Y4

R: Calculations.

C: Convex and concave shapes

E: Problems. Constructions. 3 views of solids

Lesson Plan
51

Activity ***Notes***

1 **Mental calculation**

a) T says a multiplication or division (up to 10 × 10). Ps say result.

b) T says an addition or subtraction with whole hundreds (up to 10 000). Ps say result.

c) Substitution up to 5000 (10 000) with +, –, ×, ÷
e.g. T says, '750 + what = 3000?' P says ' 2250', etc.

d) Multiplication and division, e.g. 300 × 4, 5000 ÷ 10, 4500 × 2, 7600 ÷ 2, 3963 ÷ 3, 460 × 4, 3514 ÷ 7, 1500 × 6, etc.

Whole class activity

In order round class or Ps chosen randomly

If a P makes a mistake, next P corrects it.

At speed. In good humour!

Praising, encouraging only

Feedback for T

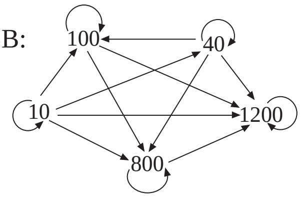
5 min

2 **Multiples and factors**

a) Let's compare these numbers and draw arrows pointing towards the multiples. What is a multiple? (A number which is exactly divisible by that number; or the result of multiplying that number by another number.)

Ps come to BB to draw arrows, explaining reasoning. Class agrees or disagrees.

BB:



If the arrows pointed in the opposite direction, what would they show? (factors) What is a factor? (A number which multiplies another number to make that number, or divides into that number exactly.)

What about the arrows pointing to the number itself? (They would still be correct pointing in the opposite direction because, e.g. 40 is a multiple of 40 and also a factor of 40.)

Whole class activity

Numbers written on BB or SB or OHT

Discussion, reasoning, agreement, praising

e.g. reasoning:

'200 is a multiple of 10 because 10 times 20 = 200'

If Ps forget to include the numbers themselves, T reminds them.

Whole class discussion

Agreement, praising

BB: $40 \times 1 = \underline{40}$ (multiple)

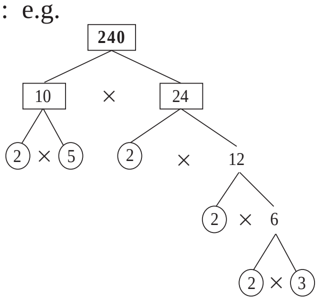
$\underline{40} \times 1 = 40$
or $40 \div 1 = \underline{40}$ (factor)

b) Let's find all the factors of 240. Let's do it logically. What is the smallest factor possible? (1) 1 times what makes 240? (240)

Ps come to BB to continue writing the pairs of factors. Class points out errors. Let's list them in increasing order. (BB, as below.)

Many of these factors are also multiples of the other factors. How can we break 240 down into its lowest possible factors? (Ps might remember from Y3, otherwise T starts diagram and Ps continue.) Elicit that the circled numbers are prime factors (i.e. a number which can be divided only by itself and 1).

BB: e.g.



Factors of 40

1, 2, 3, 4, 5, 6, 8, 10, 12, 15,
240, 120, 80, 60, 48, 40, 30, 24, 20, 16,

Prime factors of 240:

$240 = 2 \times 2 \times 2 \times 2 \times 3 \times 5$

Let's write 240 as a multiplication of its prime factors. Ps dictate what T should write. Class checks that they multiply to make 240.

BB: $240 = 1 \times 240$
$= 2 \times 120$
$= 3 \times 80$
$= 4 \times 60$ etc.

Ps decide which pair of factors to start with.

BB: prime number
divisible by only 1 and itself

Repeat starting with another pair of factors, e.g. 4 × 60. Agree that it does not matter which pair is used at the start; the list of prime factors will be the same.

Ps list the prime factors in increasing order.

Agreement, praising

12 min

Y4

Lesson Plan 51

Activity | *Notes*

3

Linear scale

On some maps, the scale is sometimes shown like this to make it easier for us to see what the distances mean in real life. They are called linear scales.

Here are two linear scales. Who can explain what they mean? Ask several Ps what they think. T writes agreed scale above each table and Ps write on own copies if they have them.

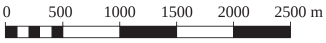
Let's complete the tables. Ps come to BB to write missing distances, explaining reasoning and showing its position on the linear scale. Class agrees/disagrees. (Ps can fill in own tables if they wish.)

BB: *Scale*: 1 cm → 10 m *Scale*: 1 cm → 500 m

a)

On map	In real life
1 cm	10 m
7 cm	**70 m**
1 mm	**1 m**
10 cm	**100 m**
37 cm	**370 m**
8 cm	80 m
15 cm	150 m
5 mm	5 m

b)



On map	In real life
1 cm	500 m
1 mm	**50 m**
1 cm 5 mm	**750 m**
3 cm	**1500 m**
3 mm	**150 m**
5 cm	2 km 500 m
10 cm	5 km
8 mm	400 m

Whole class activity

T holds up a large map with a linear scale.

BB: linear scale

Tables drawn on BB or use enlarged copy master for demonstration only!

Ps could have copies (not enlarged!) too.

At a good pace

Encourage Ps to calculate mentally.

Reasoning, agreement, praising

Details: e.g.

$37 \times 10 \text{ m} = \underline{370 \text{ m}}$

1 cm 5 mm = 15 mm

1 cm → 500 m

1 mm → 50 m

$15 \times 50 \text{ m} = (500 + 250) \text{ m} = \underline{750 \text{ m}}$

2 km 500 m = 2500 m

$2500 \div 500 = 25 \div 5 = \underline{5}$ (cm)

18 min

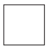
4

Views of a cube

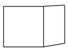
Ps have small cubes on desks. Hold your cube in different positions. Count how many edges, faces and vertices you can see.

Now study these diagrams. Can you hold your cube so that you see these views?

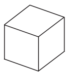
BB: a)



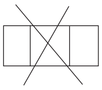
b)



c)



d)



Elicit that view d) is impossible!

Let's fill in the table to show what we can see and what we can't see for the other 3 views.

	Visible			Not visible		
	edges	faces	vertices	edges	faces	vertices
a)	4	1	4	8	5	4
b)	7	2	6	5	4	2
c)	9	3	7	3	3	1

Ps come to BB to fill in the table, referring to diagrams. Class agrees or disagrees.

How can we check that we have not missed anything? [The visible and invisible edges (faces, vertices) should add up to 12 (6, 8)].

Whole class activity

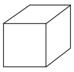
Give Ps a short time to manipulate and study their cubes before showing them the views on the copy master to try out.

Drawn on BB or use enlarged copy master or OHP

T demonstrates with large cube if Ps are unsure.

Reasoning, agreement, checking, praising

BB:



$e = 12$

$f = 6$

$v = 8$

22 min

Y4

Lesson Plan 51

Activity | *Notes*

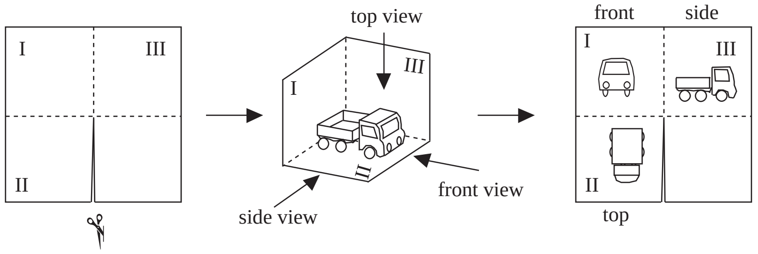
5

Views of an object

Ps have squares of paper, scissors and an object to view on desks.

T demonstrates each step of how to make the 'viewing tool', referring to diagrams on BB, and Ps follow instructions. (4th square is folded beneath 3rd square.)

BB:



Ps put their object inside viewing tool and draw what they see from the top, front and side. T chooses Ps to show their drawings and objects to class. Class decides whether the views are roughly correct.

Whole class activity

T has large square of paper for demonstration.

Items brought from home or provided by T (e.g. toy car, house, animal, solid shapes) or models built from unit cubes.

T should have own diagrams prepared beforehand (or use enlarged copy master or OHP).

In good humour throughout!

Drawings need only be rough (or Ps draw around the shape)

Praising, encouragement only!

26 min

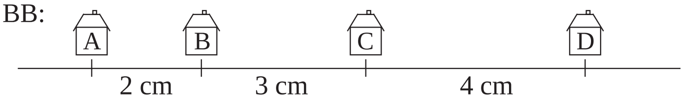
6

PbY4a, page 51

Q.1 Read: *Calculate the real distances if 1 cm on the diagram means 62 m in real life.*

Ps first measure distances between the houses and write on the diagram in *Pbs*. Review with whole class. Ps dictate lengths and T writes on diagram on BB. Mistakes corrected.

BB:



Set a time limit. Encourage Ps to calculate mentally but necesssary calculations can be written in *Ex. Bks* (or on slates).

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

Solution:

a) B → A: 62 m ×2 = <u>124 m</u>
b) C → B: 62 m × 3 = <u>186 m</u>
c) D → C: 62 m × 4 = <u>248 m</u>
d) C → A: 62 m × 5 = 300 m + 10 m = <u>310 m</u>
e) D → B: 62 m × 7 = 420 m + 14 m = <u>434 m</u>
f) D → A: 62 m × 9 = 540 m + 18 m = <u>558 m</u>

Individual work, monitored

Drawn on BB or use enlarged copy master or OHP

BB: *Scale*: 1 cm → 62 m

Agreement, correcting, praising

Reasoning, agreement, self-correcting, praising

If some Ps used addition, discuss whether it is quicker to add or to multiply.

Feedback for T

31 min

Y4

Lesson Plan 51

Activity

Notes

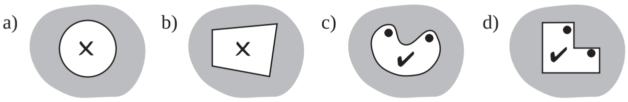
7

PbY4a, page 51

Q.2 Read: *In a dense forest there are some clearings. In which of the clearings could you hide from someone? Write a tick or a cross inside each one.*

Review at BB with whole class. T points to each shape in turn and Ps show ✔ or ✘ on scrap paper or slates. Ps who are wrong come to BB to try to explain where they would hide.

BB:



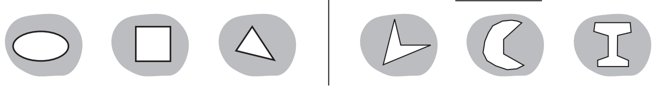
In a) and b), two people could not hide from each other. We say that such shapes are <u>convex</u>.

In c) and d), two people <u>could</u> hide from each other. We say that such shapes like these are <u>concave</u>. (Remember which is which – you can hide in a cave!)

In your *Ex. Bks*, draw 3 different shapes which are convex and 3 different shapes which are concave. Set a time limit.

T chooses Ps to draw their diagrams on the BB. Class decides whether they are correct.

e.g. BB: <u>Convex</u> <u>Concave</u>



Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correcting, praising

BB: <u>convex</u>

BB: <u>concave</u>

Individual work, monitored, helped

Agreement, praising

Extra praise for creative (but correct) shapes!

35 min

8

PbY4a, page 51

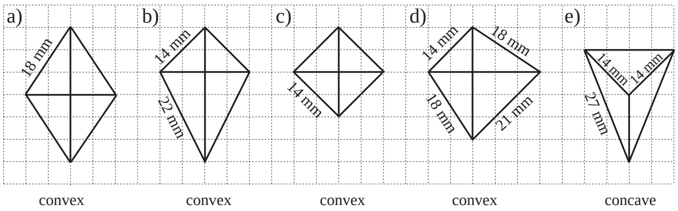
Q.3 Read: *The two lines in each diagram are the diagonals of a quadrilateral. They are perpendicular to one another. Draw the quadrilaterals and measure their sides.*

Deal with one shape at a time. T elicits (reminds Ps about) the notation for equal sides. (1 short perpendicular line for 1st set, 2 lines for 2nd set, etc. within a diagram)

Ps measure lengths in mm and write on diagrams. Ps finished first draw solutions on BB.

Review at BB with whole class. Ps dictate lengths and T writes on BB. Class agrees/disagrees. Mistakes corrected. Is the shape convex or concave? Ps shout out in unison.

Solution:



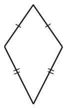
Extension

What other questions can you think of to ask about the shapes? e.g. Is it symmetrical? Does it have perpendicular or parallel sides? What kind of angles does it have? What is it called? What is the length of its perimeter? What is its area? etc.)
T (class) decides which questions to answer.

Individual work, monitored, helped [or part f) done with whole class]

Drawn on BB or use enlarged copy master or OHP

BB: <u>equal lines</u>



Agreement, self-correcting, praising

Extra praise if Ps did part f) correctly without help!

If disagreement about whether a shape is concave or convex, Ps come to BB to show where 2 people could hide.

Whole class activity

T might point out that a) is a <u>rhombus</u> (a parallelogram with equal sides).

Elicit that a <u>parallelogram</u> is a quadrilateral with its opposite sides parallel.

40 min

Y4

Lesson Plan 51

Activity

9

PbY4a, page 51

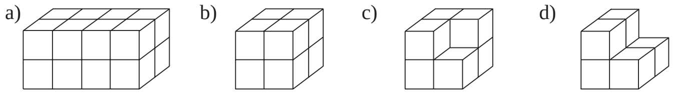
If possible, T has large models to show to class and/or Ps have own models built from unit cubes.

Q.4 Read: *How many faces, edges and vertices does each solid have?*
What is its volume (in unit cubes)?
What is its surface area (in unit squares)?

Deal with one part at a time. Ps count and/or calculate and write results in *Pbs*.

Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning by referring to the large model or by a calculation. Class agrees/disagrees. Mistakes discussed/corrected.

Solution:



faces:	6	6	9	8
edges:	12	12	21	18
vertices:	8	8	14	12
volume:	16 cubes	8 cubes	7 cubes	6 cubes
area:	40 squares	24 squares	24 squares	22 squares

Extension

- Are these solids convex or concave? Think of the solids as being empty boxes and imagine 2 flies buzzing around inside each shape. Could they hide from each other? T asks several Ps what they think and why. (a) and b) are convex; c) and d) are concave)
- Who can think of a name which describes all 4 solids? (polyhedrons because they are solids with many plane faces)

  Elicit that a) and b) are also hexahedrons as they have 6 plane faces (i.e. a cuboid is a hexahedron) and b) is also a regular hexahedron, as its 6 faces are congruent, i.e. a cube is a regular hexahedron.

45 min

Notes

Individual work, monitored, helped

(or volume and area done with the whole class if Ps do not have own models to manipulate)

Diagram drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

BB: e.g.

a) $V = 4 \times 3 \times 2 = \underline{16}$ ⧉

$A = 4 \times 8 + 2 \times 4$

$= 32 + 8 = \underline{40}$ □

b) $V = 2 \times 2 \times 2 = \underline{8}$ ⧉

$A = 6 \times 4 = \underline{24}$ □

T helps with c) and d).

Whole class discussion

Ps come to BB to show where the flies could hide.

Extra praise if Ps have remembered the names.

c) nonahedron: 9 plane faces

d) octahedron: 8 plane faces

(decahedron: 10 plane faces)

Y4

R: Calculations. Sequences. Quantities
C: Shapes. Properties. Convex and concave shapes
E: Problems. Constructions. Nets of solids

Lesson Plan *52*

Activity

Notes

1

Mental calculation

Follow my instructions, do each calculation in your head and show me the result when I say.

a) Start with 40 . . . multiply by 7 (280) . . . subtract 110 (170) . . . multiply by 10 (1700) . . . add 4500 (6200) . . . divide by 2 (3100) . . . and multiply by 3.

Show me the result . . . now! (9300)

Ps who respond incorrectly work through the calculations again with help of class.

b) I am thinking of a number. If I subtract 100 and multiply by 7, the result will be 1400. What is the number I am thinking of?

Show me . . . now! (300)

P who responds correctly explains at BB to Ps who were wrong.

BB: e.g. $(x - 100) \times 7 = 1400$, so

$x = 1400 \div 7 + 100 = 200 + 100 = \underline{300}$

Check: $\underline{300} - 100 = 200, \quad 200 \times 7 = 1400$ ✔

Whole class activity

Less able Ps can write results of each step on slates or scrap paper.

Ps nod heads when they are ready for next step.

In unison

Reasoning, agreement, praising

Less able Ps may do calculation on slates or scrap paper or in *Ex. Bks*.

Reasoning, checking, agreement, praising

or $1400 \div 7 = 200$

$200 + 100 = \underline{300}$

4 min

2

Sequences

T says first 3 terms of a sequence and Ps continue it, then give the rule.

a) 8888, 7777, 6666, (5555, 4444, 3333, 2222, 1111, 0, – 1111, – 2222, . . .) (*Rule:* – 1111)

b) 25, 535, 1045, (1555, 2065, 2575, 3085, 3595, 4105, 4615, 5125, 5635, 6145, . . .) (*Rule:* + 510)

c) 16 000, 8000, 4000, (2000, 1000, 500, 250, 125, 62 and a half, 31 and a quarter, . . .) (*Rule:* ÷ 2)

d) 2, 6, 18, (54, 162, 486, 1458, 4374, . . .) (*Rule*: × 3)

Whole class activity

T chooses Ps at random.

Class points out errors.

At a good pace

Ps may do necessary calculations on scrap paper or slates or in *Ex. Bks*.

Agreement on the rules.

(Ps could check large numbers with calculators.)

10 min

3

Quantities

What do the quantities in a) [b), c)] measure? (capacity, mass, length)

Let's change the quantities into other units. Ps come to BB to write missing values, explaining reasoning Class points out errors.

BB:

a) 1 litre = $\boxed{100}$ cl = $\boxed{1000}$ ml   4000 ml = $\boxed{400}$ cl = $\boxed{4}$ litres

14 litres = $\boxed{1400}$ cl = $\boxed{14\ 000}$ ml   8500 ml = $\boxed{850}$ cl = $\boxed{8\frac{1}{2}}$ litres

b) 1 kg = $\boxed{1000}$ g   7000 g = $\boxed{7}$ kg

$3\frac{1}{2}$ kg = $\boxed{3500}$ g   4300 g = $\boxed{4}$ kg $\boxed{300}$ g

c) 1 m = $\boxed{100}$ cm = $\boxed{1000}$ mm   1 km = $\boxed{1000}$ m

7 m = $\boxed{700}$ cm = $\boxed{7000}$ mm   6 km = $\boxed{6000}$ m

2000 m = $\boxed{2}$ km   3800 m = $\boxed{3}$ km $\boxed{800}$ m

Whole class activity

Written on BB or use enlarged copy master or OHP

At a good pace

Reasoning agreement, praising

Feedback for T

14 min

Y4

Lesson Plan 52

Activity

Notes

4

Nets

Ps each have a cube, a cuboid, 2 sheets of card and scissors on desks.

Individual (or paired) work, monitored, helped, corrected

a) Let's draw a net for the rectangular cuboid.

Lay your cuboid on a sheet of card and draw around the face it is lying on. Now turn it over to lie on an adjacent face (without letting it slip) and draw around that face. Tick each face after you have drawn it so that you know it has been done. Continue until the whole net has been drawn.

T has large models and sheets of paper for demonstration.

Show me your net . . . now! T does a quick check before continuing.

In unison. Ps check neighbour's nets too.

Ps cut out net and fold it into a cuboid, checking that it will cover the solid cuboid exactly.

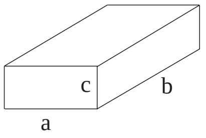
Accept any correct net.

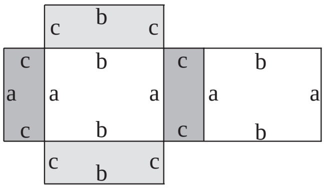
- Colour the opposite faces in the same colour.
- Label parallel edges with the same letter.

Open out your net to see what it looks like now!

Ps talk about the cuboid: the number of faces, edges, vertices and point out the sets of parallel and perpendicular edges and faces.

BB: e.g.

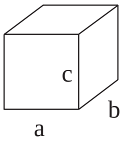


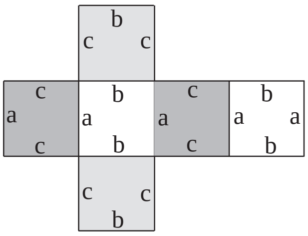


Ps find the matching feature on the nets as it is dealt with.

b) Repeat with the cube.

BB:





Are the solids (nets) convex or concave?

(Both solids are <u>convex</u> and both nets are <u>concave</u>.)

If disagreement, Ps come to BB to point out possible 'hiding' places .

23 min

5

PbY4a, page 52

Individual work, monitored, helped

Q.1 Read: *Draw over the sets of parallel lines in the same colour. Mark the right angles.*

Write C in the shapes which are convex and N in the shapes which are not convex.

Drawn on BB or use enlarged copy master or OHP

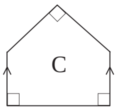
If Ps prefer, they can draw arrowheads instead of colouring. Ps can use edge of ruler or folded right angle to measure angles which they are unsure about.

Discussion, agreement, self-correction, praising

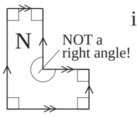
Review at BB with whole class. Ps come to BB to mark the features. Class agrees/disagrees. Mistakes discussed and corrected. What are the names of the shapes?

Ps could say what kind of angles the others are.

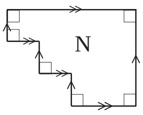
Solution:

i)


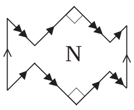
pentagon

ii)


hexagon

iii)


octagon

iv)


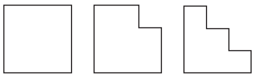
decagon
(10-sided polygon)

ii) Note that the obtuse angle is <u>not</u> a right angle, but is equal to 3 right angles.

(The right angle is <u>outside</u> the shape!)

Extension

The perimeters of these shapes are equal. BB: Who can explain why? Will their areas be equal too? (No) Why not?



Drawn on BB or use enlarged copy master or OHP

Discussion, agreement. praising

28 min

Y4

Lesson Plan 52

Activity ***Notes***

6

PbY4a, page 52

Q.2 Read: *In each diagram, one side of a polygon has been drawn.*

a) Complete the diagram to form a triangle which has:

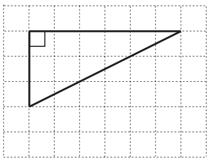
i) 1 right angle,
ii) 3 angles less than a right angle,
iii) 1 angle greater than a right angle.

Ps draw lines lightly with pencil first, so that they can be amended easily.

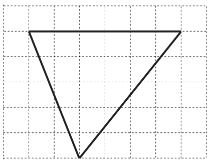
Review with whole class. Ps come to BB to draw their triangles. Class checks that they are correct. Who drew different triangles? Deal with all cases.

Solution: e.g.

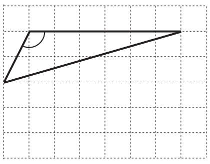
i)



ii)



iii)



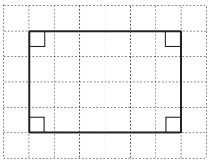
Read: *b) Complete the diagram to form a quadrilateral which has:*

i) 4 right angles,
ii) 2 right angles,
iii) no right angles.

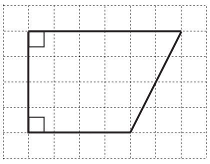
Review with whole class. Ps come to BB to draw their quadrilaterals. Class checks that they are correct. Who drew different quadrilaterals? Deal with all cases. (Several solutions are possible.)

Solution: e.g.

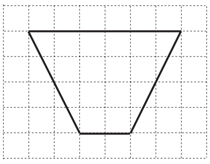
i)



ii)



iii)



33 min

Individual work, monitored, helped

Use enlarged copy master or OHP

Agreement, self-correction, praising

Elicit that:

i) is a right-angled triangle

ii) is an acute-angled triangle

iii) is an obtuse-angled triangle

Agreement, self-correction, praising

Where relevant, Ps identify symmetrical shapes and draw the lines of symmetry.

7

PbY4a, page 52

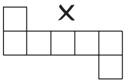
Q.3 Read: *Colour the nets which could be folded to make a cube.*

Review at BB with whole class. T points to each net and Ps shout 'Yes' or 'No'. If 'No', Ps explain why not.

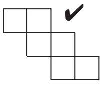
T could have nets already prepared and folded to demonstrate in case there is disagreement.

Solution:

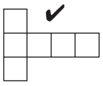
a)



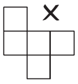
b)



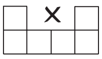
c)



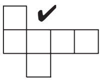
d)



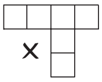
e)



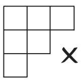
f)



g)



h)



37 min

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

(Ps could have cut-out nets on desks too!)

Agreement, self-correcting, praising

d) could be amended to make a possible net.

Elicit that each net is a <u>concave</u> polygon.

Y4

Lesson Plan 52

Activity

8

PbY4a, page 52

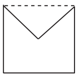
Q.4 Read: *Complete these non-convex shapes so that they become convex shapes.*

Elicit that the shapes are concave. Set a time limit.

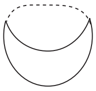
Review at BB with whole class. Ps come to BB. Class agrees/ disagrees. Accept any correct solution.

Solution: e.g.

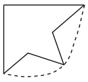
a)



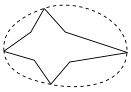
b)



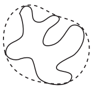
c)



d)



e)



41 min

Notes

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Differentiation by time limit

Ps can discuss solutions with their neighbours

Agreement, self-correcting, praising

9

Scale

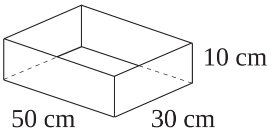
We want to make an open box which is 1 fifth of the size of this box. T has real box to show and also a diagram with real lengths marked.

Ps convert to scaled down lengths and come to BB to write them on net. Class agrees/disagrees. What is the scale? (*Scale*: 1 cm → 5 cm)

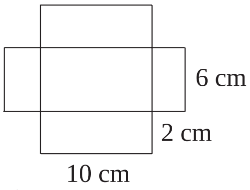
If there is time, Ps could draw the reduced net and cut out and fold it to make a box.

BB: e.g.

In real life



1 fifth of the size



45 min

Whole class activity

Drawn on BB or use enlarged copy master or OHP

(but measurements will vary according to size of real box)

Agreement, praising

Y4

R: Calculations. Measures

C: Shapes: parallel and perpendicular lines; convex and concave

E: Problems

Lesson Plan
53

Activity

Notes

1

Divisibility

T writes an addition on BB. e.g. $342 + 6\square$

What number could we write for the missing digit so that the sum is:

a) divisible by 5 $(342 + 6\underline{3} = 405$ or $342 + 6\underline{8} = 410)$

b) divisible by 4 $(342 + 6\underline{2} = 404$ or $342 + 6\underline{6} = 408)$

c) divisible by 3 $(342 + 6\underline{0} = 402$ or $342 + 6\underline{3} = 405$ or
$342 + 6\underline{6} = 408$ or $342 + 6\underline{9} = 411)$

d) divisible by both 5 and 4 (not possible!)

e) divisible by both 5 and 3 $(342 + 6\underline{3} = 405)$

f) divisible by neither 5 nor 4 not 3 $(342 + 6\underline{1} = 403$ or
$342 + 6\underline{4} = 406$ or $342 + 6\underline{5} = 407)$

5 min

Whole class activity

At a good pace

Ps come to BB or dictate to T

Class checks that they are correct by doing the divisions.

Reasoning, agreement, praising

Extra praise if Ps remember that to be divisible by 5, the number must end in 0 or 5.

Feedback for T

2

Problems

Listen carefully, do the calculation in your head or on the back of your slates and show me the result when I say.

a) *I am thinking of a number. If I add 23 to 5 times my number, the result is 373. What number am I thinking of?*

Show me . . . now! (70)

P who responds correctly explains at BB to Ps who were wrong.

BB: e.g. $x \times 5 + 23 = 373$, so

$x = (373 - 23) \div 5 = 350 \div 5 = \underline{70}$

Check: $\underline{70} \times 5 + 23 = 350 + 23 = 373$ ✔

b) *If I subtract 400 from half of another number, the result is 1000. What is the number?*

Show me . . . now! (2800)

P who responds correctly explains at BB to Ps who were wrong.

BB: e.g. $x \div 2 - 400 = 1000$, so

$x = (1000 + 400) \times 2 = 1400 \times 2 = \underline{2800}$

Check: $\underline{2800} \div 2 - 400 = 1000$ ✔

10 min

Whole class activity but individual calculation

T repeats each question slowly to give Ps time to think and do the calculation.

Responses shown on scrap paper or slates in unison.

Reasoning, agreement, praising

Mistakes analysed. Agree that to solve the problems, the <u>reverse</u> operations should be done in the reverse order.

Checks can be done with a calculator.

Y4

Lesson Plan 53

Activity

Notes

3 **Which is more?**

Which quantity is more and how much more?

What should we do first? (Change both sides to the same unit.) Ps come to BB to convert the units, then to fill in missing sign and to calculate the difference, explaining reasoning. Class points out errors.

BB:

a) $5\text{ km }320\text{ m} \;\underset{80\text{ m}}{\boxed{>}}\; \overset{5\text{ km }240\text{ m}}{4100\text{ m} + 1\text{ km }140\text{ m}}$

b) $3924\text{ ml} \;\underset{207\text{ ml}}{\boxed{<}}\; \overset{4131\text{ ml}}{2\text{ litres }2131\text{ ml}}$ $\qquad \begin{array}{r} 4131 \\ -\;3924 \\ \hline 207 \end{array}$

c) $\overset{7527\text{ cm}}{75\text{ m }27\text{ cm}} \;\underset{3137\text{ cm}}{\boxed{>}}\; \overset{4390\text{ cm}}{4010\text{ cm} + 3\text{ m }80\text{ cm}}$ $\qquad \begin{array}{r} 7527 \\ -\;4390 \\ \hline 3137 \end{array}$

d) $\overset{5900\text{ g}}{8300\text{ g} - 2\text{ kg }400\text{ g}} \;\boxed{=}\; \overset{5900\text{ g}}{5\text{ kg }900\text{ g}}$ $\qquad \begin{array}{r} 8300 \\ -\;2400 \\ \hline 5900 \end{array}$

e) $\overset{434\text{ min.}}{7\text{ hours }14\text{ minutes}} \;\underset{26\text{ min.}}{\boxed{<}}\; \overset{460\text{ min.}}{1000\text{ minutes} - 9\text{ hours}}$

Whole class activity

Written on BB or use enlarged copy master or OHP

At a good pace

Ps can do necessary calculations on scrap paper or slates or in *Ex. Bks.*

Reasoning, agreement, praising

Feedback for T

BB: $1000 - 9 \times 60$
$= 1000 - 540$
$= 460$ (min)

16 min

4 **Compass directions**

Ps have square grid on desks (or use page of squared *Ex. Bks*).

Which compass points are missing from this compass?
Ps dictate what T should write at each point.

Draw a dot on a grid point half-way down your page on the LHS. This is your start point. Now draw straight lines according to my instructions.

1. Move N by 2 units.
2. Turn to face NE and move 2 diagonals.
   What kind of turn did you make? (half a right angle to the right)
3. Turn to face E and move 3 units.
   What kind of turn did you make? (half a right angle to the right)
4. Turn to face S and move 2 units.
   What kind of turn did you make? (a right angle to the right)
5. Turn to face SW and move 2 diagonals.
   What kind of turn did you make? (half a right angle to the right)
6. Turn to face SE and move 2 diagonals.
   What kind of turn did you make? (a right angle to the left)
7. Turn to face W and move 5 units.
   What kind of turn did you make? (1 and a half right angles to the right)
8. Turn to face N and move 2 units.
   What kind of turn did you make? (a right angle to the right)

- What kind of shape have you drawn? (7-sided polygon or h<u>eptagon</u>)
- Is it convex or concave? (concave)
- How many right angles did we turn altogether? T writes on BB, with Ps' help: BB: $\frac{1}{2} + \frac{1}{2} + 1 + \frac{1}{2} - 1 + 1\frac{1}{2} + 1 = 4$ (right angles)

Who can think of other questions to ask about it? (e.g. Which lines are parallel /perpendicular? What is its perimeter (area)? etc.)

