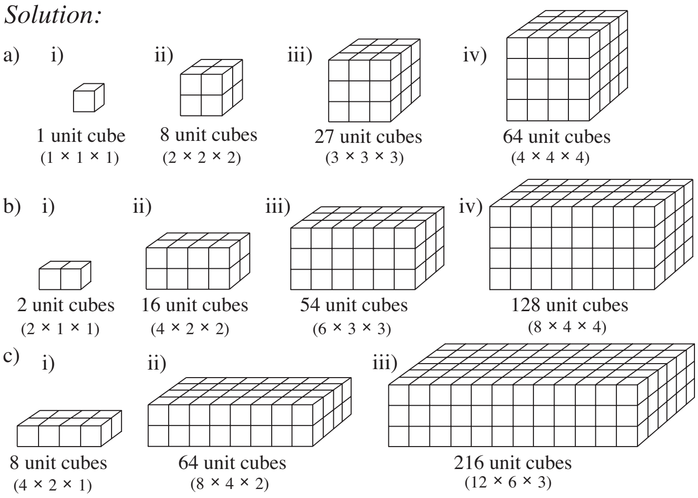
Think about what is the relationship between them.

Deal with parts a). b) and c) one at a time. Parts a) and b) can be done as individual work, reviewed with the whole class. Part c) can be done as a whole class activity.

Elicit that it is easier to count how many unit cubes long, how many wide and how many high, then multiply the numbers together. Mistakes discussed and corrected. Elicit that number of cubes used is the **<u>volume</u>** of the solid.

What do you notice about each part?

Solution:



Notes:

Individual work to start, monitored, helped

Use enlarged copy master. T has large models already prepared for demonstration

Ps can build cuboids on desks if problems.

Discussion, reasoning, agreement, self-correction, praising

Ps might notice that:

i) → ii): scale factor 2;

i) → iii): scale factor 3

i) → iv): scale factor 4

a) are <u>similar</u> cubes (length = width = height)

b) are <u>similar</u> cuboids (length = 2 × width = 2 × height)

c) are <u>similar</u> cuboids (length = 2 × width = 4 × height)

Extension

- What is the surface area of each cuboid? Extra praise if Ps notice quick ways to calculate, rather than counting each square, e.g.

  a): 6 equal faces, so area = 6 × number of squares on 1 face

  e.g. iii): $A = (6 \times 9 = \underline{54})$ unit squares

  b) : 4 × number of squares on larger faces + 2 × number of squares on smaller faces

  e.g. iii): $A = (4 \times 18 + 2 \times 9 = 72 + 18 = \underline{90})$ unit squares

  c) : 2 × each of 3 sizes of faces

  e.g. iii): $A = 2 \times (3 \times 12 + 3 \times 6 + 6 \times 12)$ unit squares

  $= 2 \times (36 + 18 + 72)$ unit squares

  $= 2 \times 126$ unit squares

  $= \underline{252}$ unit squares

Notes:

Whole class discussion Reasoning, agreement, praising

Surface area (unit squares):

a) i) 6 ii) 24 iii) 54 iv) 96

b) i) 10 ii) 40 iii) 90 iv) 160

c) i) 28 ii) 112 iii) 252

45 min

Bk3	R: Calculation. Similarity **C: Building 3-D shapes** *E: Symmetry. Views from front, side, top*	*Lesson Plan 96*
Activity		***Notes***
1	***Book 3, page 96*** Q.1 Read: *Write as many 3-digit numbers as you can from the numbers 2, 3, 5 and 7.* Encourage logical listing (e.g. starting with the smallest) Review at BB with whole class. T writes what Ps dictate in a logical order. BB: 235 325 523 723 237 327 527 725 253 352 532 732 257 357 537 735 273 372 572 752 275 375 573 753 Elicit that there are 4 possible hundreds digits, that for every hundreds digit there are 3 possible tens digits, and that for every tens digit there are 2 possible units digits, i.e. there are $4 \times 3 \times 2 = \underline{24}$ possible 3-digit numbers. In your *Ex. Bks*: a) add up the smallest and the greatest numbers; b) subtract the smallest number from the greatest number. Review at BB with whole class. Mistakes discussed and corrected. *8 min*	Individual work in listing numbers, monitored BB: $\boxed{2}$ $\boxed{3}$ $\boxed{5}$ $\boxed{7}$ Set a time limit Whole class review Agreement, praising Extra praise if Ps listed all 24 possible 3-digit numbers Feedback for T Discussion, agreement, praising Individual work, monitored Reasoning, agreement, praising BB: a) $753 + 235 = 988$ b) $753 - 235 = 518$
2	**Problem 1** Listen carefully and write the data in your *Ex. Bks*. Then try to work out the answer. You can discuss it with your neighbours if you wish. *Ella had £3.60 in her piggy bank. She helped her Mum every day for a week and earned the same number of 10 p coins each day.* *Ella did not spend any of the money and at the end of the week she had more than £7.50 but less than £9 in her piggy bank. How many 10 p coins could Ella have earned each day?* Set a time limit. Ps who think they have solved it explain solutions to class. Who agrees? Who did it another way? etc. If no P found correct solution, class tries to solve it together with T's help. *Possible solutions:* Had: £3.60 = 360 p Earned: $7 \times \boxed{} \times 10$ p Then had at least: £7.50 + 10 p = 760 p; at most £9 – 10 p = 890 p So earned at least: 760 p – 360 p = 400 p at most: 890 p – 360 p = 530 p So total number of 10 p coins earned is at least: 400 p ÷ 10 p = 40 at most: 530 p ÷ 10 p = 53 So $40 \le 7 \times \boxed{} \le 53$. The only multiples of 7 between 40 and 53 are 42 and 49, so number of coins earned each day: $\boxed{} = 42 \div 7 = \underline{6}$, or $\boxed{} = 49 \div 7 = \underline{7}$ *Answer:* Ella could have earned six or seven 10 p coins each day. *15 min*	Individual or paired trial T repeats slowly. Ps repeat in own words (with reminders from T if necessary) Discussion, reasoning, checking, agreement, praising Accept 'Trial and Error' methods which lead to the correct answer, but also show a more logical solution. or $750 < 360 + 7 \times \boxed{} \times 10 < 900$ $390 < 7 \times \boxed{} \times 10 < 540$ $39 < 7 \times \boxed{} < 54$ The number of coins must be a whole number, as it is impossible to have part of a coin. The only multiples of 7 more than 39 and less than 54 are 42 and 49. Continue as opposite. *Check:* $7 \times \underline{6} \times 10$ p = 420 p (360 + 420 = 780) p = £7.80 ✔ $7 \times \underline{7} \times 10$ p = 490 p (360 + 490 = 850) p = £8.50 ✔

Bk3 | *Lesson Plan 96*

Activity | ***Notes***

3

Problem 2

Listen carefully and think how you would solve this problem.
Show me the operation when I say. (On scrap paper or 'slates'.)
Write the answer too if you have time. (Data noted in *Ex. Bks*.)

Ps who respond correctly exlain to those who do not. Ps dictate calculation to T (or come to BB). Class says answer as a sentence.

a) *In the supermarket today there are 500 packets of Kit-Kat biscuits. Each day, 60 packets of the biscuits are delivered and 55 packets are sold. How many days ago did the supermarket have 450 packets of Kit-Kat biscuits?*

Show me . . . now! $(500 - 450) \div (60 - 55)$ or

$$450 + (60 - 55) \times \square = 500$$

BB: $(500 - 450) \div (60 - 55) = 50 \div 5 = \underline{10}$

Answer: The supermarket had 450 packets of Kit-Kat biscuits 10 days ago.

Notes:

Individual work in writing the operation or equation

(Or Ps work out answer in *Ex. Bks* and T asks Ps to explain their methods of solution.)

T repeats slowly. (Use any item Ps are familiar with.)

Ps repeat in own words (with reminders from T).

In unison.

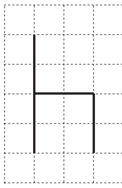
Reasoning, agreement, self-correction, praising

20 min

4

Enlargements and reductions

Draw this 'chair' in your *Ex. Bks* (or on squared grid sheets).

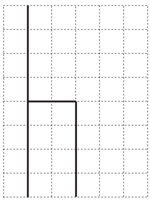
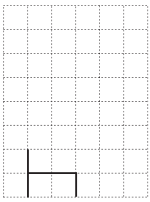
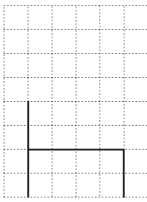
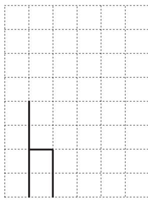
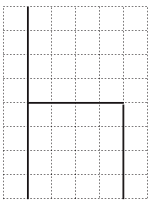
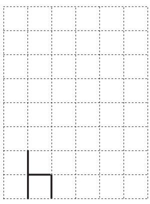
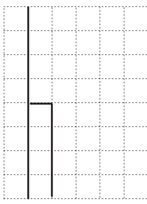


Draw another chair which is:

a) twice the height but the same width as the 1st chair;
b) half the height and the same width as the 1st chair;
c) the same height but twice the width as the 1st chair;
d) the same height but half the width of the 1st chair;
e) twice the height and twice the width as the 1st chair;
f) half the height and half the width of the first chair;
g) twice the height and half the width of the 1st chair..

Which chairs are <u>similar</u> to the original chair? (e and f) Discuss why others are <u>not</u> similar.

Solution:

a) 
b) 
c) 
d) 
e) 
f) 
g) 

Notes:

Individual work, monitored, helped, but class kept together on each shape

Chair drawn on BB or OHT or use enlarged copy master or OHP (with rest of chairs covered up)

T repeats instructions while walking round class.

Review at BB with whole class. T uncovers each 'chair' as it is dealt with.

Agreement, praising

Elicit that:

e) is an enlargement, scale factor 2 (i.e. twice the size)

f) is a reduction, scale factor 1 half (i.e. half the size)

25 min

Bk3

Lesson Plan 96

Activity		*Notes*

5

Book 3, page 96

Q.2 a) Read: *Build solids from unit cubes to match each of these ground plans.*

Elicit that in each solid there will be 9 columns.
Make sure that Ps realise that each number shows the number of cubes in that column.

If possible, the different solids could be made in different colours to make them easily identifiable. e.g. i) red, ii) blue, iii) green. T chooses Ps to show their solids to class.

b) Read: *How many unit cubes are needed to build each solid?*

Ps write total below each ground plan in *Pbs*.
T holds up each solid in turn and Ps show numbers on command or shout out in unison.

c) Read: *Which solid is symmetrical? Draw the line of symmetry.*

Discuss where the lines of symmetry would be on the ground plans and then show the planes of symmetry on the large models. (T has models already prepared so that a piece of card can be slipped between the two symmetrical halves and they can be split easily. Check with a mirror.)

Notes:

Ps should have enough cubes on desks to build all 3 solids.

Individual or paired work, monitored, helped, corrected

Praising only

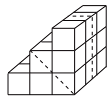
On scrap paper or 'slates'. Agreement, self-correcting, praising

Whole class discussion and demonstration

Solution:

i)

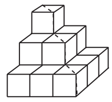
1	2	3
1	2	3
1	2	3



18 2 planes of symmetry

ii)

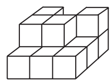
3	2	1
2	2	1
1	1	1



14 1 plane of symmetry

iii)

2	1	2
2	2	1
1	1	1



13 not symmetrical

30 min

6

Book 3, page 96

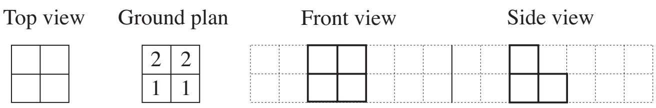
Q.3 a) Read: *Rita built a solid from 6 unit cubes. She drew how it looks from above and made a ground plan.*

Draw in the grid what Rita's solid would look like from the front and side.

Ps can build Rita's solid first if they need to.

Review at BB with whole class. Ps come to BB to draw the 2 views. Class agrees/disagrees. Mistakes corrected.

Solution:



Notes:

Individual (or paired) work, monitored, helped

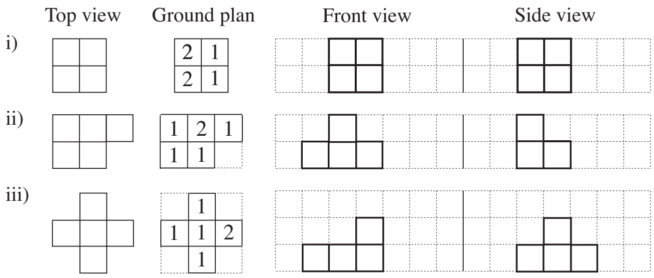
Drawn on BB or use enlarged copy master or oHP

Agreement, self-correction, praising

Feedback for T

Bk3

Lesson Plan 96

Activity		*Notes*
6	***Book 3, page 96*** (Continued)	
	Q.3 b) Read: *Build solids from 6 unit cubes to match the views from the top.* *Make a ground plan and draw the front and side views in the grids.*	Individual (or paired) work, monitored, helped. Drawn on BB or use enlarged copym master or OHP
	T explains task by showing a possible solid for each part. Ps can build T's solid or make up their own shape.	Demonstration to make sure that Ps know what to do.
	T chooses Ps to show their solids to class and to draw their plans and views. Class points out errors or applauds if correct.	Note to T: i) there are 6 possibilities ii) there are 5 possibilities iii) there are 5 possibilities
	Various solutions are possible, e.g. 	Demonstration, reasoning, agreement, praising [If a P shows the first example, discuss the fact that all views are the same and you cannot tell the actual construction from them!]

45 min

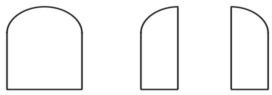
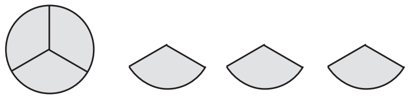
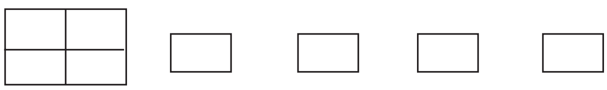
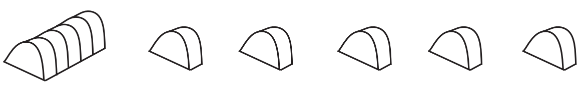
Bk3

R: Calculation. Shapes

C: Fractions: using and finding halves, quarters, eighths, thirds

E: Other fractions

Lesson Plan 97

Activity		*Notes*
1	**Sequence** Write in your *Ex. Bks* only the results to the operations I say. T: 3×4, $7 \times 3 + 1$, 6×7, 9×8, $9 \times 9 + 31$ Review with whole class. T writes what Ps dictate on BB. Mistakes corrected. BB: 12, 22, 42, 72, 112 If these are the first 5 terms in a sequence, what is the rule? Give Ps time to think, then if no P knows, T gives hint about differences. What are the next 10 terms? Ps come to BB to write them. Class agrees/disagrees. BB: 12, 22, 42, 72, 112, (162, 222, 292, 372, 462, 562, 672, . . .) 10 20 30 40 50 60 70 80 90 100 110 *5 min*	Individual work in doing calculations Ps nod heads when ready for next one. Agreement, self-correction, praising Agreement on rule: difference is increasing by 10 At a good pace Feedback for T Extra praise if Ps notice rule without hint from T.
2	**Cutting into equal parts** T has various real items of food (e.g. slice of bread, melon, bar of chocolate, Swiss roll, etc.) and asks Ps to come to front to cut them into equal parts. e.g. a) **A**, come and cut this slice of bread into 2 equal parts. What is each part called? (1 half) Who can write an equation about it? BB:  1 whole = 1 half + 1 half 1 whole = 2 halves b) **B**, come and cut this melon into 3 equal parts. What is each part called? (1 third) Who can write an equation about it? BB:  1 whole = 1 third + 1 third + 1 third 1 whole = 3 thirds c) **C**, come and cut this bar of chocolate into 4 equal parts. What is each part called? (1 quarter) Who can write an equation about it? BB:  1 whole = 1 quarter + 1 quarter + 1 quarter + 1 quarter 1 whole = 4 quarters d) **D**, come and cut this cake into 5 equal parts. What is each part called? (1 fifth) Who can write an equation about it? BB:  1 whole = 1 fifth + 1 fifth + 1 fifth + 1 fifth + 1 fifth 1 whole = 5 fifths *11 min*	Whole class activity T shows real (or plasticine) items first then draws rough diagrams on BB or OHP. Ps do the cutting with T's help. Class decides whether all the parts are equal in size and what fraction each is of the whole. (T could have cutting lines marked on each item if Ps are not very able.) Ps come to BB to write equations and class reads them aloud in unison. At a good pace Elicit that: 2 quarters = 1 half Feedback for T

Bk3

Lesson Plan 97

Activity		*Notes*

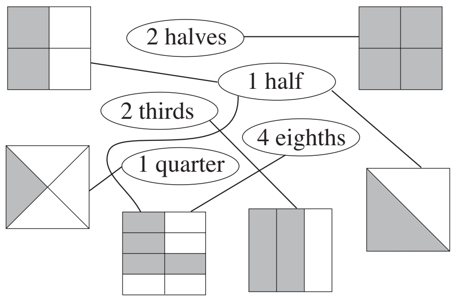
3

Equal values

Let's join up the fractions to the matching shapes.

Ps come out to draw joining lines, explaining reasoning. Class agrees/ disagrees. Extra praise if Ps notice that 4 eighths = 1 half.

BB:



Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Feedback for T

15 min

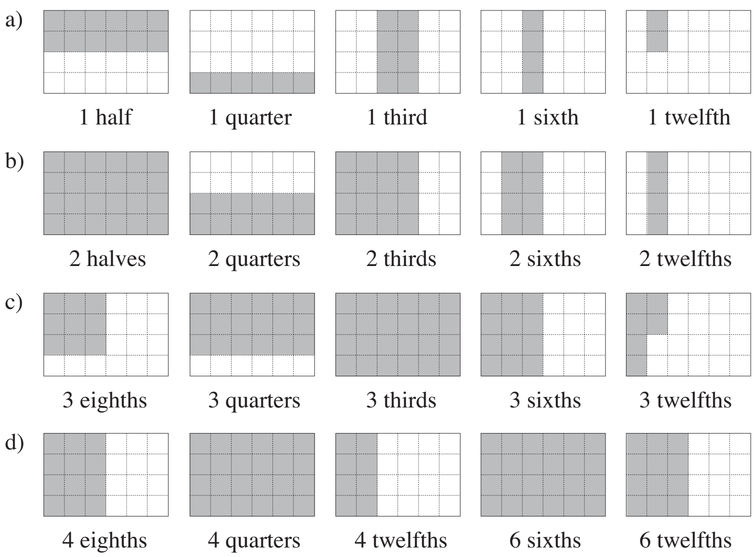
4

Shading fractions

Ps each have a sheet of 4 × 6 rectangles on desks. T tells Ps that each rectangle is <u>1 whole</u> unit. Colour the parts of them that I say.

T reads the fraction and Ps show it by colouring the appropriate number of grid squares. Deal with one part at a time. Review at BB with whole class. Mistakes discussed and corrected. Ps might notice equivalent fractions.

BB: e.g.



Notes: Individual (or paired) work, monitored, helped

T has grids drawn on BB or use enlarged copy master or OHP

Ps finished first come to BB or OHP to draw their solutions.

Discussion, agreement, self-correction, praising

Elicit that each rectangle has been divided up into 24 (4 × 6) small grid squares, so, e.g.

1 twelfth of 24 = 24 ÷ 12
= 2

6 twelfths of 24 = 6 × 2
= <u>12</u>

1 eighth of 24 = 24 ÷ 8
= 3

etc.

25 min

5

Book 3, page 97

Q.1 Read: *Circle in red the rectangles which have 1 half shaded.*
Circle in blue the rectangles which have 1 third shaded.
Circle in green the rectangle which has 1 quarter shaded.

If you have time, write below the rectangles you have <u>not</u> circled what part has been shaded.

Review at BB with whole class. Mistakes discussed and corrected.

Solution:

Circled: 1 half: a) and c); 1 third: f) and h); 1 quarter: b)

Uncircled: d) 1 sixth; e) 2 thirds; g) 3 quarters

Notes: Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Elicit that: 1 half = 2 quarters = 3 sixths = 4 eighths

[Practice in spelling, saying and reading fractions]

38 min

Bk3

Lesson Plan 97

Activity		*Notes*

6

Book 3, page 97

Q.2 T explains that the shaded part of each diagram shows what one person got. Ps read problems silently themselves, study the diagram and then write the answer as a sentence.

Review with whole class. T writes on BB what Ps dictate.
Ps check their wording and spelling.

a) *Anna invited 5 friends to her birthday party. She cut her cake into 6 equal pieces. What part of the cake did each child get?*

(Anna + 5 friends = 6 people, so each person got 1 piece)

Answer: Each child got 1 sixth of the cake.

b) *How was the block of ice-cream divided up if each person at the table got 1 seventh of it?*

Answer: The ice-cream was divided up into 7 equal parts.

c) *This is how Mrs Mouse cut up the cheese to give to her 8 children. Did they each get 1 eighth of the cheese?*

Elicit that the cheese was divided into 8 pieces, but the pieces were not equal sizes.

Answer: No, they did not get 1 eighth of the cheese each.

35 min

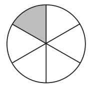
Notes:

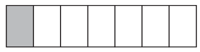
Individual work, monitored, helped

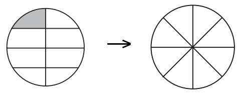
T has diagrams drawn on BB or OHP

Set a time limit.

Discussion, reasoning, agreement, self-correction, praising

a) BB: 

b) 

c) 

How should Mrs Mouse have divided up the cheese fairly? Ps come to BB to draw it. Agreement, praising

7

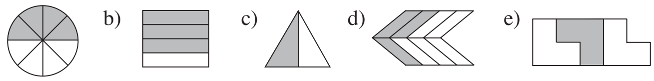
Book 3, page 97

Q.3 Read: *Colour the parts of the shapes given.*

Review at BB with whole class. Ps come out to BB to colour diagrams and explain their reasoning, Mistakes corrected

e.g d): 'The shape is divided into 8 equal parts, so each part is 1 eighth. I colour 3 of them to show 3 eighths.'

Solution:



a) 4 eighths b) 3 quarters c) 1 half d) 3 eighths e) 1 third

40 min

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correcting, praising

T repeats unclear reasoning correctly.

What part of each shape is not shaded?

8

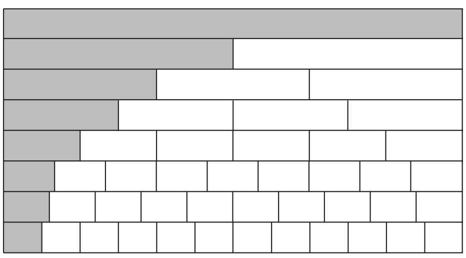
Book 3, page 97, Q.4

Read: *A strip of paper is 1 unit long. What is the value of each shaded part?*

T has rectangle drawn (or strips of paper stuck) on BB and fractions shown by colouring (or by coloured strips of paper).

Ps come to BB to choose a row, count how many equal parts there are, explain reasoning as above and write fraction at the side. Class points out errors. For each part, T asks what fraction is not coloured.

BB:



1 unit
a) 1 half
b) 1 third
c) 1 quarter
d) 1 sixth
e) 1 ninth
f) 1 tenth
g) 1 twelfth

45 min

Notes:

Whole class activity (or individualwork, monitored, helped)

Or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

What do you notice? e.g.

1 third = 2 sixths = 3 ninths = 4 twelfths, etc.

Who can write an addition (subtraction) about the strip?

e.g. 1 ninth + 8 ninths = 1

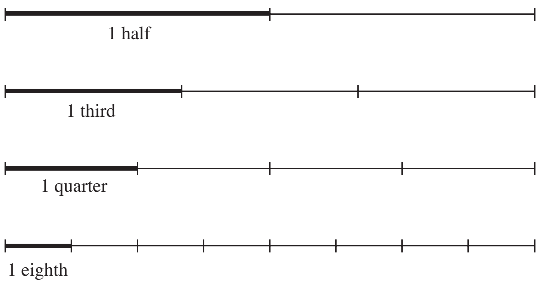
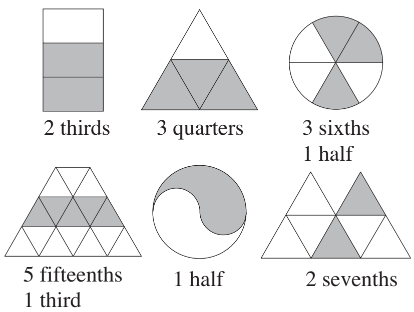
Bk3

R: Calculation

C: Fractions

E: Comparison, completing diagrams

Lesson Plan 98

Activity		*Notes*
1	**Mental practice** a) Tell me the nearest whole 10 greater than: 600 (800, 440, 740, 934, 532, 301, 1766, 15, 171, etc.) b) Tell me the nearest whole 100 smaller than: 600 (800, 440, 740, 934, 532, 301, 1766, 15, 171, etc.) c) Tell me the nearest whole 10 smaller than: 600 (800, 440, 740, 934, 532, 301, 1766, 15, 171, etc.) d) Tell me the nearest whole 100 greater than: 600 (800, 440, 740, 934, 532, 301, 1766, 15, 171, etc.) *5 min*	Whole class activity T chooses Ps at random At speed If a P answers incorrectly, the next P corrects it Praising, encouragement only
2	**Fractions of a line** T has 4 lines of equal length drawn on the BB. T: Think of these lines as the same line divided into different numbers of equal parts. Who can come and colour over 1 half (1 third, 1 quarter, 1 eighth) of the lines? Ps come to BB to choose appropriate line, colour over the relevant part and label it. Class points out errors. BB:  Who can think of equations to write about the line? e.g. 1 half + 1 half = 1; 1 third + 2 thirds = 1; 1 – 7 eighths = 1 eighth; 1 half = 2 quarters, etc. *10 min*	Whole class activity Lines drawn on BB or use enlarged copy master or OHP At a good pace Reasoning, agreement, praising Elicit that each line is 1 whole. Involve several Ps. Praising, encouragement only Extra praise for creativity
3	**Fractions of shapes** What part of each shape has been shaded? BB:  Ps come ot BB to choose a shape and say and write the fraction, explaining reasoning, e.g. 'The rectangle has been divided into 3 equal parts, so each part is 1 third. Two of them are shaded, so the shaded part is 2 thirds of the whole rectangle.' Class agrees/disagrees. Which part is not shaded? *15 min*	Whole class activity Drawn on BB or use enlarged copy master or OHP At a good pace Reasoning, agreement, praising Elicit that each shape is 1 whole. Discuss equivalent fractions: shaded part of circle: 3 sixths = 1 half shaded part of quadrilateral 5 fifteenths = 1 third

Bk3

Lesson Plan 98

Activity		*Notes*

4

Missing numbers

Let's complete the missing numbers.