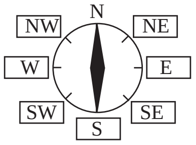
Whole class activity but individual drawing of shape

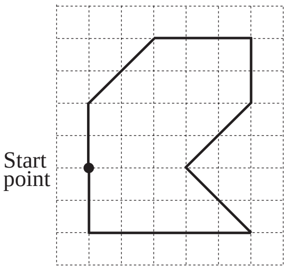
Compass and grid drawn on BB or use enlarged copy master or OHP

A also works on BB (hidden from rest of class).

A, show us what you drew. Who drew the same? etc. Mistakes corrected.

BB:





Discussion about the shape.

BB: <u>heptagon</u>

Elicit that turning to the right is like adding and turning to the left is like subtracting.

Agreement, praising

23 min

Y4

Lesson Plan 53

Activity ***Notes***

5

PbY4a, page 53

Q.1 Read: *List the letters of the shapes for which each statement is true.*

Set a time limit. Ps read statements themselves then list the relevant letters. Ps have rulers and/or folded right angles to help them.

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

Solution:

a) *It has 2 sides which are equal in length.* (B, C, D, E, F, I, J, K)
b) *All its sides are equal.* (E, J, K)
c) *Its opposite sides are equal.* (B, E, I, J, K)
d) *It has a pair of perpendicular sides.* (A, C, E, G, H, I, K)
e) *It has a pair of parallel sides.* (B, E, F, H, I, J, K)
f) *It is symmetrical.* (C, D, E, F, I, J, K)
g) *There is a right angle at every vertex.* (E, I, K)
h) *Opposite sides are parallel to each other.* (B, E, I, J, K)

What word would desctibe all the shapes? (quadrilaterals,)

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Differentiation by time limit.

Ps (T) mark the features on diagrams on BB as they are dealt with.

Agreement, self-correction, praising

At a good pace

Ps might tell other names they know, e.g.

square (E, K);
rectangle (E K, I)
parallelogram (B, J) [E, I, K]
rhombus (J) [and E, K]

30 min

6

PbY4a, page 53

Q.2 Read: *List the statements in Question 1 which are true for all*
a) rectangles b) squares.

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

Solution:

a) rectangles: all except b) b) squares: all of them

Individual work, monitored, helped

Discussion, reasoning, agreement, self-correction, praising

Extension

Who can describe a rectangle (square) in one sentence? e.g.

'A rectangle is a parallelogram with adjacent sides perpendicular.' (or 'with 4 right angles').

'A square is a rectangle with equal sides.'

Ask several Ps what they think.

Praising, encouragement only

34 min

7

PbY4a, page 53

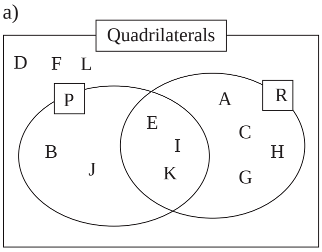
Q.3 Read: *Write the letters of the quadrilaterals in Question 1 in the correct set.*

Deal with one part at a time. Review meaning of each set first.

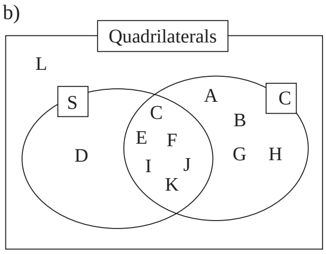
Review at BB with whole class. Ps come to BB or dictate to T. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a)



b)



Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correcting, praising

Extension

Tell me true (false) statements about the shapes. e.g.

'Each quadrilateral has 2 pairs of parallel sides.' (F)

'There is a quadrilateral which has 2 pairs of parallel sides and no right angles.' (T)

40 min

Y4

Lesson Plan 53

Activity

8

Missing faces

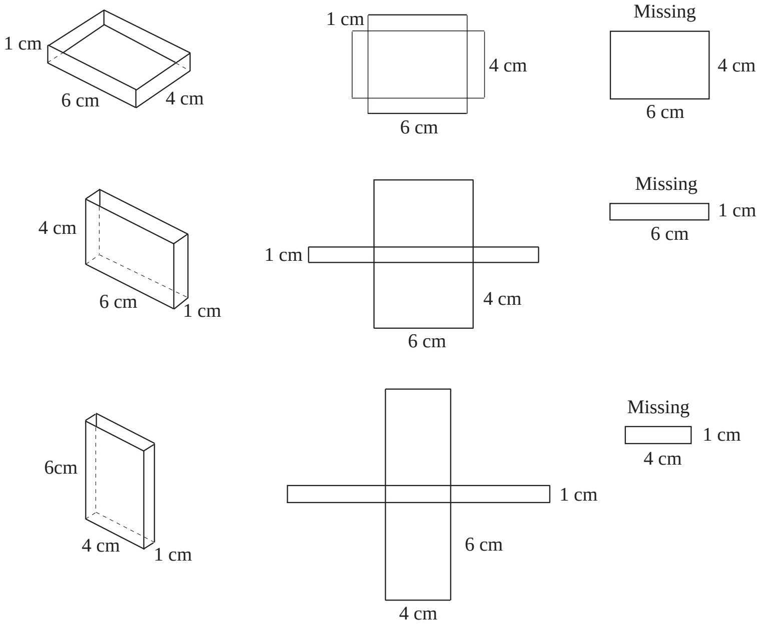
The edges of a cuboid-shaped box are 6 cm, 4 cm and 1 cm long. The box is open and has no top. What could be the lengths of the missing face?

T asks several Ps what they think. (6 cm by 4 cm, 6 cm by 1 cm or 4 cm by 1 cm) Let's show them in a diagram.

What could the box look like? Ps come to BB or dictate to T what to draw. Draw the 3 different nets in your *Ex. Bks* to exactly the right size.

Ps might like to continue at home if there is not enough time.

BB:



45 min

Notes

Whole class activity

Discussion involving several Ps. Agreement, praising

Rough diagrams drawn on BB or T could use enlarged copy master or OHP and uncover each case as it is found.

If completed at home, T reviews before *Lesson 54.*

Y4

R: Calculations
C: Shapes: properties, angles
E: Problems

Lesson Plan 54

Activity / ***Notes***

1

Mental calculation

a) T says an addition. Ps say sum.

e.g. 45 + 29, 23 + 96, 842 + 199, 3005 + 573, 5400 + 2800, etc.

b) T says a subtraction. Ps say difference.

e.g. 76 – 19, 728 – 34, 954 – 260, 4300 – 700, 6834 – 1004, etc.

c) T says a multiplication. Ps say product.

e.g. 600×8, 12×5, 4100×2, 35×60, 7×220, etc.

d) T says a division. Ps say quotient.

e.g. $350 \div 5$, $48 \div 4$, $720 \div 9$, $3600 \div 40$, $4218 \div 6$, etc.

Notes:

Whole class activity

At speed in order round class.

If a P makes a mistake the next P corrects it

Agreement, praising

In good humour!

If problems, write operation on BB.

Ps may think of operations too!

5 min

2

Secret number

I am thinking of a number between 1 and 10 000. You must ask me questions to find what it is but I can answer only Yes or No.

e.g. <u>3817</u>

Does it have more than 2 digits? (Yes) Is it more than 1000? (Yes) Is it less than 5000? (Yes) Is it more than 2500? (Yes) Is its thousands digit 3? (Yes) Is it more than 3500? (Yes) Is it less than 3750? (No) Is its hundreds digit odd? (No) Is it less than 3850? (Yes) Is its tens digit even? (No) Is its tens digit more than 1? (No) Is it divisible by 5? (No) Is it more than 3816? (Yes) Is its less than 3819? (yes) Is its units digit odd? (Yes) It is 3817! (Yes)

If time, a P thinks of a number and answers questions (with T's or another P's help if necessary).

Notes:

Whole class activity

Encourage logical questioning and keep ing in mind clues already given.

Ps could make notes on scrap paper or slates or in *Ex.Bks.*

A P (T) could track of important clues on BB, e.g.

$1000 < x < 5000$
$2500 < x < 5000$
$3750 < x < 3850$
$3816 < x < 3819$

Extra praise for clever questions.

10 min

3

Time

T has a large real or model clock. Ps have model clocks on desks too.

Set your hour and minute hands to point to 12 o'clock.

a) Turn the minute hand by 1 right angle to the right. To which number is it pointing? (3) How many minutes has it passed? (15 min)

b) Now turn the minute hand back to 12. Through how many right angles will the minute hand turn after 30 minutes? (2 right angles). To which number will the minute hand be pointing? (6)

c) Now turn the minute hand back to 12. Through how many right angles would the minute hand have turned if it is now pointing to 9? (3 right angles) How much time has passed? (45 min)

d) Now turn the minute hand back to 12. How many minutes could have gone by if the minute hand turns by less than a right angle? (Accept actual mintues but agree after discussion that it could be more than 0 minutes but less than 15 minutes).

How could we write it mathematically? Ps dictate to T.

Notes:

Whole class activity

Use copy master from *Y2 Lesson Plan 103/1*

Ps respond by showing clocks or writing on slates and showing in unison on command.

Elicit that:

BB:

1 quarter of a turn = 1 r. a.
half a turn = 2 r. a.
3 quarters of a turn = 3 r. a.
1 whole turn = 4 r. a.

BB: $0 < t < 15$ (mi.)

15 min

Y4

Lesson Plan 54

Activity

4

Properties of a rectangle and a square

Ps each have square and rectangular-shaped pieces of paper on desks.

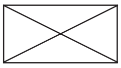
a) Pick up this sheet (▭). Who can tell me something about it? e.g.

- It has 4 sides, 4 vertices and 4 angles, so it is a quadrilateral.
- Its opposite sides are parallel and equal to each other, so it is also a parallelogram.
- Its adjacent sides are perpendicular to each other, so its 4 angles are right angles.
- It is a rectangle.

T: Fold your paper in half so that one pair of opposite sides meet exactly. Now unfold it. Repeat for the other pair of opposite sides. Unfold it again. What can you tell me?

- A rectangle has 2 lines of symmetry (or mirror lines).

T: How many diagonals does it have? Draw them in.



•. A rectangle has 2 diagonals.

Are the diagonals lines of symmetry too? (No, because if it is folded along the diagonals, the edges do not meet exactly.)

T: What kind of angles do the diagonals make? (2 equal acute angles and 2 equal obtuse angles)

T: If you draw only one diagonal, what shapes does it make? (2 congruent right-angled triangles) Ps can cut them to confirm.

If you draw both diagonals, what shapes do they make? (4 triangles, opposite triangles are congruent.)

What else do you notice about each triangle? (The 2 sides formed by the diagonals are equal in length.)

T tells class that a triangle with 2 equal sides is called an isosceles triangle.

b) Pick up this sheet (□). Who can tell me something about it? e.g.

- It has 4 sides, 4 vertices and 4 angles. It is a quadrilateral.
- Its opposite sides are parallel and equal to each other, so it is also a parallelogram.
- Its adjacent sides are perpendicular to each other so its 4 angles are right angles so it is also a rectangle.
- All its 4 sides are equal, so it is a square.

T: Fold your paper in half in different ways, so that opposite sides meet exactly. Now unfold it. What can you tell me?

- A square has 4 lines of symmetry (or mirror lines) and 2 of them are its diagonals. Draw over the diagonals.

T: What kind of angles do the diagonals make? (4 right angles)

What else can you tell me about the diagonals? (The diagonals are perpendicular and equal to each other.)

T: If you draw only one diagonal, what shapes does it make? (2 congruent, right-angled, isosceles triangles)

If you draw both diagonals, what shapes do they make? (4 congruent, isosceles, right-angled triangles)

25 min

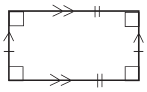
Notes

Whole class activity

Ps should have 2 or 3 of each shape so that they can be folded or drawn on in different ways.

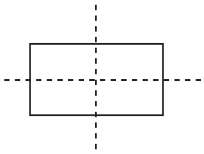
T prompts Ps if necessary.

BB:

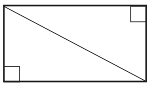


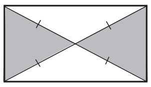
T demonstrates if necessary

BB:



Discussion, demonstration, agreement, praising

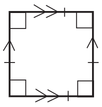




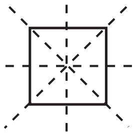
isosceles triangle: 2 equal sides

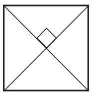
Involve as many different Ps as possible.

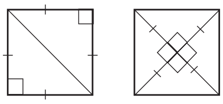
BB:



T demonstrates if necessar.y.







Y4

Lesson Plan 54

Activity

Notes

5

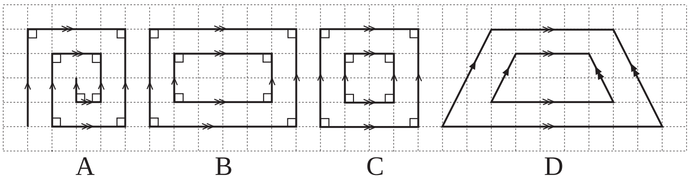
PbY4a, page 54

Q.1 Read: *Draw over the parallel lines in the same colour.*
Mark the right angles.

Ps can show parallel lines with arrowheads if they prefer.

Review with whole class. Ps come to BB to mark the features. Class agrees/disagrees. Mistakes corrected

Solution:



Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, agreement, self-correcting, praising

Extension

Let's label the shapes A, B, C, and D. What can you tell me about each shape? T asks several Ps. Class agrees/disagrees. e.g.

A is a line made up of straight segments (It is <u>not</u> a polygon.)

B is made up of 2 rectangles. They are <u>not</u> similar because they are not in proportion to one another. (One side of the bigger rectangle is twice as long and the other side is 1 and a half times as long as the matching sides on the smaller rectangle.)

C is made up of 2 similar squares. The inner square is half the size of the outer square.

D is made up of 2 quadrilaterals. They are <u>not</u> similar because they are not in proportion to one another. (Two sides of the smaller shape are half as long, another is 3 fifths as long and the fourth is 5 ninths as long as the matching sides on the bigger shape.) They each have 1 pair of parallel sides and 1 pair of equal sides.

Whole class discussion

Ps come to BB to point and explain.

Praise all positive contributions.

Ps explain why shapes in B and D are <u>not</u> similar and shapes in C <u>are</u> similar.

T tells Ps that a quadrilateral with only 1 pair of parallel sides is called a <u>trapezium</u>

28 min

6

PbY4a, page 54

Q.2 Read: *We labelled the vertices of this pentagon with letters and marked the angles.*

At which vertex is there:

a) a right angle
b) an angle smaller than a right angle
c) an angle greater than a right angle?

Ps use edge of ruler or folded right angles to measure the angles. Ps answer by writing initial letters of vertices.

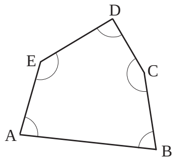
Review at BB with whole class. Ps dictate to T. Class agrees/disagrees. Mistakes checked again and corrected.

Solution: a) D b) A and B c) C and E

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

BB:

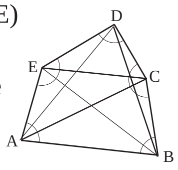


Agreement, self-correcting, praising

Extension

1. Let's draw all the diagonals. How many did you draw? (5) Tell me their names. (AD, AC, BE, BD, CE)

   T explains that, e.g. AB, means the line joining point A to point B, AC means the line joining point A to point C, etc.



2. If we want to name an angle, we say, e.g. 'angle A', or 'angle EAB', which also names the two lines, EA and AB, that make up the angle at A.

   Ps practise naming angles and pointing to them on the diagram.

Individual work, monitored

Agreement, praising

T shows convention for naming lines and angles.

'angle A' is fine if there is only one angle at A, as in diagram above, but if there are two or more, then the lines should be named too to avoid confusion.

33 min

Y4

Lesson Plan 54

Activity

Notes

7

PbY4a, page 54

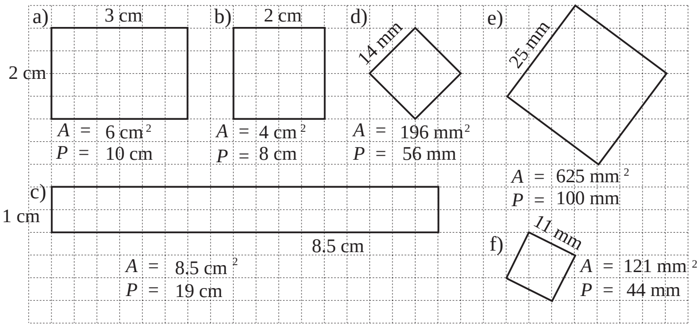
Q.3 Read: *Measure the sides of each rectangle. Calculate its perimeter and area.*

Elicit that only 2 measurements are needed for the rectangles and only 1 is needed for the square. Ps can measure in cm or mm or by counting the grid squares (for less able Ps). Necessary calculations can be done in *Ex. Bks*.

Set parts a), b) and c), then review. Confirm the calculations needed for the area and perimeter of a rectangle and square. (BB)

Then deal with one at a time. Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Mistakes discussed and corrected. Difficult calculations shown in detail on BB.

Solution: e.g.



Details: e.g.

d) $A = 14 \times 14 = 14 \times 10 + 14 \times 4 = 140 + 56 = \underline{196}$ (mm^2)

$P = 4 \times 14 = 40 + 16 = \underline{56}$ (mm)

e) $A = 25 \times 25 = 25 \times 20 + 25 \times 5 = 250 \times 2 + 25 \times 5$

$= 500 + 125 = \underline{625}$ (mm^2)

$P = 4 \times 25 = 80 + 20 = \underline{100}$ (mm)

f) $A = 11 \times 11 = 11 \times 10 + 11 \times 1 = 110 + 11 = \underline{121}$ (mm^2)

$P = 4 \times 11 = 40 + 4 = \underline{44}$ (mm)

40 min

Individual (or paired) work, monitored, helped

Or parts a), b) and c) as individual work, reviewed; parts d), e) and f) as whole class activity

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

Reasoning, agreement, self-correction, praising

BB:

<u>Rectangle</u>

A = length × width
P = 2 × length + 2 × width

<u>Square</u>

A = length × length
P = 4 × length

Or area:

a) A = 24 grid squares
b) A = 16 grid squares
c) A = 34 grid squares
d) A = 8 grid squares
e) A = 25 grid squares
f) A = 5 grid squares

BB: $25 \times 5 = 100 + 25$
$= \underline{125}$

Praising, encouragement only

Extra praise if Ps remember short short way of writing cm and mm squares: cm^2, mm^2

8

PbY4a, page 54

Q.4 Read: *The diagram shows the net of an open box drawn to a smaller scale.*

a) What shape was the box?

b) How long were the edges of the box if 1 mm on the diagram means 1 cm in real life? Write them on the diagram.

c) Draw the rectangle which is missing if the box had been covered.

Deal with one part at a time, or set a time limit. Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Mistakes discussed and corrected.

Solution:

a) cuboid (with one face missing) b) and c) as opposite.

T could have real box already prepared to show to class.

45 min

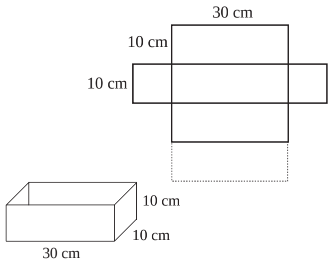
Individual work, monitored, helped

(or whole class activity)

Net drawn on BB or OHT

Agreement, self-correcting, praising

BB: <u>Scale</u>: 1 mm → 1 cm



Y4

Lesson Plan
55

Activity

Notes

Tables aand calculation practice, revision of geometric terms, activities, consolidation

PbY4a, page 55

Solutions:

Q.1

	On diagram	In real life
length:	20 mm	40 cm
width:	15 mm	30 cm
height:	10 mm	20 cm

Q.2 Missing face: 4 cm by 3 cm, 4 cm by 2 cm or 3 cm by 2 cm

Q.3

$10 \times \underline{300} = 3000$ $\underline{0} \times 1600 = 0$ $\underline{40} \times 40 = 1600$

$90 \times \underline{30} = 2700$ $1500 \div \underline{30} = 50$ $1970 \div \underline{10} = 197$

$\underline{500} \times 50 = 25\,000$ $90 \div \underline{2} = 45$ $\underline{100\,000} \div 200 = 500$

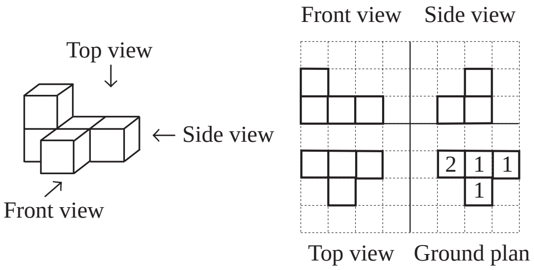
$\underline{300} \times 80 = 24\,000$ $\underline{1000} \div 5 = 200$ $\underline{1900} \div 1900 = 1$

$\underline{1000} \times 11 = 11\,000$ $\underline{660} \div 6 = 110$ $\underline{20\,000} \div 5000 = 4$

$\underline{1000} \times 54 = 54\,000$ $\underline{4900} \div 7 = 700$ $\underline{2000} \div 200 = 10$

$25 \times \underline{2000} = 50\,000$ $8600 \div \underline{200} = 43$ $2000 \div \underline{500} = 4$

Q.4



Y4

R: Calculation

C: Shapes: similarity and congruence

E: Problems

Lesson Plan 56

Activity

Notes

1

Table 1

Study this table. Think about what the rule could be. Agree on one form of rule (e.g. sum of top and middle rows equals bottom row).

Ps come to BB to choose a column and fill in the missing number. Necessary calculations can be done in *Ex. Bks* first, or at side of BB.

Class points out errors. Who can write the rule in a mathematical way? Who agrees? Who can think of another way to write it? etc.

BB:

a	1234	432	7200	3100	**2617**	4052	4231	**3677**
b	4321	8600	2800	**4900**	3333	1796	**4231**	3030
c	5555	9032	**10 000**	8000	5950	**5848**	8462	6707

Rule: $c = a + b$ $b = c - a$ $a = c - b$

5 min

Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Bold numbers are missing.

Feedback for T

2

Table 2

Study this table. Think about what the rule could be. Agree on one form of rule (e.g. product of top and middle rows equals bottom row).

Ps come to BB to choose a column and fill in the missing number. Necessary calculations can be done in *Ex. Bks* first, or at side of BB.

Class points out errors. Who can write the rule in a mathematical way? Who agrees? Who can think of another way to write it? etc.

BB:

x	3142	40	0	300	140	**500**	3615	60	**1600**	5420
y	3	70	5148	8	**20**	7	2	**90**	3	**1**
z	9426	2800	**0**	**2400**	2800	3500	**7230**	5400	4800	5420

Rule: $x \times y = z$ $x = z \div y$ $y = z \div x$

10 min

Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Bold numbers are missing.

Feedback for T

3

Triangles

Ps have 2 cm, 3 cm, 4 cm, 5 cm, 6 cm and 7 cm long straws on desks (if possible with corner brackets to fix the straws in place)

We are going to make some triangles using the straws as the sides. Listen carefully to my instructions!

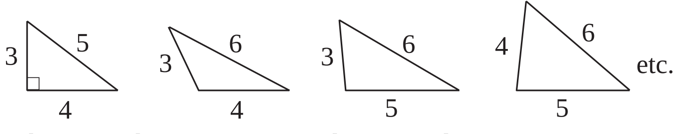
a) Make a triangle from a 3 cm, a 4 cm and a 5 cm straw.

What can you say about it? (It is a right-angled triangle)

b) Make <u>different</u> triangles from the 3 cm, 4 cm, 5 cm and 6 cm straws but do not use more than one straw of each length.

What can you tell me about them? (right-angled, acute-angled, obtuse angled triangles)

BB:



Ps might notice that, e.g. 3, 4, 5 and 4, 3, 5 sides give <u>congruent</u> triangles (i.e. they cover each other exactly). Elicit that the order of the sides does not matter. Any order will give a congruent triangle, as long as the same lengths are used.

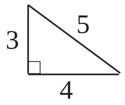
Who remembers what the sign for 'congruent' is? P comes to BB.

Paired work, but whole class kept together.

If possible, different coloured straws for different lengths

Monitored, helped, corrected

BB:



T allows Ps time to form various triangles, then shows copy master or drawings of some possible triangles.

Discussion on the types of triangles, agreement, praising

T demonstrates congruency with prepared models if no P has noticed it.

BB: $\cong$ means 'congruent'

Y4

Lesson Plan 56

Activity

Notes

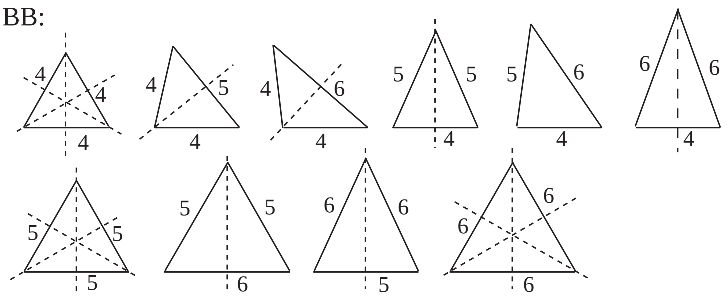
3

(Continued)

c) Make different triangles with 4 cm, 5 cm or 6 cm straws but this time you can use as many of each type as you wish. Look out for symmerical triangles while you are doing it. Try to do it logically!

Ps come to BB to draw round their triangles and T completes the list if Ps did not find each of the 10 <u>different</u> possibilities. (Class makes sure that there are no congruent triangles.)

BB:



Which of them are symmetrical? Ps come to BB to point and draw the lines of symmetry. Class agrees/disagrees.

Extension

Now make a triangle with a 2 cm, a 5 cm and a 7 cm straw. What does it look like? (It is impossible!) Why? (To make a triangle the sum of two of the sides must be greater than the 3rd side.)

20 min

Paired work, monitored

Set a time limit

Ps make as many triangles as they can in the time given.

Or have BB already prepared or use enlarged copy master or OHP and Ps come to BB to tick the triangles that they have made.

Discussion, agreement, praising

Ps could point out <u>isosceles</u> (2 equal sides) and <u>equilateral</u> (3 equal sides) triangles.

Agree that each line of symmetry (or mirror line) divides the triangle into two <u>equal</u> parts.

In good humour!

Extra praise if Ps can explain.

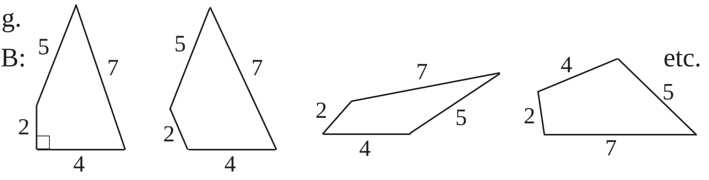
4

Quadrilaterals

a) Make different quadrilaterals from the 2 cm, 4 cm, 5 cm, 6 cm and 7 cm straws but do not use more than one straw of each length.

e.g.

BB:

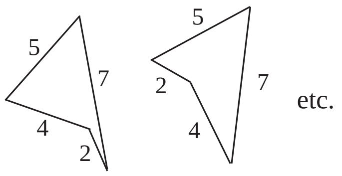


Agree that many different quadrilaterals can be formed. Are those on the BB convex or concave? (Convex)

b) Let's see if you can make some <u>concave</u> quadrilaterals from the straws, again using not more than one of each type.

Ps come to BB to draw round their shapes. Class agrees/disagrees that they are concave. Ps show where 2 people could hide from each other.

e.g. BB:



c) This time, make a <u>convex</u> polygon from <u>any</u> of the straws. T might ask some Ps to show their polygons to the class and talk about them. (e.g. type of polygon, number of sides, type of angles, length of perimeter, etc.)

Repeat for <u>concave</u> polygons.

25 min

Paired work, monitored

T allows Ps time to form various quadrilaterals, then shows copy master or drawings of some possibilities.

Discussion on the types of angles in each

Agreement, praising

Set a time limit

Agreement, praising

Demonstration, agreement, praising

Y4

Lesson Plan 56

Activity

Notes

5

PbY4a, page 56

Q.1 Read: *List the similar shapes.*

What word would describe all these shapes? (polygons)
What does 'similar' mean? (The same shape – but can be a different size.) What sign do we use for 'similar to'? (~)

Ps first study the shapes and then list them or colour similar shapes in the same colour (less able Ps).

Review at BB with whole class. Ps come to BB or dictate to T.

BB: A ~ E ~ F ~ K, B ~ D ~ H ~ J ~ L, C ~ G ~ I

Ps might notice that A and E, and B and D, are also congruent (i.e. can cover each other exactly) Elicit sign for 'congruent to'.

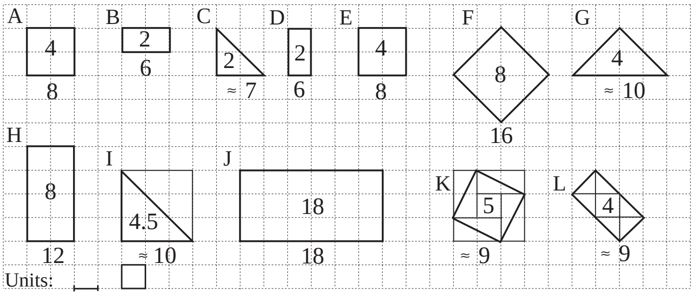
Read: *Write the area inside each shape and the length of the perimeter below.*

Elicit that the area is measured in grid squares and the perimeter in grid units. Do the areas first, then the perimeters.

Ps come to BB to count and write only numerical values inside and below each shape but say the units. Class agrees/disagrees.

In the difficult shapes, T helps with counting half grid squares for the area and approximating the lengths of slanting sides for the perimeter. (2 diagonals ≈ 3 units, so, e.g. in G: $P \approx 10$)

Solution:



Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

BB: ~ means 'similar to'

Discussion, agreement, self-correction, praising

BB: A ≅ E, B ≅ D

Whole class activity

At a good pace

Ps can work in *Pbs* at the same time.

Discussion, agreement, praising

Or Ps might suggest measuring the 'difficult' perimeters with thread and then holding the thread along a grid line to count how many units long it is.

Extra praise if Ps suggest such creative strategies!

Elicit that C, G and I are right-angled, isosceles triangles.
Ps mark the right angles and the 2 equal sides.

32 min

6

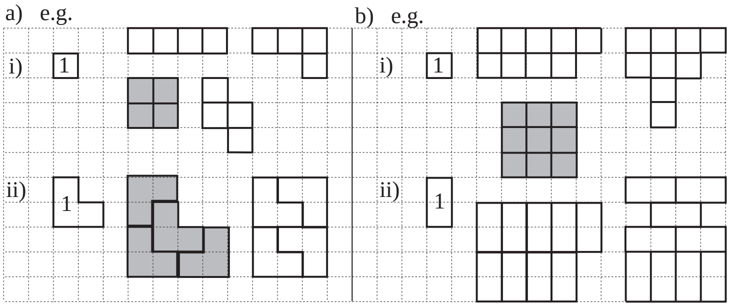
PbY4a, page 56

Q.2 Read: *a) Draw shapes using 4 unit shapes*
b) Draw shapes using 9 unit shapes.

Deal with one part at a time. T explains task. Make sure that Ps realise that in each part, the unit is the given shape with the '1' inside, not the grid squares.)

Review at BB with whole class. T chooses Ps to show their shapes. Class makes sure that it is made up of the required number of units.

Possible solution: (shapes similar to original unit are shaded)



Individual work, monitored, helped, corrected

Drawn on BB or use enlarged copy master or OHP

Ps could have sheets of 5 mm squared paper on desks in case they need more grid space.

Discussion, agreement, self-correcting, praising

If no P has drawn a shape similar to the original unit, T asks Ps to draw one on BB.

Extension

Which shapes are symmetrical? Where would you draw the line of symmetry?

38 min

Y4

Lesson Plan 56

Activity

Notes

7

PbY4a, page 56

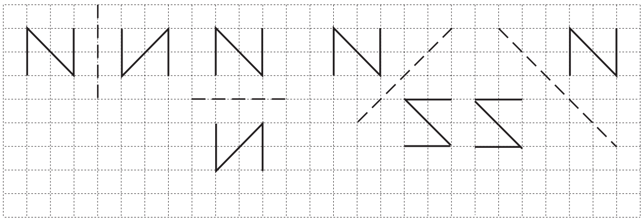
Q.3 a) Read: *Reflect the letter N in the given axis (mirror line).*

What does reflect mean? Imagine that the slashed line is a mirror. What would you see if you looked in the mirror? (A reflection or mirror image). Elicit that each point on the reflection must be the same distance away from the mirror line as the corresponding point on the original image.

Let's see if you can draw the reflections without a mirror to help you!

Review at BB with whole class. Ps come to BB to draw the reflections. Class points out errors. Mistakes discussed and corrected.

Solution:



Whole class discussion to start revising what 'reflect' means.

Let Ps try to explain first.

Drawn on BB or use enlarged copy master or OHP

Individual work, monitored, helped (corrected)

Agreement, self-correction, praising

Elicit that points of the image nearest (furthest away from) the mirror are also nearest (furthest away from) the mirror in the reflection

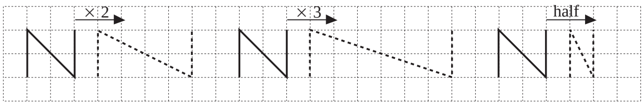
b) Read: *Stretch the letter N in the direction shown by the arrow.*

What does 'stretch mean? What does × 2, ×3, etc. mean? T could demonstrate using printed elasticated material .

Imagine that the letter N has been drawn on elastic material and you are pulling it in the direction of the arrow. Let's see if you can draw what it would look like.

Review at BB with whole class. Ps come to BB to draw their solutions. Class points out errors. Mistakes discussed and corrected.

Solution:



Discussion on meaning of 'stretch'. Demonstration with various materials.

Let Ps try to explain first.

Drawn on BB or use enlarged copy master or OHP

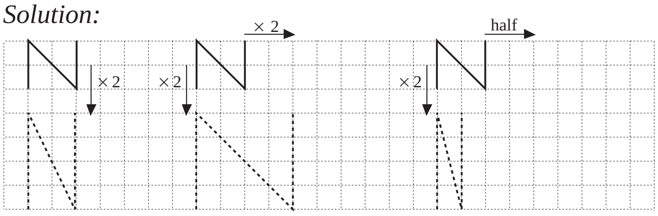
Do first stretched image on BB with whole class if necessary.

Agreement, self-correcting, praising

Extensions

1. What about if we stretched the letter N in two directions at once? Ps come to BB ro draw the stretched images. Class agrees/disagrees.

Solution:



Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Agreement, praising

2. Is the letter N symmetrical? (It does not have line symmetry but it does have <u>rotational</u> symmetry.) T (Ps) demonstrate by pinning a letter N to BB and rotating it. It covers itself exactly 2 times in one complete turn, so we say that it has rotational symmetry of order 2.

Whole class discussion

T has letter N already prepared.

Praising if Ps remember the concept from Y2.

45 min

Y4

R: Calculations. Quantities

C: Similarity and congruence. Reflection. Symmetry

E: Problems

Lesson Plan 57

Activity

Notes

1

Table 1

Study this table. Think about what the rule could be. Agree on one form of rule in words (e.g. top row equals 4 times the bottom row).

Revise relationship btween the units of length. (BB)

Ps come to BB to choose a column and fill in the missing number, explaining reasoning. Accept any correct unit of length.

Class points out errors. Who can write the rule in a mathematical way? Who agrees? Who can think of another way to write it? etc.

BB:

	(127 cm)	(42 cm)		(1540 cm)	(70 cm)		(25 cm)	(half a m)
a	1 m 27 cm	420 mm	5 km	15 m 40 cm	**700 mm**	1700 km	**1 quarter of a metre**	50 cm
b	5 m 8 cm	1680 mm	20 km	**61 m 60 cm**	2800 mm	**6800 km**	1 metre	**200 cm**
	(508 cm)	(168 cm)		(6160 cm)	(280 cm)		(100 cm)	(2 m)

$a = b \div 4$, $b = 4 \times a$, $b \div a = 4$, $a \div b = 1$ quarter

T points to a quantity, Ps change it to different units.

Extension

Everyone stand up! Hold your hands 1 m (100 cm, 50 cm, 10 cm, 1 cm, 1 mm) apart . . . now! T walks round, quickly checking and correcting Ps measures with prepared strips of card or a ruler

5 min

Whole class activity

Drawn on BB or use enlarged copy master or OHP

BB: 1 km = 1000 m
1 m = 100 cm = 1000 mm
1 cm = 10 mm

At a good pace

Reasoning (converting some quantities to a more suitable unit) agreement, praising

Discussion, agreement on the rule.

At speed. Agreement, praising

In good humour, especially in the case of way-out estimates!

Ps can check neighours too.

2

Table 2

Study this table. Think about what the rule could be. Agree on one form of rule in words (e.g. sum of top and bottom rows equals 12 hours).

Revise relationships between the units of time. (BB)

Ps come to BB to choose a column and fill in the missing number. Class points out errors. Who can write the rule in a mathematical way? Who agrees? Who can think of another way to write it? etc.

BB:

			(4 hrs)						
x	5 hours	4 hrs 20 min	240 min	11 hours	**2 hrs 45 min**	6 hrs 21 min	**1 hr 59 mins**	710 min	3 hrs 18 min 30 sec
y	7 hours	7 hrs 40 min	8 hours	**1 hour**	9 hrs 15 min	**5 hrs 39 min**	10 hrs 1 min	**10 min**	**8 hrs 41 min 30 sec**

Rule: $x + y = 12$ hours, $x = 12$ hrs $- y$, $y = 12$ hrs $- x$

Extension

T points to a value in table. Ps say it as difference between 2 real times. (e.g. 3.20 pm to 7.40 pm is 4 hours 20 minutes; 8 o'clock in the morning to 1 minute past 6 in the evening is 10 hours 1 minute, etc.)

10 min

Whole class activity

Drawn on BB or use enlarged copy master or OHP

BB: 1 hr = 60 minutes
1 min = 60 seconds

At a good pace

Reasoning, agreement, praising

Discussion, agreement on the rule.

Agreement, praising

(or in pairs: P_1 gives start time and P_2 gives later time)

3

Secret numbers

What number am I thinking of? Listen tto the clues and show me the answer when I say.

a) *It is a 4-digit number. It has the greatest possible units digit and the smallest possible hundreds digit. In the tens column it has the greatest possible even digit. It is less than 2000.*

Show me . . . now! (1089) P answering correctly explains to class.

b) *If I divide it by 7 the quotient is 317, remainder 4.*

Show me . . now! (2223) P answering correctly explains to class.

BB: $317 \times 7 + 4 = 2100 + 70 + 49 + 4 = 2170 + 53 = \underline{2223}$

c) *It is less than 40 and divisible by 2, 7 and 4.*

Show me . . now! (28) P answering correctly explains to class.

16 min

Whole class activity

T repeats each clue slowly to give Ps time to think/calculate.

Ps show answers on scrap paper or slates in unison.

Ps do necessary calculations on back of slates or in *Ex. Bks*.

Discussion, agreement, checking, praising

c) Agree that 'divisible by 2' is unnecessary information!

BB: $7 \times 4 = \underline{28}$

Y4

Lesson Plan 57

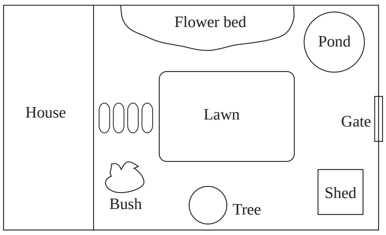
Activity | ***Notes***

4

Plans and maps

a) This is the plan of a garden. What does it show? e.g.

BB:



What is missing from the plan? (a scale) T writes it above the plan.

Which distance shall we measure? (e.g. from the Tree to the Flower bed) Ps come to BB to measure using BB ruler or a pair of compasses which they then hold against a ruler (with T's help). Lengths need only be approximate.

What distance would it be in real life? Let's show it in a table.

Continue with other measurements suggested by Ps. T could ask questions in the other direction too! e.g. In the real garden there is a fountain in the middle of the lawn. It is 1 and a half metres wide. How wide would it be on the plan? (half a cm or 5 mm) etc.

b) T has copy of a real map pinned to BB (or on an OHT) and Ps have copies on desks too if possible. Talk about what the map shows and what the scale is first.

Ps come to BB in pairs, choose 2 places on the map and measure the map distance. Class helps them to work out the real distance.

T asks questions in both directions. e.g. How far is A from B in real life? If the real distance between C and D is 10 km, how far apart are they on the map? Ps can ask the questions too!

Whole class activity

Drawn on BB or items cut from magazines and stuck to BB, or rough plan of T's own garden, or use enlarged copy master or OHP

Ps decide which distances to measure.

BB: e.g. *Scale*: 1 cm → 3 m

	On plan	In real life
T to F:	9 cm	27 m
H to S:	15 cm	45 m
etc.		

Agreement, praising

Ps could think of questions too!

Use simple map of local area if possible.

(Or Ps work in pairs on maps on desks, choose 2 places, measure the distance and convert to the real life distance.

Then Ps relate their findings to class. Deal with all cases.)

22 min

5

PbY4a, page 57

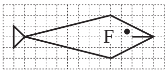
Q.1 Read: *i) Complete the drawings of fish F on the other grids.*
ii) Colour the fish which is similar to fish F.

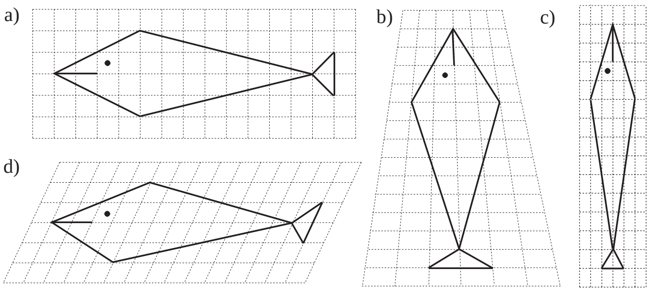
Ps use rulers to draw the straight lines. Ps count the number of grid units along and up on F before drawing the copies.

Review at BB with whole class. Ps come to BB or T has solution already prepared and uncovers each part as it is dealt with. **A**, which fish did you colour? Who agrees? etc.

Solution: Who can write it in a mathematical way?

BB: F ~ a





Individual work, monitored, helped, corrected

Drawn on BB or use enlarged copy master or OHP

Agreement, self-correction, praising

What has been done to fish F to make the other fish?

Ps come to BB to point and explain. Class agrees/disagrees. T helps with mathematical terms if necessary.

a) enlarged

b) enlarged and stretched vertically at the tail end

c) stretched horizontally

d) enlarged and skewed (pushed over) to the right

30 min

Y4

Lesson Plan 57

Activity

6

PbY4a, page 57

Q.2 Read: *a) Draw over in the same colour the perimeters of similar shapes.*

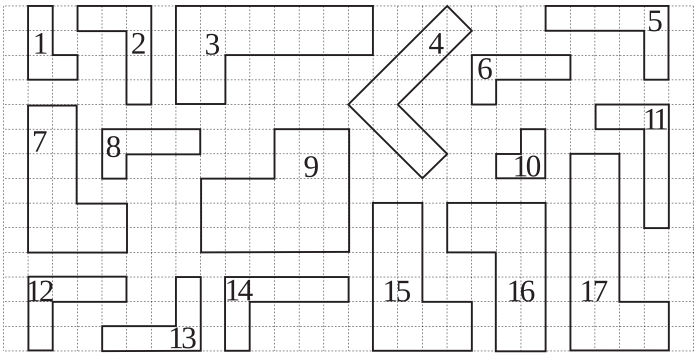
b) Colour in the same colour the shapes which are congruent.

What name could you give to all these shapes? (Polygons or hexagons) Are they convex or concave? (concave)

More able Ps could number the shapes and list the similar and congruent shapes in *Ex. Bks* if they prefer.

Review at BB with whole class. T numbers the shapes and Ps dictate the similar and congruent ones (or come to BB to point).

Solution:



a) 1 ~ 7 ~ 15 ~ 16, 2 ~ 4 ~ 12 ~ 13, 3 ~ 6 ~ 8 ~ 17,
5 ~ 11 ~ 14

b) 2 ≅12 ≅ 13, 3 ≅ 17, 5 ≅ 11 ≅ 14, 6 ≅ 8, 7 ≅ 15 ≅ 16

38 min

Notes

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Agreement, praising

Elicit this method from Ps themselves. (How else could we show which shapes are similar and which are congruent?)

Discussion, reasoning, agreement, self-correcting, praising

T could have congruent shapes already cut out to show that they cover each other exactly.

(Note that 5 has to be turned over so that it fits 11 or 14.)

What can you tell me about the angles in each hexagon? (There are 5 right angles and one obtuse angle. There are no acute angles.)

7

PbY4a, page 57

Q.3 Read: *a) Enlarge the boat to twice its size.*

b) Reduce the boat to half its size.

How can we do it? (Count the number of grid units in each line segment, then multiply it by 2 for a) and divide by 2 for b).

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

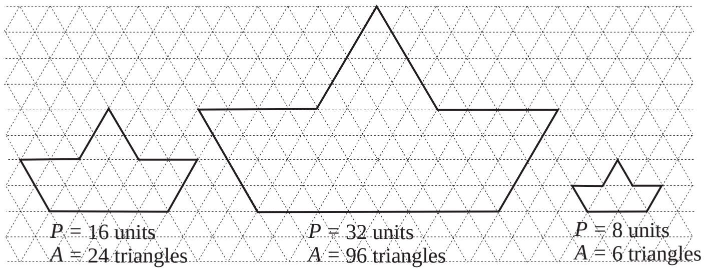
Read: *c) Count the perimeter of each boat.*

d) Count the area of each boat.

Elicit that perimeter is counted in grid units (i.e. the side of a grid triangle) and the area is counted in grid triangles..

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

Solution:



45 min

Notes

Individual work, monitored, helped, corrected.

Drawn on BB or use enlarged copy master or OHP

Discussion, agreement, self-correction, praising

Discussion, agreement, self-correcting, praising

What do you notice?

If each line section is:

- enlarged by 2 times, the area is enlarged by 2 × 2 = 4 times;
- reduced by a half, the area is reduced by half of a half = 1 quarter.

If each line section is increased by 3 times, by how many times will the area increase? (9 times)

Y4

R: Calculations
C: Similarity and congruence
E: Problems

Lesson Plan 58

Activity | ***Notes***

1

Mental practice

a) Multiplication and division tables: in relay round class. T says a multiplication or division, P gives result and says another multiplication or division to next P.

b) T says an operation, Ps say result. T asks some Ps to explain their reasoning too. e.g.

4200 + 3300 (7500), 9050 – 4070 (4980), 621 + 620 (1241),

70 × 19 (= 70 × 20 – 70 = 1400 – 70 = $\underline{1330}$),

4200 ÷ 5 (= 4200 ÷ 10 × 2 = 420 × 2 = $\underline{840}$) etc.

Whole class activity

Class points out errors or repeats. At speed.

T chooses Ps at random.

If a P makes a mistake, the next P corrects it.

(Or results shown on scrap paper or slates on command.)

5 min

2

Factorising

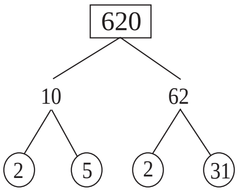
What is a <u>factor</u> of a number? (A factor of a number divides into that number exactly, or multiplies another number to make that number.) What is a <u>prime factor</u> of a number? (A factor which cannot be broken down any further, or is divisible only by itself and 1.)

Whole class activity

Quick revision of terms

a) Who remembers how to find the prime factors of a number?
P comes to BB to start diagram (or T starts if nobody remembers) and other Ps continue. Let's write the number as a multipication of its prime factors in increasing order. Ps dictate what T should write. Class checks that the product equals the number being factorised.

BB:
e.g.



<u>Prime factors of 620</u>

620 = 2 × 2 × 5 × 31

<u>Factors of 620</u>

1,	2,	4,	5,	10,	20,
620,	310,	155,	124,	62,	31,

Are these the only factors of 620? (No, there are other factors, e.g. 1 and 620, 10 and 62, or <u>any</u> combination of the prime factors.)

Let's list <u>all</u> the factors of 620. Let's do it logically. Ps dictate the factors to T or come to BB. (List shown above) Class points out errors.

Ps choose 2 starting factors (it does mot matter which two)

Reasoning, agreement, praising

At a good pace

Prime factors elicited first, then used to obtain other factors.

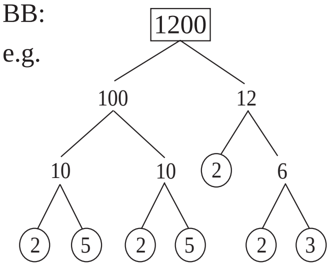
(It is easier to list the factors in vertical pairs, as opposite.)

Discussion, agreement, checking, praising

T helps, showing how to use the prime factors to obtain the other factors.

b) Repeat in similar way for 1200. Ps choose the 2 starting factors.

BB:
e.g.



<u>Prime factors of 1200</u>

1200 = 2 × 2 × 2 × 2 × 3 × 5 × 5

<u>Factors of 1200</u>

1,	2,	3,	4,	5,	6,	8,	10,	12,	15,	16,	20,	24,	25,	30,
1200,	600,	400,	300,	240,	200,	150,	120,	100,	80,	75,	60,	50,	48,	40,

Calculator can be used to check the multiplication and to obtain other factors from the prime factors.

Reasoning, agreement, praising

13 min

Y4

Lesson Plan 58

Activity

Notes

3

Tessellation

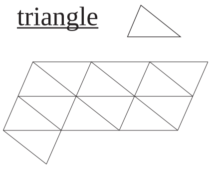
Ps have various sets of congruent shapes on desks. Use the congruent shapes as tiles and fit them together in different ways so that there is no space between any of them. The mathematical name for this is to tessellate. (BB)

Deal with one shape at a time. T holds it up and Ps name it and tell what they know about it. See if you can tessellate with these shapes and how many different patterns you can make! Set a time limit.

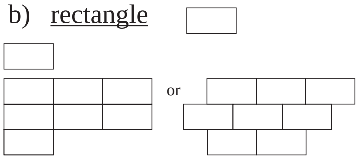
Review at BB with whole class. Ps come to BB to stick on (or draw) their patterns. Class agrees or disagrees whether they are valid (i.e. no spaces between the shapes). (Or T has SB or OHT already prepared.)

BB: a) triangle

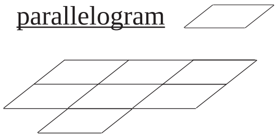
e.g.



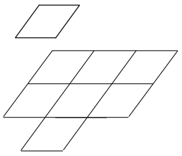
b) rectangle



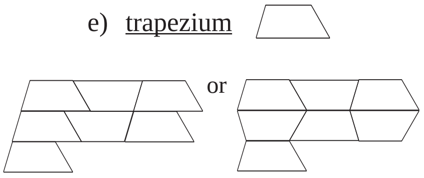
c) parallelogram



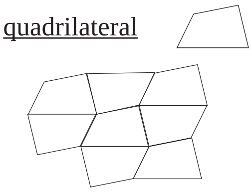
d) rhombus



e) trapezium



f) quadrilateral



25 min

Paired work, monitored, helped

Can use copy master copied on to coloured card and cut out.

BB: to tessellate : to tile

(relate to tiling a wall or floor)

Whole class discussion about each type of shape first.

Agreement, praising

What can you tell me about the patterns?

(e.g.which lines are parallel and which are perpendicular; types of angles; which patterns have horizontal, vertical, or slanting sides, etc.)

What has been done to the 1st shape in the pattern to make the others? Ps expalain in own words. T mentions:

- reflection vertically or horizontally or diagonally
- translation (movement)

and demonstrates each on BB.

4

PbY4a, page 58

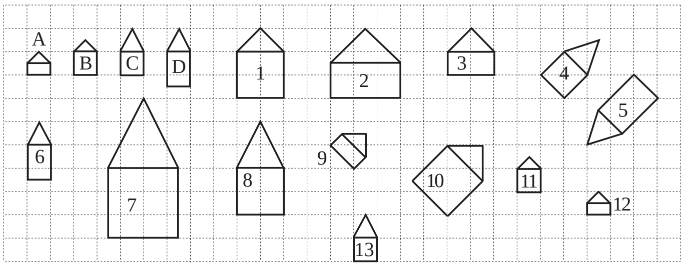
Q.1 Read: a) *List the numbers of the houses which are similar to: House A, House B, House C and House D.*

b) *List the houses which are congruent to one another.*

Ps can list only the numbers of the houses or write in a mathematical way using the notation ~ and ≅.

Review at BB with whole class. Ps come to BB or dicatate to T. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:



a) A ~ 2 ~ 3 ~ 9 ~ 12 B ~ 1 ~ 10 ~ 11
C ~ 4 ~ 7 ~ 8 D ~ 5 ~ 6

b) A ≅ 12, B ≅ 11, D ≅ 6

Elicit that no house is congruent to C. Ps draw one. (C ≅ 13)

31 min

Individual work, monitored, helped

Use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correction, praising

Feedback for T

Extension

Discuss the ratio of enlargement of similar houses.

e.g. A → 2 (× 3)
A → 3 (× 2)
C → 7 (× 3)
C → 8 (× 2) etc.

Stress that every side of the shape has been enlarged by this amount of times.

Y4

Lesson Plan 58

Activity

5

PbY4a, page 58

Q.2 a) Read: *Write the perimeter and area of each shape using the units shown.*

Ps need only write the numerical values. Set a time limit.

Review at BB with whole class. Ps come to BB or dictate to T, but saying 'grid units' or 'grid squares' . Class agrees/ disagrees. Mistakes discussed and corrected.

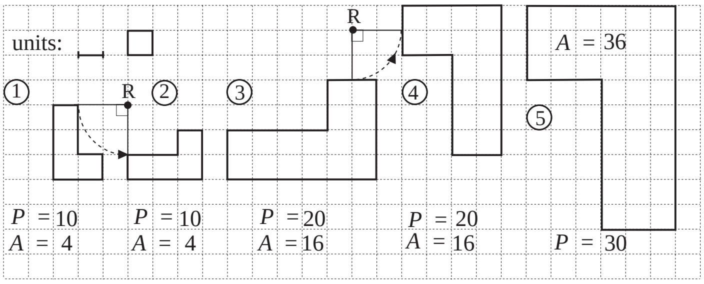
b) Read: *What have we done to each shape to make the next shape?*

Let Ps think about it for a minute. Ps come to BB to explain in own words. T repeats using mathematical terms. (rotation, enlargement) Encourage Ps to use them too.

In the case of rotation, T shows the point of rotation (R) and elicits through what kind of angle the shape has been rotated.

In the case of enlargement, Ps give the ratio of enlargement.

Solution:



① $\xrightarrow[\text{by 1 }\llcorner]{\text{rotation}}$ ② $\xrightarrow[\times\ 2]{\text{enlargement}}$ ③ $\xrightarrow[\text{by 1 }\llcorner]{\text{rotation}}$ ④ $\xrightarrow[\times\ 1\frac{1}{2}]{\text{enlargement}}$ ⑤

Which shapes are similar? (① ~ ② ~ ③ ~ ④ ~ ⑤)

Which shapes are congruent? (① ≅ ②, ③ ≅ ④)

Extension

Who can show me 1 cm square on the grid? Ps measure the grids in *Pbs*, then come to BB to show it. BB: 1 cm × 1 cm = 1 cm^2

Who remembers the short way to write 1 cm square? (1 cm^2)

What is the area of each of the shapes in cm^2?

(① and ②: A = 1 cm^2, ③ and ④: A = 4 cm^2, ⑤: A = 9 cm^2)

38 min

Notes

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Whole class activity

Involve several Ps.

Discussion, demonstration, agreement, praising

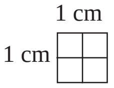
T could have models of shapes cut out and stuck to wires or strips of stiff card, then pinned to BB at points R to show rotation.

Elicit that from ① to ⑤ is an enlargement by 3 times.
i.e. ratio of enlargement = 3

∟ 1 right angle

Ps dictate to T who writes on BB. Agreement, praising

BB:



A = 1 cm^2

Ps divide up grids in *Pbs* into cm squares, then dictate to T.

Agreement, praising

Y4

Lesson Plan 58

Activity

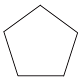
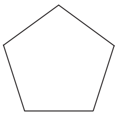
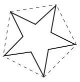
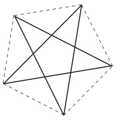
Notes

6

Erratum

In part c), 'trianges ' should be 'triangles'

PbY4a, page 58

Q.3 i)  ii)  iii)  iv) 

Individual work, monitored, but class kept together on activities.

a) Read: *Draw over in green the sides of the regular pentagons in i) and ii).*

Drawn on BB or use enlarged copy master or OHP

b) Read: *Colour blue the 5-pointed star in iii).*

Praising

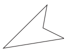
c) Read: *How many triangles, quadrilaterals and pentagons can you see in iv)?*

Individual trial first, then whole class review

Tell Ps to count only shapes within the solid lines! Ask several Ps for their totals. Ps come to BB to show the outline of the shapes while class keeps count.

Discussion, demonstration, agreement, praising

Solution:

Triangles: <u>10</u>, quadrilaterals: <u>10</u>
(5 convex  + 5 concave );

pentagons: <u>6</u> (1 convex  + 5 concave )

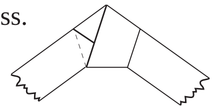
Draw the individual shapes on BB if there are problems.

Elicit the difference betwen the 2 types of qadrilaterals and pentagons.

d) Read: *Try to make a pentagon from a paper strip like this.*

Individual trial, monitored, helped

Ps have one or two paper strips on desks. T has large model already made up to show to class.



When you have done it, colour the pentagon you have made.

T (or P who managed it well) demonstrates to class.

Demonstration, praising

What can you tell me about this pentagon?
(e.g. Its 5 sides are equal in length, so it is a <u>regular</u> pentagon. It has 5 obtuse angles. It is similar to i) and ii). It is convex.)

T gives hints if Ps cannot think of anything.

Praising, encouragement only!

Extension

What is the connection between the pentagons and the 5-pointed stars? (The 5-pointed star in iv) has been made by drawing the <u>diagonals</u> of a pentagon. The 5-pointed star in iii) is the star in iv) with the sides of the middle pentagon deleted.)

Whole class discussion

Extra praise if Ps think of this without help.

What mathematical name can you think of for the 5-pointed star? (10-sided polygon, or decagon) What else can you say about it? (All its sides are equal. It has acute and obtuse angles. It is concave.)

BB: <u>decagon</u>
10-sided polygon

Praise all positive contributions.

45 min

Y4

R: Calculations
C: Revision: angles, parallel/perpendicular, shapes, solids
E: Problems

Lesson Plan 59

Activity

Notes

1

Missing quantities 1

Study these quantities. What are they measures of? (length or distance) Quickly revise relationship between units of length. (BB)

Let's change the quantities to the units shown. Ps come to BB to fill in missing values, explaining reasoning. Class agrees/disagrees.

BB:

a) 7 km 300 m = $\boxed{7300}$ m
4 km 83 m = $\boxed{4083}$ m
3 km 120 m = $\boxed{3120}$ m
16 km 9 m = $\boxed{16\,009}$ m

b) 5630 m = $\boxed{5}$ km $\boxed{630}$ m
3043 m = $\boxed{3}$ km $\boxed{43}$ m
9302 m = $\boxed{9}$ km $\boxed{302}$ m
14 150 m = $\boxed{14}$ km $\boxed{150}$ m

5 min

Whole class activity

Written on BB or use enlarged copy master or OHP

BB: 1 km = 1000 m
1 m = 100 cm = 1000 mm
1 cm = 10 mm

At a good pace

Reasoning, agreement, praising

Feedback for T

(or done as a mental practice and Ps show results on scrap paper or slates on command)

2

Missing quantities 2

Let's round these lengths to the nearest whole metre. Ps come to BB to write missing numbers, explaining reasoning. Class agrees/disagrees.

BB:

a) 640 cm ≈ $\boxed{6}$ m
450 cm ≈ $\boxed{5}$ m
530 cm ≈ $\boxed{5}$ m
680 cm ≈ $\boxed{7}$ m

b) 398 cm ≈ $\boxed{4}$ m
287 cm ≈ $\boxed{3}$ m
438 cm ≈ $\boxed{4}$ m
648 mm ≈ $\boxed{1}$ m

c) 5 m 5 cm ≈ $\boxed{5}$ m
5 m 50 cm ≈ $\boxed{6}$ m
6048 mm ≈ $\boxed{6}$ m
5005 mm ≈ $\boxed{5}$ m

10 min

Whole class activity

Written on BB or use enlarged copy master or OHP

At good pace

Reasoning, agreement, praising

(or done as a mental practice and Ps show results on scrap paper or slates on command)

3

Missing operations

T points to each arrow in turn. What operation is missing from this arrow? Show me . . . now! Ps who respond correctly come to BB to write in the missing number and sign, explaining reasoning.

BB:

a) $1\text{ m} \underset{\times 2}{\overset{\div 2}{\rightleftarrows}} 50\text{ cm}$

b) $1\text{ km} \underset{\times 4}{\overset{\div 4}{\rightleftarrows}} 250\text{ m}$

c) $40\text{ cm} \underset{\times 10}{\overset{\div 10}{\rightleftarrows}} 40\text{ mm}$

d) $40\text{ cm} \underset{\div 5}{\overset{\times 5}{\rightleftarrows}} 2\text{ m}$

Whole class activity but individual feedback on scrap paper or slates.

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Extension

T points to a length (distance). Ps show it with hands or in classroom or mention a place locally which is roughly that distance away.

(e.g. A is sitting about 2 m away from B. The park is about 1 km from the school.)

15 min

Whole class activity

(Estimation practice)

Class agrees/disagrees on accuracy of examples.

Y4

Lesson Plan 59

Activity

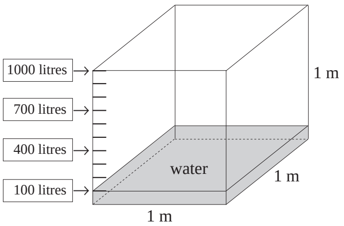
Notes

4

Capacity

This is a diagram of a fish tank. BB:

What shape is it? (cube)



a) 100 litres of water have been poured in. What is the depth of the water? (10 cm) Why?

(1 m has been divided into 10 equal parts, so there is a tick at every 10 cm)

BB: 1 m = 100 cm, 100 cm ÷ 10 = 10 cm

A, come and show us where the water has reached 10 cm and write the missing quantity in the box. (100 litres)

If the level of the water was at each of the other arrows, how much water would be in the tank? Ps come to BB to fill in the missing quantities. Class agrees/disagrees.

b) This table shows the how much water there is in the tank at certain levels. Let's complete the table. Ps come to BB to choose a column and fill in the missing value, explaining reasoning. Class agrees/disagrees.

Who can write a rule for the table? Who agrees? Who can write it in a different way? etc.

BB:

Level of water	10 cm	20 cm	40 cm	**50 cm**	**70 cm**	100 cm	1 cm	**3 cm**	1 mm	**7 mm**
Amount of water	100 litres	**200 litres**	**400 litres**	500 litres	700 litres	**1000 litres**	**10 litres**	30 litres	**1 litre**	7 litres

20 min

Whole class activity

Drawn on BB or use enlarged copy master or OHP

(If possible, T could have a real cubic fish tank to show.)

Discussion on meaning of scale on side of diagram.

At a good pace

Agreement, praising

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Rule:

Let W = water, L = level

W (litres) = $10 \times L$ (cm),

$L = W \div 10$, $W \div L = 10$

$(L \div W = 1 \text{ tenth})$

Information for Ts

100 litres = 1 hectolitre,

1 m^3 of water → 1000 litres,

1 cm^3 of water → 1 ml,

1 cl of water → 10 cm^3,

1 litre of water → 1000 cm^3

5

Diagonals of rectangles

Ps have a 2 shapes on desks, a 3 × 4 rectangle and a 3 × 3 square.

a) Let's start with the rectangle.

i) Draw its diagonals. Are the diagonals also lines of symmetry? Find out by folding your shape diagonally. (No, they are not.)

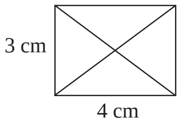
ii) Cut the rectangle along its diagonals. How many polygons did you get? (4) What shapes are they? (isosceles triangles, i.e. 2 sides are equal in length) Are any of the triangles congruent? (There are 2 different pairs of congruent triangles.)

b) Repeat all the above with the square. Elicit that:

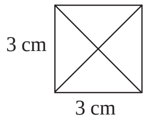
- The 2 diagonals are also lines of symmetry (mirror lines).
- The 2 diagonals are perpendicular to one another.
- After cutting, there are 4 congruent, right-angled, isosceles triangles.