BB:

a) 1 (whole) = $\square$ fifths b) 1 (whole) = $\square$ sevenths

c) 1 (whole) = $\square$ sixths d) 1 (whole) = $\square$ tenths

e) 1 (whole) = $\square$ eighths f) 1 (whole) = $\square$ ninths

e.g. a) T: 1 whole equals how many fifths? Tell me . . . now! (5)

19 min

Notes:

Whole class activity

T has BB or SB or OHT already prepared.

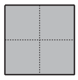
T points to each part in turn.

Class shouts out missing number on command and T writes in box.

Agreement, praising

5

Drawing the whole

Draw this in your *Ex. Bks* and colour it. BB: 

How many grid squares does it cover? (4)

Draw the whole shape if this (T points to shaded square) is:

a) 1 half of the whole b) 1 third of the whole

c) 1 quarter of the whole d) 1 fifth of the whole

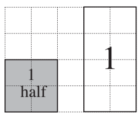
e) 1 sixth of the whole etc.

Deal with one part at a time. Review with whole class. Agree that the whole can be <u>any</u> shape which covers the correct number of squares.

a) 1 (whole) = 2 × 1 half e.g.

Area = 2 × 4 squares

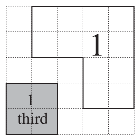
= <u>8</u> squares



b) 1 (whole) = 3 × 1 third

Area = 3 × 4 squares

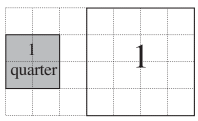
= <u>12</u> squares



c) 1 (whole) = 4 × 1 quarter

Area = 4 × 4 squares

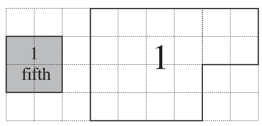
= <u>16</u> squares



d) 1 (whole) = 5 × 1 fifth

Area = 5 × 4 squares

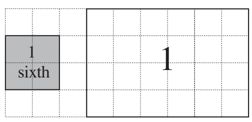
= <u>20</u> squares



e) 1 whole = 6 × 1 sixth

Area = 6 × 4 squares

= <u>24</u> squares



25 min

Notes:

Individual work, monitored, helped, correcetd

Ps draw in squared *Ex Bks* or on squared grid sheets.

Discussion, reasoning, agreement, self-correcting praising

T has BB or SB or OHT already prepared (or use enlarged copy master) and uncovers each solution as it is dealt with.

(Or T chooses Ps to draw their shape on BB or OHP and class discusses it.)

Praise unusual (but correct) 'wholes'.

Elicit the names of the whole shapes.

e.g. for the shapes opposite:

a) and e) rectangles

b) and d) hexagons (irregular)

c) square

Bk3

Lesson Plan 98

Activity		Notes

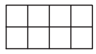
6

Book 3, page 98

Q.1 Read: *This is 1 unit.*

What part of this unit is each of these drawings?

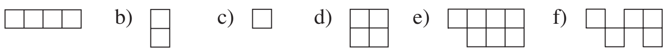
Elicit that the 1 (whole) unit covers 8 grid squares.



Review at BB with whole class. Ps come to BB to write the fractions, explaining reasoning. Who wrote the same? Who wrote another fraction? etc. Discuss equivalent fractions.

What fraction is needed to complete 1 unit?

Solution:



a) 4 eighths, 2 quarters, 1 half
b) 2 eighths, 1 quarter
c) 1 eighth
d) 4 eighths, 2 quarters, 1 half
e) 7 eighths
f) 5 eighths

30 min

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correcting, praising

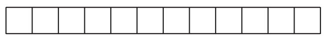
Orally round class

e.g. 1 half + 1 half = 1
7 eighths + 1 eighth = 1
1 quarter + 3 quarters = 1
etc.

7

Book 3, page 98

Q.2 Read: *This rectangle is 1 unit.*



Elicit that the 1 unit covers 12 grid squares.

Ps draw round appropriate number of grid squares to show the fractions given.

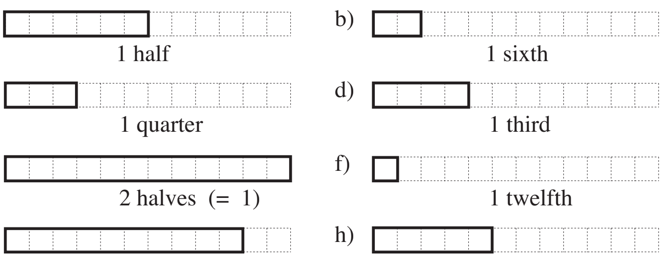
Review at BB with whole class. Ps come to BB to show the fractions, explaining reasoning. e.g.

g) 1 unit = 12 (squares). 1 sixth of a unit = 12 ÷ 6 = 2 (squares)
5 sixths of a unit = 5 × 2 = 10 (squares)

Mistakes discussed and corrected.

What fraction is needed to complete 1 unit?

Solution:



a) 1 half
b) 1 sixth
c) 1 quarter
d) 1 third
e) 2 halves (= 1)
f) 1 twelfth
g) 5 sixths
h) 5 twelfths

35 min

Notes:

Individual work, monitored, helped

Grids drawn on BB or use enlarged copy master or OHP

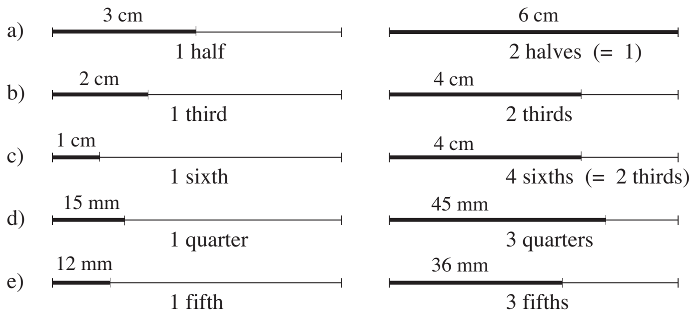
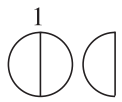
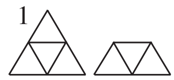
Discussion, reasoning, agreement, self-correction, praising

Orally round class

e.g. 1 half + 1 half = 1
1 sixth + 5 sixths = 1
etc.

Bk3

Lesson Plan 98

Activity		Notes
8	**_Book 3, page 98_** Q.3 Read: *A line is 1 unit long. Measure and colour over these parts of the line.* Let's measure the line to see how long 1 unit is. T reminds Ps how to measure accurately. Ask several Ps what they think. Agree on length. T writes on BB. Deal with one part at a time. Ps can write calculations in *Ex. Bks* if they cannot do it mentally, then colour over the fraction and write the length above it (in cm or mm). Review with the whole class. Ps explain reasoning. (BB) Mistakes discussed and corrected. What fraction is needed to complete 1 unit? (Orally) *Solution:*  *40 min*	Individual work, monitored, helped Lines drawn on BB or use enlarged copy master or OHP BB: <u>1 unit</u> = 6 cm = 60 mm Discussion, reasoning, agreement, self-correction, praising BB: e.g. e) 1 unit = 60 mm 1 fifth of a unit = 60 mm ÷ 5 = 12 mm 3 fifths of a unit = 3 × 12 mm = 36 mm [or 3 × (60 mm ÷ 5)] Ps might notice that: 2 halves = 1 4 sixths = 2 thirds Feedback for T
9	**_Book 3, page 98, Q.4_** Read: *Which positive whole numbers can be written instead of the letters?* Who can tell me the positive whole numbers? (1, 2, 3, 4, 5, . . .) Deal with one part at a time. T writes statement on BB. Let's read it together. e.g. '*a* times 1 half is less than 1' **X,** what number do you think *a* could be? Why? Who agrees? Who thinks something else? etc. Let's check. BB: *Solution:* a × 1 half < 1, a = 1 (as 2 × 1 half = 1) b × 1 half = 1, b = 2 c × 1 half > 1, c: 3, 4, 5, . . . (c: > 2) d × 1 quarter < 1, d: 1, 2, 3 (as 4 × 1 quarter = 1) e × 1 quarter = 1, e = 4 f × 1 quarter > 1, f: 5, 6, 7, . . . (f: > 4) *45 min*	Whole class activity (or individually if Ps wish) Agreement, praising In unison Reasoning, agreement, checking, praising T checks by drawing diagrams on the BB, e.g. c:  f: 

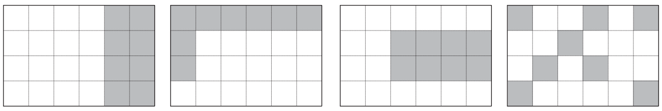
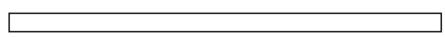
Bk3

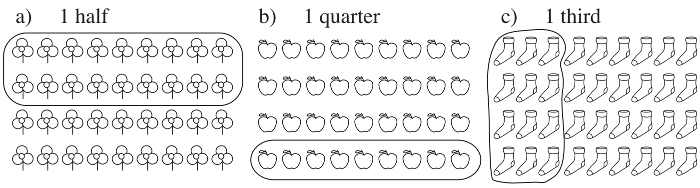
R: Calculation

C: Fractions

E: Fractional parts

Lesson Plan 99

Activity		*Notes*
1	**Sequences** T says first few terms of a sequence, Ps continue it. Elicit the rule. a) 144, 149, 159, 174, (194, 219, 249, 284, 324, 369, 419, . . .) +5 +10 +15 +20 +25 +30 +35 +40 +45 +50 *Rule*: difference is increasing by 5.) b) 512, 256, 128, (64, 32, 16, 8, 4, 2, 1, 1 half, 1 quarter) *Rule*: Each following term is half of the previous term. (÷ 2) *5 min*	Whole class activity Ps write the terms in *Ex. Bks* first. Give Ps time to think. T chooses Ps at random. T gives hint about rule if Ps do not think of it. Discussion, reasoning, checking, praising
2	**Fractions** T has several copies of a rectangle (6 × 4) drawn or stuck on BB or SB. a) **A**, come and colour 1 third of the rectangle. **A** explains reasoning too. Who agrees? Who can think of another way to do it? Ask 3 or 4 Ps to colour 1 third in different ways. Class checks that they have coloured 8 grid squares. e.g.  b) Who can colour 1 quarter (1 eighth) of the rectangle? *10 min*	Whole class activity Or use enlarged copy master or OHP BB: 1 unit = 24 squares 1 third of 24 = 24 ÷ 3 = 8 (squares) 1 quarter of 24 = 24 ÷ 4 = 6 (squares) 1 eighth of 24 = 24 ÷ 8 = 3 (squares) Agreement, praising
3	**Folding** Each P has a strip of paper on desks. T has large strip for demonstration.  a) Fold the paper in two like this. Make sure that the ends meet exactly.  What fraction of the whole strip of paper can you see? (1 half) Let's check. Unfold your strip of paper. How many equal parts has it been divided into? (2) Elicit that 2 halves = 1 whole. b) This time, fold the paper in two, then in two again. What fraction of the whole strip of paper can you see now? (1 quarter)  Let's check. Unfold your strip of paper. How many equal parts has it been divided into? (4) Elicit that 4 quarters = 1 whole. c) This time, fold the paper in two, then in two again, then in two again. What fraction of the whole strip of paper can you see now? (1 eighth)  Let's check. Unfold your strip of paper. How many equal parts has it been divided into? (8) Elicit that 8 eighths = 1 whole *15 min*	Individual folding but whole class discussion on results T demonstrates at front of class. T asks several Ps what they think and why. Reasoning, agreement, praising Feedback for T Discuss the relationship between the parts: BB: 1 = 2 halves = 4 quarters = 8 eighths 1 half = 2 quarters = 4 eighths 1 quarter = 2 eighths

Bk3		*Lesson Plan 99*
Activity		***Notes***
4	**Problems** Listen carefully and think how you would calculate the answer. Ps come to BB to explain reasoning and write calculations on BB. Class checks that they are correct. a) *John had 400 1 p coins. He divided them into 2 equal parts. How many coins were in each part? What fraction of John's money was in each part?* BB: 400 ÷ 2 = <u>100</u> *Answer:* 100 coins were in each part. Each part was 1 half of John's money. b) *John divided up his 400 1 p coins into equal parts. There was 50 p in each part. Into how many equal parts did John divide up his money? What fraction of John's money was in each part?* BB: 400 p ÷ 50 p = 40 p ÷ 5 p = <u>8</u> *Answer:* John divided his money into 8 equal parts. Each part was 1 eighth of John's money. c) *John divided up his 400 1 p coins into equal parts. Each part was 1 quarter of his money. Into how many equal parts did John divide up his money? How much was in each part?* BB: 1 whole = 1 quarter × <u>4</u>; 400 p ÷ 4 = <u>100 p</u> *Answer:* John divided his money into 4 equal parts. There was 100 p (= £1) in each part. *20 min*	Whole class activity At a good pace T repeats slowly. Ps repeat problem in own words (with T's help) Ps can do calculations in *Ex. Bks* first if they wish. Discussion, reasoning, agreement, praising Feedback for T
5 **Extension**	***Book 3, page 99*** Q.1 Read: *Circle: a) 1 half, b) 1 quarter, c) 1 third.* Elicit that there are 4 × 9 = <u>36</u> items in each picture. Review at BB with whole class. Ps come to BB to explain and write divisions. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* e.g.  How many flowers (apples, socks) would be in 2 halves (2 quarters, 2 thirds, 3 quarters, 4 quarters) of the picture? What part of each picture would one item be? (1 thirtysixth) *25 min*	Individual work, monitored (helped) Use enlarged copy master or OHP Discussion, reasoning, agreement, self-correction, praising BB: a) 1 half of 36 = 36 ÷ 2 = <u>18</u> b) 1 quarter of 36 = 36 ÷ 4 = <u>9</u> c) 1 third of 36 = 36 ÷ 3 = <u>12</u> Ps can choose the fractions too. Praising, encouragement only Ask several Ps what they think.

Bk3

Lesson Plan 99

Activity		*Notes*

6

Book 3, page 99

Q.2 Read: *Fill in the missing numbers.*
If 1 unit is this, what are these parts?

Into how many equal parts has this unit been divided? (12)
Elicit that each part (a square) is 1 twelfth of 1 unit (the rectangle).

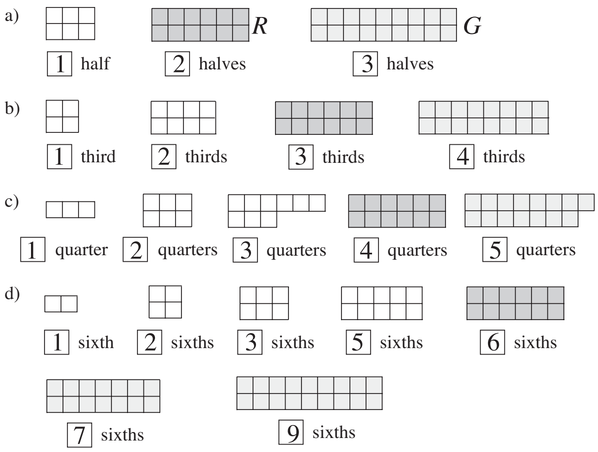
Deal with one part at a time. Review at BB with the whole class. Ps come to BB to write missing numbers and explain reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

Read: *Colour: red the shapes equal to 1,*
green the shapes more than 1.

Review at BB with whole class. T points to each shape in turn and class shouts out whether it should be red, green or neither.

Discuss equivalent fractions. Ps dicate them to T to write on BB.

Solution

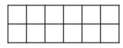


31 min

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

BB: 1 unit 
12 twelfths = 1

Reasoning, agreement, self-correction, praising

Individual work, monitored (or whole class activity)

Agreement, praising

BB:
1 half = 2 quarters = 3 sixths
1 third = 2 sixths
2 halves = 3 thirds =
4 quarters = 6 sixths = 1
3 halves = 1 and a half
4 thirds = 1 and a third
etc.

Praising, encouragement only

Feedback for T

7

Book 3, page 99

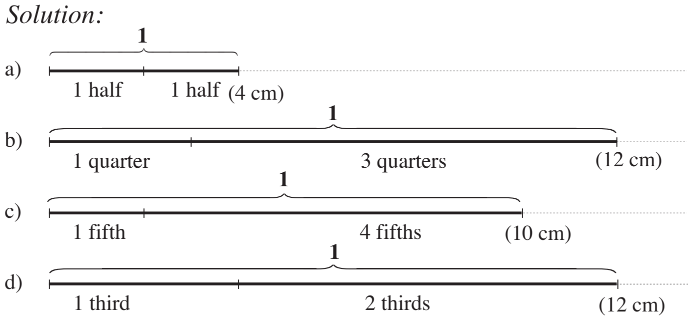
Q.3 Read: *Draw the whole unit if this is:*
a) 1 half, b) 1 quarter, c) 1 fifth, d) 1 third.

Deal with one part at a time. Ps measure given fraction accurately with a ruler, then calculate the whole unit (by addition or multiplication). Ps extend the line already given to the required length.

Review at BB with whole class. Ps explain reasoning, writing calculations on BB and giving the measurements.
Class agrees/disagrees. Mistakes corrected.

What fraction of the line did you have to draw to make 1 unit?

Solution:



37 min

Notes:

Ps have rulers on desks

Individual work, monitored, helped, corrected

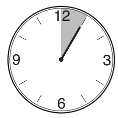
Draw on BB or use enlarged copy master or OHP for demonstration only!

Reasoning, agreement, self-correction, praising

BB:
a) 1 unit = 2 × 2 cm = <u>4 cm</u>
b) 1 unit = 4 × 3 cm
= <u>12 cm</u>
c) 1 unit = 5 × 2 cm
= <u>10 cm</u>
d) 1 unit = 3 × 4 cm
= <u>12 cm</u>

Elicit that:
1 half + <u>1 half</u> = 1
1 quarter + <u>3 quarters</u> = 1
1 fifth + <u>4 fifths</u> = 1
1 third + <u>2 thirds</u> = 1

Bk3 | *Lesson Plan 99*

Activity		*Notes*
8	**Fractions of time** T has a large clock to demonstrate. Elicit that 1 revolution of the minute hand is 1 hour. BB: 1 hour = 60 minutes. Let's use 1 hour as 1 unit of time (BB) • Who can move the minute hand to show 1 half (1 quarter, 3 quarters, 1 sixth, 1 twelfth, 1 tenth, etc.) of an hour? P comes out to move the minute hand. Class agrees/disagrees. How many minutes has it moved? Who can write an equation about it? e.g. BB: 1 quarter of an hour = 60 min. ÷ 4 = <u>15 min.</u> 3 quarters of an hour = 15 min. × 3 = 30 min. + 15 min. = 45 min. etc. • T (or P) moves the minute hand. Class says how many minutes moved and what fraction it is of 1 hour. *42 min*	Whole class activity Or draw clock on BB and Ps come out to draw hands and shade the appropriate part. e.g.  60 min. ÷ <u>12</u> = 5 min. 1 twelfth of an hour Discussion, reasoning, agreement, praising At a good pace Praising, encouragement only
9 **Extension**	**Fractions of length** ***Ps have cm ruler on desks***. How many mm are in 1 cm? (10) Let's use 10 cm as our unit of measure. How many mm is that? (100) • How many mm there are in 1 half, (1 fifth, 1 tenth, 1 quarter) of 10 cm? Ps use their rulers to help them. T asks several Ps what they think. Class agrees/disagrees. (50 mm, 20 mm, 10 mm, 25 mm) • T says a length in cm (e.g. 10 cm, 5 cm, 2 cm, 2 and a half cm, and Ps say what part of 10 cm it is. (1 whole, 1 half, 1 fifth, 1 quarter). In what other way could we write 2 and a half cm? Ps come to BB to write and explain. (2.5 cm, meaning 2 whole cm and 5 <u>tenths</u> of a cm) *45 min*	Whole class activity BB: 1 unit = 10 cm = 100 mm Discussion, reasoning, agreement, praising At a good pace BB: e.g. 1 quarter of 10 cm = 10 cm ÷ 4 = 2 and a half cm (= 2.5 cm) Reasoning, agreement, praising

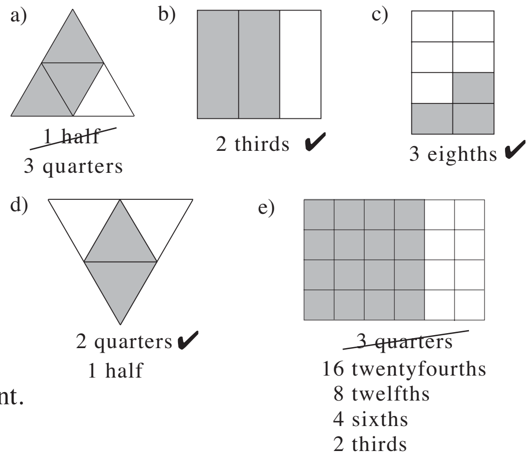
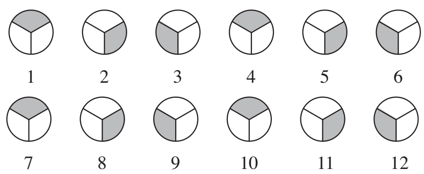
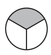
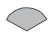
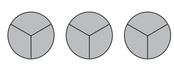
Bk3

R: Mental calculation

C: Fractions

E: Fractional parts

Lesson Plan 100

Activity		*Notes*
1	**Secret numbers** a) I thought of a number. I subtracted 130 from it and the result was 148. What was the number I first thought of? Show me . . . now! (278) (Written on 'slates' or scrap paper) P who responded correctly explains to those who did not. b) I thought of a number. I added 143 to it and the result was 220. What was the number I first thought of? Show me . . . now! (77) (Written on 'slates' or scrap paper) P who responded correctly explains to those who did not. *5 min*	Whole class activity Ps can do vertical calculations in *Ex. Bks* if they need to. In unison Reasoning, agreement, praising BB: a) 148 + 130 = <u>278</u> In unison BB: b) 220 – 143 = <u>73</u>
2	**Find the mistakes** This is *Silly Sammy*'s homework. What do you think he had to do? (Write below each diagram what part of it is shaded.) Has *Silly Sammy* made a mistake? Let's check it for him. Ps come to BB to check each diagram, pointing out any mistake and correcting it. Discuss equivalent fractions where relevant.  *10 min*	Whole class activity Drawn on BB or use enlarged copy master or OHP Agree that each large shape is 1 whole unit. Reasoning, agreement, correcting, praising BB: 2 quarters = 1 half 16 twentyfourths = 8 twelfths = 4 sixths = 2 thirds
3	**Sequence** What can you tell me about the shapes on the BB? (12 circles, each divided into 3 equal parts. Each part is 1 third of the circle.) Let's make a sequence by colouring 1 third of each circle. Where should we start? (e.g. at the top and go round clockwise). BB: e.g.  We can see 12 terms but imagine the sequence up to the 30th term! a) What would be the numbers of the terms coloured like this? i)  (2, 5, 8, 11, 14, 17, 20, 23, 26, 29) ii)  (1, 4, 7, 10, 13, 16, 19, 22, 25, 28) *Rule:* + 3 Elicit that when divided by 3 the numbers in i) give a remainder of 2 and in ii) give a remainder of 1 and that every 3rd number (3, 6, 9, . . .) is exactly divisible by 3 (i.e. a multiple of 3).	Whole class activity Drawn on BB or use enlarged copy master or OHP BB: 3 thirds = 1 Ps come to BB to colour each circle as shown. At a good pace T writes what class dictates. Ps might notice that these numbers form a sequence increasing by 3. Discussion, agreement, praising
Extension	How many circles could be formed by 9  ?  *15 min*	BB: 9 × 1 third = 9 thirds = 3

Bk3

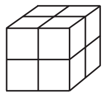
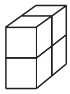
Lesson Plan 100

Activity | **Notes**

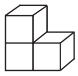
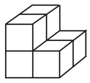
4

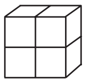
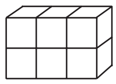
Fractions of solids

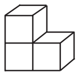
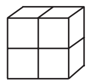
T has various solids made up from unit cubes as below.

a) If this is 1 unit,  build 1 half (1 quarter, 1 eighth, 3 quarters, 5 eighths, etc.) of it. e.g. *1 half* 

b) Build 1 whole solid if this (T shows large model to class)

i)  is 1 half of it. e.g. 

ii)  is 2 thirds of it, e.g 

iii)  is 3 quarters of it, e.g 

Repeat each fraction with with other shapes.

21 min

Notes:

Individual (or paired) work

Ps have cubes on desks.

Deal with one fraction at a time. T shows 1 unit to class.

Ps can show their solids to T on command or T chooses Ps to show different possible solutions and class checks that they are correct.

(Or done as a whole class activity, with Ps building the solids in front of the class.)

Reasoning, agreement, paraising only

Extra praise for creative solutions

5

Book 3, Page 100

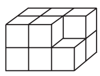
Q.1 Read: *If this solid is 1 unit, what part of a unit are these solids?*

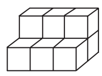
Deal with one part at a time. Ps build the 1 unit solid on desks. How many cubes are in 1 unit? (12, so 1 cube is 1 twelfth of 1 unit)

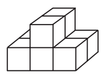
Ps build the parts to compare with it. Ps write fraction in *Pbs*.

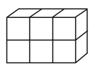
Review at BB with whole class. Check with a large model.

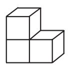
Solution:

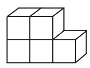
a) 
11 twelfths

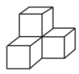
b) 
9 twelfths
3 quarters

c) 
8 twelfths
4 sixths
2 thirds

d) 
6 twelfths
3 sixths
1 half

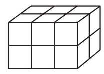
e) 
3 twelfths
1 quarter

f) 
5 twelfths

g) 
4 twelfths
2 sixths
1 third

28 min

Notes:

Paired work (or individual work if Ps wish) 

BB: 1 unit =

(3 × 2 × 2 = <u>12</u>) cubes

Or done as a whole class activity with large models already prepared by T, or a combination of all three.

Diagrams drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correcting, praising

Discuss equivalent fractions, e.g. 9 twelfths = 3 quarters, etc.

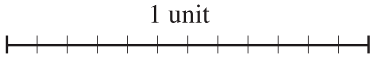
Feedback for T

6

Comparing fractions

T draws a line on BB (or use a piece of card or metre stick) divided into 12 equal sections. Elicit that each section is 1 twelfth of the line.

BB: 1 unit



Which part of the line is longer:

a) 1 quarter or 1 half b) 1 sixth or 1 quarter

c) 5 twelfths or 7 twelfths d) 1 third or 2 sixths?

T asks several Ps what they think. Ps come to BB in pairs to show each fraction, to explain reasoning and to write a statement about it.

30 min

Notes:

Whole class activity

BB: 1 unit = 12 twelfths

Reasoning, agreement, praising

BB:

a) 1 quarter < 1 half

b) 1 sixth < 1 quarter

c) 5 twelfths < 7 twelfths

d) 1 third = 2 sixths

Bk3

Lesson Plan 100

Activity		*Notes*

7

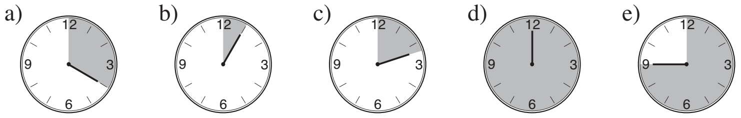
Book 3, Page 100, Q.2

Read: *Only the minute hand is on the clock. What part of an hour does it show?*

Elicit that 1 hour = 60 minutes. T (or P) shows movement of minute hand on model (or real) clock for each part.

Ps come to BB to explain reasoning and write the fraction. Class agrees/ disagrees. If problems, write equations on BB or check on clock.

Solution:



a)	b)	c)	d)	e)
20 minutes	5 minutes	12 minutes	60 minutes	45 minutes
1 third	**1 twelfth**	**1 fifth**	**1 whole**	**3 quarters**
of an hour	of an hour	of an hour	hour	of an hour

35 min

Notes:

Whole class activity (or individual work if Ps wish)

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

e.g. reasoning:

e) 45 min. = 3 × 15 min.

15 min. = 60 min. ÷ 4

15 min. = 1 quarter of an hour

45 min. = 3 quarters of an hour

8

Book 3, page 100

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

Set a time limit. Review at BB with whole class. T could use models (e.g. 1 finger is 1 fifth of the number of fingers on one hand) or T or Ps draw diagrams on BB or SB or OHT.

Solution:

a) 2 fifths + 3 fifths = 1 b) 3 quarters + 1 quarter = 1

c) 2 sixths + 4 sixths = 1 d) 5 eighths + 3 eighths = 1

e) 3 tenths + 7 tenths = 1

f) 5 hundredths + 95 hundredths = 1, (e.g. use £1 as the unit: £1 = 100 p, so 1 p = 1 hundredth of a £1, 5 p + 95 p = £1)

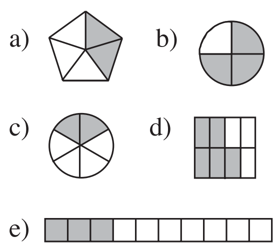
40 min

Notes:

Individual work, monitored, helped

Reasoning, agreement, praising

BB: e.g.



9

Book 3, page 100

Q.4 Read: *Fill in the missing numbers.*

Deal with one part at a time. Set a time limit. Review orally with whole class. If problems, Ps write operations on BB.

e.g. BB: 1 quarter of a metre = 100 cm ÷ 4
= 80 cm ÷ 4 + 20 cm ÷ 4
= 20 cm + 5 cm = 25 cm

3 quarters of a metre = 3 × 25 cm
= 3 × 20 cm + 3 × 5 cm
= 60 cm + 15 cm = 75 cm

Solution:

a) half a metre = 50 cm
1 fifth of a metre = 20 cm
1 tenth of a metre = 10 cm
3 quarters of a metre = 75 cm
3 fifths of a metre = 60 cm
7 tenths of a metre = 70 cm
11 hundredths of a metre = 11 cm

b) half a kg = 500 g
1 quarter of a kg = 250 g
1 tenth of a kg = 100 g
3 quarters of a kg = 750 g
5 tenths of a kg = 500 g
2 fifths of a kg = 400 g
9 hundredths of a kg = 90 g

45 min

Notes:

Individual work, monitored, helped

(or done orally round the class if time is short)

BB: 1 m = 100 cm
1 kg = 1000 g

Differentiation by time limit

T could have BB or SB or OHT already prepared and uncover each equation as it is dealt with (or use enlarged copy master or OHP)

Reasoning, agreement, self-correction, praising

In a) T could ask for answers in mm too.

Feedback for T

Bk3

R: Mental calculation, Fractions

C: Revision and practice. Equations, inequalities

E: Commbinatorics, set problems

Lesson Plan 101

Activity		*Notes*

1 Problems

Listen carefully and show me the answer when I say. You can draw a diagram in your *Ex. Bks.* to help you.

a) *If 2 thirds of a birthday cake was eaten, what part of it was left?*

Show me . . . now! (1 third)

A, come and draw a diagram on the BB and explain your solution.

(e.g. 'The cake was cut into thirds, so there were 3 equal pieces. Two of the 3 thirds were eaten, so 1 third was left.')

b) *If 3 quarters of a chocolate cake was eaten, what part of it was left?*

Show me . . . now! (1 quarter)

B, come and draw a diagram on the BB and explain your solution.

c) *If 5 eighths of a fruit cake was eaten, what part of it was left?*

Show me . . . now! (3 eighths)

C, come and draw a diagram on the BB and explain your solution.

6 min

Notes:

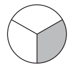
Individual drawing and calculating, monitored

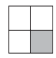
T reads problems while walking round class.

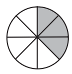
Answers written on scrap paper or on 'slates' and shown in unison.

Reasoning, agreement, praising

BB: e.g. (shaded part is left)

a)  3 thirds – 2 thirds = <u>1 third</u>

b)  4 quarters – 3 quarters = <u>1 quarter</u>

c)  8 eighths – 5 eighths = <u>3 eighths</u>

2 Oral practice

T asks a question. Ps answer in complete sentences, explaining reasoning too. e.g.

a) What part of 48 is 12? (12 is <u>1 quarter</u> of 48, because $48 \div \underline{4} = 12$, or because $\underline{4} \times 12 = 48$)

b) What is half of 48? (Half of 48 = 24, as $48 \div 2 = \underline{24}$)

c) What is 1 quarter of 48? (1 quarter of 48 = <u>12</u>, as $48 \div 4 = \underline{12}$)

d) What part of 48 is 24? (24 is <u>1 half</u> of 48, because $48 \div \underline{2} = 24$, or because $\underline{2} \times 24 = 48$)

e) What part of 48 is 6? (6 is <u>1 eighth</u> of 48, because $48 \div \underline{8} = 6$, or because $\underline{8} \times 6 = 48$)

f) What is 1 sixth of 48? (1 sixth of 48 = <u>8</u>, as $48 \div 6 = \underline{8}$)

12 min

Notes:

Whole class activity

T chooses Ps at random

At a good pace

T repeats unclear explanations correctly as a model for Ps to follow.

Agreement, praising

Feedback for T

3 Estimation and calculation

T writes operations on BB. How could we estimate the result? (By rounding numbers to the nearest 100, or to the nearest 10). Agree that rounding to the nearest 10 gives a closer estimate.

Then Ps do vertical calculations in *Ex. Bks.* Review at BB with whole class. Compare the calculated result with the estimates.

BB: *Estimations*

a) $678 + 354 - 217 \approx 700 + 400 - 200 = 100 - 200 = 900$

or $\approx 680 + 350 - 220 = 680 - 130 = 810$

Check: $810 \approx \underline{815}$

Repeat for:

b) $1264 - (628 + 594) \approx 1300 - (600 + 600) = 1300 - 1200 = 100$

or $\approx 1260 - (630 + 590) = 1260 - 1220 = 40$

Check: $40 \approx \underline{42}$

18 min

Notes:

Whole class activity

Discussion, agreement, praising

T writes what Ps dictate.

Individual work, monitored

Reasoning, agreement, self-correcting, praising

BB:

a) $\begin{array}{r} 678 \\ +\ 354 \\ \hline 1032 \end{array} \quad \begin{array}{r} 1032 \\ -\ 217 \\ \hline 815 \end{array}$

b) $\begin{array}{r} 628 \\ +\ 594 \\ \hline 1222 \\ \hline \end{array} \quad \begin{array}{r} 1264 \\ -1222 \\ \hline 42 \\ \hline \end{array}$

Bk3

Lesson Plan 101

Activity		*Notes*
4	**Find the mistakes** This is *Dizzy Domble's* homework. Let's check it for him. Ps come to BB to do calculations, point out errors and correct the mistakes, explaining reasoning. Class agrees/disagrees or suggest an alternative way to check whether it is correct or not. BB: a) $623 - 578 + 216 = 317$ ✗ $\begin{array}{r} 623 \\ +\,216 \\ \hline 839 \\ \hline \end{array}$ $\begin{array}{r} 839 \\ -\,578 \\ \hline 261 \\ \hline \end{array}$ (or using only the units: $3 + 6 - 8 = 1$) *Correction:* $623 - 578 + 216 \boxed{\neq} 317$, or $628 - 578 + 216 = \underline{261}$ b) $985 + 312 - 443 = 854$ ✔ $\begin{array}{r} 985 \\ -\,443 \\ \hline 542 \\ \hline \end{array}$ $\begin{array}{r} 542 \\ +\,312 \\ \hline 854 \\ \hline \end{array}$ c) $629 + 348 - 557 = 320$ ✗ $\begin{array}{r} 629 \\ +\,348 \\ \hline 977 \\ \hline \end{array}$ $\begin{array}{r} 977 \\ -\,557 \\ \hline 420 \\ \hline \end{array}$ *Correction:* $629 + 348 - 557 \neq 320$, or $629 + 348 - 557 = \underline{420}$ (or by rounding to the nearest 10: $630 + 350 = 980$, $980 - 560 = \underline{4}20$) *24 min*	Whole class activity Written on BB or SB or OHT At a good pace Ps suggest how to check them Reasoning, agreement, checking, praising Ps suggest how to correct them. c) If Ps suggest it, discuss what would happen by rounding to nearest 100: $600 + 300 - 600 = 300$, indicating that 320 might be correct. T warns Ps about rounding too much!
5 **Extension**	***Book 3, page 101 Q.1*** Read: *Write in the missing sign to make the statement correct. Check on the grids* Deal with one part at a time. Ps come to BB to do calculation on LHS and rest of Ps do it in *Pbs*. Discuss and agree on what the missing sign might be. Let's check it! Ps come to BB to do calculation for RHS and rest of Ps work in *Pbs*. *Solution:* a) $\overset{921}{349 + 572} < \overset{926}{727 \boxed{+} 199}$ *C:* $\begin{array}{r} 349 \\ +\,572 \\ \hline 921 \\ \hline \end{array} < \begin{array}{r} 727 \\ +\,199 \\ \hline 926 \\ \hline \end{array}$ b) $\overset{499}{942 - 443} > \overset{482}{849 \boxed{-} 367}$ *C:* $\begin{array}{r} 942 \\ -\,443 \\ \hline 499 \\ \hline \end{array} > \begin{array}{r} 849 \\ -\,367 \\ \hline 482 \\ \hline \end{array}$ How many more is one side than the other? *29 min*	Whole class activity Written on BB or use enlarged copy master or OHP Discussion, reasoning, agreement, checking, praising Class agrees/disagrees with Ps at front of class, or Ps correct mistakes made in *Pbs*. (Or individual work, monitored, helped, and reviewed with whole class) a) $926 - 921 = \underline{4}$ b) $499 - 482 = \underline{17}$

Bk3

Lesson Plan 101

Activity		*Notes*

6

Book 3, page 101

Q.2 Read: *Write as many different 3-digit numbers as you can from these numbers.*

Deal with one part at a time. Set a time limit. Encourage logical listing. Ps who finish early can be asked to calculate the sum and the difference of the greatest and smallest numbers in their list.

Review orally with the whole class. T writes what Ps dictate on BB in order. Ps correct mistakes or add missed numbers.

Extension

How do we know that we have all the numbers? Elicit that in:

a) there are $3 \times 2 \times 1 = \underline{6}$ possible numbers (there are 3 possible hundreds digits and for every hundreds digit there are 2 possible tens digits and for every tens digit there is 1 possible units digit);

b) there are $4 \times 3 \times 2 = \underline{24}$ possible numbers (there are 4 possible hundreds digits and for every hundreds digit there are 3 possible tens digits and for every tens digit there are 2 possible units digits);

Solution: a) 789, 798, 879, 897, 978, 987

b) 345, 346, 354, 356, 364, 365,
435, 436, 453, 456, 463, 465,
534, 536, 543, 546, 563, 564,
634, 635, 643, 645, 653, 654

Notes:

Individual work, monitored, (helped)

e.g. starting at the smallest and listing in increasing order

Discussion, agreement, self-correction, praising

(Do not expect every number. Praise all correct ones.)

Ask several Ps what they think.

Discussion, agreement, praising

T gives hints only if Ps are struggling to explain.

BB:

a) $\begin{array}{r} 987 \\ +\,789 \\ \hline S = 1776 \\ \hline \end{array} \qquad \begin{array}{r} 987 \\ -\,789 \\ \hline D = 198 \\ \hline \end{array}$

b) $\begin{array}{r} 654 \\ +\,345 \\ \hline S = 999 \\ \hline \end{array} \qquad \begin{array}{r} 654 \\ -\,345 \\ \hline D = 309 \\ \hline \end{array}$

34 min

7

Book 3, page 101

Q.3 Read: *Write these numbers in the correct place in the diagrams.*

Deal with one part at a time. T reads out the numbers and Ps write them in the correct places in their *Pbs*.

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

Solution:

0, 4, 13, 30, 72, 95, 100, 321, 679, 1000, 1006, 1027, 2000

a)

Even	Odd
0 4 30 72 100 1000 1006 2000	13 95 321 679 1027

b)

Whole tens	Not whole tens
0 30 100 1000 2000	13 4 95 321 679 72 1027 1006

c)

3-digit	Not 3-digit
100 321 679	0 4 72 13 30 95 1006 1000 1027 2000

d)

Whole hundreds	Not whole hundreds
100 0 1000 2000	13 4 95 321 72 679 1027 1006 30

Notes:

Individual work, monitored but class kept together

T reads out numbers while walking round class.

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Who can think of other ways to sort the numbers?

(e.g. < 500, > 500; multiples of 3, not multiples of 3, etc.)

Praise all valid suggestions.

Feedback for T

40 min

Bk3

Lesson Plan 101

Activity		*Notes*
8	***Book 3, page 101,*** Q.4 Read: *Which numbers can be written instead of the shapes?* Deal with one part at a time. Ps decide where to start and what to do next. Ps do calculations in *Ex. Bks* (or on 'slates') and tell results to T. *Solution:* a) $440 - 10 \times ☆ = 315 + 45$ $440 - 10 \times ☆ = 360$ $10 \times ☆ = 440 - 360 = 80$ $☆ = 80 \div 10 = \underline{8}$ b) $726 - 571 + ◠ > 161$ $155 + ◠ > 161$ $◠ > 161 - 155 = 6$ $◠$: 7, 8, 9, . . . *Check:* a) $440 - 10 \times 8 = 440 - 80 = 360$ b) e.g. $726 - 571 + 8 = 155 + 8 = 163 > 161$ *43 min*	Whole class activity (or individual work if Ps wish) Written on BB Discussion on method of solution Ps come to BB or T writes what Ps dictate. Reasoning, agreement, praising Check answers by substituting a possible number in the statement.
9	**Revision** Everyone stand up! Follow my instructions! e.g. • Hold your arms horizontal (vertical, parallel, at right angles) • Make a quarter turn to your right (half a turn, whole turn to your left) • Turn by 1 right angle (2 right angles, 3 right angles, half a right angle) to your left (right). • Face North. Turn to face SW (NE, S, NW, E, SE, W) *45 min*	Whole class activity At speed In good humour! Ps can give instructions too. Elicit that: 2 right angles = half a turn 1 right angle = quarter of a turn

Bk3

R: Calculation (mental)

C: Revision and practice. Problems in context

E: Fractions in context

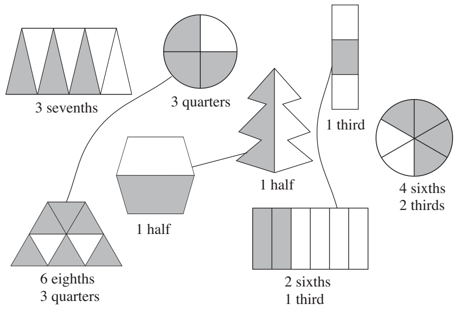
Lesson Plan 102

Activity — *Notes*

1

Matching fractions

Study these shapes. **BB:**



What can you tell me about them?

Ps come to BB to choose a shape and describe it.

(e.g 1st shape is a quadrilateral with the two horizontal lines parallel; the shape has been divided into 7 equal triangles, 3 of them are shaded.)

Ps write the part shaded below each shape.

Let's join up the shapes which have the same fraction shaded.

Ps come to BB to draw joining lines and explain reasoning. Class agrees/disagrees. Discuss equivalent fractions.

5 min

Notes:

Whole class activity

Shapes drawn on BB or use enlarged copy master or OHP

At a good pace

Agreement, praising

BB: 2 sixths = 1 third
4 sixths = 2 thirds
6 eighths = 3 quarters

Feedback for T

2

Numbers

T dictates some numbers. Ps write them in *Ex. Bks*.

T: '240, 806, 347, 580, 785, 950'

a) Write them again in increasing order.
Ps list in *Ex. Bks*, then dictate to T:
BB: $240 < 347 < 580 < 785 < 806 < 950$

b) Do these calculation in your *Ex. Bks* and show me the results when I say (on scrap paper or 'slates'). Ps who respond correctly explain.
i) What is the sum of the two greatest numbers? (1756)
ii) What is the difference between two smallest numbers? (107)

Extension

What else can you think of to do with the numbers?

(e.g. Put them in sets according to various criteria. How much more needs to be added to each one to make 1000? Which two numbers can be added (subtracted, multiplied together) to make these numbers?)

10 min

Notes:

Individual work, monitored

Reviewed at BB with the whole class

Agreement, self-correction, praising

Responses shown in unison

Reasoning, agreement, self-correction, prasing

BB: i) $\begin{array}{r} 806 \\ +\,950 \\ \hline 1756 \\ \hline \end{array}$ ii) $\begin{array}{r} 347 \\ -\,240 \\ \hline 107 \\ \hline \end{array}$

Involve several Ps.

Extra praise for creativity

3

Secret numbers

a) I thought of a number. I added 679 to it and the result was 1128. What was the number I first thought of?
Show me . . . now! (449) (on 'slates' or scrap paper)
P who responded correctly explains to those who did not. Mistakes discussed and corrected.
BB: $\square + 679 = 1128$, $\square = 1128 - 679 = 449$

$$\begin{array}{r} 1128 \\ -\;679 \\ \hline 449 \\ \hline \end{array}$$

b) This time I will give you the equation for a similar question. What could the question be? What is the secret number?
(e.g. I thought of a number. I subtracted 340 from it and the result was 563. What was the number I first thought of?)
Show me the secret number . . . now! (903)
P who responded correctly explains to those who did not. Mistakes discussed and corrected.

15 min

Notes:

Whole class activity

Ps can do calculations in *Ex. Bks* if they need to.

In unison

Reasoning, agreement, self-correcting, praising

BB: $\square - 340 = 563$

Ask several Ps what they think. T helps with wording.

In unison

BB: $\square = 563 + 340 = 903$

$$\begin{array}{r} 563 \\ +\,340 \\ \hline 903 \\ \hline \end{array}$$

Bk3

Lesson Plan 102

Activity		*Notes*

4

Problems

Listen carefully, do a rough drawing to help you if you need to and show me the answer when I say.

Individual work in drawing and calculating, monitored, helped

(or whole class activity, with cakes drawn or stuck on BB or use enlarged copy master)

a) *Mum baked 12 fairy cakes. Ann ate 2 sixths of them. How many cakes were left?*

Show me . . . now! (8)

In unison

A, come and explain how you worked out the answer. Who agrees? Who did it a different way? etc. Deal with all cases.

Reasoning, agreement, self-correcting, praising

BB: e.g.

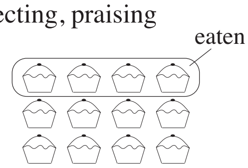
Eaten: 1 sixth of 12 = 2
2 sixths of 12 = 4

Left: 12 – 4 = <u>8</u>

(or Eaten: 2 sixths = 1 third
Left: 1 – 1 third = 2 thirds
2 thirds of 12 = <u>8</u>)

Answer: There were 8 cakes left.

BB:



Ps say answer in unison

b) *Granny baked 16 jam tarts. Billy ate 3 eighths of them. How many jam tarts were left?*

Show me . . . now! (10)

In unison

B, come and explain how you worked out the answer. Who agrees? Who did it a different way? etc. Deal with all cases.

Reasoning, agreement, self-correcting, praising

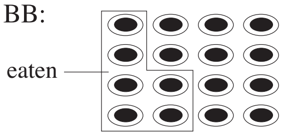
BB: e.g.

Eaten: 1 eighth of 16 = 16 ÷ 8 = 2
3 eighths of 16 = 3 × 2 = 6

Left: 16 – 6 = <u>10</u> (or Left: 5 eighths of 16 = 5 × 2 = <u>10</u>)

Answer: There were 10 jam tarts left.

BB:



Ps say answer in unison

20 min

5

Which operation?

Whole class activity

Study these operations.

Only the operations already written on BB or SB or OHT

BB:

321 – (247 – 159) (= 321 – 88 = <u>233</u>) ✔

321 – 247 – 159 ✗

321 + 247 + 159 ✗

321 – 247 + 159 (= 74 + 159 = <u>233</u>) ✔

$$\begin{array}{r} 247 \\ -\,159 \\ \hline 88 \end{array} \qquad \begin{array}{r} 321 \\ -\;\;88 \\ \hline 233 \end{array} \qquad \begin{array}{r} 321 \\ -\,247 \\ \hline 74 \end{array} \qquad \begin{array}{r} 74 \\ +\,159 \\ \hline 233 \end{array}$$

Which of them could be used to solve this problem?

Tina had 321 marbles. She gave 247 to her friend and got 159 marbles back. How many marbles does Tina have now?

T reapeats slowly and P repeats in own words.

T points to each operation in turn and Ps say whether or not it solves the problem. Why? (Why not?) Ps explain reasoning.

Discussion, reasoning, agreement, checking, praising

Ps do calculations mentally or in *Ex. Bks* and dictate to T (or come to BB) as a check.

Feedback for T

25 min

Bk3

Lesson Plan 102

Activity | **Notes**

6

Book 3, page 102

Q.1 Read: *Tick the operations which answer the problem and then do the calculations.*

Ps read the problem themselves, then work out only the operations which are correct.

Lee had a £10 note and 22 p. He spent £2.56, then his sister gave him 35 p. How much money does Lee have now?

Review at BB with the whole class. Ps explain reasoning to class. Class agrees/disagrees. Mistakes corrected.

BB:
- ✗ $1022 + 256 - 35 =$
- ✗ $1022 - 256 - 35 =$
- ✔ $1022 - 256 + 35 = 766 + 35 = \underline{801}$ (p)
- ✗ $1022 + 256 + 35 =$
- ✔ $1022 - (256 - 35) = 1022 - 221 = 801$ (p)

Notes:

Individual work, monitored, helped

Encourage Ps not to calculate every operation!

Operations written on BB or SB or OHT

Ps can do necessary calculations at side of *Pbs*

Reasoning, agreement, checking, self-correction, praising only

Elicit that the numbers shown are pence.

Agree that

$801 \text{ p} = £8.01$

30 min

7

Book 3, page 102

Q.2 Read: *Make a plan, do the calculation and write the answer in a sentence.*

Ps read the problem themselves, then write a plan.

Hetty Hedgehog had 347 apple pips. She got 172 orange pips from her Mum. Then she swapped 268 apple pips for grape pips with a friend. How many pips does Hetty Hedgehog have now?