26 min

Individual work, monitored, helped, but class kept together on the tasks.



Discussion, agreement, praising



Discussion, agreement, praising

Y4

Lesson Plan 59

Activity | ***Notes***

6

PbY4a, page 59

Q.1. Read: *Write the real distances on the sections below each map scale.*

Deal with one part at a time. Ps measure diagram in *Pbs*, then come to BB to explain the linear scale and what each black and white section means. Ps agree on a suitable scale and T writes above each diagram on BB and Ps in *Pbs*.

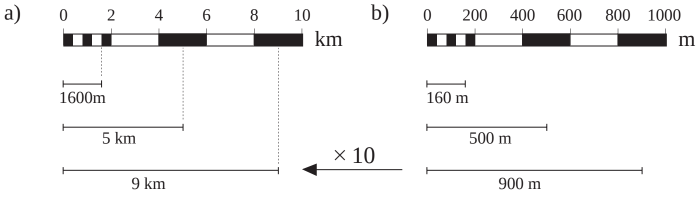
Ps write lengths below each line segment in *Pbs*. Review at BB with whole class. Ps come to BB or dictate to T. Class agrees/ disagrees. Mistakes discussed and corrected.

Extension

Who could write each scale in another way? Ps come to BB.

Solution:

Scale: 1 cm → 2000 m *Scale:* 1 cm → 200 m



Ext: *Scale:* 1 mm → 200 m *Scale:* 1 mm → 20 m

Individual work, monitored, helped

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

Initial whole class discussion on the scales.

Reasoning, agreement, self-correction, praising

Agreement, praising

What is the relationship between the two linear scales?

[a) represents 10 times more distance than b) does.]

30 min

7

PbY4a, page 59

Q.2 Read: *Draw 2 parallel lines so that their distance apart is:*

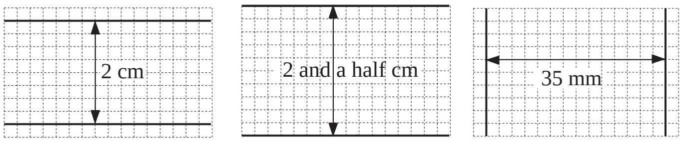
a) 2 cm b) 2 and a half cm c) 35 mm

Let Ps try it without initial discussion. Set a time limit.

Review at BB with whole class. Ps come to BB to draw lines, marking them with arrowheads. Class agrees/disagrees. Mistakes discussed and corrected. Elicit that the grid lines are 2.5 mm apart, so every 4 grid lines are 1 cm.

Solution: e.g.

a) (20 mm) b) (25 mm) c) (3.5 cm)



Individual work, monitored, helped

Use enlarged copy master or OHP for demonstration only!

Discussion, reasoning, agreement, self-correction, praising

Accept any pair of parallel lines which are the correct perpendicular distance apart.

Feedback for T

36 min

8

PbY4a, page 59

Q.3 T reads questions and Ps show compass points on scrap paper or slates on commmand. P who answered incorrectly stands up and does the turn physically, or shows it on a model or diagram.

Read: *Which compass point would we reach if we:*

- *a) faced NW, then turned 1 right angle to the right*
- *b) faced SE and turned 1 and a half right angles to the left*
- *c) faced SW and and turned 2 right angles to the right*
- *d) faced NE and turned half a right angle to the right?*

Or all Ps stand up and turn as instructed by T (or a P).

Whole class activity

(or individual work if Ps prefer, reviewed orally with whole class)

a) NE

b) N

c) NE

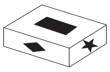
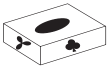
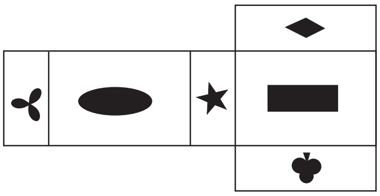
d) E Feedback for T

In good humour!

40 min

Y4

Lesson Plan 59

Activity		***Notes***
9	***PbY4a, page 59***	
	Q.4 Read: *On each side of a cuboid-shaped box there is a different symbol.* *Three faces of the box look like this.*  *The other 3 faces look like this.*  How many faces does a a cuboid have? (6)	Individual work, monitored, helped T has large models of cuboid and net already prepared.
	Read: *After cutting along some edges, we flattened out the box and got this net. Draw the other symbols on the correct faces.*	Or drawn on BB or use enlarged copy master or OHP Ps have blank nets and cuboids on desks if possible.
	T could show large model to class, and or Ps could draw the symbols on blak cuboids first.	
	Review at BB with whole class. Ps come to BB to draw (stick on) symbols. Class agrees/disagrees. T cuts original model and confirms correct solution.	Agreement, self-correcting, praising
	Solution: 	
	What can you tell me about the net? (e.g. It is an 8-sided polygon or octagon. It is concave. Is is 2-dimensional. It is a plane shape.)	Whole class discussion. Agreement, praising
	What other name can you give the cuboid it forms? (polyhedron with 6 faces or hexahedron) Elicit that it is convex (as two flies buzzing around inside could not hide from each other) and 3-dimensional.	BB: octagon — octahedron 8 sides — 8 faces 2–D — 3–D

45 min

Y4

Lesson Plan *60*

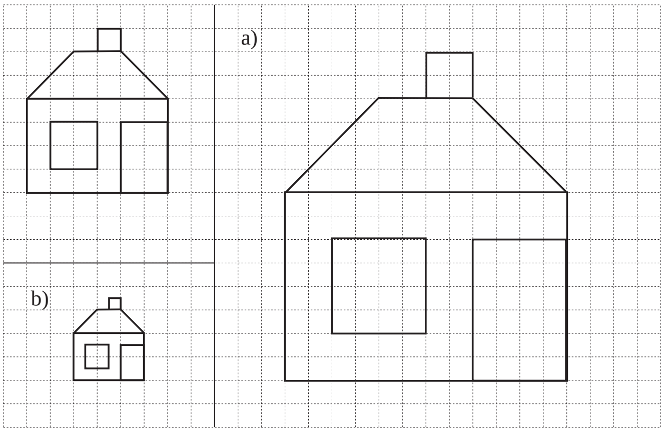
Activity

Notes

Tables and calculation practice, revision, activities, consolidation
PbY4a, page 60

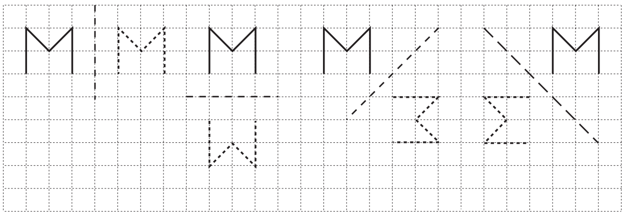
Solutions:

Q.1

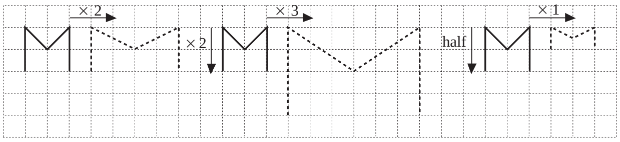


c) i) 33 unit squares
ii) 132 unit squares
iii) 8 and a quarter unit squares

Q.2 a)



b)



Q.3 $A = 15 \times 15 = 15 \times 10 + 15 \times 5 = 150 + 75 = \underline{225}\ (\text{cm}^2)$

Y4

R: Mental calculation
C: Multiplication and division (with 1-digit multiplier/divisor)
E Problems

Lesson Plan 61

Activity | ***Notes***

1

Natural numbers

What are natural numbers? (positive, whole numbers, e.g. 1, 2, 3, etc.)
How many digits would we write if we wrote all the natural numbers:

a) from 10 to 99?

Allow Ps time to calculate in *Ex. Bks*. Show me . . . now! (180)

P who answered correctly explains to those who did not.

Reasoning: There are 90 natural numbers from 10 to 99 (for each of the 9 possible tens digits there are 10 possible units digits, i.e. 9 × 10 = 90 numbers). Each of these 90 numbers has 2 digits, so we would write 90 × 2 = <u>180</u> digits.

b) from 100 to 999?

Allow Ps time to calculate in *Ex. Bks*. Show me . . . now! (2700)

P who answered correctly explains to those who did not.

Reasoning: There are 900 natural numbers from 100 to 999 (for each of the 9 possible hundreds digits there are 10 possible tens digits and for each of the 10 possible tens digits there are 10 possible units digits, i.e. 9 ×10 × 10 = 900 numbers). Each of these 900 numbers has 3 digits, so we would write 900 × 3 = <u>2700</u> digits.

Whole class activity
Agreement, praising

Answers shown on scrap paper or slates in unison.

Reasoning, agreement, praising

In unison

Reasoning, agreement, praising

Feedback for T

5 min

2

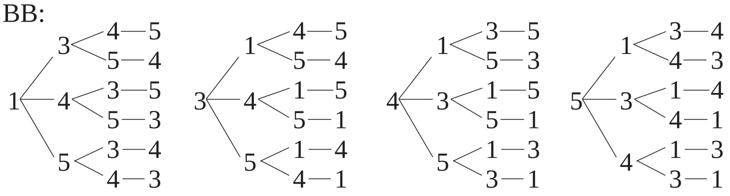
Combinatorics

How many 4-digit different numbers can you make using these four digit cards?

a) BB: $\boxed{1}$ $\boxed{3}$ $\boxed{4}$ $\boxed{5}$

Let Ps think about it and discuss it with their neighbours first.
T asks several Ps what they think. Let's show the possible numbers on the BB in a logical way using a <u>tree diagram</u>. Ps come to BB if they remember what to do or T starts and Ps continue.

BB:

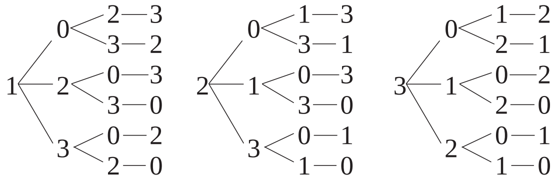


Elicit that there are <u>24</u> possible numbers. How could we have worked it out without writing down all the numbers?

(There are 4 possible cards for the thousands digit; for every thousands digit there will be 3 possible hundreds digits left; for every hundreds digit there will be 2 possible tens digits left; for each of the tens digits there will be only 1 digit left as the units digit, i.e. 4 × 3 × 2 × 1 = <u>24</u> .)

b) Repeat for BB: $\boxed{0}$ $\boxed{1}$ $\boxed{2}$ $\boxed{3}$

BB:



Extension

Which of these numbers are divisible by 5 (10, 2)?

Whole class activity
Number cards stuck on BB

Discussion on strategy for solution. Exra praise if Ps suggest tree diagrams without help from T.
At a good pace
With T's help

Agreement, praising

Extra praise if Ps can reason correctly without help from T.

As zero cannot be used as a possible thousands digit, the number of possible numbers is
3 × 3 × 2 × 1 = <u>18</u>

Class dictates and T points.
Elicit the general 'rules'.

15 min

Y4

Lesson Plan 61

Activity

Notes

3

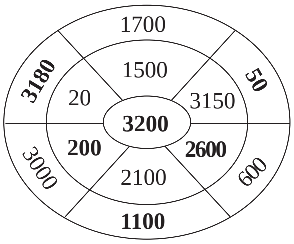
Puzzles

Study each diagram. Think about what the rule could be. When you know it, stand up. T chooses Ps standing to come to BB to fill in a missing number. Class agrees/disagrees. Other Ps gradually stand up when they understand the rule.

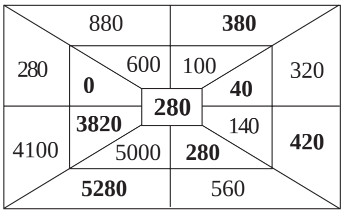
Who can tell me the rule? Who agrees? Who can say it another way? etc. Ps suggest other pairs of numbers which could have been written in each diagram.

BB:

a)



b)



Rules:

a) In each segment, the sum of the outer and middle numbers is 3200.

b) In each segment, the difference between the outer number and the middle number is 280.

Notes:

Whole class activity

Drawn n BB or use enlarged copy master or OHP

In good humour!

At a good pace

Reasoning, agreement, praising

Bold numbers (excluding middle numbers) are missing.

Feedback for T

or

a) outer = 3200 – middle,
middle = 3200 – outer

b) middle + 280 = outer,
outer – 280 = middle

21 min

4

Multiplication and division

Let's fill in the missing numbers and signs. Ps come to BB to write missing items, explaining reasoning. Class agrees/disagrees.

BB:

a)
$$\begin{tikzcd}120 \arrow[r, "\times 3"] \arrow[rr, bend right, "\boxed{\times 30}"'] & \boxed{360} \arrow[r, "\times 10"] & \boxed{3600}\end{tikzcd}$$

c)
$$\begin{tikzcd}35 \arrow[r, "\times 4"] \arrow[rr, bend right, "\times 400"'] & \boxed{140} \arrow[r, "\boxed{\times 100}"] & \boxed{14\,000}\end{tikzcd}$$

b)
$$\begin{tikzcd}9600 \arrow[r, "\div 100"] \arrow[rr, bend right, "\boxed{\div 600}"'] & \boxed{96} \arrow[r, "\div 6"] & \boxed{16}\end{tikzcd}$$

d)
$$\begin{tikzcd}12\,000 \arrow[r, "\div 10"] \arrow[rr, bend right, "\div 50"'] & \boxed{1200} \arrow[r, "\boxed{\div 5}"] & \boxed{240}\end{tikzcd}$$

What is the connection between the top and bottom arrows?

Notes:

Whole class activity

Written on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Elicit that, e.g.

$120 \times 3 \times 10 = 120 \times 30$

$9600 \div 100 \div 6 = 9600 \div 600$

etc.

25 min

5

PbY4a, page 61

Q.1 Read: *Write a number in the box so that the statement is true.*

Let's see how many of these you can do in 3 minutes! Write the results too if you have time. Start . . . now! . . . Stop!

Review at BB with whole class. Ps come to BB or dictate the missing numbers and give the results too. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a)

$27 \times 100 = \overset{2700}{270 \times} \boxed{10}$

$49 \times 100 = \overset{4900}{4900 \times} \boxed{1}$

$60 \times 100 = \overset{6000}{1000 \times} \boxed{6}$

$34 \times 100 = \overset{3400}{10 \times} \boxed{340}$

$92 \times 100 = \overset{9200}{920 \times} \boxed{10}$

b)

$130 \times 100 = \overset{13\,000}{13 \times} \boxed{1000}$

$19 \times 1000 = \overset{19\,000}{1900 \times} \boxed{10}$

$160 \times 100 = \overset{16\,000}{10 \times} \boxed{1600}$

$20 \times 1000 = \overset{20\,000}{100 \times} \boxed{200}$

$17 \times 1000 = \overset{17\,000}{170 \times} \boxed{100}$

Notes:

Individual work, monitored, helped

Written on BB or use enlarged copy master or OHP

Differentiation by time limit

Reasoning, agreement, self-correcting, praising

Extra praise if Ps do part b) correctly without help from T

30 min

Y4

Lesson Plan 61

Activity

Notes

6

PbY4a, page 61

Q.2 Read: *Do the operations in the correct order. Be careful with the brackets!*

Why do you have to be careful with the brackets? (Operations inside the brackets should be done first.)

Set a time limit. Review at BB with whole class. Ps dictate to T. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) $700 + 300 \times 5 = 700 + 1500 = \underline{2200}$

$(700 + 300) \times 5 = 1000 \times 5 = \underline{5000}$

b) $550 - 50 \times 9 = 550 - 450 = \underline{100}$

$(550 - 50) \times 9 = 500 \times 9 = \underline{4500}$

c) $200 + 300 \times 40 = 200 + 12\,000 = \underline{12\,200}$

$(200 + 300) \times 40 = 500 \times 40 = \underline{20\,000}$

d) $470 - 70 \times 5 = 470 - 350 = \underline{120}$

$(470 - 70) \times 5 = 400 \times 5 = \underline{2000}$

Individual work, monitored (helped)

Written on BB or SB or OHT

Quick revison of order of operations (brackets first, then multiplication and division, then addition and subtraction from left to right)

Differentiation by time limit

Discussion, reasoning, agreement, self-correcting, praising

Extra praise if Ps do part c) correctly

Feedback for T

35 min

7

PbY4a, page 61

Q.3 Read: *Fill in the missing quotients. Note how the dividends, divisors and quotients change.*

Set a time limit. Review at BB with whole class. Ps dictate to T. Class agrees/disagrees. Mistakes discussed and corrected.

What did you notice? (e.g. if the dividend and divisor are increased by the same amount of times, the quotient is the same.)

Solution:

a)	$18 \div 6 = \underline{3}$	$180 \div 60 = \underline{3}$	$1800 \div 600 = \underline{3}$
	$180 \div 6 = \underline{30}$	$1800 \div 60 = \underline{30}$	$18\,000 \div 600 = \underline{30}$
	$1800 \div 6 = \underline{300}$	$18\,000 \div 600 = \underline{30}$	$18\,000 \div 6000 = \underline{3}$
b)	$20 \div 4 = \underline{5}$	$200 \div 40 = \underline{5}$	$2000 \div 400 = \underline{5}$
	$200 \div 4 = \underline{50}$	$2000 \div 40 = \underline{50}$	$20\,000 \div 400 = \underline{50}$
	$2000 \div 4 = \underline{500}$	$20\,000 \div 40 = \underline{500}$	$20\,000 \div 4000 = \underline{5}$

Individual work, monitored (helped)

Written on BB or SB or OHT

Differentiation by time limit

Discussion, reasoning, agreement, self-correcting, praising

Feedback for T

40 min

8

PbY4a, page 61

Q.4 a) Read: *Write how you estimate mentally, then do the multiplication. Compare the product with the estimated result.*

Ps can estimate by rounding to nearest 1000 or nearest 100.

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

Solution:

i) $2351 \times 6 = (14\,106)$

E: $2000 \times 6 = 12000$

C: $$\begin{array}{ccccc} & 2 & 3 & 5 & 1 \\ & & & \times & 6 \\ \hline 1 & 4 & 1 & 0 & 6 \\ \hline & {\scriptstyle 2} & {\scriptstyle 3} & & \end{array}$$

ii) $1278 \times 7 = (8946)$

E: $1000 \times 7 = 7000$

C: $$\begin{array}{ccccc} & 1 & 2 & 7 & 8 \\ & & & \times & 7 \\ \hline & 8 & 9 & 4 & 6 \\ \hline & {\scriptstyle 1} & {\scriptstyle 5} & {\scriptstyle 5} & \end{array}$$

Individual work, monitored (helped)

Written on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correcting, praising

Or estimate as:

$2351 \times 6 \approx 2400 \times 6$

$= 14\,400$

Show long forms of multiplications too if Ps have difficulty understanding.

Activity

8

(Continued)

b) Read: *Estimate, calculate then check the result in your exercise book.*

Discuss the easiest way of estimating, as convential way would give 9000 ÷ 4 or 8700 ÷ 4, neither of which are easily done mentally. Agree that in this case it would be easier to round to the nearest 1000 (or 100) divisible by 4.

Ps come to BB to do the long division and checks. Rest of class works in *Ex. Bks*. Who used (remembers how to do) a short division? P comes to BB to show it, explaining reasoning.

Solution:

C:

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

E: 8654 ÷ 4 ≈ 8800 ÷ 4 = 2200

Check:

	2	1	6	3	
			×	4	
	8	6	5	2	
			+	2	
	8	6	5	4	✔

45 min

Notes

Whole class activity

Written on BB or use enlarged copy master or OHP

Discussion, agreement, praising

At a good pace

Reasoning, agreement, self-correcting, praising

or

	2	1	6	3	r 2
4	8	6	5	4	
		2	1	②	

Check against estimate too.

2163, r 2 ≈ 2200 ✔

(and with a calculator)

Y4

R: Mental calculation
C: Practice: multiplication and division
E: Problems

Lesson Plan 62

Activity

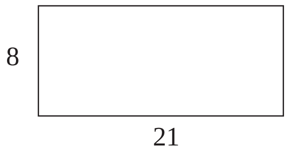
Notes

1

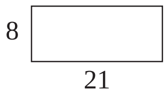
Multiplication

a) Who can suggest how to calculate the area of this rectangle? What units would you use? Elicit that the lengths of the sides are 8 units and 21 units, so the area will be in square units, or unit squares. Agree that we do not need to know the actual unit length (it could be 1 mm or 1 cm or 5 mm, etc.) to work out the area.

BB:



If the diagram was this size, would it make any difference to how we would calculate the area? (No)



Ps come to BB to work out area, or dictate to T:

BB: $A = 21 \times 8 = 20 \times 8 + 8 = 160 + 8 = \underline{168}$ (square units)

Extension

Who can write an operation for the length of the perimeter? Ps come to BB or dictate to T. Class agrees/disagrees.

BB: e.g. $P = (21 + 8) \times 2 = 29 \times 2 = 30 \times 2 - 2 = \underline{58}$ (units)

b) T has BB or SB already prepared. Imagine that we are working out the areas of other rectangles. Let's do each multiplication in two different ways. Ps come to BB or dictate to T. Class points out errors. Ps say which method they prefer and why.

BB: i) $16 \times 9 = 10 \times 9 + 6 \times 9 = 90 + 54 = \underline{144}$, or
$16 \times 9 = 16 \times 10 - 16 = 160 - 16 = \underline{144}$

ii) $19 \times 9 = 10 \times 9 + 9 \times 9 = 90 + 81 = \underline{171}$, or
$19 \times 9 = 20 \times 9 - 9 = 180 - 9 = \underline{171}$

iii) $106 \times 9 = 100 \times 9 + 6 \times 9 = 900 + 54 = \underline{954}$, or
$106 \times 9 = 106 \times 10 - 106 = 1060 - 106 = \underline{954}$

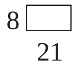
iv) $160 \times 9 = 100 \times 9 + 60 \times 9 = 900 + 540 = \underline{1440}$, or
$160 \times 9 = 160 \times 10 - 160 = 1600 - 160 = \underline{1440}$

v) $25 \times 8 = 20 \times 8 + 5 \times 8 = 160 + 40 = \underline{200}$, or
$25 \times 8 = 25 \times 10 - 25 \times 2 = 250 - 150 = \underline{200}$

vi) $205 \times 8 = 200 \times 8 + 5 \times 8 = 1600 + 40 = \underline{1640}$, or
$205 \times 8 = 205 \times 10 - 205 \times 2 = 2050 - 410 = \underline{1640}$

Whole class activity
Rectangles drawn on BB
Discussion about units.
Involve several Ps.

or this size:



Agreement, praising

Reasoning, agreement, praising

Reasoning, agreement, praising

Or T shows 1st example and Ps use as model for others.
At a good pace
Reasoning, agreement, praising
Ps write in *Ex. Bks.* too.

If these were actual rectangles and the units were the same as in a), which rectangle would be:
- almost the same shape as the rectangle in a)? (ii)
- the longest and thinnest? (vi)

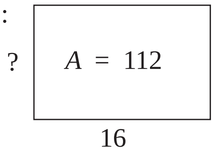
8 min

2

Division

a) How long is the missing side of the rectangle? How can we work it out? Agree that again the actual size of each unit does not matter; the sides are in units and the area is in unit squares.

BB:



Ps come to BB or dictate to T. e.g.

$? = 112 \div 16 = 56 \div 8 = \underline{7}$ (units)

or $112 \div 16 = (80 + 32) \div 16$
$= 5 + 2 = \underline{7}$

Extension

Who can write an operation for the length of the perimeter? Ps come to BB or dictate to T. Class agrees/disagrees.

BB: $P = (16 + 7) \times 2 = 23 \times 2 = \underline{46}$ (units)

Whole class activity
Drawn on BB or SB or OHT

Discussion, reasoning, agreement, praising

Agreement, praising

Y4

Lesson Plan 62

Activity | ***Notes***

2

(Continued)

b) T has BB or SB already prepared. Let's do these divisions. Ps come to BB or dictate to T, explaining reasoning. Class points out errors, or easier ways to calculate.

BB: i) $160 \div 20 = 16 \div 2 = \underline{8}$

ii) $432 \div 4 = 400 \div 4 + 32 \div 4 = 100 + 8 = \underline{108}$

iii) $132 \div 3 = 120 \div 3 + 12 \div 3 = 40 + 4 = \underline{44}$,

iv) $435 \div 5 = 400 \div 5 + 35 \div 5 = 80 + 7 = \underline{87}$

v) $659 \div 6 = 600 \div 6 + 54 \div 6 + 5 \div 6 = 100 + 9 + 0$, r 5
$= \underline{109\text{, r }5}$

At a good pace

Reasoning, agreement, praising

Is it possible that the dividends could be areas of rectangles and the divisors could be one of the sides? [Yes, but some would be very long rectangles! In v), length of a side would be 109 and 5 sixths (units)]

16 min

3

What is the rule?

Study the completed columns in the table. What could the rule be? Ps suggest different forms of the rule in words and class checks them.

Let's complete the table. Ps come to BB to choose a column and write the missing numbers, explaining reasoning. Class agrees/disagrees.

How can we write the rule in a mathematical way? Who agrees?
Who can think of another way to write it? etc.

BB:

u	1	2	5	15	4	7	**10**	130	350	**1400**	5000	3700	**0**
v	1	1	3	4	5	**6**	50	17	**100**	2200	1	**0**	1059
w	3	5	13	34	**13**	20	70	**277**	800	5000	**10 001**	7400	1059

Rule: $w = 2 \times u + v$ $\quad v = w - 2 \times u$ $\quad u = (w - v) \div 2$

Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Discussion, reasoning, agreement, praising

($v =$ and $u =$ might need T's help)

22 min

4

PbY4a, page 62

Q.1 Read: *Do the calculations in the correct order and compare the results.*

Deal with one column of each part at a time. (These calculations require high concentration, so if Ps are struggling, change to whole class work.) Ps can do calculations in *Ex. Bks* and write interim results above operation signs in *Pbs*.

Review at BB with whole class. Ps dictate results to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed/corrected.

Ps point out equal results and try to explain why they are equal (with T's help).

Solution:

a) $180 \times 6 - 5 = 1080 - 5 = \underline{1075}$ $\quad (180 - 6) \times 5 = 174 \times 5 = \underline{870}$

$180 \times 5 - 6 = 900 - 6 = \underline{894}$ $\quad (180 - 5) \times 6 = 175 \times 6 = \underline{1050}$

$180 \times 6 - 5 \times 6 = 1080 - 30 = \underline{1050}$ $\quad 180 - 6 \times 5 = 180 - 30 = \underline{150}$

$180 \times 5 - 6 \times 5 = 900 - 30 = \underline{870}$ $\quad 180 \times (6 - 5) = 180 \times 1 = \underline{180}$

b) $200 \times 4 + 5 = 800 + 5 = \underline{805}$ $\quad (200 + 4) \times 5 = 204 \times 5 = \underline{1020}$

$200 \times 5 + 4 = 1000 + 4 = \underline{1004}$ $\quad (200 + 5) \times 4 = 205 \times 4 = \underline{820}$

$200 \times 5 + 4 \times 5 = 1000 + 20 = \underline{1020}$ $\quad 200 + 4 \times 5 = 200 + 20 = \underline{220}$

$200 \times 4 + 5 \times 4 = 800 + 20 = \underline{820}$ $\quad 200 \times (4 + 5) = 200 \times 9 = \underline{1800}$

Individual work, monitored, helped

(or whole class activity)

Written on BB or SB or OHT

Discussion, reasoning, agreement, self-correction, praising

Extra praise for Ps who did all the calculations independently and correctly!

28 min

Activity | **Notes**

5

PbY4a, page 62

Q.2 Read: *Do the calculations in the correct order and compare the results.*

Deal with one part at a time. Ps do calculations in *Ex. Bks* and write interim results above operation signs.

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

Ps point out equal results and try to explain why they are equal.

Solution:

a)

$1600 \div 8 - 2 = 200 - 2 = \underline{198}$

$1600 \div (8 - 2) = 1600 \div 6 = \underline{266, \text{r}\,4}$

$1600 \div 2 - 8 = 800 - 8 = \underline{792}$

$(1600 - 8) \div 2 = 1592 \div 2 = \underline{796}$

$1600 - 8 \div 2 = 1600 - 4 = \underline{1596}$

$1600 \div 2 - 8 \div 2 = 800 - 4 = \underline{796}$

b)

$1600 \div 8 \times 2 = 200 \times 2 = \underline{400}$

$1600 \div (8 \times 2) = 1600 \div 16 = \underline{100}$

$1600 \div 2 \times 8 = 800 \times 8 = \underline{6400}$

$1600 \times 2 \div 8 = 3200 \div 8 = \underline{400}$

$(1600 \div 8) \times 2 = 200 \times 2 = \underline{400}$

$1600 \times 8 \div 2 = 12\,800 \div 2 = \underline{6400}$

$1600 \times (8 \div 2) = 1600 \times 4 = \underline{6400}$

34 min

Notes:

Individual work, monitored, helped

Written on BB or SB or OHT

Reasoning, agreement, self-correction, praising

Whole class discussion

Agreement, praising

N.B.

As intense concentration is needed here, change to whole class work as soon as Ps begin to struggle or become off task.

(or $= 1600 \times 4 = 6400$)

6

PbY4a, page 62

Q.3 Read: *Solve the problems in your exercise book. Do not forget any steps!*

What are the steps? (Read question, write a plan, estimate the result, do the calculation, check it and write the answer as a sentence.) Set a time limit.

X, come and show us how you worked out the answer. Who agrees? Who did it a different way? etc. Mistakes dicussed and corrected.

Solution: e.g.

a) *If there are 7 kg of beans in each box, how many kg of beans are in 1205 boxes?*

Plan: 1 box: 7 kg
1205 boxes: 7 kg × 1205

E: $7\text{ kg} \times 1200 = 8400\text{ kg}$

C:

$$\begin{array}{|c|c|c|c|c|}\hline & 1 & 2 & 0 & 5 \\ \hline & & & \times & 7 \\ \hline & 8 & 4 & 3 & 5 \\ \hline & {\scriptstyle 1} & & {\scriptstyle 3} & \end{array}$$

Answer: There are 8435 kg of beans in 1205 boxes.

b) *How many kg do 405 bricks weigh if each brick weighs 8 kg?*

Plan: 1 brick: 8 kg
405 bricks: 8 kg × 405

E: $8\text{ kg} \times 400 = 3200\text{ kg}$

C:

$$\begin{array}{|c|c|c|c|}\hline & 4 & 0 & 5 \\ \hline & & \times & 8 \\ \hline 3 & 2 & 4 & 0 \\ \hline & & {\scriptstyle 4} & \end{array}$$

Answer: 405 bricks would weigh 3240 kg.

39 min

Notes:

Individual work, monitored, helped

Or numerical answers shown on scrap paper or slates in unison on command. Ps responding correctly explain to those who were wrong.

Reasoning, agreement, self-correction, praising

Feedback for T

Y4

Lesson Plan 62

Activity

Notes

7

Division practice

a) Before we do the division in your *Pbs*, let's try this one together.

BB: 8654 ÷ 4

What should we do first? (Estimate result) Ps come to BB or dictate to T.

BB: *E:* 8654 ÷ 4 ≈ 8400 ÷ 4 = 2100

Who can come and do the calculation? Who agrees? Who can do it another way? How can we check it? e.g.

BB: 8654 ÷ 4 = 8000 ÷ 4 + 400 ÷ 4 + 200 ÷ 4 + 40 ÷ 4 + 14 ÷ 4
= 2000 + 100 + 50 + 10 + 3, r 2
= <u>2163, r 2</u>

or

	2	1	6	3
4	8	6	5	4
–	8			
	0	6		
	–	4		
		2	5	
	–	2	4	
			1	4
		–	1	2
				②

or

	2	1	6	3	r 2
4	8	6	5	4	
		2	1		

Check:

2	1	6	3
		×	4
8	6	5	2
		+	2
8	6	5	4

b) ***PbY4a, page 62***

Q.4 How can we estimate this quotient? Ps suggest ways. e.g. rounding to multiples of 7: e.g. 6129 ÷ 7 ≈ 7000 ÷ 7 = 1000

or 5600 ÷ 7 = 800, 6300 ÷ 7 = 900, so 800 < q < 900

Ps do calculation in *Pbs* (using long or short division) and check the result against estimate and with a multiplication.