Review the plan with the whole class first. Deal with all cases.

(Ps might notice that swapping 268 apple pips for grape pips does not change the amount so is not really needed in the operation, or that $-268 + 268 = 0$, so only one calculation needs to be done.)

Then Ps do calculation and write the answer as a sentence. Review at BB with whole class. Ps explain reasoning. Class agrees/disagrees. Mistakes corrected.

Solution:

Plan: $347 + 172 \overbrace{- 268 + 268}^{0} =$

(or $347 + 172 =$)

C:
$$\begin{array}{r} 347 \\ +\ \underline{172} \\ \underline{519} \end{array}$$

Answer: Hetty Hedgehog has 519 apple pips now.

Notes:

Individual work, monitored, helped

Discussion, agreement, correcting, praising

Reasoning, agreement, self-correction, praising

34 min

Bk3		*Lesson Plan 102*
Activity		***Notes***
8	***Book 3, page 102*** Q.3 First elicit that 1 litre = 100 cl, 1 cl = 10 ml (BB) Ps read the problems themselves and choose two to solve. Review at BB with whole class. Ps explain reasoning. Who agrees? Who did it a different way? etc. Mistakes corrected. a) Read: *A 2 litre bottle was full of water. We poured out 35 cl of water. How much water is left in the bottle?* BB: 200 cl – 35 cl = <u>165 cl</u> (= <u>1 litre 65 cl</u>) b) Read: *A 2 litre bottle contained 35 cl of water. We poured in another 35 cl of water. How much water is in the bottle now?* BB: 35 cl + 35 cl = <u>70 cl</u> c) Read: *A 2 litre bottle contained 36 cl of water. We poured out 10 cl 9 ml of water. How much water is left in the bottle?* BB: 36 cl – 10 cl 9 ml = 360 ml – 109 ml = <u>251 ml</u> (= <u>25 cl 1 ml</u>) *40 min*	Individual work, monitored, helped T warns Ps that not all the information in a question is needed in the calculation! Reasoning, agreement, self-correcting, praising Ps must listen to the problem they did not do and say whether they disagree with the reasoning. Praising, encouragement only Feedback for T
9	***Book 3, page 102 Q.4*** Read: *Last April it rained on 3 fifths of the days.* How many days are there in April? (30, as shown on the calendar) T (or P) reads each part and Ps do calculations in *Pbs*, using the calendar to help them. Ps show solutions on scrap paper or 'slates' on command. Ps who responded correctly explain to those who did not. a) Read: *On how many days did it rain?* Show me . . . now! (15) *Solution:* e.g. 1 fifth of 30 days = 30 days ÷ 5 = 6 days 3 fifths of 30 days = 6 days × 3 = <u>18 days</u> b) Read: *Did it rain on more than half the days?* Show me . . . now! (Yes) Solution: e.g. 1 half of 30 days = 30 days ÷ 2 = 15 days 18 days > 15 days, i.e. more than half the days. c) Read: *What part of April was dry?* Show me . . . now! (2 fifths) *Solution:* e.g. It rained on 3 fifths of the days.. 5 fifths – 3 fifths = 2 fifths It was dry on <u>2 fifths</u> of the days. (= 12 days) *45 min*	Individual work, monitored, helped (Or whole class activity and Ps dictate solution to T) Reasoning, agreement, self-correcting. praising Deal with all methods Feedback for T

Bk3	R: Calculation **C: Opposite quantities and numbers. Negative temperature** *E: Positive and negative quantities or numbers*	*Lesson Plan 103*
Activity		***Notes***
1	**Sequences** T says the first 3 terms of a sequence. Ps continue it, then give the rule. a) 800, 400, 200, (100, 50, 25, 12 and 1 half, 6 and 1 quarter, 3 and 1 eighth) *Rule:* Each following term is half of the previous term. (÷ 2) b) 800, 600, 400..., (200, 0, – 200, – 400, – 600, – 800, . . .) *Rule:* decreasing by 200. c) 10°C, 13°C, 16°C, (19°C, 22°C, 25°C, . . .) *Rule:* increasing by 3°C. d) 6°C, 5°C, 4°C, (3C, 2C, 1°C, 0°C, – 1°C, – 2°C, – 3°C, . . .) *Rule:* decreasing by 1°C T explains that the 'degree Celsius' is a unit used to measure <u>temperature</u>. What is temperature? (How hot or cold something is.) What can you tell me about it? Ps' tell own experiences (e.g. ice in the freezer, snow in winter, sunburn in summer, temperature rising when they are ill, shivering when they are cold, boiling water, etc.) Involve several Ps. This is what we use to measure temperature. Who knows what it is called? (<u>thermometer</u>) Who knows how it works? T explains briefly if nobody knows. (Bulb at bottom of glass tube holds a substance called <u>Mercury</u>. When hot it expands and rises up the tube and when cold it shrinks and falls back down the tube. It remains liquid at extreme temps.) T shows a large thermometer and talks about it. (e.g. the scale is in degrees Celsius (°C) and this thermometer shows temperatures from + 20°C to minus 20 °C) Which temperature do you think is hottest (coldest)? Ps come out to point and say it. (+ 20 degrees Celsius is hottest, <u>minus</u> 20 degrees Celsius is coldest) T tells the class (or elicits) that water freezes at a temperature of 0°C. Who can point to this temperature on the thermometer? What do you think + 10°C (– 10°C) means? (10 degrees more than 0°C, 10 degrees less than 0°C) What does the scale remind you of? (e.g. a vertical number line) We say that these numbers (T points) are <u>positive</u> (i.e. > zero) and these numbers are <u>negative</u> (i.e. < zero). T tells class that the '+' sign is usually left off the positive numbers. *8 min*	Whole class activity T chooses Ps at random T notes which Ps know about negative numbers already. If one P knows, P tries to explain the meaning to class and other Ps might follow the pattern. Ps should concentrate on the <u>numbers</u> and copy what T says for the unit. Agreement on rules, praising BB: <u>temperature</u> 1°C : <u>1 degree Celsius</u> Discussion Praise all contributions BB: <u>thermometer</u> Use large model or large real thermometer (or enlarged copy master or OHP) Or T has various scales to show different ranges of temperature. Ps come out to point to and read the highest (lowest) point on each scale. BB: +10°C <u>positive</u> > 0°C – 10°C <u>negative</u> < 0°C 10°C means +10°C
2	**Temperatures** Ps each have a model thermometer on desks (or colour copies of copy master from *Activity 1*. a) Set your thermometer to the temperature I am showing on mine. Ps hold them up and T does a quick check. Let's read it out together. (e.g. 7°C, 0°C, – 3°C, etc.) Is it positive or negative? b) Set your thermometer to the temperature I say. Ps hold them up and T does a quick check. (e.g. 8°C, – 5°C, 0°C, etc.) c) T shows some temperatures. Ps read them aloud. d) T says two temperatures. Which is higher (lower)? Who can write it in a mathematical way? How many degrees higher (lower)? *13 min*	Whole class activity T shows large model and Ps show theirs on command. Reading scale with T's help Or Ps come to large model to show and say the temperatures and class agrees/disagrees. In unison. Praising only e.g. BB: – 5°C < 2°C Ps count 'ticks' on the scale. Praising

Bk3

Lesson Plan 103

Activity		*Notes*

3

Book 3, page 103

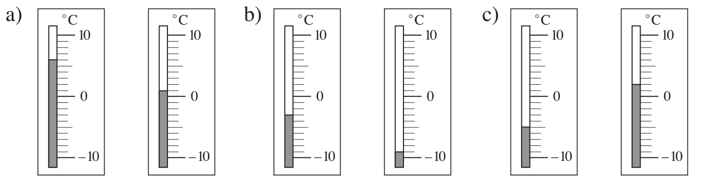
Q.1 Read: *Write the temperature below the thermometers.*
Write in the missing sign.

Deal with one part at a time. Make sure that Ps know to count how many ticks above or below 0°C the top of the Mercury is.

Ps write in the numerical values, then compare them and write in the appropriate sign.

Review at BB with whole class. Mistakes discussed/corrected.

Solution:



a) $\boxed{6}$ °C $\boxed{>}$ $\boxed{1}$ °C   b) $\boxed{-3}$ °C $\boxed{>}$ $\boxed{-9}$ °C   c) $\boxed{-5}$ °C $\boxed{<}$ $\boxed{2}$ °C

18 min

Notes:
Individual work, monitored, helped

T uses 2 large model thermometers or enlarged copy master or OHP

If possible, Ps use magnifying glasses to make the ticks easier to count (or enlarged copies of copy master)

Discussion, agreement, self-correction, praising

Ps can say the inequalities in unison as practice for reading 'minus' and 'degrees Celsius'.

Feedback for T

4

Opposites

Tell me the <u>opposite</u> of what I say. e.g.

cold (hot), high (low), colder (hotter), higher (lower), in (out), savings (debts), save (spend), under (over), below (above), up (down), in front of (behind), front (back), left (right), forwards (backwards), positive (negative), below sea level (above sea level), North (South), East (West), more than (less than), plus (minus), light (dark/heavy), white (black), curved (straight), divide (multiply), etc.

22 min

Notes:
Whole class activity

BB: <u>opposite</u>

T chooses Ps at random

Rest of class points out errors

In good humour!

T writes difficult words on BB

Praising, encouragement only

5

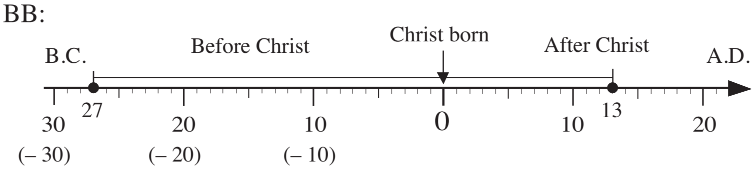
Problem

Listen carefully and think about what the problem has to do with this diagram. What could the letters stand for? What happened in the year zero?

A Roman gladiator had his 40th birthday in the 13th year after Christ was born. In what year was the Roman gladiator born?
How might the Romans have written the year he was born and the year in which he was 40?

T asks several Ps what they think. Ps make suggestions. Elicit that B.C. means 'Before Christ was born', the zero is the year Christ was born and A.D. means 'After Christ was born'. Ps come to BB to draw dots at the year of the general's birth and when he was 40 and label them. Discuss how these years could be written in Roman numerals.

BB:



T points out that the years B.C can be thought of as negative years and the years A.D. can be thought of as positive years, but the Romans did not know about positive and negative numbers; they used B.C. and A.D. instead.

26 min

Notes:
Whole class activity

Year line drawn on BB or use enlarged copy master or OHP

T repeats slowly to give Ps time to think. Ps can discuss it with their neighbours.

Discussion involving several Ps. Ps come to BB to explain and demonstrate.

Reasoning, agreement, praising

BB: Born in XXVII B.C.
40 years old in XIII A.D.

Check: 27 + 13 = 40

Or Ps might notice by themselves

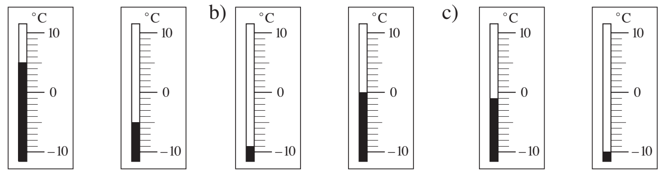
Repeat with another example if there is time.

Bk3

Lesson Plan 103

Activity		*Notes*
6	***Book 3, page 103*** Q.2 Read: *Mark the temperatures on the thermometers. Which is higher and by how much?* T explains task. Ps colour the tube of the thermometers up to the given levels. Then they compare the 2 temperatures and write the appropriate sign in the square. Then they count the ticks to find out how many degrees more the higher temperature is Deal with one part at a time. Review at BB with whole class. Ps dictate results to T or come to BB to explain reasoning. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:*	Individual work, monitored, helped Use 2 model thermometers or enlarged copy master or OHP Do part a) with whole class first if necessary. Reasoning, agreement, self-correction, praising (Ps can use magnifying glass to make counting the ticks easier or have copy of enlarged copy master.)

a) b) c)



a) 5 °C $\boxed{>}$ – 5 °C, $\boxed{10}$ °C

b) – 9 °C $\boxed{<}$ 0 °C, $\boxed{9}$ °C

c) – 1 °C $\boxed{>}$ – 10 °C, $\boxed{9}$ °C

Ps read the inequalities in unison.

30 min

7 **Negative numbers**

Let's put these temperatures in decreasing order.

BB: 3°C, – 5°C, 0°C, – 2°C, 7°C, — 10°C, 8°C

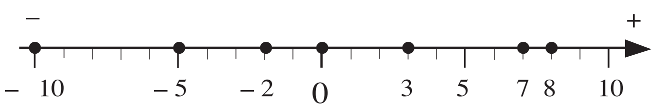
Ps come out to BB to rewrite order, crossing out values when used while rest of Ps list them in *Ex. Bks*. Class points out any errors.

BB: 8°C > 7°C > 3°C > 0°C > – 2°C > – 5°C > – 10°C

Remind Ps that: 8°C means 8°C more than 0°C, i.e. is positive (+)
– 2°C means 2°C less than 0°C, i.e. is negative (–)

Let's see if we can find these numbers on the number line!
Ps come out to point. Class agrees/disagrees.

BB:



Discuss and compare pairs of values (+ and –) and how far they are from zero and from each other. (Ps might notice that zero is similar to a line of symmetry, with, e.g. – 5 and 5 the same distance away from it.)

Notes:
Whole class activity
T has BB already prepared
At a good pace.
Agreement, praising
Use negative and positive segments of class number line or draw on BB.
At a good pace
Discussion, agreement
Extra praise if Ps notice the symmetry.

35 min

Bk3

Lesson Plan 103

Activity		Notes

8 **Book 3, page 103**

Q.3 Read: *How much does each child have? Who has more? Write in the missing sign.*

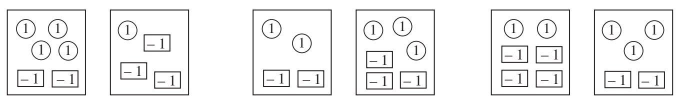
T explains the meaning of the symbols, talking about the money you have at this moment, e.g. in your purse or piggy bank (cash) and money you owe to someone, e.g. borrowed and have to pay back, or you have ordered something from a shop and you will have to pay for it later on (being in debt).

Deal with one part at a time. Review at BB with whole class. Ps dictate results to T or come to BB to explain reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

How much more is the bigger amount? Ps write on BB.

Solution:

a) Ann Paul b) Ben Rose c) Colin Sonia



a) 2 $\boxed{>}$ – 2 (4) b) 0 $\boxed{=}$ 0 c) – 2 $\boxed{<}$ 1 (3)

T asks individual Ps to describe each situation in real life. e.g. 'Ann has £4 in cash, but she is £2 in debt (or owes £2), so she really has only £2.' We say that the Ann's balance is £2.

Similarly for the other names.

Notes: Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

(or part a) done as whole class activity with 2 Ps at front of class using card coins and debt slips)

Reasoning, agreement, self-correction, praising

Elicit that, e.g. 1 and – 1 give a balance of zero.

Show amounts and differences between them on the class number line.

[Comparison is preparation for subtraction of negative whole numbers.]

BB: balance

40 min

9 **Book 3, page 103**

Q.4 Read: *Complete the drawings to make the statements correct.*

Make sure that Ps understand the meaning of the symbols and that each 1 and $\boxed{-1}$ makes 0. (Each such pair can be joined up or crossed out and what is left should be the balance.)

T could do part a) with the whole class first if necessary, with cards for 1 and $\boxed{-1}$ stuck to BB.

Review at BB with the whole class. Demonstrate with cards on BB and also show on number line. Mistakes discussed and corrected.

[Note than there are many correct solutions, e.g.

e.g. a) 1 1 $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ (1 $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$)

Solution: (most straightforward)

a) Alice's balance is – £6: 1 1 $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ ($\boxed{-1}$ $\boxed{-1}$)

b) Barry's balance is £3: 1 1 1 $\boxed{-1}$ $\boxed{-1}$ (1 1)

c) Carol's balance is £0: 1 1 1 1 $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ ✔

d) Dan's balance is – £4: 1 1 1 ($\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$)

e) Eve's balance is £5: 1 1 1 1 1 1 ($\boxed{-1}$)

Notes: Individual work, monitored, helped

(or whole class activity with Ps at front of class to be A, B, C, D and E, with cash and debt cards stuck on BB)

Discussion, reasoning, agreement, self-correction, praising

T can demonstrate this on BB if no P has done it.

Extension

How could we write them as equations? e.g.

a) $1 + 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 = -6$,
or $2 + (-8) = -6$, or $2 - 8 = -6$

Notes: Whole class discussion
Ps suggest ways.
Agreement, praising
Show on class number line.

45 min

Bk3	R: Calculation **C: Opposite quantities. Negative numbers** *E: Preparation for addition and subtraction of negative whole numbers*	*Lesson Plan 104*

Activity | ***Notes***

1

Problems

Listen carefully and think how you would solve this problem. Which operation should we write?

(Ps can write data and operations in *Ex. Bks* first before dictating to T.)

A, what do you think we should write? Who agrees? Who thinks something else? etc.

a) *Suzy Squirrel had 363 acorns, 129 acorns more than her brother Timmy Squirrel had. How many acorns will Timmy have left if he eats 148 of his acorns?*

BB: *SS* had: 363 (acorns) *TS* had: 363 – 129 (acorns)

TS now has: 363 – 129 – 148 = 234 – 148 = 86 (acorns)

or $363 - \underbrace{(129 + 148)}_{277} = 363 - 277 = \underline{86}$ (acorns)

Answer: Timmy Squirrel will have 86 acorns left.

b) *Emma was given £2.65 by her Mum, £1.28 by her Grandpa and £2.39 by her Grandma. How many 70 p sweets could Emma buy with this money?*

BB: Given: 265 + 128 + 239 = 632 (p)

Number of sweets: 632 p ÷ 70 p = 9 (remainder 2 p)

(as $\underline{9} \times 70$ p = 630 p)

Answer: Emma could buy 9 sweets with this money (and would have 2 p left over).

Notes:

Whole class activity

Give Ps time to write data and think about it.

Discussion, reasoning, agreement, praising

Calculations done mentally or vertically in *Ex. Bks*.

BB: e.g.

a) $\begin{array}{r} 363 \\ -\,129 \\ \hline 234 \\ \hline \end{array}$ $\begin{array}{r} 234 \\ -\,148 \\ \hline 86 \\ \hline \end{array}$ or $\begin{array}{r} 363 \\ -\,277 \\ \hline 86 \\ \hline \end{array}$

b) $\begin{array}{r} 265 \\ 128 \\ +\,239 \\ \hline 632 \\ \hline \end{array}$

(By looking at the multiples of 7: $\underline{9} \times 7 = 63$

so $\underline{9} \times 70 = 630$)

Ps say answer in a sentence.

8 min

2

Sequences

T says the first few terms of a sequence. Ps continue it, then give the rule.

a) 322, 319, 313, 304, (292, 277, 259, 238, 214, 187, . . .)
– 3 – 6 – 9 – 12 – 15 – 18 – 21 – 24 – 27

Rule: The difference between terms is increasing by 3.

b) – 2, 0, – 3, – 1, (– 4, – 2, – 5, – 3, – 6, – 4, . . .)
+ 2 – 3 + 2 – 3 + 2 – 3 + 2 – 3 + 2

Rule: Increasing by 2, then decreasing by 3 (+ 2, – 3).

Elicit that:

- increasing by 2 moves 2 units to the right on the number line (or 2 units up on vertical scale)
- decreasing by 3 moves 3 units to the left on the number line (or 3 units down on vertical scale)

Notes:

Whole class activity

Ps dictate what T should write (or come to BB)

Discussion on the rule

Reasoning, checking, agreement, praising

Ps have negative number lines on desks to help them.

Show on class number line or on vertical scale on thermometer model.

Agreement, checking, praising

16 min

Bk3

Lesson Plan 104

Activity		*Notes*

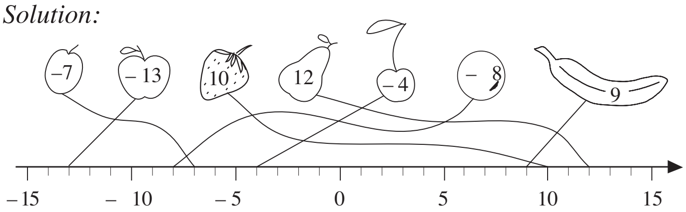
3

Book 3, page 104

Q.1 Read: *Join up the fruit to the corresponding point on the number line.*

Review at BB with whole class. Ps come to BB to draw joining lines. Class agrees/disagrees. Mistakes corrected.

Solution:



- Let's say them in
  a) increasing order: – 13, – 8, – 7, – 4, 9, 10, 12 (moving to the right along the number line or up on vertical scale)
  b) decreasing order: 12, 10, 9, – 4, – 7, – 8, – 13 (moving to the left along the number line or down on vertical scale)
- T (or P) says 2 of the numbers. Ps say which is greater, e.g.
  $12 > 9$, $10 > -7$, $-4 > -8$, $-8 < -7$, etc.

  Elicit that when comparing negative numbers, the greatest is nearest zero (the smallest is furthest away from zero).

Notes: Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP (or fruit cut out and stuck to BB above class number line)

Agreement, self-correction, praising

Feedback for T

In unison

T shows on either or both scales.

At a good pace

T chooses Ps at random:

e.g. 'minus four is greater than minus eight'

(BUT opposite is true for positive numbers)

21 min

4

Negative values

Listen carefully and think how to explain it.

a) *The temperature is higher than – 5°C but lower than 8°C.*

T asks several Ps what the temperature could be.

e.g. – 4°C, – 3°C, . . . 0°C, 1°C, . . ., 7°C, or could also include fractions of a degree, e.g. 2 and a half °C, – 1 and a half °C.

B, come and show it on the thermometer (or vertical scale drawn on BB). Agree that temperature is not as cold as – 5°C but is colder than 8°C.

Who could write it as an inequality? BB: $-5°C < \square < 8°C$

b) *The balance of Ian's bank account is more than – £5 but less than £8.*

T asks several Ps how much money Ian could have in his account.

e.g. P_1: He could have debts of £4, £3, £2 or £1. (– £4, . . , – £1)

P_2: He could nave no money left in his account. (£0)

P_3: He could have £1, £2, . . ., £7 in his account.

or P_5: He could have debts of £6 and savings of £2, as that would give a balance of – £4.

or P_6: He could have debts of £2 and savings of £9 as that would give a balance of £7.

Agree that Ian could have any amount of savings and debts so long as the balance of his account was from – £4.99 up to £7.99.

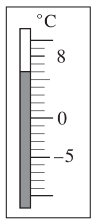
Who could write it as an inequality? BB: $-£5 < \square < £8$

Notes: Whole class activity

Ps can note data in *Ex. Bks* (or on' slates')

Ps make suggestions. Class agrees/disagrees.

Ps explain using model or diagram drawn on BB:



Ps write inequality in *Ex. Bks*.

Discussion, reasoning, agreement, praising

Ps explain using 1 and $\boxed{-1}$ cards stuck on BB and on class number line.

Extra praise if Ps think of last 2 possibilities or of using £s and pence.

Ps write inequality in *Ex. Bks*.

25 min

Bk3

Lesson Plan 104

Activity		*Notes*

5

Find the mistakes

For homework, *Tiggy Tiger* had to write an inequality to show that the temperature was between – 3°C and 5°C. These are his attempts. Which one is correct? Let's help him decide.

BB: $5 < T < -3$ ✗ $T > -3$ (not enough information)

$T < 5$ (not enough information) $\underline{-3 < T < 5}$ ✔

$T > 5$ ✗ $-3 > T > 5$ ✗

Ps come to BB to check each inequality, saying whether it is correct or not and explaining reasoning on model thermometer or vertical scale. Class agrees or disagrees.

Notes:
Whole class activity

T has BB or SB or OHT already prepared.

Elicit that T = Temperature

At a good pace

Reasoning, agreement, praising

Feedback for T

30 min

6

Book 3, page 104

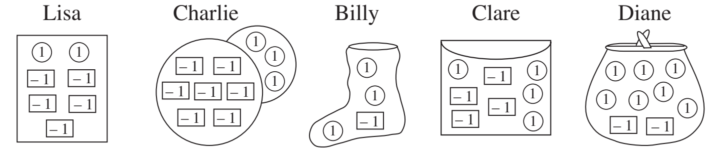
Q.2 Read: *How much money does each child really have? Write the amounts in increasing order.*

Revise the meaning of the symbols and that each 1 and $\boxed{-1}$ makes 0. Each such pair can be joined up or crossed out and what is left is the balance.

Review balance of each diagram first. Ps come to BB, explaining reasoning, Mistakes discussed and corrected.

Then Ps write balances in increasing order. Review with the whole class. Class dicates order to T to write on BB. Show each value on class number line.

Solution:



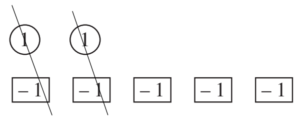
$-4 < -3 < 0 < 2 < 5$

Notes:
Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

(Or whole class activity with 5 Ps at front of class with different 'purses' containing 1 s and $\boxed{-1}$ s.)

Reasoning (with T's help), e.g. 'Lisa has £2 in cash but is £5 in debt, so she is really £3 in debt'



Agreement, self-correction, praising

35 min

7

Book 3, page 104

Q.3 Read: *Draw two different ways of showing these amounts. Use* 1 *and* $\boxed{-1}$.

Deal with one part at a time. Review orally with whole class. Deal with all cases. Class decides whether they are valid. Mistakes corrected. Refer to number line if problems.