Show me the result . . . now! (875, r 4)

P responding incorrectly comes to BB to do calculation, with help of class if necessary. What was your mistake? Who did the same? Who made a different mistake? etc. Deal with all mistakes.

Solution:

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

E: 800 < q < 900

Check:

		8	7	5
			×	7
	6	1	2	5
			+	4
	6	1	2	9

Whole class activity

Written on BB

Ps decide how to estimate and how to do calculation and check it.

At a good pace

Reasoning, agreement, praising any correct form of obtaining the quotient

Whole class discussion about estimate first.

Individual work, monitored

In unison

Reasoning, agreement, self-correction, praising

Or using short form.

Check could also be done with a calculator.)

45 min

Y4

R: Mental calculation
C: Multiplication and division
E: Problems

Lesson Plan
63

Activity *Notes*

1

What is the rule?

Study the completed columns in the table. What can the rule be? Ask several Ps what they think. Agree on one form of the rule in words. (e.g. bottom row is 4 times the top row).

Let's complete the table. Ps come to BB to chooose a column and write missing number, explaning reasoning. Class agrees/disagrees.

Who can write the rule in a mathematical way? Who agrees? Who can write it a different way? etc.

a) BB:

a	3	400	2018	500	**90**	443	**1540**	1	**700**	**0**
P	12	1600	8072	**2000**	360	**1772**	6160	**4**	2800	0

Rule: $P = 4 \times a$ $a = P \div 4$ $(P \div a = 4)$

If I said that the values in the table relate to a polygon, what do you think *a* and *P* could be? Ask several Ps what they think.

(The polygon is a square with sides *a* units. *P* is the perimeter of the square.) Is there a column in the table which is not needed? (Last column on RHS, as if $P = 0$, there is no square!)

b) BB:

a	2	40	360	5	1100	**78**	5400	**1300**	220	**1**
b	3	80	440	8	**1900**	122	600	1300	**0**	450
P	10	240	1600	**26**	6000	400	**12 000**	5200	440	902

Rule: $P = 2 \times a + 2 \times b$ $P = 2 \times (a + b)$ $P = (a + b) \times 2$
$a = P \div 2 - b$ $b = P \div 2 - a$ $(P \div (a + b) = 2)$

What do you think the values in this table could be? Ask several Ps what they think.

(The polygon is a rectangle with shorter side *a* units and longer side *b* units. *P* is the perimeter of the rectangle.)

Study the table carefully. What do you notice? (In 3rd column from right, the values relate to a square. In 2nd column from right, $b = 0$, so *a* is only a line, not the side of a rectangle!)

Whole class activity

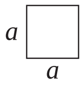
Tables drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Discussion, checking, agreement, praising

BB:



Extension What is its area? [$a \times a$ (or a^2) unit squares]

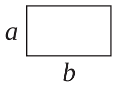
At a good pace

Agreement, praising

With T's help in forming the rules

Discussion, checking, agreement, praising

BB:



Extension What is its area? [$a \times b$ unit squares]

10 min

2

Sequences

These are the first 3 terms of a sequence. BB: 3, 9, 27, . . .

Let's continue the sequence using a different rule each time. Ps dictate to T or come to BB, explaining reasoning. Class points out errors.

a) *Rule*: Each following term is 3 times the previous term.

BB: $\boxed{3} \xrightarrow{\times 3} \boxed{9} \xrightarrow{\times 3} \boxed{27} \xrightarrow{\times 3} \boxed{81} \xrightarrow{\times 3} \boxed{243} \xrightarrow{\times 3} \boxed{729} \xrightarrow{\times 3} \boxed{2187} \xrightarrow{\times 3} \boxed{6561}$

b) *Rule*: The difference between the terms is increasing by 12.

BB: $\boxed{3} \xrightarrow{+ 6} \boxed{9} \xrightarrow{+ 18} \boxed{27} \xrightarrow{+ 30} \boxed{57} \xrightarrow{+ 42} \boxed{99} \xrightarrow{+ 54} \boxed{153} \xrightarrow{+ 66} \boxed{219} \xrightarrow{+ 78} \boxed{297}$

c) *Rule*: Multiply by 3, then add 18

BB: $\boxed{3} \xrightarrow{\times 3} \boxed{9} \xrightarrow{+ 18} \boxed{27} \xrightarrow{\times 3} \boxed{81} \xrightarrow{+ 18} \boxed{99} \xrightarrow{\times 3} \boxed{297} \xrightarrow{+ 18} \boxed{315} \xrightarrow{\times 3} \boxed{945}$

Whole class activity

Written on BB or use enlarged copy master or OHP

Difficult calculations done in *Ex. Bks* or at side of BB

Reasoning, agreement, praising

BB: e.g.

a)

	7	2	9	×	3
2	1	8	7	×	3
6	5	6	1		

b)

	9	9
+	5	4
1	5	3
+	6	6
2	1	9
+	7	8
2	9	7

(Or T could allow the use of calculators.)

Y4

Lesson Plan 63

Activity

Notes

2

(Continued)

d) *Rule*: Add 6, then multiply by 3

BB: $\boxed{3}\xrightarrow{+6}\boxed{9}\xrightarrow{\times 3}\boxed{27}\xrightarrow{+6}\boxed{33}\xrightarrow{\times 3}\boxed{99}\xrightarrow{+6}\boxed{105}\xrightarrow{\times 3}\boxed{315}\xrightarrow{+6}\boxed{321}$

e) *Rule* Add 6, then add 18

BB: $\boxed{3}\xrightarrow{+6}\boxed{9}\xrightarrow{+18}\boxed{27}\xrightarrow{+6}\boxed{33}\xrightarrow{+18}\boxed{51}\xrightarrow{+6}\boxed{57}\xrightarrow{+18}\boxed{75}\xrightarrow{+6}\boxed{81}$

Parts d) and e) can be done mentally

Extension

f) *Rule*: The difference between the terms is increasing by 3 times.

Ps first continue the sequence. Let's write the difference below each pair of terms as a check. What do you notice?

Elicit that the differences form another sequence with the same rule (i.e. the difference between terms is increasing by 3 times).

BB:

Original sequence → $\boxed{3}\ \boxed{9}\ \boxed{27}\ \boxed{81}\ \boxed{243}\ \boxed{729}\ \boxed{2187}\ \boxed{6561}$

Difference sequence → $\boxed{6}\ \boxed{18}\ \boxed{54}\ \boxed{162}\ \boxed{486}\ \boxed{1458}\ \boxed{4374}$

Difference sequence of the difference sequence → $\boxed{12}\ \boxed{36}\ \boxed{108}\ \boxed{324}\ \boxed{972}\ \boxed{2916}$

Do you notice anything else about the original sequence? (It is the same as the sequence in a).) Who can explain it? (If the terms of a sequence are increasing by 3 times, then their differences must also be increasing by 3 times.)

[N.B. It is important to make Ps understand from this activity that the first 3 terms of a sequence do not necessarily determine the rule!]

BB: e.g.

f)

$$\begin{array}{r} 162 \\ \times\ 3 \\ \hline 486 \end{array} \qquad \begin{array}{r} 243 \\ +\ 486 \\ \hline 729 \end{array}$$

$$\begin{array}{r} 486 \\ \times\ 3 \\ \hline 1458 \end{array} \qquad \begin{array}{r} 729 \\ +\ 1458 \\ \hline 2187 \end{array}$$

$$\begin{array}{r} 1458 \\ \times\ 3 \\ \hline 4374 \end{array} \qquad \begin{array}{r} 2187 \\ +\ 4374 \\ \hline 6561 \end{array}$$

18 – 6 = 12 54 – 18 = 36

$$\begin{array}{r} 162 \\ -\ 54 \\ \hline 108 \end{array} \qquad \begin{array}{r} 486 \\ -\ 162 \\ \hline 324 \end{array}$$

$$\begin{array}{r} 1458 \\ -\ 486 \\ \hline 972 \end{array} \qquad \begin{array}{r} 4374 \\ -\ 1458 \\ \hline 2916 \end{array}$$

Discussion, agreement, praising

25 min

3

PbY4a, page 63

Q.1 Read: *Write a plan, calculate and check the result in your exercise book. Write the answer as a sentence below.*

Set a time limit. Ps read questions themselves and solve in *Ex. Bks*. (Deal with one part at a time if class is not very able.)

Review at BB with whole class. Ps could show numerical results on scrap paper or slates on command. P who answers correctly explains to those who do not. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) *Workmen are laying square floor tiles on the kitchen floor.*

They can fit 14 tiles along one side of the kitchen and 30 tiles along the adjoining side.

How many tiles are needed to cover the floor?

Plan: 30 × 14 (tiles)

C: $30 \times 14 = 3 \times 140 = 300 + 120 = \underline{420}$

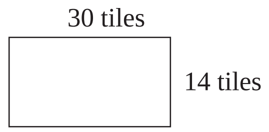
Answer: 420 tiles are needed to cover the floor.

Individual work, monitored, (helped)

Ps could show their plans on slates first.

Reasoning, agreement, self-correcting, praising

BB:



or

$$\begin{aligned} 30 \times 14 &= 30 \times 10 + 30 \times 4 \\ &= 300 + 120 \\ &= \underline{420} \end{aligned}$$

Activity | ***Notes***

3 (Continued)

b) *Donna has 130 buttons and Liz has 4 times more. How many buttons does Liz have?*

Plan: D: 130 buttons L : 130 × 4 (buttons)

C: 130 × 4 = 400 + 120 = <u>520</u>

Answer: Liz has 520 buttons.

Check:
$$\begin{array}{c|ccc} & 1 & 3 & 0 \\ \hline 4 & 5 & 2 & 0 \\ & 1 & & \end{array}$$ ✔

c) *How much money did the owner of the beehive collect if he stored 160 kg, which was 1 sixth of the honey, for feeding the bees during the winter?*

Plan: Stored: 1 sixth of the honey collected: 160 kg
All the honey collected: 160 kg × 6

C: 160 × 6 = 600 + 360 = <u>960</u> (kg)

Answer: The owner collected 960 kg of honey.

Check:
$$\begin{array}{c|ccc} & 1 & 6 & 0 \\ \hline 6 & 9 & 6 & 0 \\ & 3 & & \end{array}$$ ✔

31 min

4 ***PbY4a, page 63***

Q.2 Read: *Write your plan here. Do the calculation and check the result in your exercise book. Write the answr as a sentence here.*

Set a time limit. Ps read problems themselves and solve them.

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

Individual work, monitored, (helped)

Deal with one at a time if Ps are not very able.

Reasoning, agreement, self-corecting, praising

Solution:

a) *Fred's age is 1 fifth of the age of his grandmother. How old is Fred if his grandmother is 65 years old?*

Data: G: 65 years F: 1 fifth of 65 years

Plan: 65 years ÷ 5 *C:* 65 ÷ 5 = 50 ÷ 5 + 15 ÷ 5
= 10 + 3 = <u>13</u>

Answer: Fred is 13 years old.

Check:
13 × 5 = 50 + 15 = 65 ✔

b) *Bella has £720, which is 8 times as much as Paula has. How much does Paula have?*

Data: B: £720 = 8 × P

Plan: P: £720 ÷ 8 *C:* £ 720 ÷ 8 = <u>£90</u>

Answer: Paula has £90.

Check: 90 × 8 = 720 ✔

c) *The farmer's w ife packed 480 eggs into boxes which could hold 6 eggs. How many boxes did she need?*

Plan: 480 eggs ÷ 6 eggs *C:* 480 ÷ 6 = <u>80</u>

Answer: She needed 80 boxes.

Check: 80 × 6 = 480 ✔

d) *Diana left the country 210 days ago. How many weeks have gone by since then?*

Plan: 1 week = 7 days; 210 days ÷ 7 days = <u>30</u> (times)

Answer: 30 weeks have gone by.

Check: 30 × 7 = 210 ✔

40 min

Y4

Lesson Plan 63

Activity

5

PbY4a, page 63, Q.3

Read: *Sam Snail was invited to his friend's house, which is 804 m from Sam's house. Sam left home at 8 am. He arrived after 11 am but before 12 noon.*

a) What is the least number of metres that Sam could have gone every hour?

How could we solve it? T asks several Ps what they think. Elicit that the least number of metres per hour would be at the slowest speed and take the longest time.

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

BB: Start time: 8.00 am Distance travelled: 804 m

If Sam arrived at 12 am, time taken is 12 – 8 = 4 (hours)

4 hours → 804 m, so every hour → 804 m ÷ 4 = 201 m

Answer: The least number of metres Sam could have gone every hour is 201 m.

Read: *b) What is the most number of metres that Sam could have gone every hour?*

How could we solve it? T asks several Ps what they think. Elicit that the most number of metres per hour would be at the fastest speed and take the shortest time.

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

If Sam arrived at 11 am, time taken is 11 – 8 = 3 (hours)

3 hours → 804 m, so every hour → 804 m ÷ 3 = 268 m

Answer: The most number of metres Sam could have gone every hour is 268 m.

BUT Sam arrived before 12 noon and after 11 am. How could we show the answers to a) and b) correctly? Ps suggest ways. e.g.

Let n be the number of metres Sam covered every hour. Then the number of metres Sam could have gone every hour is:

BB: $201 \text{ m} < n < 268 \text{ m}$

45 min

Notes

Whole class activity

(Or individual or paired trial first if Ps wish.)

Discussion involving several Ps. T gives hints if Ps have no idea how to solve it.

Demonstrate fast and slow speeds in the classroom if Ps have difficulty understanding.

Reasoning, agreement, praising

Discuss the fact that we can only work out Sam's average speed. (Sam could have moved at the same speed all the time, or moved faster in the first 2 hours and slower in the last hour if he was tired.)

Extra praise if Ps point this out by themselves.

Discussion, reasoning, agreement, praising

Y4

R: Mental calculation
C: Multiplication and division
E: Problems

Lesson Plan
64

Activity

Notes

1

Secret numbers

I am thinking of a number which is less than 20 000. Ask me questions to find out what it is but I can answer only 'Yes' or 'No'.

e.g. <u>2719</u>

Is it less than 10 000? (Yes) Does it have 4 digits? (Yes) Is the thousands digit less than 5? (Yes) Is the number less than 3000? (Yes) Is the number more than 2000? (Yes) Is the hundreds digit less than or equal to 5? (No) Is the number more than 2750? (No) Is the hundreds digit even? (No) Is the number more than 2725? (No) Is the tens digit odd? (Yes) Is the units digit more than 5? (Yes) Is the number even? (No) Is the number 1 less than a whole 10 ? (Yes) It is 2719! (Yes)

If time, Ps can think of secret numbers and answer questions too.

Whole class activity

Encourage Ps to ask logical questions and to keep in mind clues already given.

Ps can make notes on scrap paper or slates or in *Ex. Bks.*

Discourage Ps from asking the same kind of question as the one before. Extra praise for creative questions.

Praising, encouragement only

Wth T's help

5 min

2

What is the rule?

Study the completed columns in the table. What can the rule be? Ps suggest a rule in words and class checks that it is correct.

Let's complete the table. Ps come to BB to chooose a column and write missing number, explaning reasoning. Class agrees/disagrees.

Who can write the rule in a mathematical way? Who agrees? Who can write it in a different way? etc.

a) Rule in words: e.g. 'If we multiply the *x* number by itself and add 1 to the product, then we get the *y* number.'

BB:

x	1	2	3	4	5	20	6	**7**	8	**9**	10	30	40	**100**	**0**
y	2	5	10	17	26	401	**37**	50	**65**	82	**101**	**901**	**1601**	10 001	1

Rule: $y = x \times x + 1$ $x = (y - 1) \div x$

Extension

Who remembers what we call numbers which can be formed by multiplying another number by itself? (<u>Square numbers</u>) Who can tell me a square number? (1, 4, 9, 16, 25, 36, 49, 64, 81, 100, . . .)

b) Rule in words: e.g. 'If we multiply the *u* number by 5 and add 3 to the product, then we get the *v* number.'

BB:

u	4	1	10	100	2	3	7	21	**8**	**9**	16	1000	150
v	23	8	53	503	**13**	**18**	**38**	**108**	43	48	**83**	**5003**	**753**

Rule: $v = u \times 5 + 3$ $u = (v - 3) \div 5$ $[\ u \times 5 = v - 3\ ]$

Whole class activity

Written on BB or use enlarged copy master or OHP

Discussion on the rule.

At a good pace

Reasoning, agreement, checking, praising

e.g. $3 \times 3 + 1 = 10$

Ps dictate to T or come to BB to write the rules mathematically.

Class checks with values in table.

BB: <u>Square number</u> 3 $\boxed{9}$ 3
e.g. $3 \times 3 = \underline{9}$

e.g. $4 \times 5 + 3 = 23$

Ps dictate to T or come to BB to write the rules mathematically.

Class checks with values in table.

With T's help where necessary.

13 min

3

Inequalities

Which numbers will make the inequality true? Ps come to BB or dictate to T, explaining reasoning. Class checks that they are correct.

BB: or, e.g.

a) $1 < \square < 6$ $\square$: 2, 3, 4, 5 (2 and a half)

b) $170 < \square$ $\square$: 171, 172, 173, . . . (423 and 2 fifths)

c) $890 > \square$ $\square$: 889, 888, . . ., 2, 1, 0 (– 1, – 2, – 3. . .)
(1 third, 7 eighths)

d) $\overset{2765}{2310 + 455} < \square < \overset{2780}{6000 \div 2 - 220}$

$\square$: 2766, 2767, . . ., 2779 (2766 and a quarter)

Whole class activity

Written on BB or SB or OHT

At a good pace

Reasoning, checking, agreement, praising

Accept natural numbers but extra praise for complete solution (i.e. natural numbers, fractions, negative numbers where appropriate)

Y4

Lesson Plan 64

Activity

Notes

3

(Continued)

e) 5040 ≤ ☐ + 2000 < $\overset{5045}{10\,000 - 4955}$

3040 ≤ ☐ < 3045 (by subtracting 2000 from each part)

☐ : 3040, 3041, 3042, 3043, 3044 (or, e,g. 3042 and a half, etc.)

Ps suggest what to do first and how to continue.

T helps only if Ps are stuck.

Reasoning, agreement, checking, praising

20 min

4

Divisibility

BB: 57, 2048, 1610, 4955, 2666, 5000, 439, 605, 7340, 9932

Which of these numbers are divisible by:

a) 5 (1610, 4955, 5000, 605, 7340) [units digit 0 or 5]

b) 2 (2048, 1610, 2666, 5000, 7340, 9932) [units digit even]

c) 2 <u>and</u> 5 (1610, 5000, 7340) [units digit 0]

d) 2 <u>or</u> 5 (2048, 1610, 4955, 2666, 5000, 605, 7340, 9932) [units digit even or 5]

e) 10? (same as part c)

Whole class activity

Written on BB or SB or OHT

Ps dictate to T in unison or come to BB to list numbers.

Elicit the 'rule' for each case.

Ps can suggest other numbers for each part too.

Agreement, praising

Feedback for T

25 min

5

PbY4a, page 64

Q.1 Read: *Estimate in your head first, then do the multiplication.*

Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. If problems, ask Ps to explain using place values.

(e.g. '6 times 7U = 42U = 4T + 2U; I write 2 in the units column answer and write 4 below the tens column', etc.)

Mistakes discussed and corrected. Discuss other forms of multiplication too, e.g. horizontal and long multiplication.

Solution:

a)

$$\begin{array}{ccccc} & & 8 & 9 & 7 \\ & & & \times & 6 \\ \hline & 5 & 3 & 8 & 2 \\ & & 5 & 4 & \end{array} \qquad \begin{array}{ccccc} & & 5 & 0 & 7 \\ & & & \times & 9 \\ \hline & 4 & 5 & 6 & 3 \\ & & & 6 & \end{array} \qquad \begin{array}{ccccc} & & 5 & 1 & 6 \\ & & & \times & 8 \\ \hline & 4 & 1 & 2 & 8 \\ & & 1 & 4 & \end{array} \qquad \begin{array}{ccccc} & & 4 & 7 & 6 \\ & & & \times & 7 \\ \hline & 3 & 3 & 3 & 2 \\ & & 5 & 4 & \end{array}$$

b)

$$\begin{array}{ccccc} & 3 & 1 & 0 & 6 \\ & & & \times & 3 \\ \hline & 9 & 3 & 1 & 8 \\ & & & 1 & \end{array} \qquad \begin{array}{ccccc} & 4 & 0 & 5 & 7 \\ & & & \times & 2 \\ \hline & 8 & 1 & 1 & 4 \\ & & 1 & 1 & \end{array} \qquad \begin{array}{ccccc} & 1 & 3 & 5 & 6 \\ & & & \times & 7 \\ \hline & 9 & 4 & 9 & 2 \\ & 2 & 3 & 4 & \end{array} \qquad \begin{array}{ccccc} & 5 & 6 & 3 & 4 \\ & & & \times & 5 \\ \hline 2 & 8 & 1 & 7 & 0 \\ & 3 & 1 & 2 & \end{array}$$

or, e.g.

1356 × 7 = 7000 + 2100 + 350 + 42 = 9100 + 392 = <u>9492</u>

Individual work, monitored (helped)

Written on BB or use enlarged copy master or OHP

Differentiation by time limit.

Ps say estimate before dictating or writing the calculation.

Reasoning, agreement, self-correcting, praising

Show other forms on BB, e.g.

$$\begin{array}{ccccc} & 1 & 3 & 5 & 6 \\ & & & \times & 7 \\ \hline & & & 4 & 2 \\ & & 3 & 5 & 0 \\ & 2 & 1 & 0 & 0 \\ + & 7 & 0 & 0 & 0 \\ \hline & 9 & 4 & 9 & 2 \end{array}$$

32 min

Y4

Lesson Plan 64

Activity

Notes

6

PbY4a, page 64

Q.2 Read: *Estimate in your head first, then do the division. Check your result.*

Set a time limit. Elicit that results can be checked with a multiplication.

Review at BB with whole class. Ps come to BB or dictate to T, saying estimate and explaining reasoning. If problems, ask Ps to explain using place values. Accept any form of division.

Mistakes discussed and corrected. Discuss and show other forms of division if not used by Ps. (horizontal, short division)

e.g. 3856 ÷ 6 = 3600 ÷ 6 + 240 ÷ 6 + 16 ÷ 6

= 600 + 40 + 2, r 4 = 642, r 4

Solution:

a)

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

	1	1	5	7	r 1
3	3	4	7	2	
–	3				
	0	4			
	–	3			
		1	7		
	–	1	5		
			2	2	
		–	2	1	
				①	

		6	4	2	r 4
6	3	8	5	6	
–	3	6			
		2	5		
	–	2	4		
			1	6	
		–	1	2	
				④	

b)

		9	9	r 2
5	4	9	7	
–	4	5		
		4	7	
	–	4	5	
			②	

		8	6
7	6	0	2
–	5	6	
		4	2
	–	4	2
			0

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

Checks:

2 2 6 × 3
6 7 8

1 1 5 7 × 3
3 4 7 1
+ 1
3 4 7 2

6 4 2 × 6
3 8 5 2
+ 4
3 8 5 6

9 9 × 5
4 9 5
+ 2
4 9 7

8 6 × 7
6 0 2

5 7 6 × 7
4 0 3 2
+ 4
4 0 3 6

Individual work, monitored, helped

Written on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Feedback for T

or

		6	4	2	r 4
6	3	8	5	6	
		2	1	④	

Ask several Ps which method they like best and why.

40 min

7

PbY4a, page 64**, **Q.3

Read: *Write the operation here. Estimate in your head, then do the calculation in your exercise book. Write the result again here.*

P reads question to class. Ps do calculation in *Ex. Bks*. and show result on scrap paper or slates on command. P who responds correctly explains to those who do not. Who agrees? Who did it another way? etc. Deal with all methods. Mistakes discussed and corrected.

Solution:

a) What is four times as much as three times 675? (8100)

e.g. *675* × 3 × 4 = 675 × 12 = 675 × 10 + 675 × 2

= 6750 + 1350 = <u>8100</u>

b) What is nine times as much as twice 591? (10 638)

e.g. 591 × 2 × 9 = 1182 × 9 = 11 820 – 1182 = 10 720 – 82

= <u>10 638</u>

c) What is half of 1 fifth of 3720? (372)

e.g. 3720 ÷ 5 ÷ 2 = 3720 ÷ 10 = <u>372</u>

Whole class activity

(or individual work, monitored, helped and reviewed at BB)

Results shown in unison

Reasoning, agreement, self-correction, praising

or, e.g.

a)

	6	7	5	×	3
2	0	2	5	×	4
8	1	0	0		

b)

	5	9	1
		×	2
1	1	8	2
	1		

	1	1	8	2
			×	9
1	0	6	3	8
	1	7	1	

c)

		7	4	4
5	3	7	2	0
		2	2	

	3	7	2
2	7	4	4
	1		

45 min

Y4

Lesson Plan 65

Activity

Notes

Calculation practice, revision, activities, consolidation
PbY4a, page 65

Solutions:

Q.1 a) $21 \div 7 = \underline{3}$ $\quad 210 \div 70 = \underline{3}$ $\quad 2100 \div 700 = \underline{3}$

$210 \div 7 = \underline{30}$ $\quad 2100 \div 70 = \underline{30}$ $\quad 21\,000 \div 700 = \underline{30}$

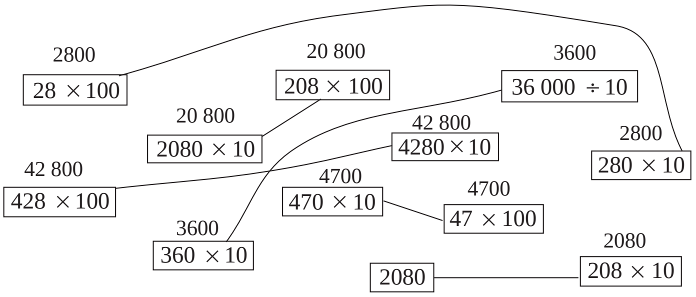
$2100 \div 7 = \underline{300}$ $\quad 21\,000 \div 70 = \underline{300}$ $\quad 21\,000 \div 7000 = \underline{3}$

b) $20 \div 5 = \underline{4}$ $\quad 200 \div 50 = \underline{4}$ $\quad 2000 \div 500 = \underline{4}$

$200 \div 5 = \underline{40}$ $\quad 2000 \div 50 = \underline{40}$ $\quad 20\,000 \div 500 = \underline{40}$

$2000 \div 5 = \underline{400}$ $\quad 20\,000 \div 50 = \underline{400}$ $\quad 20\,000 \div 5000 = \underline{4}$

Q.2



Q.3 a) Each day: 45 min × 7 = <u>315 min</u>

b) Each week (5 school days): 315 min × 5 = <u>1575 min</u>

c) In 12 weeks: 1575 × 12 = 15750 + 3150 = <u>18 900 (min)</u>

Q.4 a) Distance between 75 poles: 53 m × <u>74</u> (as only 74 gaps!)

$53 \times 74 = 50 \times 74 + 3 \times 74 = 5 \times 740 + 3 \times 74$

$= 3700 + 222 = \underline{3922}$ (m)

b) First take off the eldest son's extra £100:
£10 000 – £100 = £9900, which is then divided equally.
£9900 ÷ 3 = £3300, so the two other sons each got £3300.
The eldest received £3300 + £100 = <u>£3400</u>.

Q.5 a) $13 \times 1000 = 130 \times \underline{100}$ $\qquad$ b) $560 \times 10 = 2300 + \underline{3300}$

$2500 \times 10 = 100 \times \underline{250}$ $\qquad 29 \times 100 = 3000 - \underline{100}$

$40 \times 100 = 1000 \times \underline{4}$ $\qquad 17\,000 \div 100 = 10 \times \underline{17}$

Y4

R: Mental calculation

C: Revision and practice

E: Problems

Lesson Plan 66

Activity

Notes

1

Missing digits

Which numbers can be written instead of the letters? Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees.

BB:

a) Rounded to the nearest 10, it is 5430.

5 4 3 *a*	5 4 *b* 5	5 *c* 3 4	*d* 4 2 8	5 4 *e* 4
(*a:* 0, 1, 2, 3, 4)	(*b* = 2)	(*c* = 4)	(*d* = 5)	(*e* = 3)

b) Rounded to the nearest 100, it is 7800.

7 8 5 *a*	7 8 *b* 9	7 *c* 5 2	*d* 7 8 9	7 7 *e* 0
(–)	(*b*: 0, 1, 2, 3, 4)	(*c* = 7)	(*d* = 7)	(*e:* 5, 6, 7, 8, 9)

c) Rounded to the nearest 1000, it is 9000.

9 3 7 *a*	8 5 *b* 0	9 *c* 9 9	*d* 5 0 0	*e* 4 9 9
(*a:* 0 to 9)	(*b*: 0 to 9)	(*c*: 0, 1, 2, 3, 4)	(*d* = 8)	(*e* = 9)

Whole class activity

Written on BB or SB or OHT

At a good pace

Reasoning, agreement, praising

Feedback for T

Draw relevant segments of the number line for one or two of the numbers.

6 min

2

4-digit numbers

a) Let's list 4-digit numbers which have 4 as the sum of their digits.

Ps come to BB or dictate to T. Class checks that the numbers are correct and that there are no duplications.

BB: 1003, 1012, 1021, 1030, 1102, 1111, 1120, 1201, 1210, 1300; 2002, 2011, 2020, 2101, 2110, 2200;

3001, 3010, 3100

b) Let's list 4-digit numbers which have 6 as the product of their digits.

Ps come to BB or dictate to T. Class checks that the numbers are correct and that there are no duplications.

BB: 1116, 1161, 1611, 6111; 1123, 1132, 1213, 1231, 1312, 1321, 2113, 2131, 2311, 3112, 3121, 3211

Whole class activity

Encourage logical listing, e.g. in increasing order, as it makes the task easier.

At a good pace

Agreement, praising

T could have complete list already prepared on SB or OHT to check whether Ps have missed any.

14 min

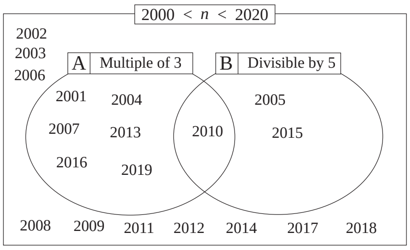
3

Sets

Let's put the natural numbers between 2000 and 2020 in the correct set. What is a natural number? (positive, whole number)

Ps can do calculations in *Ex. Bks* first before coming to BB to write a number. Class points out errors.

BB:



- How many numbers are in Set A but not in Set B? (6)
  What can you say about them? (They are divisible by 3 but not by 5.)
- How many numbers are in Set B but not in Set A? (2)
  What can you say about them? (They are divisible by 5 but not by 3.)
- Where is the intersection of Set A and Set B? P comes out to BB to point. What can you say about the number in it? (It is a multiple of 3 and also of 5.) What other number must it be a multiple of? (15)

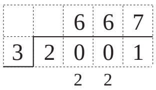
Whole class activity

Drawn on BB or use enlarged copy master or OHP

Or Ps have copies of copy master on desks to try it out first individually, then dictate their results to T.

Reasoning, agreement, praising

Elicit that only one calculation needs to be done:



as every 3rd number after 2001must be a multiple of 3, and multiples of 5 have units digit 5 or 0.

16 min

Y4

Lesson Plan 66

Activity ***Notes***

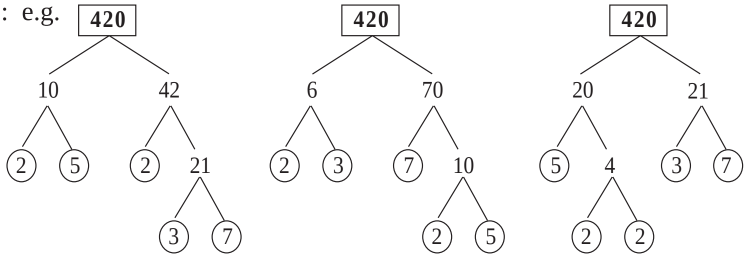
4

Factorisation

Let's factorise 420 in different ways and write it as the product of its prime factors. What should we do first? (Choose 2 factors, e.g. 10 and 42) Then what should we do? (Draw a diagram.) Ps come to BB to write factors, circling the <u>prime</u> factors. Class agrees/disagrees.

Repeat for two other pairs of factors suggested by Ps. Agree that all three diagrams end up with the same prime factors.