Agree that there are many possible solutions (only limitation is the space given in the response boxes).

Solution: e.g.

a) – £3 = $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ = $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ 1

b) £3 = 1 1 1 = 1 1 1 1 $\boxed{-1}$

c) £0 = $\boxed{}$ = $\boxed{-1}$ $\boxed{-1}$ $\boxed{-1}$ 1 1 1

Notes:
Individual work, monitored, helped

T can stick 1 s and $\boxed{-1}$ s on BB to show Ps' solutions.

Reasoning, agreement, self-correction, praising

Agree on the <u>general rule</u> for each part. There must be in:

a) 3 more $\boxed{-1}$ s than 1 s

b). 3 more 1 s than $\boxed{-1}$ s

c) an equal number of $\boxed{-1}$ s and 1 s.

40 min

Bk3		*Lesson Plan 104*
Activity		***Notes***

8

Book 3, page 104

Q.4 Read: *Wendy went to Austria for a winter holiday.*

One day, she decided to note down the outside temperature every hour.

She made this table to show her data.

Who can tell us what the table means? (e.g. Top row shows the time of day Wendy read the thermometer: 7 hours means 7 o'clock in the morning and 19 hours means 7 o'clock in the evening. Bottom row shows the temperature at that time of day.)

Ps read the questions and answer them in *Pbs*.

Review at BB with whole class. Check on model thermometer (or vertical scale). Mistakes discussed and corrected.

Solution:

a) When was it: i) coldest (8.00 am or 08.00 hours)

ii) warmest? (3.00 am or 15.00 hours)

b) Write the temperatures in increasing order.

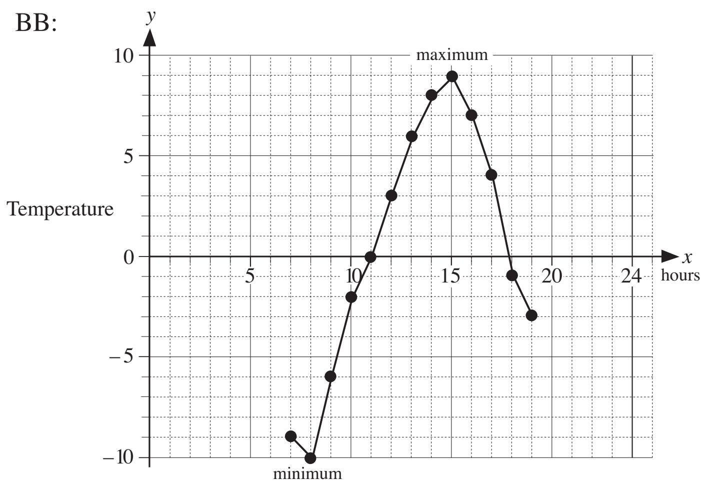
($-10 < -9 < -6 < -3 < -2 < -1 < 0 < 3 < 4 < 6 < 7 < 8 < 9$)

Let's show the temperatures on this graph. T explains or elicits what each axis shows. (x axis shows the hours and y axis shows the temperatures)

Ps come out to choose a column from table, point to the relevant hour with RH and temperature with LH and move both along relevant grid lines until they meet. P draws (or sticks on) a dot at the correct point. Class agrees/disagrees.

Let's join up the dots. What have we drawn? (a graph) What does it show? (how the temperature rises and falls) What does the top (bottom) of the graph show? (highest temperature; lowest temperature) We call these points the <u>maximum</u> and <u>minimum</u> points on the graph.

BB:



Extension

If Wendy noted the reading on the thermometer every hour after 7 pm how do you think the graph would continue? T asks several Ps what they think. (It would probably keep falling as it usually becomes colder the later it is in the day.)

Notes:

Whole class discussion to start

Table drawn on BB or use enlarged copy master or OHP

Discussion, agreement, praising

Quick revision of notation of time if necessary.

Individual work, monitored, helped

Reasoning, agreement, self-correction, praising

Graph drawn on BB or on a grid sheet or use enlarged copy master or OHP

At a good pace

With T's help if necessary

Agreement, praising

Whole class discussion

T encourages Ps to explain in own words

BB: <u>maximum</u> : highest point

<u>minimum</u> : lowest point

Discuss how day temperature changes in relation to the sun.

(Ps could have copies of copy master on desks and draw the points and line as individual work if they wish.

If short of time, Ps can complete graph in *Lesson 130,* or at home.)

Discussion, demonstration on graph, reasoning, agreement, praising

45 min

Bk3

R: (Mental) calculation

C: Multiplication. Properties of multiplication

E: Expressing the rules of multiplication

Lesson Plan 105

Activity | ***Notes***

1

Competition

T divides class into 3 (or 6) teams of roughly equal ability. T writes a number for each team on different parts of the BB (or on SB, flip chart, or large sheets of paper stuck to wall).

I will give you 2 minutes to write as many different ways as you can to describe your number. You must start and stop when I say.

Start ... now! Ps from each team come to BB one after another to write different descriptions. Rest of team correct their team-mates' errors, point out repetitions and note ideas from other teams. . . . Stop!

Quick check of each team's descriptions. Each team's score is the number of correct forms minus the number of wrong ones.

5 min

Notes:

Whole class activity

At a good pace

e.g.

BB: <u>150</u> <u>200</u> <u>250</u>

3×50
5×30
$100 + 50$
$300 \div 2$
etc.

Class applauds the winners

2

Find the mistake

Let's decide whether these inequalities are correct or not.

BB:

a) $-3 \underset{6}{\cancel{<}} -9$ ✗ $\quad(-3 \underset{6}{>} -9)$

b) $-15 \underset{4}{<} -1$ ✔

c) $-8 \underset{\cancel{10}}{<} -2$ ✗ $\quad(-8 \underset{6}{<} -2)$

d) $-5 \underset{\cancel{2}}{<} 3$ ✗ $\quad(-5 \underset{8}{<} 3)$

e) $-2 \underset{\cancel{1}}{\cancel{>}} 1$ ✗ $\quad(-2 \underset{3}{<} 1)$

f) $-20 \underset{30}{<} 10$ ✔

Ps come to BB to check each inequality, saying whether it is correct or not and explaining reasoning on vertical scale or class number line. Ps write correct inequality where relevant. Class agrees or disagrees.

10 min

Notes:

Whole class activity

Inequalitites written on BB or use enlarged copy master or OHP

At a good pace

Ps write corrected inequalities in *Ex. Bks*.

Reasoning, agreement, praising

Ps can make up inequalities too for class to check.

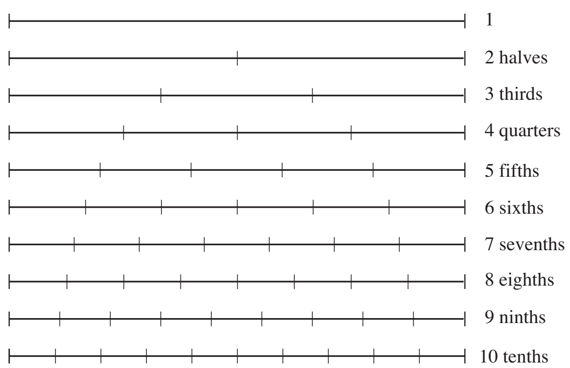
3

Equivalent fractions

This line has been divided into different numbers of equal parts. What are the parts called? T points to each line in turn and Ps say what it has been divided into. (1 whole, 2 halves, 3 thirds, etc.)

Let's find different ways of expressing the same segment of the line.

BB:



Ps come to BB to choose a line segment and to write its value in different ways. e,g,

BB: 1 half = 2 quarters = 3 sixths = 4 eighths = 5 tenths
1 third = 2 sixths = 3 ninths; 2 thirds = 4 sixths = 6 ninths
1 quarter = 2 eighths; 3 quarters = 6 eighths, etc.

15 min

Notes:

Whole class activity

Lines drawn on BB or use enlarged copy master or OHP

Ps could have copies of copy master on desks too.

T writes what Ps dictate.

At a good pace

T (Ps) could check equivalent fractions by drawing a dotted vertical line or lining the ticks up against a ruler.

Reasoning, agreement, praising

Class points out errors.

Feedback for T

Bk3

Lesson Plan 105

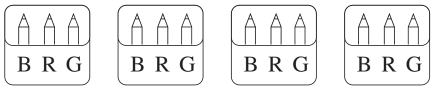
Activity | **Notes**

4

Multiplication revision 1

We have blue, red and green coloured pencils and we have to put one of each colour into the 4 wallets like this. How could we do it?

BB:



After discussion, elicit that there are 2 ways.

a) We could put a blue pencil in each wallet, then a green pencil in each wallet, then a red pencil in each wallet.

How could we write it mathematically?

BB: $4 + 4 + 4 = 12 = 3 \times 4$

Elicit (or tell) that in this equation, 3 is the <u>multiplier</u> (i.e. number of groups) and 4 is the <u>multiplicant</u> (i.e. number in each group).

b) We could put a blue, a red and a green pencil in the first wallet, then do the same for the other 3 wallets.

How could we write it mathematically?

BB: $3 + 3 + 3 + 3 = 12 = 4 \times 3$

Elicit that in this case 4 is the <u>multiplier</u> (i.e. number of groups) and 3 is the <u>multiplicant</u> (i.e. number in each group).

We can also say that 3 and 4 are <u>factors</u> of 12. (i.e. when multiplied together they give a product of 12) In multiplication does it matter which way round the factors are? (No, the result is the same for both ways.) Confirm with a diagram on the BB.

Extension

What are <u>all</u> the factors of 12? (<u>1</u> × <u>12</u>, <u>2</u> × <u>6</u>, <u>3</u> × <u>4</u>)

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP

Ask several Ps what they think

Discussion, reasoning, agreement, checking,

T explains both ways if Ps have not suggested them.

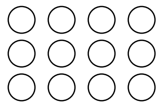
Ps can demonstrate each way on BB or OHT with coloured chalk or pens (vertical lines would do for pencils and squares for the wallets)

BB: 3 × 4 — <u>multiplier</u> <u>multiplicant</u> — 4 × 3

Discussion, revision

BB: <u>factors</u>

$3 \times 4 = 4 \times 3 = 12$



20 min

5

Multiplication revision 2

Let's see how much money I have in this purse! (T opens purse and sticks the model coins on the BB.)

BB: (10) (10) (10)
(10) (10) (10)

How much money do I have? (60 p)

What multiplications could we write? (e.g. $6 \times 10 = 60$)

Think about the rows and columns. What other multiplications could we write? e.g.

BB:

a) there are 2 rows, with 3 (10)s in each: $2 \times (3 \times 10) = 60$, or

b) there are 3 columns, with 2 (10)s in each: $3 \times (2 \times 10) = 60$, or

c) there are 2 × 3 coins, each coin is (10): $(2 \times 3) \times 10 = 60$, or

d) there are 3 × 2 coins, each coin is (10): $(3 \times 2) \times 10 = 60$,

If we left off the brackets, would it make a difference to the product? (No, the product would be the same, working from left to right.)

If we did the calculation from right to left (in any order) would the product change? (No)

Confirm that if all the operations are multiplications, then the order does not matter. What other operation is this true for? (addition)

Notes:

Whole class activity

Purse already prepared

T writes what Ps dicate

Reasoning, agreement, praising

After Ps' suggestions, T writes these operations on BB.

Ps copy into *Ex. Bks*.

Whole class discussion

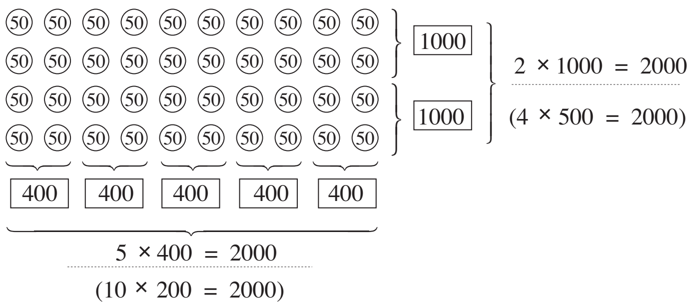
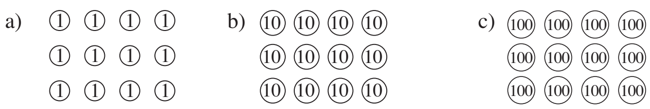
Agreement, praising

Feedback for T

25 min

Bk3

Lesson Plan 105

Activity		*Notes*
6	***Book 3, page 105*** Q.1 Read: *How much is in the picture? Fill in the missing numbers.* T explains task. Elicit that each blank box refers only to the two columns or rows indicated and that the dotted lines refer to the whole amount. Review at BB with whole class. Ps come to BB to write in missing numbers explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. What other multiplications could we have written? e.g. 4 rows of 500: $4 \times 500 = 2000$, (or $4 \times 10 \times 50 = 2000$); 10 columns of 200: $10 \times 200 = 2000$ (or $10 \times 4 \times 50 = 2000$) *Solution:* (= 40×50) 	Individual trial first, monitored, helped (or whole class activity) Diagram drawn on BB or use enlarged copy master or OHP Discussion, reasoning, agreement, self-correction, praising Ps make suggestions and class agrees/disagrees. T confirms on diagram Praising, encouragement only
Extension	Discuss how the factors change. (e.g. $4 \times 500 = 5 \times 400$; $2 \times 1000 = 10 \times 200$; $4 \times 500 = 40 \times 50$) Read: *What is 30 × 50?* Ps suggests ways to do it. (e.g. using first 3 rows in the diagram or writing the multiplication in a different way: e.g. BB: $30 \times 50 = 3 \times 10 \times 50 = 3 \times 500 = \underline{1500}$ *30 min*	Whole class discussion Ps tell what they notice. T helps with wording if necessary. Reasoning, agreement Praising only (Do not expect too much!)
7	***Book 3, page 105*** Q.2 Read: *Write additions and multiplications about the pictures.* Deal with one part at a time. Review at BB with whole class. Deal with all cases. Mistakes discussed and corrected. *Solution:* e.g.  a) $4 + 4 + 4 = 12$; $3 + 3 + 3 + 3 = 12$; $3 \times 4 = 12$; $4 \times 3 = 12$ b) $40 + 40 + 40 = 120$; $30 + 30 + 30 + 30 = 120$; $3 \times 40 = 120$; $4 \times 30 = 120$ c) $400 + 400 + 400 = 1200$; $300 + 300 + 300 + 300 = 1200$; $3 \times 400 = 1200$; $4 \times 300 = 1200$ What do you notice about the amount in each part? (e.g. amount in b) is 10 times more than in a) and 1 tenth of the amount in c); amount in c) is 10 times more than in b) and 100 times more than in a)) *35 min*	Individual work, monitored, helped Diagram drawn on BB or use enlarged copy master or OHP Reasoning, agreement, self-correction, praising Accept other multiplications, e.g. $3 \times 4 \times 10 = 120$ $2 \times 60 = 120$ $12 \times 100 = 1200$ BB: $1200 = 10 \times 120$ $= 100 \times 12$

Bk3		*Lesson Plan 105*

Activity		*Notes*
8	***Book 3, page 105*** Q.3 Read: *Three brothers were each left 257 dollars in their American uncle's will. How much did their uncle leave them in total? Fill in the missing numbers.* Who can explain what the diagram means? (A, B and C are the 3 brothers. Each brother has two 100 dollar notes, one 50 dollar note, a 5 dollar coin and a 2 dollar coin, i.e. 257 dollars) Ps write the sub-totals in the blank boxes (horizontally and vertically, then write the total amount on the dotted line. Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. Let's say the answer in a sentence. *Answer:* Their uncle left the brothers 771 dollars in total. *Solution:* $\left.\begin{array}{llll} \text{A:} & \boxed{100}\ \boxed{100} & \boxed{50} & 5\ 2 \\ \text{B:} & \boxed{100}\ \boxed{100} & \boxed{50} & 5\ 2 \\ \text{C:} & \boxed{100}\ \boxed{100} & \boxed{50} & 5\ 2 \end{array}\right\\} 3 \times \left(\boxed{200} + \boxed{50} + \boxed{7}\right)$ $\underbrace{3 \times \boxed{200}}_{\boxed{600}} + \underbrace{3 \times \boxed{50}}_{\boxed{150}} + \underbrace{3 \times \boxed{7}}_{\boxed{21}} = 600 + 150 + 21 = \underline{771}$ *40 min*	Individual work, monitored, helped (Or done as a whole class activity, with Ps as the three brothers and model money stuck on BB.) Diagram drawn on BB or use enlarged copy master or OHP Initial discussion/explanation Reasoning, agreement, self-correction, praising In unison. Praising If possible, T could have real American dollars to show to class and show how the unit of money is written: $ (dollar) [Preparation for vertical multiplication with place value columns]
9	***Book 3, page 105*** Q.4 Read: *Write the results. Underline the operation which is impossible.* Let's see how many of these can you can do in 4 minutes! Start . . . now! . . . Stop! Ps change pencils and mark their own work. Review orally round class. Mistakes discussed and corrected. Agree that the impossible operation is $10 \div 0$, as you cannot divide a number into <u>no</u> equal parts! Who had all correct (1, 2, 3, more than 3 mistakes)? What were your mistakes? Make a note of them and try to learn those tables by heart at home! *45 min*	Individual work, monitored Differentiation by time limit. (Less able Ps may use their multiplication tables.) Quick check Agreement, self-correction, praising Evaluation. T notes the most common mistakes for revision in *Lesson 135*.

Bk3

R: Multiplication and division tables. Other operations

C: Multiplication: properties

E: Expressing properties of multiplication

Lesson Plan *106*

Activity		*Notes*
1	**Jumps along the number line** *Kangaroo* is jumping 10 units at a time along the number line. *Squirrel* is jumping 5 units at a time along the number line. What numbers do they each land on if: a) they start at zero? *K*: 0, 10, 20, 30, 40, 50, . . . (+ 10) *S*: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, . . . (+ 5) b) they start at 150 and jump to the right? *K*: 150, 160, 170, 180, 190, 200, ... (+ 10) *S*: 150, 155, 160, 165, 170, 175, 180, . . . (+ 5) c) they start at 500 and jump backwards to the left? *K*: 500, 490, 480, 470, 460, 450, 440, 430, . . . (– 10) *K*: 500, 495, 490, 485, 480, 475, 470, 465, . . . (– 5) Ps show each set of jumps on number line too. *6 min*	Whole class activity Boys could be *Kangaroo* and girls could be *Squirrel*. At speed, in relay or in unison Girls (boys) point out each others' mistakes. Elicit the rule for each sequence. Use class number line or appropriate segments drawn on BB or OHP.
2	**Sequences** Write only the results in your *Ex. Bks*. Continue the sequence if you can! T dictates: 6 × 6 – 2, 7 × 7 – 20, 5 × 8 – 21, 6 × 4 – 20, . . . What is the sequence? T writes what Ps dictate. What is the rule? BB: 34, 29, 19, 4, (– 16, – 41, . . .) *Rule*: <u>difference</u> is increasing by 5. – 5, – 10, – 15, – 20, – 25, . . . What do you notice about the differences? (They make another sequence: – 5, – 10, – 15, – 20, – 25 . . . *Rule*: decreasing by 5) *10 min*	Whole class activity but individual writing in *Ex. Bks*. Do not expect many Ps to continue the sequence but one or two might be able to do it. Discussion, agreement on the rule. T gives hint if necessary. Accept other wording, e.g. 'subtract 5 more each time' Agreement, praising
3	**Multiplication and division practice** T says a multiplication or division, Ps say result. Listen carefully and put your hand on your head if anyone makes a mistake! e.g. 5 × 1, 50 ÷ 5, 4 × 3, 21 ÷ 3, 25 ÷ 5 10 × 2, 40 ÷ 4, 2 × 6, 42 ÷ 6, 10 × 10 7 × 5, 6 ÷ 2, 9 × 2, 63 ÷ 9, 27 ÷ 3 5 × 9, 80 ÷ 8, 7 × 3, 18 ÷ 6, 4 × 8 5 × 2, 35 ÷ 5, 6 × 7, 18 ÷ 9, 56 ÷ 8 2 × 3, 8 ÷ 2, 7 × 9, 18 ÷ 3, 10 × 0 etc.	Whole class activity In relay round class at speed If a P makes a mistake, class puts hands on heads and next P has to correct it. In good humour! Praising, encouragement only Ps can give extra facts too.
Extension	Here are some of the operations. Can you find a relationship between any of them? (e.g. 21 ÷ 3 = 42 ÷ 6 = 63 ÷ 9 = 7: if dividend and divisor are increased by the same number of times, the quotient stays the same; or 18 ÷ 6 is half of 18 ÷ 3: if dividend is the same but the divisor is doubled, then the quotient will be halved) *15 min*	Written on BB or OHT Agreement, praising T encourages (or helps) Ps to explain using correct mathematical terms.

Bk3

Lesson Plan 106

Activity		***Notes***

4

Book 3, page 106

Q.1 Read: *Fill in the missing numbers.*

Elicit that there are 5 rows of 4 (= 20) calculations. Let's see how many you can do in 3 minutes! Start . . . now! Stop!

Review orally with whole class. Ps change pencils and mark own work, correcting mistakes, then write how many correct out of 20 at the side of *Pbs*.

Who had all 20 correct? Who made a mistake in row a), etc.? What was your mistake? Who did the same? etc.

Stand up if you you did not finish them all. Sit down if you finished row d), c), etc.

Note your mistakes and try to learn those facts by heart.

Notes:

Individual work, monitored

Less able Ps may use their multiplication tables.

Differentiation by time limit

Ps give results. T asks some Ps to explain their reasoning (e.g. in first 3 columns, use reverse operation; in last column, divide by quotient to find missing divisor)

Praising, encouragement only

20 min

5

Multiplication and addition

Let's write multiplications and additions about the diagrams.

Ps come to BB to write an operation, explaining reasoning. Class agrees/disagrees . (T helps with wording and mathematical terms.)

BB:

a)

2 2 2	20 20 20	200 200 200
$3 \times 2 = 6$	$3 \times 20 = 60$	$3 \times 200 = 600$
$2 + 2 + 2 = 6$	$20 + 20 + 20 = 60$	$200 + 200 + 200 = 600$

b)

2 2 2 2 2 2	20 20 20 20 20 20	200 200 200 200 200 200
$\underbrace{2 \times 3}_{} \times 2 = 12$	$\underbrace{2 \times 3}_{} \times 20 = 120$	$\underbrace{2 \times 3}_{} \times 200 = 1200$
$6 \times 2 = 12$	$6 \times 20 = 120$	$6 \times 200 = 1200$
$2+2+2+2+2+2$	$20+20+20+20+20+20$	$200+200+200+200+200+200$
$4 + 4 + 4 = 3 \times 4$	$40 + 40 + 40 = 3 \times 40$	$400 + 400 + 400 = 3 \times 400$
$6 + 6 = 2 \times 6$	$60 + 60 = 2 \times 60$	$600 + 600 = 2 \times 600$

What do you notice about how the factors and products change? Ask several Ps what they think. Encourage Ps to use mathematical terms.

Elicit that, e.g., if one of the factors is 10 (100) times more but the other factor is the same, then the product is also 10 (100) times more.

Notes:

Whole class activity

(or individual work in *Ex. Bks* first, monitored)

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

At a good pace

T helps where necessary

Reasoning, agreement, praising

Possible equations are shown

Discussion, comparison, agreement, praising

T repeats unclear statements correctly.

25 min

6

Book 3, page 106

Q. 2 Read: *Write additions and multiplications about the pictures.*

Elicit similarity to previous activity. There is space for only 3 operations in your *Pbs*, but you can write more in your *Ex. Bks* if you have time.

Review at BB with whole class. Ps dictate to T or come out to write on BB. Class agrees/disagrees. Deal with all cases.

Solution: e.g.

a)	b)	c)
2 2 2 2 2 2 2 2 2	20 20 20 20 20 20 20 20 20	200 200 200 200 200 200 200 200 200
$3 \times 3 \times 2 = 18$	$3 \times 3 \times 20 = 180$	$3 \times 3 \times 200 = 1800$
$6 + 6 + 6 = 18$	$60 + 60 + 60 = 180$	$600 + 600 + 600 = 1800$
$3 \times 6 = 18$	$3 \times 60 = 180$	$3 \times 600 = 1800$

Notes:

Individual work monitored, helped

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

Reasoning, agreement, self-correction, praising

What do you notice?

Elicit again that if one of the factors is 10 (100) times more but the other stays the same, the result will also be 10 (100) times more.

30 min

Bk3

Lesson Plan 106

Activity		*Notes*

7

Book 3, page 106

Q.3 Read: *Fill in the missing products. Note how they change.*

Deal with one row at a time. Review at BB with whole class. Ps dictate missing products. Mistakes discussed and corrected

Compare the columns. What do you notice about them?

Ps point out how the factors and products change. T helps with wording and mathematical terms. (e.g. there is no change in result between columns 2 and 3, as in both cases one factor is 10 times more than in 1st column. It does not matter which factor it is.)

Solution:

a)	$5 \times 3 = \boxed{15}$	$50 \times 3 = \boxed{150}$	$5 \times 30 = \boxed{150}$	$5 \times 300 = \boxed{1500}$	$50 \times 30 = \boxed{1500}$
b)	$8 \times 2 = \boxed{16}$	$80 \times 2 = \boxed{160}$	$8 \times 20 = \boxed{160}$	$8 \times 200 = \boxed{1600}$	$80 \times 20 = \boxed{1600}$
c)	$3 \times 3 = \boxed{9}$	$30 \times 3 = \boxed{90}$	$3 \times 30 = \boxed{90}$	$3 \times 300 = \boxed{900}$	$30 \times 30 = \boxed{900}$
d)	$4 \times 5 = \boxed{20}$	$40 \times 5 = \boxed{200}$	$4 \times 50 = \boxed{200}$	$4 \times 500 = \boxed{2000}$	$40 \times 50 = \boxed{2000}$
	$\underset{\times 10}{<}$	$=$	$\underset{\times 10}{<}$	$=$	

Notes: Individual work, monitored, helped

T could have solution already prepared on BB or SB (or use enlarged copy master or OHP) and uncovers each row as it is dealt with.