BB: e.g.



Who can come and write the multipication? Class checks that the product is 420.

BB: $420 = 2 \times 2 \times 3 \times 5 \times 7$

Now let's list <u>all</u> the factors of 420. Let's do it logically. Ps dictate the pairs of factors in order, starting at 1×420 and using the prime factors to help them. T writes on BB (e.g. 1 on LHS and 420 on RHS, or paired vertically as below).

BB: <u>Factors of 420</u>:

1,	2,	3,	4,	5,	6,	7,	10,	12,	14,	15,	20
420,	210,	140,	105,	84,	70,	60,	42,	35,	30,	28,	21

Whole class activity

Ps decide what to do and choose the pairs of factors.

T helps only if Ps are stuck.

Ps draw diagrams in *Ex. Bks* if they wish.

BB: <u>Prime factors of 420</u>

2, 2, 3, 5, 7

Agreement, checking, praising

Or Ps could write factors in *Ex. Bks* first before dictating to T.

Elicit that there are 24 factors (12 pairs).

Agreement, praising

25 min

5

PbY4a, page 66

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

Let's see if you can do these in 3 minutes! Try do do the calculations mentally if you can. Start . . . now! . . . Stop!

Review at BB with whole class. Ps come to BB to write missing items, explaining reasoning. Who agrees? Who wrote a different operation? etc. Mistakes discussed and corrected.

Solution:

a) $45 \xrightarrow{+37} \boxed{\mathbf{82}} \xrightarrow{\mathbf{-70}} 12 \xrightarrow{+320} \boxed{\mathbf{332}} \xrightarrow{+127} \boxed{\mathbf{459}} \xrightarrow{\mathbf{+32}} 491$

b) $5093 \xrightarrow{-410} \boxed{\mathbf{4683}} \xrightarrow{\mathbf{+77}} 4760 \xrightarrow{+1050} \boxed{\mathbf{5810}} \xrightarrow{-2205} \boxed{\mathbf{3605}} \xrightarrow{\mathbf{+4395}} 8000$

c) $75 \xrightarrow{\div 3} \boxed{\mathbf{25}} \xrightarrow{\times \mathbf{4}} 100 \xrightarrow{\times 80} \boxed{\mathbf{8000}} \xrightarrow{\div 20} \boxed{\mathbf{400}} \xrightarrow{\times 15} 6000$

d) $400 \xrightarrow{\div 8} \boxed{\mathbf{50}} \xrightarrow{\mathbf{+204}} 254 \xrightarrow{\times 2} \boxed{\mathbf{508}} \xrightarrow{\times 4} \boxed{\mathbf{2032}} \xrightarrow{\mathbf{-132}} 1900$

Extension

What would the arrows mean if they pointed in the opposite direction? T points to each in turn, class shouts out operation.

Individual work, monitored, helped

Written on BB or use enlarged copy master or OHP

Discussion, reasoning, self-correcting, praising

Feedback for T

Other operations possible, e.g. 400 <u>+ 5600</u> = 6000

In unison, at speed

31 min

Y4

Lesson Plan 66

Activity		***Notes***

6

PbY4a, page 66

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

Study each equation carefully! Look for an easy way to solve it! Set a time limit.

Review at BB with whole class. Ps come to BB to write missing numbers, explaining reasoning. Who agrees? Who did it a different way? etc. Mistakes discussed and corrected.

Extra praise if Ps deduced answer by noticing connection between LHS and RHS of equations. (e.g. a) 2800 is 1000 <u>less</u> than 3800, so missing number will be 1000 <u>more</u> than 1500, i.e. 2500) There is no need to work out the result of each side.

Solution:

a) 3800 + 1500 = 2800 + <u>2500</u> (= 5300)

b) 7200 – 3500 = 6200 – <u>2500</u> (= 3700)

c) 4700 + 2600 = 6700 + <u>600</u> (= 7300)

d) 8100 – 4700 = 9100 – <u>5700</u> (= 3400)

e) 1600 + 6900 = 2000 + <u>6500</u> (= 8500)

f) 6400 – 2800 = 6000 – <u>2400</u> (= 3600)

Individual work, monitored, (helped)

Written on BB or SB or OHT

Reasoning, agreement, self-correcting, praising

If no P noticed this, T gives hints about a) and asks Ps to explain the other parts in a similar way.

35 min

7

PbY4a, page 66

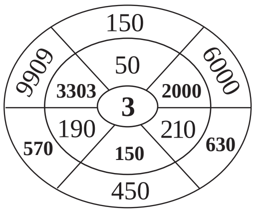
Q.3 Read: *Work out the rule for each diagram. Fill in the missing numbers..*

Deal with one part at a time. Elicit one form of the rule in words. Set a time limit.

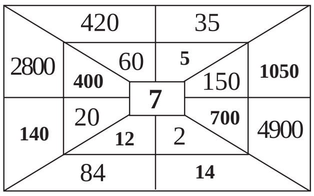
Review at BB with whole class. Ps come to BB to write numbers, explaining reasoning. Class agree/disagrees. Mistakes discussed and corrected.

Solution:

a)



b)



Rule: Outer ÷ 3 = Inner
Inner × 3 = Outer
Outer ÷ Inner = 3

Outer ÷ 7 = Inner
Inner × 7 = Outer
Outer ÷ Inner = 7

Individual work, monitored, helped

(Or whole class activity if time is short)

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Elicit other forms of each rule, as shown.

40 min

Y4

Lesson Plan 66

Activity

Notes

8

PbY4a, page 66

Q.4 Do the operations as quickly as you can and then check them. You may use long or short division in part b).

Review at BB with whole class. Ps come to BB, explaining reasoning (with place value if there are problems, especially for multiplying and dividing by 10). Mistakes discussed and corrected.

Solution:

a)

		9	4	7
			×	3
	2	8	4	1
		1	2	

	1	1	8	6
			×	8
	9	4	8	8
	1	6	4	

	2	0	6	1
			×	5
1	0	3	0	5
		3		

	1	8	0	4
		×	1	0
1	8	0	4	0
	8		4	

b)

	1	2	1	5
5	6	0	7	9
–	5			
	1	0		
–	1	0		
		0	7	
		–	5	
			2	9
		–	2	5
				④

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

		8	3	3
3	2	5	0	1
–	2	4		
		1	0	
	–		9	
			1	1
		–		9
				②

			2	9	1
1	0	2	9	1	0
	–	2	0		
			9	1	
		–	9	0	
				1	0
			–	1	0
					0

N.B. Multiplication and division by 2-digit numbers have not been taught yet, so extra praise for Ps who reason and answer correctly.

Ps might agree that multiplying and dividing by 10 are simpler and quicker if done mentally!

45 min

Individual work, monitored, helped

Written on BB or use enlarged copy master or OHP

T notes how Ps cope with multiplying and dividing by10.

Reasoning, agreement, self-correction, praising

T shows long forms of × and ÷ by 10, reasoning with place values.

BB:

	1	8	0	4
		×	1	0
	0	0	0	0
1	8	0	4	0
1	8	0	4	0

Agree that <u>any</u> number multiplied by 10 must have 0 as the units digit.

BB: 1804 × 10 = <u>18040</u>

2910 ÷ 10 = <u>291</u>

Y4

R: Mental calculation
C: Revision and practice: 4 operations, geometry
E: Problems

Lesson Plan 67

Activity

Notes

1

Sequences

What could the rule be? T asks several Ps. Class checks the rules and decides which to use. Ps continue the sequence by coming to BB or dictating to T (or P). Class points out errors.

a) 0, 3, 8, 15, 24, (35, 48, 63, 80, 99, 120, . . .)

Rule: Difference is increasing by 2. (3, 5, 7, 9, 11, 13, 15, 17, . . .)

or Square numbers minus 1:

1 × 1 – 1 = 0, 2 × 2 – 1 = 3, 3 × 3 – 1 = 8, etc.

b) 1, 1, 2, 3, 5, 8, 13, (21, 34, 55, 89, 144, 233, 377, . . .)

Rule: From the 3rd term, each term is the sum of the 2 previous terms. (1 + 1 = 2, 2 + 1 = 3, 3 + 2 = 5, 5 + 3 = 8, . . .)

[T: This is a special sequence named after the man who first used it. It is called the Fibonacci sequence. It is often found in nature, e.g. in the arrangement of leaves on a stem, the petals on a flower, the scales on a cone. T could have examples to show to class.]

c) 10, 20, 40, (80, 160, 320, 640, 1280, 2560, 5120, . . .)

Rule: Each following term is twice the previous term.

or (70, 110, 160, 220, 290, 370, 460, 560, . . .)

Rule: Difference is increasing by 10.

or (50, 70, 80, 100, 110, 130, . . .)

Rule: + 10, then + 20, repeated, etc.

10 min

Whole class activity

T helps Ps in expressing the rules.

Agreement, checking, praising

At a good pace

Accept any valid rule!

Extra praise for creativity!

BB: Fibonacci Sequence

1, 1, 2, 3, 5, 8, 13, . . .

Use whichever rule Ps decide on to start with, then ask for other ways to continue the sequence and what the rule is in each case.

Praising, encouragement only

2

Plane shapes

Ps each have an envelope on desk containing a selection of plane shapes. T has larger version too for demonstration.

a) Empty out the shapes. Lay out the triangles and put the other shapes back in the envelope. Let's classify the triangles by putting them into sets.

How could we do it? Ps suggest ways. Let's do it this way.

Set A: All its angles are less than a right angle. Put the triangles which belong to this set on LHS of your desk. What do we call these triangles? (acute-angled triangles)

Set B: It has a right angle. Put these triangles on the RHS of your desk. What do we call these triangles? (right-angled triangles)

Set C: It has an angle more than a right angle. Put these triangles at the side of the desk nearest you. What do we call these triangles? (obtuse-angled triangles)

b) Put the triangles in a pile at the top of your desk and empty out the other shapes. This time take out the quadrilaterals and lay them on your desk. (T quickly goes round the class checking them.)

How could we group these quadrilaterals? Ps suggest ways. Class decides which criteria to use. e.g.

BB: Set A: It has 2 pairs of parallel sides.
Set B: It has line symmetry.

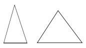
T draws a Venn diagram on BB and Ps stick T's set of quadrilaterals in correct sets. Class points out errors. (Ps could group shapes on desks too using string or wool to define the sets.)

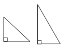
Whole class activity

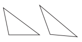
Use copy master, 1 sheet per P, shapes cut out and put in envelope (or any selection of plane shapes).

Discussion, agreement, praising

Ps group triangles on desks and Ps stick T's set on BB:

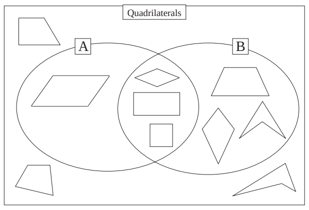
Set A: 

Set B: 

Set C: 

T quickly checks/corrects Ps' arrangements.

Drawn on BB:



Elicit that shapes which satisfy both criteria go in the intersection of Sets A and B.

Y4

Lesson Plan 67

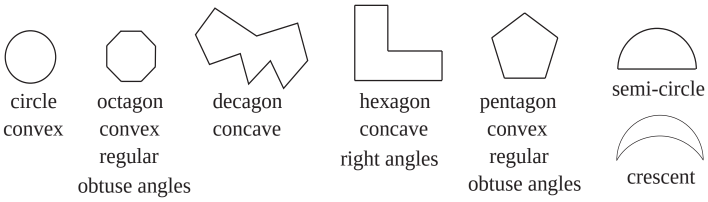
Activity

Notes

2

(Continued)

c) What can you tell me about the shapes which are left?
T holds them up one at a time and Ps tell class what they know about it. T gives hints if necessary. e.g.



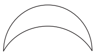
Whole class discussion

Involve several Ps

Agreement, praise all correct contributions.

Write unfamiliar names on BB

e.g. crescent (a thin moon)



20 min

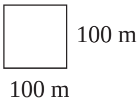
3

Perimeter and area

The farmer measured the sides of two of his fields and drew rough diagrams like this. Let's help him work out the perimeter and area of each field. Ps come to BB to do calculations, explaining reasoning. Class agrees/disagrees. e.g.

BB:

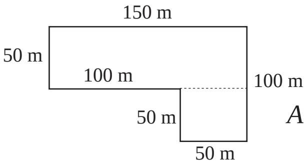
a)



$P = 100\text{ m} \times 4 = \underline{400\text{ m}}$

$A = 100 \times 100 = \underline{10\,000}$ (m^2 or metre squares)

b)

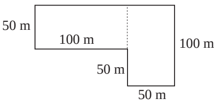


$P = (150 + 100 + 50 + 50 + 100 + 50)\text{ m}$ or

$= (250 + 250)\text{ m}$

$= \underline{500\text{ m}}$

$A = (150 \times 50 + 50 \times 50)\text{ m}^2$ or



$= (7500 + 2500)\text{ m}^2$

$= \underline{10\,000\text{ m}^2}$

Whole class activity

Diagrams drawn on BB or SB or OHT

Reasoning, agreement, praising

$100 \times 100 = 10 \times 1000$

$P = 150 + 2 \times 100 + 3 \times 50$

$= 150 + 200 + 150$

$= \underline{500}$ (m)

$A = 100 \times 50 + 100 \times 50$

$= 5000 + 5000$

$= \underline{10\,000}$ (m^2)

25 min

4

PbY4a, page 67

Q.1 Read: *Measure the different distances as the crow flies on the map.*

Talk about the map first. Ps suggest what the various places on the map could be, e.g. A (church), B (statue), C (station as beside the railway line), D (Sailing club as beside a lake).

What does 'as the crow flies' mean? (In a straight line)

Elicit that, e.g. AB in the table means from A to B.

Ps measure in mm and write lengths in middle column of table.

Review with whole class. Only measurements which are wildly inaccurate need be corrected.

Read: *Calculate the real distances if they are 1000 times the map measurements. Complete the table.*

Elicit that scale is: 1 mm → 1000 mm = 1 m

Ps complete RH column of table. Review at BB with whole class. Ps dictate to T or come to BB. Mistakes corrected.

Extension

What is the ratio between the real and map distances? (1000:1)

If the ratio was 2000:1 (500:1) what would the real distances be? T points to each row in turn and class shouts out distance.

[AB: 32 m (8 m), AC: 100 m (25 m), AD: 126 m (31.5 m), etc.]

Individual work, monitored, helped but class kept together

(or whole class activity)

Use enlarged copy master or OHP for demonstration only.

Discuss the map, suitable units and how to measure (e.g. edgeto nearest edge).

Agreement, self-correcting only if necessary, praising

Discussion on the scale.

Agreement, self-correcting, praising

BB:

Journey	Distance on map	Real distance
AB ≈	16 mm	16 m
AC ≈	50 mm	50 m
AD ≈	63 mm	63 m
BC ≈	32 mm	32 m
BD ≈	47 mm	47 m
CD ≈	10 mm	10 m

30 min

Activity | ***Notes***

5

PbY4a, page 67

Q.2 Read: *Solve the problems in your exercise book.*

Deal with one at a time. Revise mathematical terms if necessary.

P reads question, then do calculation and show result on scrap paper or slates on command.

Ps answering correctly explain to those who do not. Mistakes discussed and corrected.

Solution:

a) *The sum of two terms is 8061. One term is 2354. What is the other term?*

BB: 8061 – 2354 = <u>5707</u> *Check:* 5707 + 2354 = 8061 ✔

b) *The difference is 3425. The reductant is 8106. What is the subtrahend?*

BB: 8106 – 3425 = <u>4681</u> *Check:* 4681 + 3425 = 8106 ✔

c) *The difference is 3425. The subtrahend is 8106. What is the reductant?*

BB: 8106 + 3425 = <u>11 531</u> *Check:* 11 531 – 8106 = 3425 ✔

d) *The product is 8500. One factor is 4. What is the other factor?*

BB: 8500 ÷ 4 = <u>2125</u> *Check:* 2125 × 4 = 8500 ✔

e) *The quotient is 582 and the divisor is 6. What is the dividend?*

BB: 582 × 6 = <u>3492</u> *Check:* 3492 ÷ 6 = 582 ✔

Notes:

Individual work, monitored, helped

e.g. subtrahend and reductant

In unison

Reasoning, checking, agreement, self-correcting, praising

a) $\begin{array}{rcccc} & 8 & 0 & 6 & 1 \\ - & 2 & 3 & 5 & 4 \\ \hline & 5 & 7 & 0 & 7 \end{array}$

b) $\begin{array}{rcccc} & 8 & 1 & 0 & 6 \\ - & 3 & 4 & 2 & 5 \\ \hline & 4 & 6 & 8 & 1 \end{array}$

c) $\begin{array}{ccccc} & 8 & 1 & 0 & 6 \\ + & 3 & 4 & 2 & 5 \\ \hline 1 & 1 & 5 & 3 & 1 \\ & & & 1 & \end{array}$

d) $\begin{array}{c|cccc} & 2 & 1 & 2 & 5 \\ \hline 4 & 8 & 5 & 0 & 0 \\ & & 1 & 2 & \end{array}$

e) $\begin{array}{cccc} & 5 & 8 & 2 \\ & & \times & 6 \\ \hline 3 & 4 & 9 & 2 \\ & 4 & & 1 \end{array}$

40 min

6

PbY4a, page 67**, **Q.3

Read: *Calculate the operations in a simpler way.*

Agree that 'simpler' means quicker and easier. Ps come to BB to show simpler ways of doing the calculations? Who agrees? Who thinks something else? etc. (Agree that multiplication is quicker than addition but only if Ps know their multiplication tables by heart!)

Solution:

a) $\begin{array}{rcccc} & 1 & 3 & 4 & 5 \\ & 1 & 3 & 4 & 5 \\ & 1 & 3 & 4 & 5 \\ & 1 & 3 & 4 & 5 \\ & 1 & 3 & 4 & 5 \\ & 1 & 3 & 4 & 5 \\ & 1 & 3 & 4 & 5 \\ + & 1 & 3 & 4 & 5 \\ \hline 1 & 0 & 7 & 6 & 0 \end{array}$ Simpler: $\begin{array}{ccccc} & 1 & 3 & 4 & 5 \\ & & & \times & 8 \\ \hline 1 & 0 & 7 & 6 & 0 \\ & 2 & 3 & 4 & \end{array}$

b) 6500 – (710 + 710 + 710 + 710 + 710)

Simpler: 6500 – (710 × 5) = <u>2950</u>

or

$\begin{array}{cccc} & 7 & 1 & 0 \\ & & \times & 5 \\ \hline 3 & 5 & 5 & 0 \end{array}$ $\begin{array}{rcccc} & & 10 & 10 & \\ & 6 & 5 & 0 & 0 \\ - & 3_1 & 5_1 & 5 & 0 \\ \hline & 2 & 9 & 5 & 0 \end{array}$ 3550

c) 8400 ÷ 2 ÷ 2 ÷ 2 = 4200 ÷ 2 ÷ 2 = 2100 ÷ 2 = <u>1050</u>

Simpler: $\begin{array}{c|cccc} & 1 & 0 & 5 & 0 \\ \hline 8 & 8 & 4 & 0 & 0 \\ & & 4 & & \end{array}$

d) 723 × 3 × 3 = <u>6507</u>

$\begin{array}{cccc} & 7 & 2 & 3 \\ & & \times & 3 \\ \hline 2 & 1 & 6 & 9 \end{array}$ $\begin{array}{cccc} 2 & 1 & 6 & 9 \\ & & \times & 3 \\ \hline 6 & 5 & 0 & 7 \\ & 2 & 2 & \end{array}$ Simpler: $\begin{array}{cccc} & 7 & 2 & 3 \\ & & \times & 9 \\ \hline 6 & 5 & 0 & 7 \\ & 2 & 2 & \end{array}$

Notes:

Whole class activity

(or individual work first if Ps prefer)

Written on BB

Discussion, demonstration, reasoning, agreement, praising

Accept any correct way of calculating.

Make sure Ps realise that:

BB: 8400 ÷ 2 ÷ 2 ÷ 2
= 8400 ÷ (2 × 2 × 2)
= 8400 ÷ 8

Show a simpler example if necessary, e.g.

16 ÷ 2 ÷ 2 ÷ 2 = 16 ÷ 8 = <u>2</u>

45 min

Y4

R: Mental calculation
C: Revision and practice
E: Problems

Lesson Plan 68

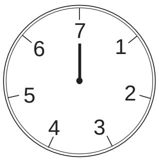
Activity

1

Sevenland

In *Sevenland*, the wizard is playing tricks on the King by changing the numbers on his clock face. Let's help the king to tell the time!

a) This is what the King's clock looked like at noon one day:



i) Where would the hour hand be pointing after:

• 2 hours	It would point to	2	
• 5 hours	It would point to	5	
• 7 hours	It would point to	7	
• 8 hours	It would point to	1	(7 + 1)
• 10 hours	It would point to	3	(7 + 3)
• 14 hours	It would point to	7	(7 + 7)
• 50 hours?	It would point to	1	(7 whole turns + 1) etc.

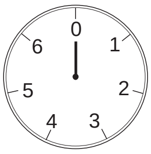
Elicit that:

- there are 7 numbers on the clock, so to find the number to which the hand is pointing, divide the number of hours by 7;
- if there is no remainder, the hour hand will point to 7;
- if there is a remainder of 1 the hour hand will point to 1,
- if there is a remainder of 2 the hour hand will point to 2, etc.

ii) How many hours could have passed if the hand is pointing to:

- 7? (0, 7, 14, 21, 28, . . .) • 3? (3, 10, 17, 24, . . .)

b) The next day at noon, the King's clock looks like this:



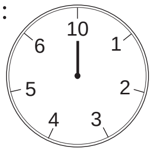
i) Where would the hour hand be pointing after:

• 6 hours	It would point to	6	
• 7 hours	It would point to	0	
• 9 hours	It would point to	2	(7 + 2)
• 21 hours	It would point to	0	(21 ÷ 7 = 3; i.e. 3 whole turns)
• 48 hours	It would point to	6	(48 ÷ 7 = 6, r 6 i.e. 6 whole turns + 6)

ii) How many hours could have passed if the hand is pointing to:

- 4? (4, 11, 18, 25, 32, . . .) • 6? (6, 13, 20, 27, . . .)

c) The next day at noon, the King's clock looks like this:



i) Where would the hour hand be pointing after:

• 4 hours	It would point to	4	
• 6 hours	It would point to	6	
• 9 hours	It would point to	2	(7 + 2)
• 32 hours	It would point to	4	(32 ÷ 7 = 4; i.e. 4 whole turns)
• 49 hours	It would point to	10	(49 ÷ 7 = 7 i.e. 7 whole turns)

ii) In *Sevenland*, they count in sevens, not tens, so they do not read 10 as 'ten' but as 'one zero'. What do you think it means? (1 whole group of 7 and no units.).

We say that in *Sevenland* they count in base 7 whereas we count in base 10.

How do you think they would write, e.g. our number 11? (14)
How do you think they would read their number 14? ('one four')

9 min

Notes

Whole class activity

Clocks drawn on BB or T has model clocks with amended faces, or use copy master enlarged onto card and cut out.

Ps come to BB to stick on hour hand or show on model.

Class agrees/disagrees.

Ps explain reasoning when more than 7 hours.

Discussion, agreement, praising

Agree that it is impossible to have a remainder > 6.

T chooses Ps at random
Agreement, praising

What is different about it? (Again there are 7 numbers but there is a zero instead of the 7.)

Ps come to BB to stick on hour hand or show on model.

Class agrees/disagrees.

Ps explain reasoning after 7 hours.

T chooses Ps at random.

Agreement, praising

Elicit that there are again 7 numbers but the 0 has changed to 10.

T asks Ps at random without letting them show it on model first and asks them to explain their reasoning.

Discussion. Extra praise if Ps think of explanation without help.

BB: Base 10 Base 7
e.g. 11 14
(1 × 10 + 1) (1 × 7 + 4)

Agreement, praising

Activity		***Notes***

2

Problem 1

George has been asked to make a rectanglular-shaped garden. Let's help him!

a) *If he only has enough fencing for a* <u>*perimeter*</u> *of 850 m, what size of rectangle could he dig?*

Let's draw a diagram first to help us. Ps come to BB or suggest what T should draw,including labels for sides. Elicit that:

BB: $P = 850$ m $= (a + b) \times 2$**,** so $a + b = 850$ m $\div 2 = 425$ m

How could we show the possible values for a and b? (In a table)
T draws table and Ps come to BB to fill in columns or dictate values for a and b to T. Class agrees/disagrees. Encourage logical listing.

BB: e.g.

a	1	2	3	. . .	50	100	. . .	200	201	202	. . .	212	213	212 and a half
b	424	423	422	. . .	375	325	. . .	225	224	223	. . .	213	212	212 and a half

. . .

↗

Extension

Could George make a square garden? (Yes, when *a = b.)* If not already in table, add this column now. Ps dictate what T should write. BB: 425 ÷ 2 = <u>212 and a half</u>

What else could you say about the square garden? (It is the biggest garden as it has the greatest area.)

b) *If the* <u>*area*</u> *of the garden must be 850 metre squares, what could the lengths of the sides be?*

How could we find out? Ps suggest how to solve it, with hints from T if necessary. [Make a table for a and b. *Rule:* $a \times b = 850$ (m^2)]

How do we know what numbers to put in the table? Elicit that the numbers must be <u>factors</u> of 850. Let's factorise 850 first. Ps come to BB or T writes what Ps dictate. Agree that the <u>prime</u> factors of 850 are 2, 5 and 17. (Each a prime number: divisible only by 1 and itself.)

Let's use the prime factors to find <u>all</u> the factors of 850 to put in the table. Ps come to BB or dictate pairs of factors to T.

BB:

a	1	2	5	10	17	25	(then vice versa)
b	850	425	170	85	50	34	

Extension

Which garden would need the longest (shortest) fence?

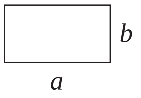
Longest: 850 m by 1 m: $P = (850 + 1) \times 2 = 851 \times 2 = \underline{1702}$ (m)

Shortest: 25 m by 34 m: $P = (25 + 34) \times 2 = 59 \times 2 = \underline{118}$ (m)

Whole class activity

Ps suggest what to do and how to continue, with T's help and guidance where necessary.

BB:



$a + b = 425$ (m)

Accept any correct solution but discuss the shape and usefulness of extreme cases.

T s reminds Ps how to use ellipses (. . .) when making long lists of numbers

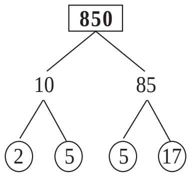
Discussion, reasoning, agreement, praising

Agree that the most regular shape has the greatest area.

Discussion on strategy

Agreement, praising

BB:



Agree that there is no need to list the reverse values for a and b, as they will give the same size of rectangle.

Discussion, reasoning, agreement, praising

Agree that the most regular shape has the shortest perimeter.

18 min

3

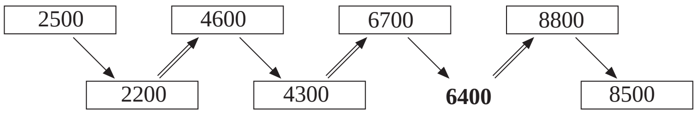
PbY4a, page 68

Q.1 Read: *Fill in the missing numbers if the double arrow means + 2400 and the single arrow means – 300.*

Let's see who can do this correctly in the quickest time!

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

Solution: $\Longrightarrow$ means + 2400 and $\longrightarrow$ means – 300



Individual work, monitored (helped)

Drawn on BB or use enlarged copy master or OHP

Bold number is given.

Reasoning, agreement, self-correction, praising

Feedback for T

22 *min*

Y4

Lesson Plan 68

Activity

Notes

4

PbY4a, page 68

Q.2 Let's see how many of these you can do correctly in 4 minutes! Start . . . now! . . . Stop!

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

Who had all 8 correct? Who made just 1 mistake? Let's give them a round of applause!

Solution:

a) i)

	3	4	3	6
+	5	3	4	2
	8	7	7	8

ii)

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

iii)

	3	7	0	5
+	4	1	3	8
	7	8	4	3
			1	

iv)

	3	7	1	6
+	8	3	9	5
1	2	1	1	1
	1	1	1	

b) i)

	6	5	2	8
−	2	4	0	5
	4	1	2	3

ii)

				10
	4	1	7	3
−	1	0	4_1	6
	3	1	2	7

iii)

		10	10	
	7	0	5	9
−	4_1	2_1	6	5
	2	7	9	4

iv)

		10		10
1	2	3	4	5
−	3_1	4	2_1	9
	8	9	1	6

Extension

Let's say the sums in increasing order.

28 min

Individual work, monitored

(Only least able Ps helped)

Written on BB or use enlarged copy master or OHP

(or T could have solution already prepared and uncover each result as it is dealt with)

Reasoning, agreement, self-correction, evaluation, praising

At speed. In unison. In good humour. Praising only

5

PbY4a, page 69

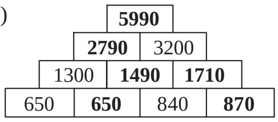
Q.3 Read: *The sum of any two adjacent numbers is the number directly above them. Fill in the missing numbers.*

Set a time limit. Necessary calculations done in *Ex. Bks.*

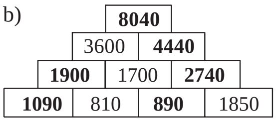
Review at BB with whole class. Ps come to BB to fill in numbers, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a)



b)



33 min

Individual work, monitored (helped)

Drawn on BB or use enlarged copy master or OHP

Differentiation by time limit

Reasoning, agreement, self-correcting, praising

Feedback for T

6

PbY4a, page 68

Q.4 Ps may use long or short division in part b). Set at time limit.

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) i)

1	1	9	5
		×	5
5	9	7	5
	4	2	

ii)

3	0	1	8
		×	3
9	0	5	4
		2	

iii)

1	2	5	1
		×	6
7	5	0	6
1	3		

iv)

	2	1	6	8
			×	9
1	9	5	1	2
	1	6	7	

b) i)

	2	0	1	5
4	8	0	6	0
			2	

ii)

	1	3	8	9	r 3
7	9	7	2	6	
−	7				
	2	7			
−	2	1			
		6	2		
	−	5	6		
			6	6	
		−	6	3	
				③	

iii)

		7	4	0	r 4
6	4	4	4	4	
	4	2			
		2	4		
	−	2	4		
			0	4	
		−		0	
				④	

iv)

		1	6	0	8
8	1	2	8	6	4
		4		6	

e.g.

40 min

Individual work, monitored helped

Written on BB or use enlarged copy master or OHP

Remind Ps to estimate first, then check their result against estimate.

Deal with one part at a time if class is not very able.

Reasoning (with place value if problems) agreement, self-correcting, praising

T might allow the use of a calculator to check results if there is disagreement.

Y4

Lesson Plan 68

Activity

7

Problem 2

Listen carefully and think how you would solve this problem.

Andrew and Ben have 36 toy cars altogether..
Andrew and Charlie have 31 toy cars altogether.
Ben and Charlie have 37 toy cars altogether.

a) How many cars do the 3 boys have altogether?

b) How many cars does each boy have?

T allows time for thinking and discussion with neighbours. Who can suggest a way? Who agrees? Who thinks another way? etc. Praise any correct way, including trial and error, but if Ps are stuck, T gives hints or shows logical method.

Solution: e.g.

a)

$$\begin{aligned} A + B &= 36 \\ A + C &= 31 \\ B + C &= 37 \\ \hline \end{aligned}$$

Adding: $2A + 2B + 2C = 104$

Or $2 \times (A + B + C) = 104$

So $A + B + C = 104 \div 2 = \underline{52}$

Answer: The 3 boys have 52 cars altogether.

b) $A = 52 - (B + C) = 52 - 37 = \underline{15}$

$B = 52 - (A + C) = 52 - 31 = \underline{21}$ (or $36 - A = 36 - 15 = \underline{21}$)

$C = 52 - (A + B) = 52 - 36 = \underline{16}$ (or $37 - B = 37 - 21 = \underline{16}$)

Answer: Andrew has 15 cars, Ben has 11 cars and Charlie has 16 cars.

45 min

Notes

Whole class activity

T reads problem 2 or 3 times while Ps note data and discuss or try out strategy for solution.

Ps suggest ways to solve it.

Praise all positive contributions.

Reasoning, agreement, checking, praising

BB:

Check: $15 + 21 + 16 = 52$ ✔

Extra praise if Ps deduce solution without help from T.