Agreement, self-correction, praising

Discussion on what Ps notice about relationship between columns.

e.g. $4 \times 500 = 2000$

$40 \times 50 = 2000$

If one factor is 10 times more but the other factor is 10 times less, the result is the same.

35 min

8

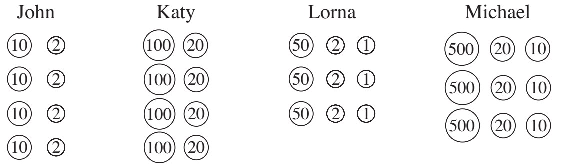
Book 3, page 106

Q.4 Read: *How many pennies does each person have?*
Calculate in different ways.

Deal with one person at a time. Ps write 2 or 3 different operations, separating each operation with a semi-colon (;).

Review at BB with whole class. Ps come out to BB to write operations, explaining reasoning on the diagrams. Class points out errors. Mistakes corrected. Deal with all cases.

Solution: e.g.



John: $40 + 8 = 48$; $4 \times \overset{12}{(10 + 2)} = 48$; $\overset{40}{4 \times 10} + \overset{8}{4 \times 2} = 48$;

Katy: $120 + 120 + 120 + 120 = 480$; $\overset{400}{4 \times 100} + \overset{80}{4 \times 20} = 480$; $10 \times 48 = 480$;

Lorna: $\overset{150}{3 \times 50} + \overset{6}{3 \times 2} + \overset{3}{3 \times 1} = 159$; $3 \times \overset{53}{(50 + 2 + 1)} = 159$;

Michael: $530 + 530 + 530 = 1590$; $\overset{159}{3 \times 53} \times 10 = 1590$; $3 \times \overset{530}{(500 + 30)} = 1590$;

Notes: Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

At a good pace

Extra praise for 'clever' operations.

Compare the amounts.
Elicit that:

K has 10 times more than J
M has 10 times more than L

Extension

How many £s would they each have?

(J: £0.48; K: £4.80;
L: £1.59; M: £15.90)

40 min

9

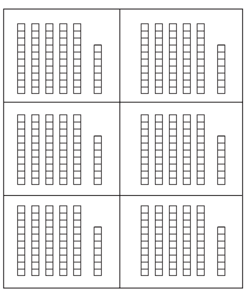
Multiplying 2-digit numbers

Study this diagram. BB:

What can you tell me about it?

What has the diagram to do with the operations?

What do you think the missing numbers should be?



$\boxed{5\,7} \times \boxed{6} =$

$\boxed{5\,0} \times \boxed{6} + \boxed{7} \times \boxed{6}$

$= \boxed{3\,0\,0} + \boxed{4\,2}$

$= \boxed{3\,4\,2}$

$\boxed{5\,7} \times \boxed{6} = \boxed{3\,4\,2}$

Notes: Whole class activity

Drawn on BB or use enlarged copy master or OHP

Ps come to BB to reason and explain. Class agrees/disagrees.

Ps decide on operation and calculation. Check result by estimation or vertical addition.

Praising

45 min

Bk3

R: Multiplication and division tables

C: Estimation of products

E: Preparation for vertical multiplication

Lesson Plan 107

Activity		*Notes*
1	**Oral work**	Whole class activity

What are the missing products? What do you notice about how the factors and products change?

BB: a) $40 \times 3 = \boxed{120}$ $\quad 40 \times 6 = \boxed{240}$ $\quad 40 \times 12 = \boxed{480}$

× 2

× 4

b) $30 \times 4 = \boxed{120}$ $\quad 30 \times 8 = \boxed{240}$ $\quad 30 \times 12 = \boxed{360}$

× 2

× 3

c) $50 \times 2 = \boxed{100}$ $\quad 50 \times 6 = \boxed{300}$ $\quad 50 \times 20 = \boxed{1000}$

× 3

× 10

5 min

Notes: Whole class activity

Operations written on BB or use enlarged copy master or OHP

Ps dictate the products to T or come out to write on BB, explaining reasoning (with T's help if necessary).

Class points out missed relationships.

Agreement, praising

Feedback for T

---

2 ***Book 3, page 107***

Q.1 Read: *Fill in the missing products.*

Deal with one part at a time. Review with whole class. What did you notice? (The product of the multiplication in the bottom row is the sum of the products in the first 2 rows.) Mistakes discussed and corrected.

Solution:

a) $6 \times 10 = \underline{60}$ b) $5 \times 10 = \underline{50}$ c) $30 \times 3 = \underline{90}$

$6 \times 4 = \underline{24}$ $\quad 5 \times 7 = \underline{35}$ $\quad 5 \times 3 = \underline{15}$

$6 \times 14 = \underline{84}$ $\quad 5 \times 17 = \underline{85}$ $\quad 35 \times 3 = \underline{105}$

Let's do these multiplications in the same way.

BB:

$$\begin{array}{rcr} \multicolumn{3}{l}{130 \times 7} \\ \hline 100 \times 7 & = & 700 \\ 30 \times 7 & = & +\ 210 \\ \hline 130 \times 7 & = & 910 \end{array} \qquad \begin{array}{rcr} \multicolumn{3}{l}{5 \times 175} \\ \hline 5 \times 100 & = & 500 \\ 5 \times 70 & = & 350 \\ 5 \times 5 & = & +\ 25 \\ \hline 5 \times 175 & = & 875 \end{array}$$

10 min

Notes: Individual work, monitored, helped

Written on BB or SB or OHT

Discussion, reasoning, agreement, self correction, praising

Whole class activity

Ps dictate to T what to write or come to BB, explaining reasoning.

Class agrees/disagrees.

T adds + sign and horizontal lines to emphasise the addition.

---

3 **Estimation**

Listen to this problem and think how we could estimate the answer.

There are 283 nails in each box. How many nails are in 3 boxes?

(Ps might suggest rounding to nearest 100 and nearest 10.)

We could estimate in 3 ways. T starts each method of solution, then asks Ps for help with the details.

Let B = number of nails in 1 box, T = total number of nails in 3 boxes

a) Let's estimate by rounding to the nearest 100:

BB: $B = 283$ $\qquad T = 3 \times 283$

$B \approx 300$ $\qquad T \approx 3 \times 300 = 900$

As $B < 300$, then $T < 3 \times 300 = 900$

Notes: Whole class activity

Give Ps the chance to suggest methods first.

Then T leads Ps through the 3 estimations, allowing Ps to help where they can.

Encourage Ps to say if they do not understand the reasoning.

Ps copy the 3 methods into *Ex. Bks* as T works on BB.

a) $T < 900$

Bk3

Lesson Plan 107

Activity		*Notes*

3 (continued)

b) Let's estimate by rounding to the nearest 10:

BB: $B = 283$ so $T = 3 \times 283$

$B \approx 280$ so $T \approx 3 \times 280 = 840$

$B > 280$ so $T > 3 \times 280 = 840$

c) Let's estimate using an inequality:

i) using nearest 100s:

$200 < B < 300$, so $3 \times 200 < T < 3 \times 300$

$600 < T < 900$

ii) using nearest 10s:

$280 < B < 290$, so $3 \times 280 < T < 3 \times 290$

$840 < T < 870$

What is the exact value? ($3 \times 283 = 3 \times 280 + 3 \times 3 = 840 + 9 = 849$)

Which method of estimation do you think is best? Why?

18 min

Notes:

BB: $3 \times 200 = 600$
$3 \times 80 = 240$
$3 \times 280 = 840$

b) $T > 840$

c) i) $600 < T < 900$
ii) $840 < T < 870$

BB: $3 \times 200 = 600$
$3 \times 90 = 270$
$3 \times 290 = 870$

Agreement, praising

Discussion. Ask several Ps what they think.

4

Multiplication

Let's fill in the missing products. Try to think of easy ways to do the calculations ! Ps come out to fill in missing numbers and explain reasoning. Class agrees/disagrees or suggests easier methods.

Elicit relationships between factors and products (some are given in the solution below.)

BB:

÷ 2 ÷ 2

a) $6 \times 28 = \boxed{168}$ $3 \times 28 = \boxed{84}$ = $6 \times 14 = \boxed{84}$

× 10 × 10 × 2 ÷ 2 × 10

$6 \times 280 = \boxed{1680}$ $3 \times 280 = \boxed{840}$ $6 \times 140 = \boxed{840}$

÷ 2 × 2

b) $4 \times 16 = \boxed{64}$ = $8 \times 8 = \boxed{64}$ = $2 \times 32 = \boxed{64}$

$4 \times 160 = \boxed{640}$ $8 \times 80 = \boxed{640}$ $2 \times 320 = \boxed{640}$

$-(6 \times 1)$ $-(1 \times 15)$

c) $6 \times 16 = \boxed{96}$ $6 \times 15 = \boxed{90}$ $5 \times 15 = \boxed{75}$

$6 \times 160 = \boxed{960}$ $6 \times 150 = \boxed{900}$ $5 \times 150 = \boxed{750}$

$-(6 \times 10)$ $-(1 \times 150)$

d) ***Book 3, page 107***

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

Let's see if you can do these calculations on your own!

Review at BB with whole class. Relationships discussed. Mistakes corrected.

Solution:

a) $3 \times 24 = 72$ b) $6 \times 12 = 72$ c) $3 \times 12 = 36$

$3 \times 240 = 720$ = $6 \times 120 = 720$ $\xrightarrow{\div 2}$ $3 \times 120 = 360$

26 min

Notes:

Whole class activity

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

Ps try to do calculations in steps mentally. Write details on BB if necessary, e.g.

$6 \times 28 = 6 \times 20 + 6 \times 8$
$= 120 + 48 = 168$

Discuss how the factors and products change.

Ps point out what they notice.

Praising, encouragement only!

Individual work, monitored

Written on BB or SB or OHT

Discussion, reasoning, agreement, self-correction, praising

Feedback for T

Bk3		*Lesson Plan 107*
Activity		***Notes***
5	***Book 3, page 107*** Q.3 Read: *Estimate the product (P). Is the estimate more or less than the exact product?* Do part a) with the whole class first. We don't need to work out the product exactly but just compare it with our estimates. Ps come out to BB to fill in the missing numbers and signs, explaining reasoning. T and /or other Ps help if necessary. a) 227×4 i) *Rounding 227 to the nearest hundred:* BB: $P \approx \underline{200} \times 4 = \underline{800}$ $P > 800$ ii) *Rounding 227 to the nearest ten:* BB: $P \approx \underline{230} \times 4 = \underline{920}$ $P < 920$ Now let's see if you can do part b) on your own. You may do the calculations at the side of your *Pbs*, or in your *Ex. Bks*. Review at BB with whole class. (Inequalities could be shown on 'slates' on command.) Ps dictate results to T. Mistakes corrected. b) 468×6 i) *Rounding 468 to the nearest hundred:* BB: $P \approx \underline{500} \times 6 = \underline{3000}$ $P < 3000$ ii) *Rounding 468 to the nearest ten:* BB: $P \approx \underline{470} \times 6 = \underline{2820}$ $P < 2820$	Whole class activity to start Written on BB or SB or OHT or use enlarged copy master or OHP BB: P = product Reasoning, agreement, praising Details of calculations written at side of BB, e.g $230 \times 4 = 200 \times 4 + 30 \times 4$ $= 800 + 120 = \underline{920}$ Individual work, monitored, helped (or continue as whole class activity if Ps are still unsure) Reasoning, agreement, self-correction, praising BB: $470 \times 6 = 400 \times 6 + 70 \times 6$ $= 2400 + 420$ $= \underline{2820}$
Extension	What are the <u>exact</u> products? Ps do calculations in *Ex. Bks*. a) $227 \times 4 = 200 \times 4 + 20 \times 4 + 7 \times 4 = 800 + 80 + 28 = \underline{908}$ b) $468 \times 6 = 400 \times 6 + 60 \times 6 + 8 \times 6 = 2400 + 360 + 48$ $= \underline{2808}$ *34 min*	Individual work, monitored, reviewed, corrected Or done vertically as at beginning of lesson. Praising
6	**Estimation practice** Let's estimate these products by rounding to the nearest 100. Will the exact product be more or less than the estimate? Ps come to BB or dictate to T. Class points out errors. BB: a) $162 \times 5 \approx (200 \times 5 = 1000)$ $162 \times 5 < 1000$ b) $177 \times 4 \approx (200 \times 4 = 800)$ $177 \times 4 < 800$ c) $315 \times 3 \approx (300 \times 3 = 900)$ $315 \times 3 > 900$ d) $231 \times 4 \approx (200 \times 4 = 800)$ $231 \times 4 > 800$ *38 min*	Whole class activity (or individual work in *Ex. Bks*) Written on BB or SB or OHT or use enlarged copy master from *Activity 7*. Reasoning, agreement, praising At a good pace Feedback for T

Bk3

Lesson Plan 107

Activity		*Notes*

7

Book 3, page 107

Q.4 Read: *Estimate the product by rounding to the nearest ten.*

Compare your estimate with the exact product too. You can write any necessary calculations in your *Ex. Bks.* or at the side of your *Pbs* (or on your 'slates').

Deal with one part a a time. Review at BB with the whole class. Ps dictate results to T or come to BB to write in missing numbers and signs, explaining reasoning. Mistakes discussed/corrected.

Solution:

a) $162 \times 5 \approx \underline{160} \times 5 = \underline{800}$ $\quad$ $162 \times 5 > 800$

b) $177 \times 4 \approx \underline{180} \times 4 = \underline{720}$ $\quad$ $177 \times 4 < 720$

c) $315 \times 3 \approx \underline{320} \times 3 = \underline{960}$ $\quad$ $315 \times 3 < 960$

d) $231 \times 4 \approx \underline{230} \times 4 = \underline{920}$ $\quad$ $231 \times 4 > 920$

Notes: Individual work, monitored, helped

(Or whole class activity if time is short)

Written on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Details of calculations written on BB: e.g.

$$160 \times 5 = 100 \times 5 + 60 \times 5$$
$$= 500 + 300 = \underline{800}$$

(or vertically if Ps suggest it)

42 min

8

Book 3, page 107

Q.5 Read: *In your exercise book, estimate, calculate and check the answer. Write it below.*

Ps read the problem themselves, write the operation required, then estimate the product to the nearest 10. Then Ps calculate exact product and compare with their estimation as a check. Then they write the answer as a sentence in their *Pbs*.

Either keep Ps together for each step, then review, or if Ps are able and wish it, let them do the whole exercise before review.

In both cases, Ps dicate solution to T and correct their mistakes. Class says answer as a sentence in unison.

Grandpa gave £1.35 to each of his 4 grandchildren.
How much did he give them altogether?

Solution: (Could be already prepared and each part uncovered as it is dealt with)

Plan: Each grandchild: £1.35 = 135 p
4 grandchildren: 4×135 p

E: $4 \times 135 \approx 4 \times 140 = 4 \times 100 + 4 \times 40 = 560$ (p)

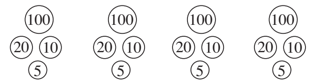
C: $4 \times 135 = 4 \times 100 + 4 \times 30 + 4 \times 5$
$= 400 + 120 + 20 = \underline{540}$ (p)
$= \underline{£5.40}$

Answer: He gave them £5.40 altogether.

Notes: Individual work, monitored, helped

(Or whole class activity if time is short)

T could have diagram drawn (or coins stuck) on BB to help Ps: e.g.



Reasoning, agreement, self-correction, praising

Agree that $4 \times 135 < E$

(or vertically if Ps suggest it)

$$\begin{array}{rcr} 4 \times 100 & = & 400 \\ 4 \times 30 & = & 120 \\ 4 \times 5 & = & +\ 20 \\ \hline 4 \times 135 & = & \underline{540} \end{array}$$

Check: $540 < 560$ ✔

45 min

Bk3

R: Mental calculation

C: Multiplication. Estimation

E: Preparation for vertical multiplication (without crossing tens)

Lesson Plan 108

Activity		*Notes*

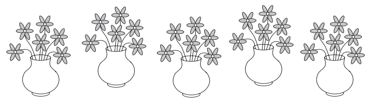
1

Addition and multiplication

How many flowers are in the vases? Who can write an addition and multiplication for each part?

BB:

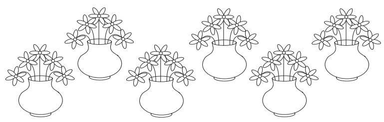
a)



$6 + 6 + 6 + 6 + 6 = 30$

$5 \times 6 = 30$

b)



$5 + 5 + 5 + 5 + 5 + 5 = 30$

$6 \times 5 = 30$

Ps come to BB to write operations, explaining reasoning. Class points out errors and makes sure that operations match the pictures.

3 min

Notes:

Whole class activity

Drawn on BB or use enlarged copy master or OHP, or plastic flowers in real vases, or Ps at front of class holding flowers, windmills, etc.)

Reasoning, agreement, praising

Agree that:

$5 \times 6 = 6 \times 5 = 30$

Feedback for T

2

Find the mistakes

This is *Barry Bear*'s homework but he did it in a hurry. Let's correct it for him.

BB:

a) $25 \times 2 = \cancel{55}$ 50 ✗ b) $12 \times 3 = 36$ ✔ c) $18 \times 5 = \cancel{105}$ 90 ✗

d) $4 \times 21 = 84$ ✔ e) $6 \times 19 = \cancel{138}$ 114 ✗ f) $2 \times 54 = \cancel{134}$ 108 ✗

Ps come to BB to tick correct answers or cross out mistakes and correct them, explaining reasoning. Class agrees/disagrees.

8 min

Notes:

Whole class activity

T has BB or SB or OHT already prepared

At a good pace

Reasoning, agreement, praising

Ps write details of calculations at side of BB where necessary.

3

Missing signs

Which operation signs could be written in the circles to make the inequalities correct? Try it in your *Ex. Bks* first.

Ps dictate their results to T who writes in the signs. Who agrees? Who thinks something else? etc. Let's check the calculation.

BB: e.g.

a) $6 \times 7 + 8 \leq 51$ b) $(3 + 3) \times 8 > 33$

c) $(9 - 4) \times 9 < 67$ d) $3 \times 7 - 5 > 12$

13 min

Notes:

Whole class activity

Written on BB or SB or OHT

Or Ps try out possible signs on 'slates' or on scrap paper

Reasoning, agreement, checking, praising

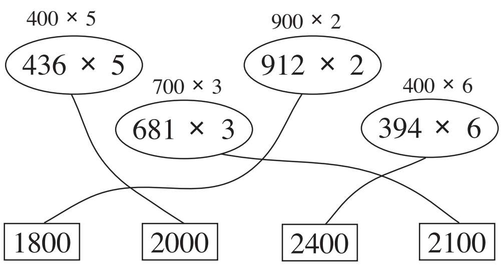
One solution given but others are possible.

4

Estimation

Let's join up each operation to its estimated value. How have the estimates been calculated? (by rounding the number to the nearest 100)

BB:



Ps come to BB to draw joining lines (or rearrange cards), explaining reasoning. Class agrees/disagrees.

18 min

Notes:

Whole class activity

Written on BB or on cards stuck to BB, or use enlarged copy master or OHP

Ps can try it out in *Ex. Bks* first before coming to BB.

Reasoning, agreeement, checking, praising

What would the numbers be rounded to the nearest 10?

T points to each and class shouts out : e.g. $436 \approx 440$

Bk3

Lesson Plan 108

Activity		*Notes*
5	***Book 3, page 108*** Q.1 Read: *Write a plan, estimate the answer to the nearest 10 p, then do the calculation.* *Ribbon costs £2.54 per metre. How much do 3 metres cost?* Ue the diagram to help you understand the problem. Review at BB with whole class (or after each step if necessary). Ps come to BB to explain their solutions. Class agrees/disagrees. Check solution against estimate and confirmby rearranging coins. *Solution:* . *Plan:* Cost of: 1 metre: £2.54 = 254 p; 3 metres: 3×254 p *Estimate:* $3 \times 254 \approx 3 \times 250 = 3 \overset{600}{\times} 200 + 3 \overset{150}{\times} 50 = 750$ (p) *Calculation:* $3 \times 254 = 3 \overset{600}{\times} 200 + 3 \overset{150}{\times} 50 + 3 \overset{12}{\times} 4 = \underline{762}$ (p) *Answer:* 3 metres of ribbon cost 762 p (= £7.62). *23 min*	Individual work, monitored helped Coins stuck on BB: £1 £1 £1 £1 £1 £1 2 50 2 2 50 2 2 50 2 Ps could show final answer on scrap paper or on 'slates' in unison on command. Reasoning, agreement, self-correction, praising Agree that $E < C$ *Check* : 750 p < 762 p ✔ £1 £1 £1 £1 £1 £1 50 50 50 2 2 2 2 2 2
6	***Book 3, page 108*** Q.2 Read: *Estimate the result in your head first, then do the calculation.* Ps estimate by rounding number to nearest 10 and calculating mentally (or at side of *Pbs* or in *Ex. Bks* or on 'slates'). Ps could write estimate lightly above each operation. Ps write details of calculations in *Ex. Bks* if necessary before writing the products in *Pbs*. Review after each row. Ps explain reasoning and compare calculated product with estimate. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a) $32 \times 30 = 960$ $24 \times 20 = 480$ $16 \times 50 = 800$ $38 \times 20 = 760$ b) $14 \times 60 = 840$ $17 \times 50 = 850$ $13 \times 70 = 910$ $21 \times 40 = 840$ c) $56 \times 30 = 1680$ $40 \times 37 = 1480$ $89 \times 20 = 1780$ $50 \times 34 = 1700$ *30 min*	Individual work, monitored helped Written on BB or SB or OHT (or estimates can be done orally as whole class activity first) T may differentiate, as part c) is more difficult. Reasoning, agreement, checking against estimate, self-correction, praising Ps explain calculations in detail, e.g. *E*: $32 \times 30 \approx 30 \times 30 = 900$ (so exact product is > 900) *C*: $32 \times 30 = 32 \times 3 \times 10 = 96 \times 10 = \underline{960}$ Praise 'clever' methods, e.g. $16 \times 50 = 8 \times 100 = \underline{800}$
7	**Problem** Listen carefully and think about how you would solve this problem. *An air ticket costs £213. How much will 4 air tickets cost?* What should we do first? (Write a plan.) What should I write? What should we do next? etc. Ps dictate what to do next and what T should write on BB. T directs Ps' thinking by asking appropriate questions. BB: *Plan:* Cost of 1 ticket: £213 Cost of 4 tickets: $4 \times$ £213 *Estimate:* $4 \times$ £213 $\approx 4 \times$£200 = £800, so *C > £800* Let's show the calculation in a place value table.	Whole class activity T repeats slowly and Ps repeat in own words. Give Ps time to think about it. Discussion, reasoning, agreement, praising Drawn on BB or SB or only table drawn and coins stuck on, or use enlarged copy master or OHP.

Bk3

Lesson Plan 108

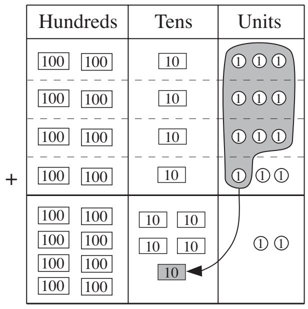
Activity		*Notes*

7

(Continued)

Let's do an addition first. Who can explain these place value tables?
Ps give reasoning. Class agrees/disagrees.

BB: *Calculation:*



	H	T	U
	2	1	3
	2	1	3
	2	1	3
+	2	1	3
		1	2
	8	5	2

$3U + 3U + 3U + 3U$
$= 12U = 1T + \underline{2U}$

$1T + 1T + 1T + 1T + (1T)$
$= 4T + 1T = \underline{5T}$

$2H + 2H + 2H + 2H$
$= \underline{8H}$

Let's write the addition in a shorter way, then write it as a multiplication.
T writes (with Ps' help) or explains pointing to copy master.

BB:

	H	T	U
	2	1	3
	2	1	3
	2	1	3
+	2	1	3
	8	5	2

H	T	U	
2	1	3	× 4
8	5	2	

2	1	3	× 4
8	5	2	

Check: £852 > £800

Answer: 4 air tickets cost £852.

Notes:

Ps come to BB to explain with T's or other Ps' help.

Drawn on BB or use enlarged copy master or OHP (or build up the tables gradually with Ps sticking model money on table drawn on BB, then filling in the numbers and explaining the total.)

Ps dictate additions using place values.

Either fill in blank grids or T explains using completed copy master.

Ps copy in *Ex. Bks*.

Ps suggest how to check result.

Ps say answer as a sentence

Praising only!

36 min

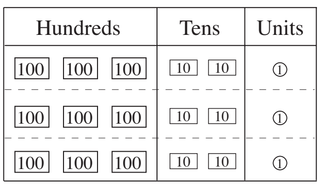
8

Book 3, page 108

Q.3 Read: *Three classes have each raised £321 for charity.*
How much have they raised altogether?
Estimate in your head, then complete the drawing and calculations.

Deal with one step at a time. Review at BB with whole class.
Ps come to BB to explain their solution. Class agrees/disagrees.

Solution:



	H	T	U
	3	2	1
	3	2	1
+	3	2	1
	9	6	3

H	T	U	
3	2	1	× 3
9	6	3	

3	2	1	×	3
9	6	3		

Answer: They have raised ££963 altogether.