N.B.

Most straightforward solution is given opposite but others are possible.

Y4

R: Mental calculation

C: Revision and practice

E: Problems

Lesson Plan
69

Activity

Notes

1

Compass directions

Everyone stand up and face the BB. Think of this direction as North. Follow my instruction and show me in which direction you are facing when I say. Ps write only initial letters on scrap paper or slates.

- Turn to the left by 1 right angle. Show me . . . now! (W)
- Turn to the right by 2 right angles. Show me . . now! (E)
- Turn to the right by 1 right angle. Show me . . . now! (S)
- Turn to the left by half a right angle. Show me . . . now! (SE)
- Turn to the right by 2 right angles. Show me . . . now! (NW)

etc.

5 min

Whole class activity

T writes N on BB.

At a good pace

In good humour!

Responses given in unison

If Ps cope easily, give more complicated instructions, combining several turns.

Ps can give instructions too.

2

Parallel lines

Ps have 5 mm squared grid sheets (or *Ex. Bks*.) and rulers on desks.

Listen carefully and follow my instructions.

a) Draw over a grid line in *red* and label it *e*.

b) Draw a *green* line which is 1 cm from *e* and label it *f*.
Elicit that there are two such lines. Let's label them f_1 and f_2.

c) Draw a *blue* line which is 2 cm from *e* and 1 cm from f_2.
Label it *g*. How many grid units is *g* from f_1? (6 grid units = 3 cm)

d) Draw two parallel lines which are 35 mm apart. How many grid units are between them? (7 grid units)
Accept any 2 lines 35 mm apart (horizontal or vertical or slanting, both new lines or using one line already drawn).

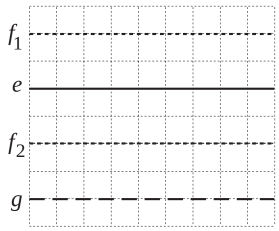
Review after each part. T chooses Ps to show their lines on BB or OHT.

10 min

Individual work, monitored, helped

T has enlarged grid on BB or OHT for demonstration only

BB: e.g.



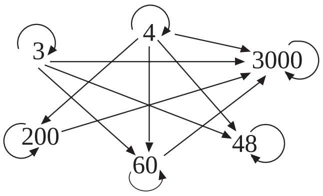
Agreement, (self-correcting), praising

3

Multiples

Draw arrows pointing towards the multiples. Ps come to BB to draw arrows, saying, e.g. '48 is a multiple of 4 because 4 × 12 = 48'. Class points out errors or missed arrows.

BB:



Elicit that, e.g.
- 3 is a multiple of 3;
- 3 is a factor of 3.

If the arrows pointed in the opposite direction, what would they show? (the factors)

15 min

Whole class activity

Written on BB or SB or OHT

T might draw an arrow first if Ps are unsure what to do.

At a good pace

Reasoning, agreement, praising

Extra praise if Ps remember to draw arrows to the number itself without hints from T.

Feedback for T

4

Problem 1

Listen carefully, draw a diagram, note the data and do the calculation in your *Ex. Bks*. Show me the answer when I say.

Ps who responded correctly explain at BB to Ps who did not. Mistakes discussed and corrected.

a) *The area of a rectangle is 8400 unit squares. The length of one of its sides is 80 units. What is the length of the adjacent side?*

BB: $b = 8400 \div 80 = 840 \div 8 = \underline{105}$ (units)

Answer: The length of the adjacent side is 105 units.

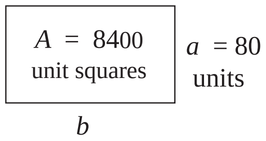
Individual work, monitored

Responses shown on scrap paper or slates in unison.

Reasoning, agreement, self-correcting, praising

BB:

e.g.



Y4

Lesson Plan 69

Activity ***Notes***

4

(Continued)

b) The perimeter of a rectangle is 6500 m. The length of one of its sides is 1500 m What is the length of the adjacent side?

BB: $P = 2 \times (a + b)$

$6500 = 2 \times (1500 + b)$

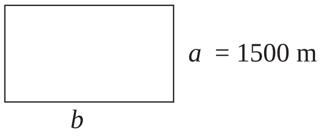
$3250 = 1500 + b$ (Dividing both sides by 2)

$b = 3250 - 1500 = \underline{1750}$ (m)

Answer: The length of the adjacent side is 1750 m.

BB:

$P = 6500$ m



Check: $2 \times (1500 + 1750)$

$= 2 \times 3250 = 6500$ ✔

20 min

5

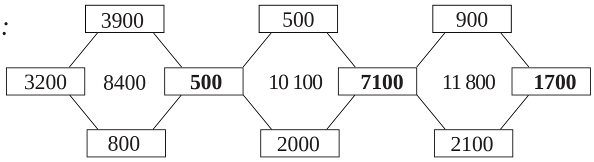
PbY4a, page 69

Q.1 Read: *The number in the middle is the sum of the 4 numbers around it. Fill in the missing numbers.*

Encourage Ps to look for easy ways to calculate mentally.

Review at BB with whole class. Ps come to BB to write missing numbers, explaining reasoning. Class agrees/disagrees or points out easier way to calculate. Mistakes discussed and corrected.

Solution:



Whole class activity

Drawn on BB or use enlarged copy master or OHP

Necessary written calculations done in *Ex. Bks*. or on scrap paper or slates.

Reasoning, checking, agreement, self-correction, praising

Details of calculations written on BB if problems.

25 min

6

PbY4a, page 69, Q.2

Read: *Mr. Silly did his divisions like this. Try to understand Mr. Silly's reasoning.*

Deal with one part at a time. Allow Ps time to study each calculation, then Ps come to BB to estimate the result, say whether *Mr. Silly*'s result could be correct or not and explain *Mr. Silly's* working (with T's or other Ps' help where necessary). P circles the mistake and writes the calculation again correctly. Class agrees/disagrees.

Solution: e.g.

a) $4136 \div 4 = 134$ ✗
013
16

↑
0 missed out

E: $4000 \div 4 = 1000$

Correct calculation:

	1	0	3	4
4	4	1	3	6
		1	1	

b) $9751 \div 3 = 325$◯ ✗
07
15
01

↑
0 and remainder 1 missed out

E: $9000 \div 3 = 3000$

Correct calculation:

	3	2	5	0	r 1
3	9	7	5	1	
		1		①	

c) $6375 \div 5 = 12075$ ✗
13
37
25
0

↑
0 should not be there!

E: $6000 \div 5 = 1200$

Correct calculation:

	1	2	7	5
5	6	3	7	5
	1	3	2	

Whole class activity

(or individual trial first if Ps wish)

Written on BB or SB or OHT

Discussion, reasoning, agreement, praising

Mr. Silly's reasoning: e.g.

a) 4Th divided by 4 = <u>1Th</u> and 0 remains.
I write 1 in the answer and 0 below the 4.

1H divided by 4 = 0H and 1H remains.
I write 0 in the answer and 1 below the 1 . . .

BUT *Mr Silly* forgot to write 0 in the hundreds column in the answer!

30 min

Y4		*Lesson Plan 69*
Activity		***Notes***
7	***PbY4a, page 69*** Q.3 Read: *Which is more? How many more? Write the correct sign and the difference.* Deal with one part at a time. Ps do calculations in *Ex. Bks*, then write interim results above/below operation signs in *Pbs* before filling in the missing sign and difference. Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a) $\underset{2091}{697 \times 3} \overset{8507}{+} \underset{6416}{802 \times 8}$ $\boxed{>}$ $\underset{5576}{697 \times 8} \overset{3170}{-} \underset{2406}{802 \times 3}$ $\boxed{5337}$ b) $\underset{1876}{268 \times 7} \overset{3172}{+} \underset{1296}{144 \times 9}$ $\boxed{>}$ $\underset{2412}{268 \times 9} \overset{1404}{-} \underset{1008}{144 \times 7}$ $\boxed{1768}$ c) $\underset{14\,142}{2357 \times 6} \overset{12\,266}{-} \underset{1876}{469 \times 4}$ $\boxed{>}$ $\underset{9428}{2357 \times 4} \overset{12\,242}{+} \underset{2814}{469 \times 6}$ $\boxed{24}$ *38 min*	Individual work, monitored, helped Written on BB or use enlarged copy master or OHP Reasoning, agreement, self-correction, praising (There is no 'clever' way of avoiding the calculations this time!)
8	***PbY4a, page 69*** Q.4 Read: *Calculate the operations in the correct order.* Deal with one part at a time. Ps do necessary calculations in *Ex. Bks* and write interim results above operation signs in *Pbs.* Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. *Solution:* a) $843 + 248 \overset{2232}{\times} 9 = \underline{3075}$ b) $7548 - 1212 \overset{202}{\div} 6 = \underline{7346}$ $(843 \overset{1091}{+} 248) \times 9 = \underline{9819}$ $(7548 \overset{6336}{-} 1212) \div 6 = \underline{1056}$ $843 \overset{7587}{\times} 9 + 248 = \underline{7835}$ $7548 \overset{1258}{\div} 6 - 1212 = \underline{46}$	Individual work, monitored, helped Written on BB or SB or OHT Reasoning, agreement, self-correcting, praising Revise order of operations if necessary.
Extension	Who can think of a problem which would require one of these calculations to solve it? Ps can discuss with neighbours first. Ps come to BB to point to their choice of equation and give their context. Ps decide whether it matches the calculation. e.g. $\underline{843 + 248 \times 9 = 3075}$ *In Magicland, there are 248 wizards. One day all the wizards in Magicland met at the biggest castle for the chief wizard's birthday. They each ate 9 cakes and after the party there were 843 cakes left over..* *How many cakes did the castle's cook bake for the party?* *45 min*	Whole class activity In good humour! T should have one or two contexts prepared in case Ps need hints. Extra praise for creative (correct) contexts!

Y4

Lesson Plan 70

Activity

Notes

Practice, revision, activities, consolidation

PbY4a, page 70

Solutions:

Q.1 a) A + B = 47 kg
A + C = 42 kg
B + C = 45 kg

2 × (A + B + C) = 134 kg

A + B + C = 134 kg ÷ 2 = <u>67 kg</u>

Answer: The reading on the scales would be 67 kg.

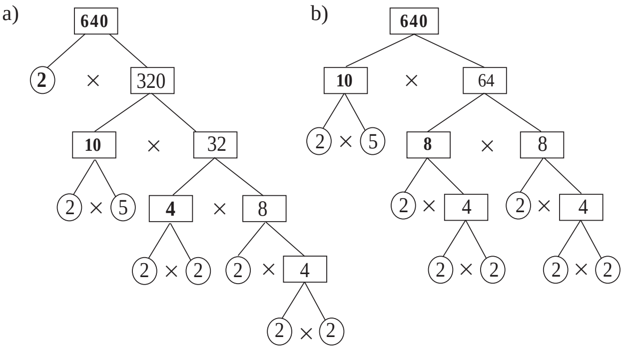
b) A = 67 kg – 45 kg = <u>22 kg</u>

B = 67 kg – 42 kg = <u>25 kg</u>

C = 67 kg – 47 kg = <u>20 kg</u>

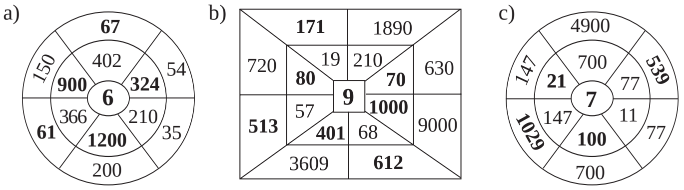
Answer: Adam weighs 22 kg, Barry weighs 25 kg and Clara weighs 20 kg.

Q.2



640 = 2 × 2 × 2 × 2 × 2 × 2 × 2 × 5

Q.3



Rule: Outer = Inner ÷ 6
Inner = Outer × 6
Inner ÷ Outer = 6

Rule: Outer = Inner × 9
Inner = Outer ÷ 9
Outer ÷ Inner = 9

Rule: Outer = Inner × 7
Inner = Outer ÷ 7
Outer ÷ Inner = 7

Q.4 Spent: £521 + (£521 – £278) = £521 + £243 = £764

Paid: £800

Change given: £800 – £764 = <u>£36</u>

Y4

R: Mental calculation
C: Contextual problems
E: Quantities

Lesson Plan
71

Activity

1

Quantities

Let's write these quantities in increasing order. Change them to the same unit first if it makes the task easier. Ps come to BB to write list (or to rearrange cards), explaining unit conversion where relevant. Class agrees/disagrees.

BB:

a) 25 cm 245 mm 2 m 210 cm 2 m 5 cm
(245 mm < 25 cm < 2 m < 2 m 5 cm < 210 cm)
e.g. 250 mm 2000 mm 2050 mm 2100 mm

b) 2 and a half km 2 km 90 m 2 km 450 m 2 km 600 m 2000 m
(2000 m < 2 km 90 m < 2 km 450 m < 2 and a half km < 2 km 600 m)
2090 m 2450 m 2500 m 2600 m

c) 32 cl 312 ml 3 litres 310 cl 302 cl
(312 ml < 32 cl < 3 litres < 302 cl < 310 cl)
e.g. 320 ml 3000 ml 3020 ml 3100 mml

d) 3 and a half litres 3 litres 40 cl 3 litres 450 ml 3 litres 5 cl 3005 ml
(3005 ml < 3 litres 5 cl < 3 litres 40 cl < 3 litres 450 ml < 3 and a half litres)
e.g. 3050 ml 3400 ml 3450 ml 3500 ml

e) 5 kg 4500 g 1500 g 25 kg 10 kg
(1500 g < 4500 g < 5 kg < 10 kg < 25 kg)
e.g. 5000 g 10 000 g 25 000 g

Notes

Whole class activity

Written on BB (or on cards stuck to BB for ease of manipulation)

Reasoning, agreement, praising

Revise relevant units of measure at each part.

BB:

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

1 km = 1000 m

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

1 kg = 1000 g

Feedback for T

10 min

2

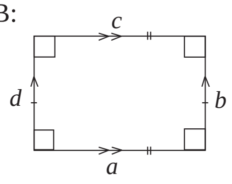
Perimeter

What name can you give all these shapes? (*polygons*)

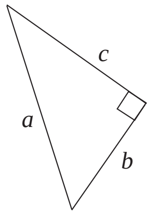
How can we work out the perimeter of each polygon? (Measure the length of each side and add the lengths.) Ps measure with rulers, then dictate measures to T to write on BB. (e.g $a = 6$ cm, $b = 4$ cm) Elicit the general rule first, then Ps come to BB to work out the perimeter.

What else can you tell me about each shape? (e.g. its name, number of sides/angles/vertices, which sides are equal/parallel/perpendicular, types of angles, regular or irregular, convex or concave, number of diagonals, etc.) T writes some of the information beside the diagram.

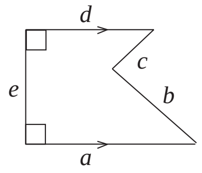
BB:

a)


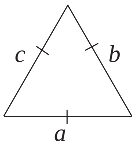
$P = 2 \times (a + b)$

b)


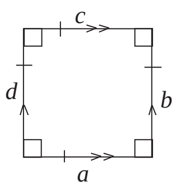
$P = a + b + c$

c)


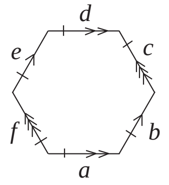
$P = a + b + c + d + e$

d)


$a = b = c$
$P = 3 \times a$

e)


$a = b = c = d$
$P = 4 \times a$

f)


$a = b = c = d = e = f$
$P = 6 \times a$

Notes

Whole class activity

Drawn on BB or use enlarged copy master or OHP

Ps have copies of copy master and rulers on desks (or Ps measure at BB with BB ruler)

Reasoning, agreement, praising

Whole class discussion

Ps refer to the sides of shapes by letters, e.g. in a):

Ps might say:	T writes:
a is equal to c,	$a = c$
d is perpendicular to a,	$d \perp a$
a is parallel to c,	$a \parallel c$
etc.	

Or Ps use the notation shown opposite, with T's help.

Praising, encouragement only

N.B. Deal only with what Ps suggest. There is no need to cover all possibilities!

18 min

Y4

Lesson Plan 71

Activity

Notes

3

Factors

Let's list the factors of these numbers.   BB: 1, 2, 4, 8, 16,
3, 9, 27, 81

Ps dictate what T should write. e.g.

BB:

1 : 1
2 : 1, 2
4 : 1, 2, 4
8 : 1, 2, 4, 8
16 : 1, 2, 4, 8, 16

3 : 1, 3
9 : 1, 3, 9
27 : 1, 3, 9, 27
81 : 1, 3, 9, 27, 81

22 min

Whole class activity

Ps shout out in unison or T chooses Ps at random.

Agreement, praising

What do you notice?

(Each number has the factors of the previous numbers plus itself; in LH column the numbers are multiples of 2; in RH column the numbers are multiples of 3, etc.)

4

PbY4a, page 71

Q.1 Read: *Make a plan, estimate, calculate, check and write the answer as a sentence.*

Deal with one part at a time. Set a time limit. Ps work in *Pbs* or in *Ex. Bks* if they need more space.

Review at BB with whole class. (Ps could show result as an inequality on scrap paper or slates on command.) Ps explain reasoning. Who agrees? Who did it another way? etc.

Solution:

a) *Helen had £3600 in her bank account and George had £2900. Each of them earned another £1500. Who has more money now and how much more?*

Plan: (H + £1500) – (G + £1500) = H – G

C: £3600 – £2900 = <u>£700</u> so $H \underset{£700}{>} G$

Answer: Helen has £700 more than George.

b) *Uncle Jack had £5400 and Aunt Molly had £4500. They each spent £1700. Who has more money left and how much more?*

Plan: (J – £1700) – (M – £1700) = J – M

C: £5400 – £4500 = <u>£900</u> so $J \underset{£900}{>} M$

Answer: Uncle Jack has left £900 more than Aunt Molly.

28 min

Individual work, monitored (helped)

Responses shown in unison

Reasoning, agreement, self-correcting, praising

Accept any correct method of solution, e.g. in a) adding £1500 to both amounts, or in b) subtracting £1700 from both amounts, before subtracting.

Extra praise if Ps realised that adding/subtracting the same amount to/from both terms in a subtraction makes no difference to the result.

Y4

Lesson Plan 71

Activity

Notes

5

PbY4a, page 71

Q.2 Read: *Solve the problems.*

Ps read problems themselves, write plans, estimate and do the calculations (in *Ex. Bks* if they need more space), check and then write the answer as a sentence in *Pbs*. Set a time limit.

Review at BB with whole class. (Ps could show results on scrap paper or slates on command.) Ps who answer correctly explain to those who do not. Class agrees/disagrees. Mistakes discussed and corrected.

Solution:

a) *Fred gathered 3456 kg of green apples, 9576 kg of red apples and 986 kg of plums from his orchard.*
How much fruit did Fred gather altogether?

Plan: 3456 kg + 9576 kg + 986 kg

E: 3000 + 10 000 + 1000 = 14 000

C:
$$\begin{array}{ccccc} & 3 & 4 & 5 & 6 \\ & 9 & 5 & 7 & 6 \\ + & & 9 & 8 & 6 \\ \hline 1 & 4 & 0 & 1 & 8 \\ \hline & 2 & 2 & 1 & \end{array} \downarrow$$

Answer: Fred gathered 14 018 kg of fruit altogether.

b) *There were 10 482 litres of water in a tank. The farmer used 7856 litres of the water to spray his fields.*
How much water was left in the tank?

Plan: 10 482 litres – 7856 litres

E: 11 000 – 8000 = 3000

C:
$$\begin{array}{cccccc} & 1 & 0 & {}^{10}4 & 8 & {}^{10}2 \\ - & & 7_1 & 8 & 5_1 & 6 \\ \hline & & 2 & 6 & 2 & 6 \\ \hline \end{array}$$

Answer: There were 2626 litres of water left in the tank.

Individual work, monitored, helped

Deal with one at a time.

Results shown in unison.

Reasoning, agreement, self-correcting, praising

Check by comparing with estimate and by adding in ↑ opposite direction.

Check by comparing with estimate and by another subtraction or addition, or with a calculator

Feedback for T

36 min

6

PbY4a, page 71, Q.3

Read: *Solve the problems.*

Listen carefully, do the calulation in your *Ex. Bks* and show me the result when I say. Ps who answer correctly explain at BB to those who do not. Who did the same? Who did it another way? etc. Mistakes discussed and corrected. Draw a diagram if necessary.

a) *A box full of apples weighs 39 kg. How many kg of apples are there in 80 boxes if an empty box weighs 5 kg?*

Plan: B + A: 39 kg, B: 5 kg; Apples in 1 box: 39 – 5 = 34 (kg)

Apples in 80 boxes: 34 × 80 = 340 × 8 = $\underline{2720}$ (kg)

Answer: There are 2720 kg of apples in 80 boxes.

b) *How much do 19 jars of honey cost if each jar costs 680 p?*

Plan: 1 jar: 680 p; 19 jars: 680 p × 19

C: 680 × 19 = 680 × 20 – 680 = 6800 × 2 – 680

= 13 600 – 680 = 12 920 (p) = $\underline{\text{£}129.20}$

Answer: 19 jars of honey cost £129.20.

c) *If 8 metres of material cost 4800 p, how much will 2 metres cost?*

Plan: 8 m → 4800 p

1 m → 4800 p ÷ 8 = 600 p

2 m → 600 p × 2 = 1200 p = $\underline{\text{£}12}$

Answer: 2 metres of material will cost £12.

Whole class activity but individual calculating

P reads each question aloud.

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

Reasoning, agreeement, self-correcting, praising

(or 39 × 80 – 5 × 80)

or (with T's help)

$$\begin{array}{ccccc|l} & & 6 & 8 & 0 & \\ & & \times & 1 & 9 & \\ \hline & 6 & 1 & 2 & 0 & (680 \times 9) \\ + & 6 & 8 & 0 & 0 & (680 \times 10) \\ \hline 1 & 2 & 9 & 2 & 0 & \\ \hline \end{array}$$

or 8 m → 4800 p
2 m → 1200 p (÷ 4)

or 8 m → £48
2 m → £12 (÷ 4)

45 min

Y4

R: Mental and written calculation

C: Contextual problems

E: Perimeter, sequences

Lesson Plan 72

Activity

Notes

1

Calculation

Let's do these calculations. Ps come to BB to work through one calculation at a time, explaining reasoning clearly with place value.

(e.g. a): 8U + 2U = 10U = 1T + <u>0U</u>. I write 0 in the answer and 1 below the tens column. 7T + 5T + 1T = 13T = 1H + 3T, etc.)

Class points out errors in calculation. Ask for long multiplication in f) and long division in h) as revision. Check with a calculator if there is disagreement.

BB:

a) $$\begin{array}{cccccc} & 1 & 2 & 6 & 7 & 8 \\ + & & & 8 & 5 & 2 \\ \hline & 1 & 3 & 5 & 3 & 0 \\ & & {\scriptstyle 1} & {\scriptstyle 1} & {\scriptstyle 1} & \end{array}$$

b) $$\begin{array}{ccccc} & 5 & 8 & 1 & 6 \\ & & 4 & 2 & 5 \\ & 1 & 3 & 4 & 8 \\ + & & & 3 & 7 \\ \hline & 7 & 6 & 2 & 6 \\ & {\scriptstyle 1} & {\scriptstyle 1} & {\scriptstyle 2} & \end{array}$$

c) $$\begin{array}{ccccc} & 3 & 7 & \overset{10}{1} & \overset{10}{6} \\ - & 1 & 5_1 & 7_1 & 8 \\ \hline & 2 & 1 & 3 & 8 \end{array}$$

d) $$\begin{array}{ccccc} 1 & 0 & \overset{10}{0} & \overset{10}{0} & \overset{10}{0} \\ - & 5_1 & 7_1 & 6_1 & 8 \\ \hline & 4 & 2 & 3 & 2 \end{array}$$

e) $$\begin{array}{ccccc} 1 & 0 & \overset{10}{1} & \overset{10}{0} & \overset{10}{1} \\ - & {}_1 & 9_1 & 9_1 & 9 \\ \hline & 9 & 1 & 0 & 2 \end{array}$$

f) $$\begin{array}{cccc} & 8 & 7 & 9 \\ & & \times & 6 \\ \hline & & 5 & 4 \\ & 4 & 2 & 0 \\ 4 & 8 & 0 & 0 \\ \hline 5 & 2 & 7 & 4 \\ {\scriptstyle 1} & & & \end{array}$$

g) $$\begin{array}{cccc} 1 & 7 & 0 & 9 \\ & & \times & 4 \\ \hline 6 & 8 & 3 & 6 \\ {\scriptstyle 2} & & {\scriptstyle 3} & \end{array}$$

h) $$\begin{array}{ccccc l} & 1 & 1 & 4 & 7 & \text{r } 3 \\ \cline{2-5} \multicolumn{1}{c|}{7} & 8 & 0 & 3 & 2 & \\ - & 7 & & & & \\ \cline{2-2} & 1 & 0 & & & \\ - & & 7 & & & \\ \cline{2-3} & & 3 & 3 & & \\ & - & 2 & 8 & & \\ \cline{3-4} & & & 5 & 2 & \\ & & - & 4 & 9 & \\ \cline{4-5} & & & & \textcircled{3} & \end{array}$$

i) $$\begin{array}{ccccc l} & & 7 & 0 & 0 & \text{r } 3 \\ \hline \multicolumn{1}{c|}{8} & 5 & 6 & 0 & 3 & \\ & & & & {\scriptstyle 3} & \end{array}$$

10 min

Whole class activity

Written on BB or use enlarged copy master or OHP

Or Ps have copy of copy master on desks (or T dictates numbers and operations and Ps write in *Ex. Bks*.) and calculate individually before showing results on scrap paper or slates in unison on command.

Reasoning, agreement, (self-correction), praising

Feedback for T

2

Sequences

Let's continue the sequence if this is the rule:

Each following term is 3 times the previous term minus 2.

T writes only first terms on BB. Ps come to BB to continue the sequence or dictate terms to T, explaining reasoning. Class checks and points out errors. (Checking can be done with a calculator.)

BB:

a) 7, (19, 55, 163, 487, 1459, 4375, 13 123, [39 367, . . .])

b) 2, (4, 10, 28, 82, 244, 730, 2188, 6562, 19 684, [. . .]

c) 1, (1, 1, 1, . . .)

15 min

Whole class activity

Written on BB

Ps can do difficult calculations in *Ex. Bks* before coming to BB or dictating to T.

Reasoning, checking, agreement, praising

Feedback for T

3

Problem

Listen carefully and think how you would solve the problem. T reads problem 2 or 3 times, giving Ps time to think and discuss with their neighbours. Then Ps come to BB or dictate what T should write, explaining reasoning. Class agrees/disagrees or suggests alternative method of solution.

A rectangular playground is 48 m long by 36 m wide.

a) *What length of fencing would we need to surround it?*

BB: $P = (48\text{ m} + 36\text{ m}) \times 2 = 84\text{ m} \times 2 = \underline{168\text{ m}}$

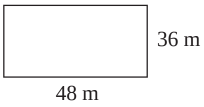
Answer: We would need 168 m of fencing.

Whole class activity

Discussion, reasoning, agreement, praising

T intervenes if Ps are having problems or make mistakes not noticed by rest of class.

BB:



Y4

Lesson Plan 72

Activity | ***Notes***

3

(Continued)

b) *How many posts would we need if we want to put them 2 m apart?*

BB: On each long side: 48 m ÷ 2 m = 24 (times)
On each short side: 36 m ÷ 2 m = 18 (times)

BUT these are the number of 2 m spaces! We need to make sure that there is a post at each end of each side. (Demonstrate with smaller numbers (e.g. 8 m by 6 m) if necessary to illustrate the concept more easily, drawing dots for posts.)

Elicit that calculation should be:

BB: Number of posts needed: 25 + 25 + 17 + 17 = 84
(or 23 + 23 + 19 + 19 = 84)

Answer: We would need 84 posts if we put them 2 m apart.

c) *How many posts would we need if we put them 3 m apart?*

BB: On each long side: 48 m ÷ 3 m = 16 (spaces)
On each short side: 36 m ÷ 3 m = 12 (spaces)
Number of posts needed: 17 + 17 + 11 + 11 = 56
(or 15 + 15 + 13 + 13 = 56)

Answer: We would need 56 posts if we put them 3 m apart.

If the question had asked, *How many posts would we need for one of the longer sides?*, what calculation would we have done?

BB: 48 ÷ 3 + 1 = 16 + 1 = 17

Extension

What is the area of the playground?

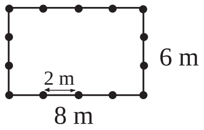
(A = 48m × 36 m = 96 m × 18 m = 192 m × 9 m = 1728 m^2)

Ps suggest how to do calculation. T give hints if necessary.

Discussion, demonstration, agreement, praising

Simpler example

BB:



Each long side:

8 m ÷ 2 m = 4 (spaces)
so 5 posts are needed

Each short side:

6 m ÷ 2 m = 3 (spaces)
but only 2 posts are needed, as corner posts are already there on long sides.

(Or if you start with short side: 4 posts are needed; long side would need only 3 posts as corner posts are already there on short sides.)

As a long side is being considered in isolation.

or: (with T's help)

$$\begin{array}{rrrrrl} & & & 4 & 8 & \\ & & \times & 3 & 6 & \\ \hline & & 2 & 8 & 8 & (48 \times 6) \\ + & 1 & 4 & 4 & 0 & (48 \times 30) \\ \hline & 1 & 7 & 2 & 8 & \\ & & {\scriptstyle 1} & & & \end{array}$$

22 min

4

PbY4a, page 72

Q.1 Read: *This sketch shows a park surrounded by 4 streets.*

Ps first measure the lengths of each street and write them outside the diagram beside the street names. How can we change them to real lengths? (Multiply by 5 and change the unit to m.) Ps write these real lengths inside the diagram.

Review at BB with whole class. Ps come to BB or dictate to T. Mistakes corrected. (T could draw a table to show the lengths.)

Read: *Sarah started at one corner and followed the railings all the way around the edge of the park back to where she started. How far did Sarah walk?*

Elicit that Sarah walked around the perimeter of the park.

Ps do calculation in *Pbs* (or in *Ex. Bks* if they need more space) and write the answer as a sentence.

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

Extensions

1. What is the ratio of the real distances to the sketch distances?
2. What is the area of the park?

(A = 190 × 115 = 19 × 1150 = 20 × 1150 – 1150
= 2 ×11500 – 1150 = 23 000 – 1150 = 21 850 (m^2)

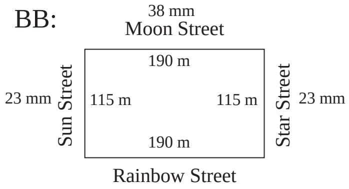
Individual work, monitored, helped

Discuss the scale and elicit how to find the real lengths.

Drawn on BB

Agreement, praising

BB:



Solution:

P = (190 m + 115 m) × 2
= 305 m × 2 = 610 m

Answer: Sarah walked 610 m.

1. *Scale:* 1 mm → 5 m
or 1 mm → 5000 mm
Real distance is 5000 times more, so ratio is 5000 : 1

28 min

Y4

Lesson Plan 72

Activity **Notes**

5

PbY4a, page 72

Q.2 Read: *This sketch shows a bicycle route through a wood.*

Estimate, then measure the length of the route on the sketch with the help of a strip of paper.

Ps have thin strips of paper (or pieces of string) on desks.
Let's estimate the length of the perimeter and write it inside the diagram. Think of a cm in your head and imagine how many you would need to cover the line. T asks several Ps for their estimate. Let's see who is closest!

Ps make a mark on diagram, then curl their strip of paper (or string or thread) around the edge of the diagram, mark the point where it meets itself, then unfurl it and lay it along a ruler.
Ps write this length inside the diagram too. (It need only be approximate.)

Review at BB with whole class. Ask several Ps what they measured and compare with their estimates. Whose estimate was closer? Class applauds Ps with closest estimate.

Read: *Calculate the length of the route in real life.*

How can we do it? (Multiply by 100 and change the unit to m.)
T asks one or two Ps to give their sketch length and real distance. Class decides whether they are correct.

e.g. Sketch distance: 128 mm.