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP (or model money stuck on BB)

Discussion, reasoning, agreement, self-correction, praising

Details of calculations written on BB with place values:

$3 \times 1U = 3U$
$2 \times 2T = 6T$
$3 \times 3H = 9H$

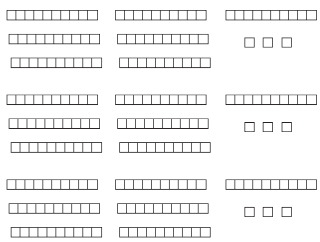
[Without crossing tens]

41 min

Bk3		*Lesson Plan 108*

Activity		***Notes***
9	***Book 3, page 108***	Individual work, monitored, helped
	Q.4 Read: *Think about what the diagram means. Fill in the missing numbers.*	
	Review at BB with whole class. Ps explain reasoning. Class agrees/disagrees. Mistakes discussed and corrected.	Drawn on BB or use enlarged copy master or OHP (or strips of card stuck on BB)
	Let's write it vertically as we did before. Ps come to BB to try, with help of class. Ps write it this way at bottom of page in *Pbs* or in *Ex. Bks*.	Discussion, reasoning, agreement, self-correction, praising

Solution:



$73 \times 3 = \boxed{2\,1\,9}$

$$\underbrace{\boxed{7\,0} \times \boxed{3}}_{\boxed{2\,1\,0}} + \underbrace{\boxed{3} \times \boxed{3}}_{\boxed{9}}$$

BB:

	7	3	×	3
2	1	9		

45 min

Bk3

R: Mental operations

C: Multiplication. Short form without crossing tens

E: Short form, crossing tens

Lesson Plan 109

Activity		*Notes*
1	**Jumps along the number line** *Grasshopper* starts at zero and jumps 4 units at a time along the number line. Where will he get to after: a) 15 jumps b) 36 jumps c) 48 jumps d) 100 jumps?. BB: a) $15 \times 4 = 10 \times 4 + 5 \times 4 = 40 + 20 = \underline{60}$ or $10 \times 4 = 40$, $5 \times 4 = 20$, $15 \times 4 = \underline{60}$ (or 15 + 15 + 15 + 15, or 30×2) b) $36 \times 4 = 30 \times 4 + 6 \times 4 = 120 + 24 = \underline{144}$ (or 72×2) c) $48 \times 4 = 40 \times 4 + 8 \times 4 = 160 + 32 = \underline{192}$ d) $100 \times 4 = \underline{400}$ *4 min*	Whole class activity For each part, Ps come to BB or dictate to T what to write. Class agrees/disagrees. (Or if Ps are able, calculations can be done on slates or in *Ex. Bks*, answers written on slates and shown on command. Ps who answered correctly explain to those who did not.) Feedback for T
2	**Estimating** Let's estimate these multiplications by rounding to the nearest 100. Ps come to BB to write estimate or dictate to T, explaining reasoning and saying whether estimate is more or less than exact product. Class agrees/disagrees. What do you notice? Repeat estimations but this time rounding to the nearest 10. BB: <u>Rounding to nearest 100</u> — <u>Rounding to nearest 10</u> a) $269 \times 4 \underset{(<)}{\approx} (300 \times 4 = 1200)$ $(270 \times 4 = 800 + 280 = 1080)$ b) $217 \times 4 \underset{(>)}{\approx} (200 \times 4 = 800)$ $(220 \times 4 = 800 + 80 = 880)$ c) $352 \times 2 \underset{(<)}{\approx} (400 \times 2 = 800)$ $(350 \times 2 = 600 + 100 = 700)$ d) $93 \times 7 \underset{(<)}{\approx} (100 \times 7 = 700)$ $(90 \times 7 = 630)$ e) $449 \times 2 \underset{(>)}{\approx} (400 \times 2 = 800)$ $(450 \times 2 = 800 + 100 = 900)$ f) $21 \times 9 \underset{(>)}{\approx} (0 \times 9 = 0)$ $(20 \times 9 \approx 180)$ Which estimation do you think is closest to the exact product? Why? Agree that rounding numbers to the nearest 100 gives a very rough estimate but rounding to the nearest 10 is closer to the exact product. *10 min*	Whole class activity T has BB already prepared Involve majority of Ps Reasoning, agreement, praising At a good pace Discuss results, e.g. Ps might notice that estimates of b), c) and e) are the same when rounding to nearest 100 but are different when rounding to nearest 10. Discuss results of f), where 21 is not at all close to zero but is nearer zero than 100. In this case, estimating by rounding to the nearest 100 is silly – much better to round to the nearest 10.
3	**Problems** Listen carefully to these problems and think how you would solve them. Do you need to do an exact calculation or will an estimate do? T reads problem. Give Ps time to write appropriate plan. Ask several Ps what they think. Class agrees on plan and Ps come to BB to complete estimates or to do exact calculations. Class agrees/disagrees. Class says answer in a sentence. a) *Pupils bought 40 plants for the school garden. Each plant cost 38 p. Roughly how much did they spend?* BB: $\boxed{40 \times 38\text{ p} \approx}$ $(40 \times 40\text{ p} = 10 \times 4 \times 40\text{ p} = 10 \times 160\text{ p} = \underline{1600\text{ p}} = \underline{£16})$ *Answer:* They spent roughly £16. Agreement that exact amount would be less than £16. (£15.20)	Individual work in writing plan (in *Ex. Bks*, or Ps could write on scrap paper or 'slates' and show on command) Whole class activity in completing estimation or calculation. If estimation, Ps say whether exact amount would be more or less than estimated amount. Ps can calculate <u>exact</u> amount in *Ex. Bks* if they wish. (e.g. $£16 - 2 \times 40\text{ p} = £16 - 80\text{ p} = £15.20$)

Bk3		*Lesson Plan 109*
Activity		***Notes***
3	(Continued) b) *Paul has 27 50 p coins. About how much money does Paul have?* BB: $\boxed{27 \times 50\text{ p} \approx}$ (30 × 50 p = <u>1500 p</u>) or (= 15 × £1 = <u>£15</u>) *Answer:* Paul has about £15. Agreement that exact amount would be less than £15. (£13.50) c) *1 box of apples weighs 28 kg. Approximately how much do 60 boxes of apples weigh?* BB: $\boxed{60 \times 28\text{ kg} \approx}$ (60 × 30 kg = 6 × 300 kg = <u>1800 kg</u>) *Answer:* 60 boxes of apples weigh approximately 1800 kg Agreement that exact amount would be less than 1800 kg. (1680 kg) d) *How much will 8 kg of plums cost if 1 kg costs £1.92?* Elicit first that £1.92 = 192 p (BB) e.g. BB: $\boxed{8 \times 192\text{ p} =}$ (8 × 100 p + 8 × 90 p + 8 × 2 p = 800 + 720 p + 16 p = 1520 p + 16 p = 1536 p = <u>£15.36</u> *Answer:* 8 kg of plums will cost £15.36. *16 min*	Exact amount: e.g. 27 × 50 p = £15 – 3 × 50 p = £15 – £1.50 = <u>£13.50</u> Exact amount: e.g. 60 × 28 kg = 60 × 20 kg + 60 × 8 kg = 1200 kg + 480 kg = <u>1680 kg</u> or (1800 – 120) kg Or 8 × £1.92 = 8 × £2 – 8 × 8 p = £16 – 64 p = <u>£15.36</u> Only problem d) requires the exact amount.
4	***Book 3, pag3 109*** Q.1 Read: *Fill in the missing products. Note how they change.* Deal with one row at a time. Review orally with whole class. Mistakes discussed and corrected Ps tell class of relationships they notice within each row. Agree that, e.g. if one factor is twice as much, then the product is twice as much; if one factor is twice as much and the other factor is half as much then the product is the same; etc. *Solution:* a) 60 × 3 = <u>180</u> 60 × 6 = <u>360</u> 60 × 9 = <u>540</u> 60 × 12 = <u>720</u> b) 40 × 5 = <u>200</u> 40 × 10 = <u>400</u> 40 × 15 = <u>600</u> 40 × 25 = <u>1000</u> c) 4 × 2 = <u>8</u> 40 × 2 = <u>80</u> 400 × 2 = <u>800</u> 40 × 20 = <u>800</u> d) 3 × 5 = <u>15</u> 30 × 5 = <u>150</u> 300 × 5 = <u>1500</u> 30 × 50 = <u>1500</u> e) 4 × 24 = <u>96</u> 8 × 12 = <u>96</u> 16 × 6 = <u>96</u> 2 × 48 = <u>96</u> 4 × 240 = <u>960</u> 8 × 120 = <u>960</u> 16 × 60 = <u>960</u> 2 × 480 = <u>960</u> *22 min*	Individual work, monitored, helped T could have solutions already prepared on BB or SB or OHP and uncover each as it is dealt with. Agreement, self-correction, praising Discussion on relationship between factors and products Involve several Ps Praising only Feedback for T
5	***Book 3, page 109*** Q.2 Read: *Fill in the missing products.* Deal with one column at a time. Review orally with whole class. Ps dictate results to T, explaining reasoning. Mistakes corrected. What do you notice about the columns? (e.g. in each column, one of the factors is always the same; the product in the bottom row is the sum of the 3 products above it.) BB: a) 5 × 100 = 500; 5 × 20 = 100; 5 × 1 = 5; 5 × 121 = 605 b) 4 × 3 = 12; 30 × 3 = 90; 200 × 3 = 600; 234 × 3 = 702 c) 7 × 8 = 56; 7 × 30 = 210; 7 × 100 = 700; 7 × 138 = 966 *28 min*	Individual work, monitored helped Written on BB or SB or OHT Reasoning agreement, self-correction, praising (or reasoning for bottom row: 234 × 3 = 200 × 3 + 30 × 3 + 4 × 3 = 600 + 90 + 12 = 702) Discussion, checking, agreement, praising Feedback for T

Bk3

Lesson Plan 109

Activity		*Notes*
6	***Book 3, page 109***	

Q.3 Read: *Estimate first, then calculate using addition and multiplication.*

Review at BB with whole class. Ps come to BB to fill in missing numbers, explaining reasoning. Mistakes corrected.

Solution:

a) $\begin{array}{r} 202 \\ 202 \\ 202 \\ +\ 202 \\ \hline \mathbf{808} \end{array}$ *E:* **800** $\quad 202 \times \boxed{\mathbf{4}} = \mathbf{808}$

b) $\begin{array}{r} 302 \\ 302 \\ +\ 302 \\ \hline \mathbf{906} \end{array}$ *E:* **900** $\quad 302 \times \boxed{\mathbf{3}} = \mathbf{906}$

c) $\begin{array}{r} 423 \\ +\ 423 \\ \hline \mathbf{846} \end{array}$ *E:* **800** $\quad 423 \times \boxed{\mathbf{2}} = \mathbf{846}$

d) $\begin{array}{r} 201 \\ 201 \\ 201 \\ 201 \\ +\ 201 \\ \hline \mathbf{1005} \end{array}$ *E:* **1000** $\quad 201 \times \boxed{\mathbf{5}} = \mathbf{1005}$

Notes:

Individual work, monitored helped

Written on BB or use enlarged copy master or OHP

Ps decide whether to round to nearest 100 or nearest 10, do estimate mentally and write digits in correct columns.

Reasoning agreement, self-correction, praising

T asks P to explain the multiplications with place values:

e.g. '1U times 5 = 5 U,
2H times 5 = 10H = 1Th'

Feedback for T

34 min

---

7 **Multiplication practice**

T chooses Ps to come to BB and calculate the products, asking them to explain their reasoning using place values. Class agrees/disagrees.

BB:

	H	T	U		
a)		8	2	×	4
	1	**6**	**8**		
b)		9	1	×	7
	6	**3**	**7**		
c)		6	2	×	3
	1	**8**	**6**		
d)		6	2	×	4
	2	**4**	**8**		
e)		9	1	×	8
	7	**2**	**8**		
f)	1	2	2	×	4
	4	**8**	**8**		

	Th	H	T	U		
g)		3	2	1	×	3
		9	**6**	**3**		
h)		3	2	1	×	4
	1	**2**	**8**	**4**		
i)		5	2	3	×	3
	1	**5**	**6**	**9**		
j)		4	0	2	×	4
	1	**6**	**0**	**8**		
k)		4	0	3	×	4
	1	**6**	**1**	**2**		
l)		6	1	2	×	3
	1	**8**	**3**	**6**		

Ps might notice connections between some of the calculations, e.g.

$62 \times 4 = 62 \times 3 + 62, \quad 91 \times 8 = 91 \times 7 + 91$, etc.

Notes:

Whole class activity

Written on BB or use enlarged copy master or OHP

At a good pace

Ps also copy into *Ex. Bks* at same time.

Reasoning, agreement, praising

T helps with wording of reasoning if necessary, e.g.

i) 523 × 3:

3U times 3 = 9U,
2T times 3 = 6T,
5H times 3 = 15H = 1Th + 5H

k) 403 × 4

3U times 4 = 12U = 1T + 4U,
4H times 4 = 16H = 1Th + 6H

40 min

Bk3		*Lesson Plan 109*

Activity		***Notes***
8	***Book 3, page 109***	Individual work, monitored, helped
	Q.4 a) Read: *Kate bought 3 chocolate bars at 82 p each. How much did she pay altogether?*	(Ps could show final amount on scrap paper or 'slates' on command.)
	Complete the calculation, then write the answer as a sentence. Remember to write the unit of money too !	Set a time limit for each part
	Review at BB with whole class. Ps explain reasoning and class agrees/disagrees. Mistakes discussed and corrected	Reasoning, agreement, self-correction, praising

Solution:

Th	H	T	U		
		8	2	×	$\boxed{3}$
	2	**4**	**6**		

Answer: Kate paid 246 p (or £2.46) altogether.

b) Read: *A brick weighs 4 kg. How heavy are 412 bricks?*

Think carefully about where you will write the numbers! When you write the answer in a sentetence remember to include the unit of measure too.

Review as above.

Solution:

Th	H	T	U		
	4	1	2	×	$\boxed{4}$
1	6	4	8		

Answer: 412 bricks weigh 1648 kg.

Notes: Reasoning, agreement, self-correcting, praising

Encourage Ps to explain using place values:

'2U times 4 = 8U.
1T times 4 = 4T,
4H times 4 = 16H = 1Thu + 6T'

Extension

c) This calculation is more difficult! Who would like to try?

BB:

Th	H	T	U		
	3	1	3	×	$\boxed{5}$

Ps come to BB to try to solve it, but might run into difficulty.

Rest of class can try to help by working out the product in another way, e.g.

313 × 5 = 300 × 5 + 10 × 5 + 3 × 5 = 1500 + 50 + 15
= 1565

We know that the product is 1565, so let's think how we could get this answer using the other method.

T leads class through by reasoning using place values :

BB: 3U × 5 = 15U = 1T + $\underline{5}$U,
1T × 5 = 5T (+ 1T) = $\underline{6}$T
3H × 5 = 15H = $\underline{1}$Th + $\underline{5}$H

Th	H	T	U		
	3	1	3	×	$\boxed{5}$
1	5	6	5		
		1			

Notes: Whole class activity

Written on squared grid on BB or SB or OHT

Discussion, reasoning, agreement, praising

BB:

Th	H	T	U		
	3	1	3	×	$\boxed{5}$
		1	5		
		5	0		
1	5	0	0		
1	5	6	5		

45 min

Bk3	R: Mental calculation **C: Multiplication** *E: Vertical multiplication, crossing tens*	*Lesson Plan* *110*

Activity		*Notes*

1 **Missing numbers**

Study this table and think what the rule could be. Ask several Ps what they think. Agree on one form of the rule. (BB) e.g. $a \times b = c$

Let's fill in the missing numbers. Ps come to BB choose a column and fill in the missing numbers, explaining reasoning. Who agrees? Who thinks something else? etc. Who can think of other ways to write the rule? Let's choose a column and check that it is correct.

BB:

a	423	211	322	323	514	73	441
b	2	5	4	3	**2**	**3**	**2**
c	846	1055	**1288**	**969**	1028	219	882

Rule: $a \times b = c$, $b \times a = c$, $c \div b = a$, $c \div a = b$

5 min

Whole class activity

Written on BB, or use enlarged copy master or OHP

Discussion, agreement on the rule.

At a good pace

Reasoning, agreement, praising

Check other forms of rule:

e.g. BB: $4 \times 322 = 1288$

$1028 \div 2 = 514$

$882 \div 441 = 2$

2 **Secret numbers**

I will think of a number and describe it. You must work it out in your *Ex. Bks*, then show me the number when I say.

a) *I am thinking of a number. It is 270 less than 3 times 250. What is the number I am thinking of?*

Show me . . . now! (480) **A**, tell us how you worked it out . Who did the same? Who did it a different way? etc.

BB: e.g. $3 \times 250 = 3 \times 200 + 3 \times 50 = 600 + 150 = 750$

$750 - 270 = 750 - 250 - 20 = 500 - 20 = \underline{480}$ or $\begin{array}{r} 750 \\ -\,270 \\ \hline 480 \end{array}$

b) *I am thinking of a number. 3 times this number is 270 more than 480. What is the number I am thinking of?*

Show me . . . now! (250) **B**, tell us how you worked it out . Who did the same? Who did it a different way? etc.

BB: e.g. $3 \times \boxed{} = 480 + 270 = 680 + 20 + 50 = 750$ or $\begin{array}{r} 480 \\ +\,270 \\ \hline 750 \end{array}$

$\boxed{} = 750 \div 3 = 600 \div 3 + 150 \div 3 = 200 + 50 = \underline{250}$

10 min

Whole class activity, but individual work in calculating

T repeats slowly

Give Ps time to do calculations in *Ex. Bks*.

Responses written on scrap paper or 'slates.

Reasoning, agreement, praising

(Or all done as a whole class activity, with Ps dictating what T should write on BB)

Extra praise if Ps might notice connection with, or use results from, part a), e.g.

$\underbrace{(480 + 270)}_{750} \div 3 = \underline{250}$

Feedback for T

3 **Sequences**

T writes first 3 terms of a sequence on BB. Ps continue it and give the rule (by coming to BB or dictating to T) explaining reasoning. Class agrees/disagrees.

a) **4, 12, 36,** [108, 324, 972, (2916, . . .)] *Rule*: × 3

Reasoning: e.g. $36 \times 3 = 30 \times 3 + 6 \times 3 = 90 + 18 = \underline{108}$

b) **2, 8, 32,** [128, 512, (2048, . . .)] *Rule*: × 4

Reasoning: e.g. $128 \times 4 = 400 + 80 + 32 = 480 + 20 + 12 = \underline{512}$

$512 \times 4 = 2000 + 40 + 8 = \underline{2048}$

c) **1536, 768, 384,** [192, 96, 48, 24, 12, 6, 3, (1 and a half, . . .)]

Rule: ÷ 2 (or every following term is half of previous term).

Reasoning: e.g. $384 \div 2 = 284 \div 2 + 100 \div 2 = 142 + 50 = \underline{192}$

16 min

Whole class activity

Reasoning, agreement, praising. Details written on BB where needed.

or $\begin{array}{rcl} 900 \times 3 &=& 2700 \\ 70 \times 3 &=& 210 \\ 2 \times 3 &=& 6 \\ \hline 972 \times 3 &=& 2916 \end{array}$

In c) Ps might calculate the first two differences:

$1536 - 768 = 768$

$768 - 384 = 384$

and realise the terms are halved.

Bk3

Lesson Plan 110

Activity		*Notes*

4

Short form of writing multiplications

What do you notice about these additions? (In each part, the numbers being added are the same.) What other operation could we write instead of addition? (multiplication) e.g. $423 + 423 + 423 = 423 \times 3$

Let's do the calculations both ways. T chooses Ps to come to BB in pairs, one to do the addition and the other to do the the multiplication.

Encourage both Ps to explain their reasoning to class. Class estimates mentally (to nearest 100 or nearest 10) to check their results.

BB:

a) *E:* $420 \times 3 = 1260$

		4	2	3
		4	2	3
+		4	2	3
	1	2	6	9

4	2	3	×	3
1 2	6	9		

b) *E:* $320 \times 4 = 1280$

		3	2	1
		3	2	1
		3	2	1
+		3	2	1
	1	2	8	4

3	2	1	×	4
1 2	8	4		

c) *E:* $310 \times 3 = 930$

	3	0	9
	3	0	9
+	3	0	9
	9	2	7

3	0	9	×	3
9	2	7		

d) *E:* $140 \times 7 = 980$

	1	4	1
	1	4	1
	1	4	1
	1	4	1
	1	4	1
	1	4	1
+	1	4	1
	9	8	7

Th	H	T	U	
	1	4	1	× 7
			7	
		2	8	0
+	7	0	0	
	9	8	7	

1	4	1	×	7
9	8	7		

or d)
$$\begin{aligned} 1 \times 7 &= 7 \\ 40 \times 7 &= 280 \\ 100 \times 7 &= 700 \\ \hline 141 \times 7 &= \underline{987} \end{aligned}$$

22 min

Notes:

Whole class activity

Written on BB or use enlarged copy master or OHP

Ps can do calculations in *Ex. Bks* first if they wish.

Reasoning, agreement, praising

Encourage Ps to give reasoning in detail with place values, e.g.

c) '9U times 3 = 27U
= 2T + 7U

so I write 7 in the units column and 2 in the tens column.

3H times 3 = 3H.

so I write 3 in the hundreds column.'

Reasoning for d) can be given in different ways, e.g.

'1U times 7 = $\underline{7}$U

4T times 7 = 28T = 2H + $\underline{8}$T

1H × 7 = 7H, 7H + 2H = $\underline{9}$H'

5

Book 3, page 110

Q.1 Read: *Estimate first, then complete the addition and multiplication.*

Set a time limit. Review at BB with whole class.

Ps come to BB to fill in missing numbers or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) *E:* $70 \times 6 = 420$

	7	1
	7	1
	7	1
	7	1
	7	1
+	7	1
4	2	6

7	1	×	6
4 2	6		

b) *E:* $200 \times 4 = 800$

	2	0	1
	2	0	1
	2	0	1
+	2	0	1
	8	0	4

2	0	1	×	4
8	0	4		

c) *E:* $530 \times 2 = 1060$

		5	3	4
+		5	3	4
	1	0	6	8

5	3	4	×	2
1 0	6	8		

d) *E:* $210 \times 5 = 1050$

		2	1	1
		2	1	1
		2	1	1
		2	1	1
+		2	1	1
	1	0	5	5

2	1	1	×	5
1 0	5	5		

26 min

Notes:

Individual work, monitored, helped

Written on BB or use enlarged copy master or OHP

Differentiation by time limit

Reasoning, agreement, self-correction, praising

If problems, write details of calulations on BB: e.g.

d) 1U times 5 = $\underline{5}$U

1T times 5 = $\underline{5}$T

2H times 5 = 10H = $\underline{1}$Th

Feedback for T

Bk3

Lesson Plan 110

Activity		*Notes*

6

Book 3, page 110

Q.2 Read: *Estimate first, then do the multiplications.*

Set a time limit. Ps estimate using easiest rounding for them. Review at BB with whole class.

Ps dictate results to T, explaining reasoning. Class agrees or disagrees. Mistakes discussed and corrected. Details using place values given where needed.

Solution:

a) *E:* 800 — $422 \times 2 = 844$; *E:* 1200 — $422 \times 3 = 1266$; *E:* 1600 — $422 \times 4 = 1688$

b) *E:* 900 — $321 \times 3 = 963$; *E:* 1200 — $421 \times 3 = 1263$; *E:* 1800 — $621 \times 3 = 1863$

c) *E:* 160 — $84 \times 2 = 168$; *E:* 1600 — $804 \times 2 = 1608$; *E:* 1600 — $402 \times 4 = 1608$

What do you notice about the multiplications. Ps point out relationships to class.

Extension

What is: 422 × 1 (422); 61 × 3 (183); 201 × 4 (804)

Notes:

Individual work, monitored, (helped)

Written on BB or use enlarged copy master or OHP

Differentiation by time limit

Reasoning, agreement, self-correction, praising

Discussion, agreement, praising

Ps calculate mentally and shout out in unison.

35 min

7

Multiplication with place values

T has BB already prepared. How much is in the first row? (T points) (6H + 3T + 7U = 537) Repeat for second row. (537)

How much is there altogether? What operations could we write? (537 + 537 or 537 × 2).

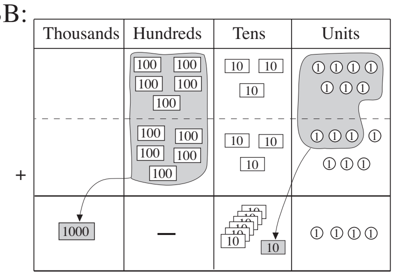
Let's estimate the result in our heads, then we will do the addition first.

Ps come to BB to stick/draw total amounts on bottom row of table and complete the addition place value table, explaining reasoning in detail.

Does this sum match your estimate? Agree that 537 + 537 = 1074

Now let's do the multiplications. Ps come to BB to complete long and short calculations, explaining reasoning in detail. Class points out errors. (Possible details given below.)

BB:



a)

	Th	H	T	U
		5	3	7
+		5	3	7
	1	0	7	4
			1	

b)

Th	H	T	U		
	5	3	7	×	2
		1	4		
		6	0		
1	0	0	0		
1	0	7	4		

c)

	5	3	7	×	2
1	0	7	4		
		1			

a) '7U + 7U = 14U = 1T + 4U, so I write 4 in the units column and move the 1T to the tens column; 3T + 3T + 1T = 7T, so I write 7 in the tens column; 5H + 5H = 10H = 1Th, so I write 0 in the hundreds column and 1 in the thousands column.'

Notes:

Whole class activity

T has model money stuck to, or drawn on, table on BB

(or use enlarged copy master or OHP)

Ps estimate result mentally first (rounding numbers to nearest 100 or 10 as they wish)

T has extra model money (if using) for Ps to stick on BB.

At a good pace

Checking against estimates, agreement, praising

T helps with details of reasoning if necessary, e.g.

b) 2 × 7 = 14
2 × 30 = 60
<u>2 × 500 = 1000</u>
2 × 537 = <u>1074</u>

c) 2 × 7U = 14U = 1T + 4U
2 ×3T = 6T, 6T + 1T = <u>7</u>T
2 × 5H = 10H = <u>1</u>Th
or in even more detail as in a)

40 min

Bk3		*Lesson Plan 110*
Activity		***Notes***
8	***Book 3, page110***	Individual work, monitored, helped
	Q.3 a) Read: *Each flower on an apple tree has 5 petals. How many petals are on a branch with 243 flowers?*	(or as whole class activity, with Ps coming to BB or dictating to T)
	Ps write the multiplicant and multiplier in the grid, then do the calculation (using their favourite method), then write the answer as a sentence.	Set a time limit for each part
	Review at BB with whole class (or review each stage of solution if necessary). Ps explain reasoning of calculation in detail (with T's help) and class agrees/disagrees. Deal with all methods used. Mistakes discussed/corrected	Ps can do calculations in *Ex. Bks* first if they wish. Reasoning, agreement, self-correction, praising
	Solution:	Or in *Ex. Bks*:
	Reasoning: e.g. '5 times 3U = 15U = 1T + 5U, so I write 5 in the units column and move the 1T to the tens column; Th H T U 2 4 3 × $\boxed{5}$ **1 2 1 5** 2 1	$5 \times 3 = 15$ $5 \times 40 = 200$ $5 \times 200 = 1000$ $5 \times 243 = \underline{1215}$
	5 times 4T = 20 T, 20T + 1T = 21T = 2H + 1T, so I write 1 in the tens column and move the 2H to the hundreds column.	or $5 \times 243 = 1000 + 200 + 15 = \underline{1215}$
	5 times 2H = 10H, 10H + 2H = 12H = 1Th + 2H, so I write 2 in the hundreds column and 1 in the thousands column.'	T reasons as opposite if no P has done it.
	Answer: There are 1215 petals on the branch.	
	b) Read: *Workmen laid 106 m of pavement a day from Monday to Friday. How many metres did they lay in a week?*	If short of time, Ps can choose only 1 of the problems, but review solutions to both with the whole class.
	This time when you write the answer in a sentetence remember to include the unit of measure too!	Or differentiation, with less able Ps doing only part b).
	Review as above.	Accept any correct method of calculating.
	Solution: Th H T U 1 0 6 × $\boxed{5}$ **5 3 0** 6U × 5 = 30U = $\underline{3}$T 1H × 5 = $\underline{5}$H	Praising, encouragement only
	Answer: They laid 530 m in a week.	Feedback for T
	45 min	

.

Bk3

R: Mental calculation

C: Multiplication. Puzzles

E: Problems involving crossing tens

Lesson Plan 111

Activity		*Notes*

1

Mental practice

Listen carefully and show me only the answer when I say. Try to work it out in your head but you can write it down if you need to.

T says operation and Ps show result on command. Ps who answered correctly explain to those who did not.

a) What number is 20 times 15? Show me . . . now! (300)

b) What number is 3 times 280? Show me . . . now! (840)

c) What number is 1 fifth of 250? Show me . . . now! (50)

3 min

Notes: Whole class activity

Rough work and results written on scrap paper or slates.

BB: e.g.

a) $20 \times 15 = 2 \times 150 = \underline{300}$

b) $3 \times 280 = 600 + 240 = \underline{840}$

c) $250 \div 5 = \underline{50}$

Reasoning, agreement, praising

2

Puzzle

The same shape stands for the same whole hundred. The sum of each row and column is 1000. What are the missing numbers?

BB:

△ 100	□ 300	○ 200	◠ 400
○ 200	□ 300	□ 300	○ 200
□ 300	□ 300	○ 200	○ 200
◠ 400	△ 100	□ 300	○ 200

or

△ 400	□ 200	○ 300	◠ 100
○ 300	□ 200	□ 200	○ 300
□ 200	□ 200	○ 300	○ 300
◠ 100	△ 400	□ 200	○ 300

Ps come to BB to explain reasoning. Class checks that they are correct. Accept trial and error but encourage logical reasoning, e.g.

C2: $3 \times \square < 1000$, so possible hundreds are 100, 200 or 300

C4: $3 \times \bigcirc < 1000$, so possible hundreds are also 100, 200 or 300

R2: $2 \times \square + 2 \times \bigcirc = 1000$, so $\square + \bigcirc = 500$

so possible hundreds for either are 200 or 300 .

R1: If $\square + \bigcirc = 500$, then $\triangle +$ ◠ $= 1000 - 500 = 500$.

They must be different from 200 and 300, so the only possible hundreds for either are 100 and 400.

There are two possible solutions, depending on how the pairs of possible numbers are allocated (as shown above)

7 min

Notes: Whole class discussion

Drawn on BB or use enlarged copy master or OHP

Give Ps a minute to think about how to solve it and to discuss with their neighbours.

Reasoning, agreement, checking, praising

If Ps do not know how to solve it, T gives hints.

[Using multiplication to solve a problem]

3

Book 3, page 111

Q.1 Read: *Complete the table. (Do the calculations in your exercise book if you need to.)*

Make sure that Ps understand what each column/row means.

Review at BB with whole class Ps dictate results to T, explaining reasoning where necessary. Class agrees/disagrees. Mistakes corrected.

Solution:

a	b	c	$a \times c$	$a \times b$	$b \times c$
400	5	3	1200	2000	15
450	6	4	1800	2700	24

11 min

Notes: Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, agreement, self-correction, praising

Feedback for T

Details, e.g.

$450 \times 6 = 2400 + 300$
$= 2700$

Bk3

Lesson Plan 111

Activity		*Notes*

4

Book 3, page 111

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

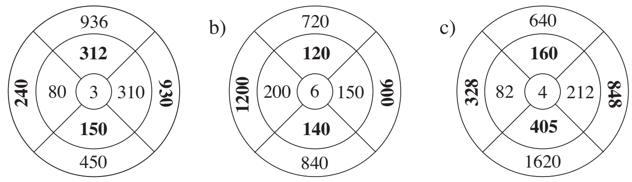
What is wrong with this puzzle? (No rule is given and it cannot be worked out as there is no completed section.)

What could the rule be? T asks several Ps what they think. Let's use the rule that in each segment, the number in the outer ring is the product of the number in the inner ring multiplied by the number in the circle.

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

Solution:

a) b) c)



Notes:

Whole class discussion to start

Drawn on BB or use enlarged copy master or OHP

Ask several Ps what they think. Praise all contributions

Individual work, monitored, helped

Reasoning, agreement, self-correction, praising

Details given if problems, e.g.

$1620 \div 4 = 1600 \div 4 + 20 \div 4$
$= 400 + 5 = 405$

18 min

5

Find the mistakes

This is how *Little Ass* did his multiplications. Let's check them by estimating first, then finding his mistakes and correcting them.

Ps come to BB to estimate by rounding to the nearest 10 or 100, as appropriate. (Some mistakes are obvious from the estimation, but some can only be found by doing the whole calculation.) Ps cross out mistakes and write correction below, explaining reasoning. Class agrees/disagrees.

BB:

a) *E:* 60 × 3 = 180
6 4 × 3
~~1 8 1~~ 2 ✗
1 9

b) *E:* 500 × 3 = 1500
5 0 2 × 3
~~1 5~~ 6 ✗
1 5 0

c) *E:* 460 × 3 = 1380
4 6 4 × 3
1 3 9 2 ✔

d) *E:* 200 × 3 = 600
1 7 0 × 3
5 1 ~~3~~ ✗
0

e) *E:* 400 × 3 = 1200
4 0 5 × 3
~~2~~ 2 1 5 ✗
1

f) *E:* 300 × 4 = 1200
3 1 6 × 4
1 2 ~~4~~ 4 ✗
6

Notes:

Whole class activity

Written on BB or use enlarged copy master or OHP

At a good pace

Reasoning, correcting, agreement, praising

Encourage Ps to explain using place values.

e.g. 316 × 4 :

4 × 6U = 24U = 2T + 4U
4 × 1T = 4T, 4T + 2T = 6T
4 × 3H = 12H = 1Th + 2H

Agree that estimating can give only a rough idea of the answer. To check properly, the whole calculation should be done again.

25 min

6

Calculation practice

a) BB: 804 604 624 824

Which of these numbers is twice the sum of 273 and 139? (824)

Ps do calculations in any way they choose in *Ex. Bks*, then sit up with arms folded when ready.

T points to each number in turn and Ps stand up if they think it is correct (or Ps can show on 'slates' on command).

A, how did you work it out? Who did the same? Who did it a different way? etc. Mistakes discussed and corrected.

e.g. 2 × (273 + 138) = 2 × 412 = <u>824</u> or

$$\begin{array}{r} 273 \\ +\,139 \\ \hline 412 \end{array} \qquad \begin{array}{r} 412 \times 2 \\ \hline 824 \end{array}$$

Deal with a) and b) in a similar way.

Notes:

Whole class activity but Ps do calculations in *Ex. Bks* (or on scrap paper, slates, etc.)

In unison. In good humour!

Reasoning, agreement, praising

Deal with all methods used. Class decides whether each method is valid.

Bk3		*Lesson Plan 111*

Activity		*Notes*

6

(Continued)

b) BB: 648 848 858 658

Which of these numbers is 6 times half of 286? (858)

BB: $6 \times (286 \div 2) = 6 \times 143 = \underline{858}$

or $6 \times 286 \div 2 = 6 \div 2 \times 286 = 3 \times 286$

$= 600 + 240 + 18 = \underline{858}$

c) BB: 305 355 325 375

Which of these numbers is 5 times the difference between 313 and 248? (325)

BB: $5 \times (313 - 248) = 5 \times 65 = 300 + 25 = \underline{325}$

Notes:

BB:
$$\begin{array}{r} 143 \times 6 \\ \hline 858 \\ {\scriptstyle 21} \end{array} \quad \text{or} \quad \begin{array}{r} 143 \times 6 \\ \hline 18 \\ 240 \\ 600 \\ \hline 858 \end{array}$$

or
$$\begin{array}{l} 3 \times \ \ \ 6 = \ \ 18 \\ 3 \times \ \ 80 = 240 \\ 3 \times 200 = 600 \\ \hline 3 \times 286 = 858 \end{array}$$

or
$$\begin{array}{r} 313 \\ -\,248 \\ \hline 65 \end{array} \qquad \begin{array}{r} 65 \times 5 \\ \hline 325 \\ {\scriptstyle 2} \end{array}$$

30 min

7

Book 3, page 111

Q.3 Read: *Calculate the products.*

Deal with one column at a time. Ps can check results using other methods in *Ex. Bks* if they are unsure about their answer.

Review at BB with whole class. Ps dictate results, giving details of calculation. Mistakes discussed and corrected.

Solution:

a)	b)	c)
26 × 5 = **130**	442 × 2 = **884**	207 × 9 = **1863**
52 × 6 = **312**	208 × 7 = **1456**	116 × 6 = **696**
44 × 4 = **176**	407 × 3 = **1221**	275 × 1 = **275**
106 × 9 = **954**	305 × 0 = **0**	307 × 6 = **1842**

Notes:

Individual work, monitored (helped)

Written on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising only

Details of longer form given if problems, e.g.

BB:
$$\begin{array}{r} 116 \times 6 \\ \hline 36 \\ 60 \\ 600 \\ \hline 696 \\ \hline \end{array}$$

Feedback for T

35 min

8

Book 3, page 111

Q.4 Read: *Fill in the missing factors.*

Deal with one row at a time. Set a time limit. Ps check their results by doing calculation mentally or in *Ex.Bks*. or on slates.

Review at BB with whole class. Ps come to BB or dictate results to T, explaining how they worked out the missing factor (using division or deduction). Mistakes discussed and corrected.

Solution:

a)	**413** × 2 = 826	**321** × 3 = 963	234 × **2** = 468	106 × **6** = 636
b)	**204** × 3 = 612	**216** × 4 = 864	135 × **2** = 270	217 × **4** = 868
c)	**152** × 4 = 608	**171** × 5 = 855	151 × **6** = 906	183 × **3** = 549

Notes:

Individual work, monitored, <u>helped</u>

Written on BB or use enlarged copy master or OHP

Can be differentiated (only the more able Ps could do part c)

Reasoning, agreement, self-correction, praising only

Details of longer form given for more difficult problems,

e.g. BB:
$$\begin{array}{r} 183 \times 3 \\ \hline 9 \\ 240 \\ 300 \\ \hline 549 \\ \hline \end{array}$$

Feedback for T

40 min

Bk3		Lesson Plan 111

Activity		*Notes*
9	**Missing digits** Let's see if you are clever enough to work out which digits are missing from these multiplications! Ps come to BB or dictate to T, explaining reasoning. Class checks that they are correct. (RH problem in b) could have other solutions.) BB:	Whole class activity Written on BB or use enlarged copy master or OHP Discussion, reasoning, checking, agreement. praising Or could be done as a competition, e.g. between boys and girls. (Or differentiated: less able solve LHS and more able solve RHS of each part) Team which solves most in a set time limit is the winner.

a)

2 3 **0** × 2
4 **6** 0

3 **2** 2 × 3
9 6 **6**

b)

2 2 3 × **4**
8 **9** 2
1

e.g.

1 6 **2** × 5
8 **1** 0
3 1

c)

3 **1** **4** × 3
9 4 2
1

8 **3** × 6
4 **9** 8
1

d)

1 **0** 9 × **9**
9 8 1

8 3 × **8**
6 **6** 4
2

45 min

Bk3	R: Mental calculation **C: Problems in context using multiplication** *E: Direct proportion. Multiplication, crossing tens*	*Lesson Plan* *112*

Activity		***Notes***

1

Making numbers

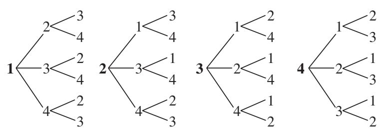
T sticks 4 number cards on BB: $\boxed{2}$ $\boxed{3}$ $\boxed{1}$ $\boxed{4}$

How many 3-digit numbers can we make from these numbers? How could we do it? (e.g. start at smallest possible number and list in increasing order.) T writes what Ps dictate.

BB:

123	213	312	412
124	214	314	413
132	231	321	421
134	234	324	423
142	241	341	431
143	243	342	432

<u>Tree Diagrams</u>



Elicit that there are 4 possible hundreds digits, that for every hundreds digit there are 3 possible tens digits, and that for every tens digit there are 2 possible units digits,

i.e. there are $4 \times 3 \times 2 = \underline{24}$ possible 3-digit numbers.

We could show the possibilities for each hundred like this. It is called a <u>tree diagram</u>. T starts off drawing the diagrams, then Ps help.

Notes: Whole class activity

Discussion on strategy for solution. Ps might remember similar activity in *Lesson 119*.

Encourage logical listing, as this makes sure than no numbers are repeated or left out.

At a good pace

Discussion, agreement, praising

When diagrams are drawn, T could point to a number in list and Ps find it on the diagram.

8 min

2

Problems 1

Listen carefully and think how you would solve these problems. Which operation should we write?

(Ps can 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.

a) *Lisa has collected 148 stamps and Emma has collected 4 times that amount. How many stamps does Emma have?*

BB: *Plan*: Lisa: 148 (stamps)
Emma: 148×4 (stamps)

$$\begin{array}{r} 148 \times 4 \\ \hline 592 \\ {\scriptstyle 1\,3} \end{array} \qquad \begin{array}{r} 148 \times 4 \\ \hline 32 \\ 160 \\ 400 \\ \hline 592 \\ \hline \end{array}$$

Answer: Emma has 592 stamps.

b) *Andrew has 148 marbles and Vicky has 4 times that amount. How many marbles do they have altogether?*

BB: *Plan*: A: 148 (marbles) V: 4×148
V + A: $148 + 4 \times 148 = 148 + 592$ (or $= 5 \times 148$)

Answer: They have 740 marbles altogether.

Notes: Whole class activity

T repeats slowly while Ps think.

Ps suggest plan and method of calculation.

Ps work at BB or dictate to T.

Reasoning, agreement, praising

Class says answer in unison.

Reasoning, agreement, praising

$$\begin{array}{r} 148 \\ +592 \\ \hline 740 \\ {\scriptstyle 1\,1} \end{array} \qquad \begin{array}{r} 148 \times 5 \\ \hline 740 \\ {\scriptstyle 2\,4} \end{array} \qquad \begin{array}{r} 148 \times 5 \\ \hline 40 \\ 200 \\ 500 \\ \hline 740 \\ \hline \end{array}$$

In unison

14 min

3

Problems 2

Listen carefully, write the data and do the calculation in your *Ex. Bks*. Show me your result when I say (on scrap paper or on 'slates').

a) *A farmer is putting his wheat into sacks. Each sack can hold 70 kg of wheat. How much wheat does the farmer have if he fills 21 sacks?*

Show me . . . now! (1470 kg)

B, explain how you worked it out. Who did the same? Who did it a different way? etc. BB: e.g. 21×70 kg $= 210 \times 7$ kg $= \underline{1470 \text{ kg}}$

Answer: He has 1470 kg of wheat.

Notes: Individual work, monitored, helped

Give Ps time to think and do the calculation.

In unison

Reasoning, agreement, praising. Discuss all methods used and mistakes.

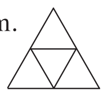
Bk3 | *Lesson Plan 112*

Activity		*Notes*
3	(Continued)	
	b) *A spider has 8 legs. How many legs do 205 spiders have?*	
	Show me . . . now! (1640)	In unison
	C, explain to us how you worked it out. Who did the same? etc.	Reasoning, agreement, praising
	BB: $205 \times 8 = 200 \times 8 + 5 \times 8 = 1600 + 40 = \underline{1640}$ or $\begin{array}{r} 2\,0\,5 \times 8 \\ \hline 1\,6\,4\,0 \\ \hline \end{array}$	
	Answer: 205 spiders have 1640 legs.	Ps give answer in a sentence.
	c) *A fish has no legs. How many legs do 978 fish have?*	
	Show me . . . now! (0)	In unison
	D, what calculation did you write? e.g. BB: $978 \times 0 = \underline{0}$	Reasoning, agreement, praising
	Answer: 978 fish have no legs.	Ps give answer in a sentence.
	How many tails would 978 fish have? (978)	Ps shout out in unison.

19 min

Activity		*Notes*
4	**Problems 3**	
	Listen carefully and think how you would solve these problems. If you think the answer is 'Yes', clap your hands; if 'No', put your hands on your heads when I say.	Whole class activity, but Ps try out problems first in *Ex. Bks*.
	a) *Joe had 1200 cabbage plants. He planted them in rows of 193. Did Joe have enough cabbage plants for 6 rows?*	T repeats slowly.
	Show me . . . now! (Yes) Ps who answered correctly explain.	Ps respond in unison.
	BB: $1200 \div 6 = 200 > 193$; or $193 \times 6 = 1158 < 2000$ $\quad \begin{array}{r} 1\,9\,3 \times 6 \\ \hline 1\,1\,5\,8 \\ \hline {\scriptstyle 5\;1} \end{array} \quad \begin{array}{r} 1\,9\,3 \times 6 \\ \hline 1\,8 \\ 5\,4\,0 \\ 6\,0\,0 \\ \hline 1\,1\,5\,8 \\ \hline \end{array}$	Reasoning, agreement, praising. Show long form if problems.
	So Joe had enough cabbage plants.	
	How many would he have left over? (42)	Ps shout out in unison.
	b) *Sammy Snail can move 4 cm in 1 minute. Is it possible that he could move 630 cm in 156 minutes?*	T repeats slowly
	Show me . . . now! (No) Ps who answered correctly explain.	Ps respond in unison.
	BB: 156×4 cm $= 400 + 200 + 24$ (cm) (or as shown opposite) $= 624$ cm < 630 cm	$\begin{array}{r} 1\,5\,6 \times 4 \text{ cm} \\ \hline 6\,2\,4 \text{ cm} \\ \hline {\scriptstyle 2\;2} \end{array} \quad \begin{array}{r} 1\,5\,6 \times 4 \text{ cm} \\ \hline 2\,4 \\ 2\,0\,0 \\ 4\,0\,0 \\ \hline 6\,2\,4 \text{ cm} \\ \hline \end{array}$
	So *Sammy Snail* could not move 630 cm in 156 minutes.	Reasoning, agreement, praising
Extension	How many more minutes would he need? (1 and a half to move 6 cm)	

24 min

Activity		*Notes*
5	***Book 3, page 112***	Whole class activity
	Q.1 a) Read: *How many triangles can you see in this diagram?*	Diagram drawn on BB
	T asks several Ps what they think. P points to them. Agree that there are $\underline{5}$ triangles (4 small + 1 large). 	Discussion, agreement
	b) Read: *How many triangles would you see in* *i) 51 of these diagrams ii) 102 of these diagrams?*	Individual work, monitored
	Ps do calculations in grids in *Pbs*, then write the answer.	Encourage Ps to use rulers to draw the horizontal lines.
	Review with whole class. Mistakes corrected.	Reasoning, agreement, self-correction, praising
	Solution: a) $\begin{array}{r} 5\;1 \times 5 \\ \hline \mathbf{2\;5\;5} \end{array}$ b) $\begin{array}{r} 1\;0\;2 \times 5 \\ \hline \mathbf{5\;1\;0} \end{array}$ or $\begin{array}{r} 2\;5\;5 \times 2 \\ \hline \mathbf{5\;1\;0} \end{array}$	Extra praise if Ps notice that $102 = 2 \times 51$
	Answer: 255 triangles 510 triangles	

28 min

Bk3

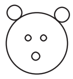
Lesson Plan 112

Activity | *Notes*

6

Book 3, page 112

Q.2 a) Read: *How many circles make this teddy bear's head?*



Clap your hands the same number of times. (6)

b) Read: *How many circles would you need to draw to make*
i) 72 teddy bear heads   ii) 105 teddy bear heads?

Ps do calculations in grids in *Pbs*, then write the answer.

Review with whole class. Mistakes corrected.

Solution:

a)

	7	2	×	6
4	**3**	**2**		
	1			

b)

1	0	5	×	6
6	**3**	**0**		

Answer: 432 circles   630 circles

Notes:
Whole class activity
Diagram drawn on BB
In unison. Praising
Individual work, monitored
Encourage Ps to use rulers to draw the horizontal lines.
Reasoning, agreement, self-correction, praising

32 min

7

Book 3, page 112

Q.3 Read: *There are 24 hours in 1 day. How many hours are there in: a) 1 week   b) 4 weeks?*

Ps do calculations in grids in *Pbs*, then fill in the missing values in the equations.

Review at BB with whole class. Ps explain reasoning in detail. Who did it a different way? etc. Mistakes corrected.

Solution:

a)

	2	4	×	7
1	**6**	**8**		
	2			

b)

1	6	8	×	4
6	**7**	**2**		
2	3			

1 week = <u>7</u> days = <u>168</u> hours, 4 weeks = <u>28</u> days = <u>672</u> hours

Notes:
Individual work, monitored, helped
Encourage Ps to use rulers to draw the horizontal lines.
Reasoning, agreement, self-correction, praising
Accept any correct calculation. e.g.

b) $24 \times 7 \times 4 = 24 \times 28$
$= 12 \times 56 = 6 \times 112$

1	1	2	×	6
6	**7**	**2**		
	1			

37 min

8

Book 3, page 112, Q.4

Read: *Is it possible to answer the questions with the data given?*

T explains that Ps do not need to work out the answer to each problem, just to decide whether they <u>could</u> answer it with the information given.

Deal with one question at a time. T chooses a P to read out the question. Give Ps a minute to think about it. Then Ps write YES or NO on scrap paper or slates and show on command (or use pre-agreed actions).

Ps who think that they <u>can</u> work out the answer come to BB to do it, thus confirming whether the problem can or can't be solved.

Solutions:

a) *A car goes at a steady speed and covers 125 m in 1 minute. What distance does it cover in 8 minutes?* [YES]

b) *Jenny weighed herself and her weight was 29 kg. What is the total weight of 9 children?* [NO]

c) *Uncle Andrew put fence posts an equal distance apart. He used 9 fence posts. How long was the fence?* [NO]

d) *A centipede has 478 legs. How many legs do 3 centipedes have?* [YES]

N.B. Accept any correct method of calculation in a) and d).

Notes:
Whole class activity
(Or individual work, reviewed with whole class)
Responses shown in unison.
Discussion, reasoning, agreement, praising
In good humour!

a)

	1	2	5	×	8
1	**0**	**0**	**0**		
	2	4			

<u>1000 m</u>

b) Each child might not weigh the same as Jenny.

c) We need to know how far apart the fence posts were.

d)

	4	7	8	×	3
1	**4**	**3**	**4**		
	2	2			

<u>1434 legs</u>

42 min

Bk3		*Lesson Plan 112*
Activity		***Notes***
9	***Book 3, page 112*** Q.5 Read: *A bee flies steadily at 217 mm per second. Complete the table.* Discuss what each row of the table means. Ps can do calculations in *Ex Bks* if necessary. Let's see how much of the table you can complete in 2 minutes! Review at BB with whole class. Ps come to BB to write in missing values or dictate to T, explaining reasoning. Mistakes discussed and corrected. *Solution:*	Individual work, monitored, helped (or whole class activity if short of time) Table drawn on BB or use enlarged copy master or OHP Reasoning, agreement, self-correcting, praising Extra praise if Ps notice relationships between columns

Time (seconds)	1	2	5	0	4	10
Distance (mm)	217	**434**	**1085**	**0**	**868**	**2170**

45 min