Real distance: 128 × 100 = 12 800 (m) = <u>12 km 800 m</u>

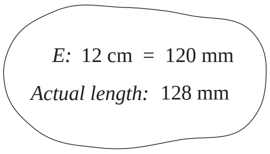
Paired work in measuring, individual work in estimating and calculating, monitored, helped

Route drawn on BB or use enlarged copy master or OHP for demonstration only.

T writes estimates on BB.

T demonstrates method of measuring..

BB:
e..g



Agreement, praising

Self-correction only if wildly inaccurate.

Reasoning, agreement, self-correction, praising

BB: 1000 m = 1 km

33 min

6

PbY4a, page 72

Q.3 Read: *Make a plan, estimate, calculate, check and write the answer as a sentence.*

Deal with one part at a time. Set a time limit. Ps can do calculations in *Ex. Bks.*

Review at BB with whole class. Ps come to BB to show solution, explaining reasoning. Who agrees? Who did it a different way? etc. Mistakes discussed and corrected.

Solutions:

a) *Bubbletown has 6718 inhabitants, which is 2576 less than Sudsville has. If 1289 people moved from Sudsville to Bubbletown, which town would have more people and how many more?*

BB: *B*: Now has : 6718

Would have: 6718 + 1289 = <u>8007</u>

S: Now has: 6718 + 2576

Would have: 6718 + 2576 – 1289 = <u>8005</u>

or Difference now: 2576 (more for S)

Change in difference would be: 2 × 1289 = 2578 (more for B)

So *B* will have 2578 – 2576 = <u>2</u> more than *S*.

Answer: Bubbletown would have 2 more people than *Sudsville*.

Whole class activity with a), then individual work, monitored, helped

Discussion, reasoning, agreement, self-correction, praising

Allow Ps to try to solve it at BB, with T's help.

e.g.

B
$$\begin{array}{cccc} & 6 & 7 & 1 & 8 \\ + & 1 & 2 & 8 & 9 \\ \hline & 8 & 0 & 0 & 7 \\ & {\scriptstyle 1} & {\scriptstyle 1} & {\scriptstyle 1} & \end{array}$$

S:
$$\begin{array}{ccccc} & 6 & 7 & 1 & 8 \\ + & 2 & 5 & 7 & 6 \\ \hline & 9 & 2 & 9 & 4 \\ & {\scriptstyle 1} & & {\scriptstyle 1} & \end{array} \qquad \begin{array}{ccccc} & & & & {\scriptstyle 10} \\ & 9 & 2 & 9 & 4 \\ - & 1 & 2 & 8_{1} & 9 \\ \hline & 8 & 0 & 0 & 5 \end{array}$$

S B
$$8005 \underset{2}{<} 8007$$

or
$$\begin{array}{cccc} 1 & 2 & 8 & 9 \\ & & \times & 2 \\ \hline 2 & 5 & 7 & 8 \\ & {\scriptstyle 1} & {\scriptstyle 1} & \end{array}$$

Extra praise if Ps suggest the difference method.

Y4

Lesson Plan 72

Activity		***Notes***

6

(Continued)

Q.3 b) *How much do 8 metres of curtain material cost if 1 m costs 2400 p?*

BB: 1 m → 2400 p or 1 m → £24
8 m → 2400p × 8 8 m → £24 × 8
= $\underline{\text{19 200 p}}$ = $\underline{\text{£192}}$

Answer: 8 metres cost £192.

c) *Steve spent 1 third of his savings, £6500, on a new car.*

i) How much money did Steve have originally?

BB: Spent: 1 third → £6500
Had: 3 thirds → £6500 × 3 = $\underline{\text{£19 500}}$

Answer: Steve had £19 500 originally.

ii) How much money does he have left?

BB: Had: 3 thirds Spent: 1 third → £6500
Had left: 2 thirds → £6500 × 2 = $\underline{\text{£13 000}}$

or Had: £19 500 Spent: £6500
Had left: £19 500 – £6500 = $\underline{\text{£13 000}}$

Answer: Steve has £13 000 left

d) *Helen bought 4 matchbox cars for each of her two brothers. She spent 2400 p altogether. How much was each car?*

BB: Bought: 4 × 2 = 8 cars Spent: 2400 p = £24
8 cars → £24
1 car → £24 ÷ 8 = $\underline{\text{£3}}$

Answer: Each car cost £3.

45 min

Notes

C:

$$\begin{array}{ccccc} & 2 & 4 & 0 & 0 \\ & & & \times & 8 \\ \hline 1 & 9 & 2 & 0 & 0 \\ & {}_3 & & & \end{array}$$

$$\begin{array}{ccccc} & 6 & 5 & 0 & 0 \\ & & & \times & 3 \\ \hline 1 & 9 & 5 & 0 & 0 \\ & {}_1 & & & \end{array}$$

$$\begin{array}{ccccc} & 6 & 5 & 0 & 0 \\ & & & \times & 2 \\ \hline 1 & 3 & 0 & 0 & 0 \\ & {}_1 & & & \end{array}$$

or

$$\begin{array}{ccccc} 1 & 9 & 5 & 0 & 0 \\ - & 6 & 5 & 0 & 0 \\ \hline 1 & 3 & 0 & 0 & 0 \\ & {}_1 & & & \end{array}$$

Check: £3 × 8 = £24
= 2400 p ✔

Accept and praise any correct method of solution in all the above but show the most straightforward too!

Y4

R: Calculations

C: Problems in context

E: Quantities. Puzzles

Lesson Plan *73*

Activity

Notes

1

Puzzle

T has additions and subtractions as letters written on BB. The same letters mean the same digits. Which numbers could we write instead of the letters? Ps can discuss with neighbours or try possible numbers on slates or in *Ex. Bks*. When they have found a solution, they show it on BB. Who agrees? Who found other numbers? etc.

If Ps are stuck, T gives hints, as below.

BB:

a)
$$\begin{array}{cccc} & A & B & C \\ + & A & B & C \\ \hline & D & A & B \end{array} \qquad \left[\begin{array}{cccc} & 3 & 6 & 8 \\ + & 3 & 6 & 8 \\ \hline & 7 & 3 & 6 \end{array} \text{ or } \begin{array}{cccc} & 1 & 0 & 5 \\ + & 1 & 0 & 5 \\ \hline & 2 & 1 & 0 \end{array} \text{ or } \begin{array}{cccc} & 2 & 6 & 3 \\ + & 2 & 6 & 3 \\ \hline & 5 & 2 & 6 \end{array} \right]$$

Hint: e.g. B must be even, $A < 5$

b)
$$\begin{array}{cccc} & A & B & C \\ - & B & C & A \\ \hline & B & C & D \end{array} \qquad \left[\begin{array}{cccc} & 7 & 3 & 6 \\ - & 3 & 6 & 7 \\ \hline & 3 & 6 & 9 \end{array} \text{ or } \begin{array}{cccc} & 5 & 2 & 6 \\ - & 2 & 6 & 5 \\ \hline & 2 & 6 & 1 \end{array} \text{ or } \begin{array}{cccc} & 2 & 1 & 0 \\ - & 1 & 0 & 2 \\ \hline & 1 & 0 & 8 \end{array} \right]$$

Hint: e.g. $A > B$. Advise Ps to try $A = 7$

c)
$$\begin{array}{cccc} & A & B & C \\ - & B & C & A \\ \hline & D & C & A \end{array} \qquad \left[\begin{array}{cccc} & 9 & 7 & 8 \\ - & 7 & 8 & 9 \\ \hline & 1 & 8 & 9 \end{array} \text{ or } \begin{array}{cccc} & 5 & 1 & 0 \\ - & 1 & 0 & 5 \\ \hline & 4 & 0 & 5 \end{array} \text{ or } \begin{array}{cccc} & 6 & 5 & 2 \\ - & 5 & 2 & 6 \\ \hline & 1 & 2 & 6 \end{array} \right]$$

Hint: e.g. $A > B$. Advise Ps to try $A = 9$

Whole class activity

Written on BB or SB or OHT

Set a time limit for each, then if nobody has solved it by then, T gives hints.

Discuss reasoning for hints:

B must be even (2 times C, or 2 times any whole number, results in an even number)

A must be < 5 (5 + 5 = 10 but D must be < 10 as there are no thousands digits)

etc.

Possible solutions given but others are possible.

Agreement, checking, praising

These are difficult problems, so if Ps solve any without help, they deserve a round of applause!

8 min

2

Missing numbers

Study the table. The rule for row *c* is given. Let's fill in the missing numbers. Encourage mental calculation where possible. Necessary written calculations can be done in *Ex. Bks* or on scrap paper or slates.

Ps come to BB to choose a column and fill in number, explaining reasoning. Class agrees/disagrees. Elicit other forms of the rule.

BB:

a	780	1000	2813	0	5000	**4000**	1
b	40	400	1000	0	**723**	315	1
$c = 2 \times a + b$	**1600**	**2400**	**6626**	**0**	10 723	8315	**3**

Rule: $c = 2 \times a + b$, $b = c - 2 \times a$, $a = (c - b) \div 2$

Extension Ps add other columns to table. Class checks that they are correct.

Whole class activity

Drawn on BB or use enlarged copy master or OHP

At a good pace

Reasoning, agreement, praising

Feedback for T

13 min

Y4

Lesson Plan 73

Activity

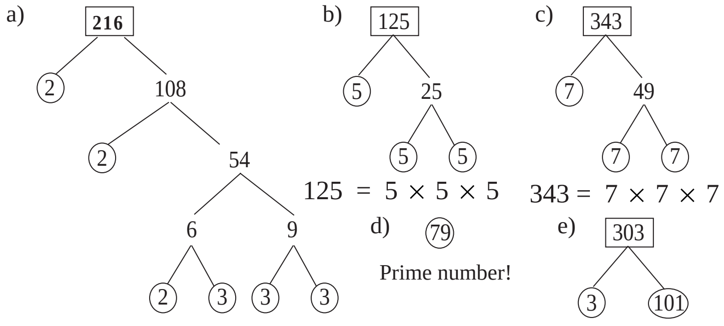
Notes

3

Factorising

Let's break down these numbers into their prime factors. Ps come to BB or dictate to T, explaining reasoning, Class agrees/disagrees.

BB:



125 = 5 × 5 × 5

343 = 7 × 7 × 7

216 = 2 × 2 × 2 × 3 × 3 × 3

303 = 3 × 101

When complete, Ps write the number as a product of its prime factors.

Let's use the prime factors to help us list <u>all</u> the factors of the number.

BB:

<u>Number</u>	<u>Factors</u>
<u>216</u>	1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 27, 36, 54, 72, 108, 216
<u>125</u>	1, 5, 25, 125
<u>343</u>	1, 7, 49, 343
<u>79</u>	1, 79 (prime number – only has factors 1 and itself)
<u>303</u>	1, 3, 101, 303

Whole class activity

(Ps can try it in *Ex. Bks*. or on their slates too if they wish.)

Ps suggest the starting pair of factors.

At a good pace

Reasoning, agreement, praising

Ps come to BB or dictate to T

Agreement, praising

List in pairs, either vertically or horizontally as shown.
(1 at LHS and 216 at RHS,
2 after the 1 and 108 before 216, etc.)

Agreement, praising

20 min

4

PbY4a, page 73

Q.1 Read: *Underline the important data. Write a plan here.*
Do the calculation and check it in your exercise book.
Write the answer as a sentence here.

Deal with one at a time (or with each step at a time if Ps are not very able). Set a time limit.

Review at BB with whole class. Ps could show results on scrap paper or slates on command. Ps answering correctly come to BB to show solution, explaining reasoning. Who did the same? Who did it another way? etc. Mistakes discussed and corrected.

Solution:

a) *To celebrate the 250th anniversary of a school, <u>1260</u> guests were invited to a reception but only <u>987</u> attended.*

How many people did not attend?

Plan: 1260 – 987

C:

	1	2	$^{10}6$	$^{10}0$
–		9_1	8_1	7
		2	7	3

Answer: 273 people did not attend.

Individual work, monitored, helped

T could review the important data before Ps solve problem.

Discussion, reasoning, agreement, self-correction, praising

The 250th anniversary is not important for the solution.

Y4

Lesson Plan 73

Activity

Notes

4

Erratum

In *Pb*

'at least one' should be 'at least once'

(Continued)

b) *In a primary school, <u>120 pupils</u> went to at least one workshop on <u>Monday</u> and <u>80</u> pupils went to at least one workshop on <u>Tuesday</u>. Each pupil went to a workshop at least once.*

How many pupils go to this school?

We can work out the least and greatest possible number of pupils in the school.

<u>Least number</u>:

If each of the 80 pupils who attended the workshop on Tuesday also attended the workshop on Monday, then:

Least no. of Ps in school is <u>120</u>.

<u>Greatest number</u>:

If each of the 80 pupils who attended the workshop on Tuesday <u>did not</u> attend the workshop on Monday, then:

Greatest no. of Ps in school is: 120 + 80 = <u>200</u>

Answer: The number of pupils who go to this school is equal to or more than 120 and less than or equal to 200.

c) *<u>Nine</u> of the same type of machine were put on a weigh-bridge before being loaded on to a train. The reading on the scale was <u>8577 kg</u>. The cost of the transport was £71.*

What did each machine weigh?

Plan: 8577 kg ÷ 9

C:

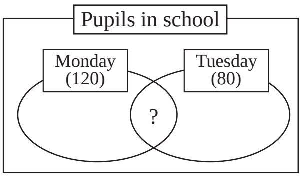
			9	5	3
9	8	5	7	7	
			4	2	

Answer: Each machine weighed 953 kg.

This is best done with the whole class.

Agree that there are not enough data to give the exact number of Ps but we can show what we know in a diagram like this.

BB:



We can show the number as an inequality:

BB: $120 \le n \le 200$

(where n is the number of Ps in the school)

Elicit or explain what a weighbridge is.

Agree that cost of transport, £171, is not important for the solution.

30 min

5

PbY4a, page 73

Q.2 Read: *Solve these problems in your exercise book.*

Ps read questions themselves. Set a time limit.

Review at BB with whole class. Ps could show results on scrap paper or slates on command. Ps who responded correctly explain to those who did not. Mistakes discussed and corrected.

Solution: e.g.

a) *Charlie bought 6 kg 720 g of apples. Linda bought 7 kg 150 g more than Charlie. What weight of apples did Linda buy?*

BB: C: 6 kg 720 g = 6720 g

L: 7 kg 150 g + 6720 g

= 7150 g + 6720 g

= 13 870 g = <u>13 kg 870 g</u>

	6	7	2	0
+	7	1	5	0
1	3	8	7	0

Answer: Linda bought 13 kg 870 g of apples.

b) *After 5 m 44 cm was cut off a length of ribbon, 6315 mm was left. How long was the ribbon to begin with?*

BB: Length cut off: 5 m 44 cm = 5440 mm

Length left: 6315 mm

Length of ribbon: 5440 mm + 6315 mm

= 11 755 mm = <u>11 m 75 cm 5 mm</u>

Answer: The length of the ribbon was 11 m 75 cm 5 mm.

Individual work, monitored, helped

Reasoning, agreement, self-correcting, praising

or Charlie: 6 kg 720 g

+ 7 kg 150 g

Linda: 13 kg 870 g

BB:

	6	3	1	5
+	5	4	4	0
1	1	7	5	5

Accept length in mm or cm too.

Activity

Notes

5 (Continued)

c) *Alex cycled at the same speed for 7 minutes. How far did he travel if he covered 352 m every minute?*

BB: 1 minute: 352 m

7 minutes: 352 m × 7 = 2464 m = <u>2 km 464 m</u>

Answer: Alex travelled 2 km 464 m.

d) *The valve on a tank was left open by mistake and 8 litres of water flowed out every second.*

The tank was empty after 547 seconds but in the final second only 2 litres of water flowed out. How much water was in the tank to begin with?

BB: Water lost after 1 second: 8 litres

after 546 seconds: 8 litres × 546

= 4368 litres

after 547 seconds: 4368 + 2 = <u>4370</u> (litres)

Answer: There were 4370 litres in the tank to begin with.

$$\begin{array}{cccc} & 3 & 5 & 2 \\ & & \times & 7 \\ \hline 2 & 4 & 6 & 4 \\ & {\scriptstyle 3} & {\scriptstyle 1} & \end{array}$$

T explains what a valve is and talks about the context if necessary.

$$\begin{array}{cccc} & 5 & 4 & 6 \\ & & \times & 8 \\ \hline 4 & 3 & 6 & 8 \\ & {\scriptstyle 3} & {\scriptstyle 4} & \end{array}$$

Or after 547 sec:

8 litres × 547 – 6 (litres)

= 4376 – 6 = <u>4370</u> (litres)

40 min

6 ***PbY4a, page 73, Q.3***

Read: *Is there enough data to answer the question? If there is, solve it.*

Deal with one part of each question at a time. P reads question aloud. T gives Ps time to think about it. When I say, stand up if you think it can be solved and remain sitting if you think there is not enough data.

Show me what you think . . . now!

Ps who think it can be solved come to BB to show solution (with help of class). Ps who do not think so explain why not.

Solutions:

a) *Jenny was born on the 1st of May and weighed 3180 g.*
On the morning of the 25th July she weighed 5 kg 615 g.

i) *How many days old was she on the 25th July?*

From 1st of May to 25 July: 31 + 30 + 25 = <u>86</u> (days)

Answer: Jenny was 86 days old on the 25th July.

ii) *How much weight had she put on since she was born?*

Weight on 1st May: 3180 g

Weight on 25th July: 5 kg 615 g = 5615 g

Weight gained: 5615 g – 3180 g = 2435 g

= <u>2 kg 435 g</u>

$$\begin{array}{ccccc} & 5 & 6 & \overset{10}{1} & 5 \\ - & 3 & 1_{1} & 8 & 0 \\ \hline & 2 & 4 & 3 & 5 \end{array}$$

Answer: Jenny had put on 2 kg 435 g in wieght.

b) *They let out 2356 litres of water from a dam on Sunday.*
On Monday they let out 7105 litres.

i) *How much water did they let out during the 2 days?*

Amount of water: 2356 + 7105 = <u>9461</u> (litres)

Answer: They let out 9461 litres during the 2 days.

ii) *How many litres of water are still in the dam?*

It is impossible to say, as we do not know how many litres were in the dam to begin with.

45 min

Whole class activity

(or individual work if Ps wish)

T has questions written on BB or SB or OHT.

In unison

Discussion, reasoning, agreement, praising

Ps tell class of any young babies they know, how old they are (months, weeks, days) and what their weight is.)

(If we assume from the 2nd weight that it is the same year!)

(T could have this weight in bags of sugar, etc. to give Ps an idea of how much the baby had grown.)

(T could have a picture of a dam to show to class and explain why dams need to be built.)

BB:

$$\begin{array}{ccccc} & 2 & 3 & 5 & 6 \\ + & 7 & 1 & 0 & 5 \\ \hline & 9 & 4 & 6 & 1 \\ & & & {\scriptstyle 1} & \end{array}$$

Extra praise for Ps who realise this without help from T.

Y4

R: Calculations

C: Problems in context

E: Factor pairs. Prime numbers

Lesson Plan 74

Activity		*Notes*

1

Sequences

Let's continue the sequences in both directions if these are the rules. Ps come to BB to write a number, explaining reasoning. Class agrees/disagrees.

BB:

a) *Rule:* The next term is 1250 more than the previous term.

(. . ., 3174, 4424), **5674, 6924, 8174,** (9424, 10 674, . . .)

b) *Rule:* The difference is decreasing by 100.

(. . ., 4992, 6154), **7216, 8178,** (9040, 9802, . . .)

1162 1062 962 862 762

Whole class activity

Bold terms already written on BB below rules.

Difficult calculations written at side of BB (or in *Ex. Bks*).

Reasoning, agreement, praising

In b), check by writing the differences between the terms.

Feedback for T

8 min

2

Factors

Let's list the factors of these numbers. What is a factor of a number? (a number which multiplies another number to make that number, or a number which divides into that number exactly)

Ps come to BB to write the factors in pairs vertically or horizontally, or dictate to T. Class agrees/disagrees.

Let's underline the prime factors. Who can write the number as the product of its prime factors? Ps come to BB. Class agrees/disagrees.

What do you notice? (e.g. each of the non-prime factors is a multiple of the prime factor. A prime number has only 2 factors, itself and 1.)

BB:

Number	Factors	No. of factors	
31	1, 31	[2]	Prime number
32	1, 2, 4, 8, 16, 32	[6]	32 = 2 × 2 × 2 × 2 × 2
33	1, 3, 11, 33	[4]	33 = 3 × 11
34	1, 2, 17, 34	[4]	34 = 2 × 17
35	1, 5, 7, 35	[4]	35 = 5 × 7
36	1, 2, 3, 4, 6, 9, 12, 18, 36	[9]	36 = 2 × 2 × 3 × 3
37	1, 37	[2]	Prime number
38	1, 2, 19, 38	[4]	38 = 2 × 19
39	1, 3, 13, 39	[4]	39 = 3 × 13
40	1, 2, 4, 5, 8, 10, 20, 40	[8]	40 = 2 × 2 × 2 × 5

Whole class activity

Numbers written down side of BB.

Ps can draw factor trees on slates or in *Ex. Bks* to help them.

At a good pace

Reasoning,agreement, checking, praising

Revise divisibility, factors and multiples.

Elicit that

- a factor of a number is a whole number which divides into that number exactly,
- a multiple of a number is a whole number which is divisible by that number exactly.

18 min

3

PbY4a, page 74

Q.1 Read: *Make a plan, estimate, calculate, check, and write the answer in your exercise book.*

Deal with one question at a time (or set a time limit and review after every 2 or 3 questions if class is very able).

Read the question, picture it in your head, solve it in your *Ex. Bks*. then show me your result when I say.

Ps answering correctly explain at BB to those who did not. Mistakes discussed and corrected.

Individual work, monitored, helped

[Or could also be used as a test to give Ps practice in working independently]

Responses shown in unison.

Discussion, reasoning, agreement, self-correction, praising

Y4

Lesson Plan 74

Activity

Notes

3 (Continued)

a) *They put 3800 kg of meat into each of two vans. Then they put an extra 1600 kg of meat into one van and took out 500 kg of meat from the other.*

How much more meat did one van carry than the other van?

BB:

<u>Van A</u>

Had: 3800 kg Then had: 3800 kg + 1600 kg = <u>5400 kg</u>

<u>Van B</u>

Had: 3800 kg Then had: 3800 kg – 500 kg = <u>3300 kg</u>

Amount more in <u>Van A</u>: 5400 kg – 3300 kg = <u>2100 kg</u>

or

Change in difference: 1600 kg + 500 kg = <u>2100 kg</u>

Answer: The first van carried 2100 kg more meat than the other.

Draw a diagram if necessary.

Or plan in one line:

(3800 + 1600) – (3800 – 500)

= 1600 + 500 = <u>2100</u> (kg)

$$\begin{array}{ccccc} & 5 & 4 & 0 & 0 \\ - & 3 & 3 & 0 & 0 \\ \hline & 2 & 1 & 0 & 0 \end{array}$$

$$\begin{array}{ccccc} & 1 & 6 & 0 & 0 \\ + & & 5 & 0 & 0 \\ \hline & 2 & 1 & 0 & 0 \end{array}$$

On slates:

A > B

2100 kg

b) *A lorry can carry, at most, 2100 kg of wood. How much wood could have been moved by the lorry after it has made 9 journeys?*

BB:

Wood moved after: 1 journey → 2100 kg

9 journeys → 2100 kg × 9 = <u>18 900 kg</u>

Answer: The lorry could have moved 18 900 kg of wood.

$$\begin{array}{ccccc} & 2 & 1 & 0 & 0 \\ & & & \times & 9 \\ \hline 1 & 8 & 9 & 0 & 0 \end{array}$$

c) *In an orchard, 8706 kg of apples and 6954 kg of pears were picked. The apples were put into nets which could hold 8 kg each. The pears were packed into boxes which could hold 6 kg each. They filled 876 nets of apples and 876 boxes of pears.*

Which fruit did they have more of left over? How much more?

BB:

<u>Apples</u> Picked: 8706 kg Each net: 8 kg

Packed in nets: 8 kg × 876 = 7008 kg

Left over: 8706 kg – 7008 kg = <u>1698 kg</u>

<u>Pears</u> Picked: 6954 kg Each box: 6 kg

Packed in boxes: 6 kg × 876 = 5256 kg

Left over: 6954 kg – 5256 kg = <u>1698 kg</u>

Answer: They had the same quantity of each fruit left over.

$$\begin{array}{cccc} & 8 & 7 & 6 \\ & & \times & 8 \\ \hline 7 & 0 & 0 & 8 \\ & 6 & 4 & \end{array} \qquad \begin{array}{ccccc} & & & ^{10} & ^{10} \\ & 8 & 7 & 0 & 6 \\ - & 7 & 0_1 & 0_1 & 8 \\ \hline & 1 & 6 & 9 & 8 \end{array}$$

$$\begin{array}{cccc} & 8 & 7 & 6 \\ & & \times & 6 \\ \hline 5 & 2 & 5 & 6 \\ & 4 & 3 & \end{array} \qquad \begin{array}{ccccc} & & & ^{10} & ^{10} \\ & 6 & 9 & 5 & 4 \\ - & 5 & 2_1 & 5_1 & 6 \\ \hline & 1 & 6 & 9 & 8 \end{array}$$

(On slates: A = P)

d) *Leslie has saved £2856 and Ann has saved 6 times that amount. How much money does Ann have?*

BB:

L: £2856, A: £2856 × 6 = <u>£17 136</u>

Answer: Ann has £17 136.

$$\begin{array}{ccccc} & 2 & 8 & 5 & 6 \\ & & & \times & 6 \\ \hline 1 & 7 & 1 & 3 & 6 \\ & 5 & 3 & 3 & \end{array}$$

e) *Emma has £3756 in her bank account, which is 6 times the amount that David has.*

How much money is in David's bank account?

BB:

E: £3756, D: £3756 ÷ 6 = <u>£626</u>

Answer: David has £626 in his bank account.

$$\begin{array}{c|cccc} & & 6 & 2 & 6 \\ \hline 6 & 3 & 7 & 5 & 6 \\ & & 1 & & 3 \end{array}$$

Y4

Lesson Plan 74

Activity | **Notes**

3

(Continued)

f) *This month, Paul has earned £2145, which is 1 seventh of the amount that he had in his bank account at the beginning of the month.*

How much did he have in his bank account at the beginning of the month?

BB:

1 seventh of amount: £2145 Whole amount: £2145 × 7

= <u>£15 015</u>

Answer: Paul had £15 015 in his bank account at the beginning of the month.

	2	1	4	5
			×	7
1	5	0	1	5
	1	3	3	

g) *Chris had saved £16 247. He spent 1 seventh of it on a holiday.*

i) *How much money did he spend on his holiday?*

BB:

Had: £16 247 Spent: £16 247 ÷ 7 = <u>£2321</u>

Answer: Chris spent £2321 on his holiday.

		2	3	2	1
7	1	6	2	4	7
		2	1		

ii) *How much money does he have left?*

BB: e.g.

Has left:: £16 247 – £2321 = <u>£13 926</u>

or:

Spent: 1 seventh → £2321

Has left: 6 sevenths → £2321 × 6 = <u>£13 926</u>

Answer: Chris has £13 926 left.

			10		
	1	6	2	4	7
–		2_1	3	2	1
	1	3	9	2	6

	2	3	2	1
			×	6
1	3	9	2	6
	1	1		

h) *A motorcyclist covered 11 064 m in 8 minutes.*
A cyclist covered 2290 m in the same time.

How much further did the motorcyclist travel than the cyclist?

BB:

MC: 11064 m C: 2290 m

Difference: 11064 m – 2290 m = <u>8774 m</u> (= 8 km 774 m)

Answer: The motorcyclist travelled 8 km 774 m further.

			10	10	
	1	1	0	6	4
–		2_1	2_1	9	0
		8	7	7	4

Agree that the 8 minutes is not needed for the solution.

41 min

4

PbYY4a, page 74, Q.2

Read: *Write T in the box if you think the statement is true and F if you think it is false.*

T chooses a different P to read each question to class. Ps write T or F in *Pbs*. Show me what you have written . . now!

T chooses 2 Ps with different responses to explain reasoning to class. Class decides who is correct. (T could have sugar, salt, flour, water and scales on hand in case of disagreement.)

a)	*20 cl of sugar weighs the same as 20 cl of flour.*	(F)
b)	*1 litre of water weighs the same as 1 litre of flour.*	(F)
c)	*1 kg of salt takes up less space than 1 kg of sugar.*	(T)
d)	*1 kg of flour weighs more than 1 kg of salt.*	(F)
e)	*A 10 cm cube made from wood takes up less space than a 10 cm cube made from marble.*	(F)

Whole class activity

Responses written on scrap paper or slates, or use pre-agreed actions for T and F.

Reasoning, agreement, self-correcting in *Pbs*, praising

Reasoning: e.g.

a) Sugar is heavier than flour.
b) Water is heavier than flour.
c) Salt is heavier than sugar, so less is needed for 1 kg.
d) They are equal. (Both 1 kg)
e) Both have volume 100 cm^2.

45 min

Y4

Lesson Plan
75

Activity

Notes

Calculation practice, revision, activities, consolidation

PbY4a, page 75

Solutions:

Q.1 a) 2 km 740 m + 3 km 38 m = 5 km 778 m

b) 3 kg – 2 kg 860 g = 1 kg – 860 g = 140 g

c) 1 hour 25 minutes + 2 hours 45 minutes
= 3 hours 25 minutes + 45 inutes = 4 hours 10 minutes

d) 4 hours 5 minutes – 2 hours 20 minutes
= 2 hours 5 minutes – 20 minutes = 1 hour 45 minutes

e) (2 litres 450 ml) × 2 = 4 litres 900 ml

f) (4 litres 50 ml) ÷ 3 = 4050 ml ÷ 3 = 1350 ml
= 1 litre 350 ml

g) (2 hours 43 minutes) × 2 = 4 hours 86 minutes
= 5 hours 26 minutes

h) (3 hours 18 minutes) ÷ 2 = 198 minutes ÷ 2
= 99 minutes
= 1 hour 39 minutes

Q.2 a) $3060 > 3006$ b) $80 < 8000 \div 10$

c) $21\,306 = 21\,406 - 100$ d) $476 \times 2 > 320 \times 2$

e) $32\,178 > 22\,178 + 1001$ f) $8.5 = 9 - \frac{1}{2}$

Q.3 a) 2569 – (1360 + 226) = 2569 – 1586 = 983
983 students could have attended the concert.

b) Tickets sold: 1360 + 226 + 1100 = 2686
People unable to attend: 2686 – 2569 = 117

Q.4 a) 2000 + 50 = 2050 b) 3000 + 400 + 80 = 3480

c) 886 – 80 = 806 d) 4066 – 2000 = 2066

e) 2000 + 840 + 9 = 2849 f) 6271 – 1886 = 4385

Q.5

a) 1305	b) 2020	c) 999	d) 652	e) 2001
MCCCV	MMXX	CMXCIX	DCLII	MMI
f) 2504	g) 1450	h) 1108	i) 586	j) 1263
MMDIV	MCDL	MCVIII	DLXXXVI	MCCLXIII

Y4

R: Mental calculation

C: Fractions: including tenths; equivalent fractions

E: Models

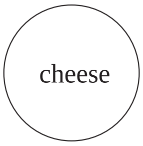
Lesson Plan 76

Activity ***Notes***

1

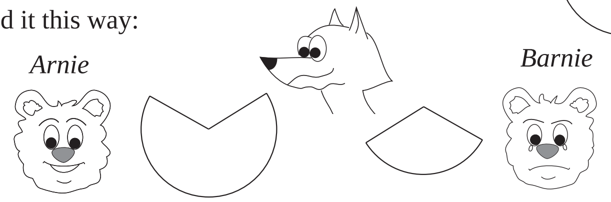
Fractions 1

One day, *Freddie Fox* stopped to help *Arnie* and *Barnie Bear* share a piece of cheese they had found. BB:



He did it this way:

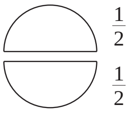
BB:



and told the bears that now they each had half of the cheese. Was this true? (No, because if they each had half, the <u>2 pieces</u> would be <u>equal</u>.)

Let's pretend that the circle on your desk is the bears' cheese. Cut it into 2 halves and show me them when I say. Show me . . now!

BB:



P responding correctly explains how he/she did it. (Folding in half so that the 2 edges meet exactly, then cutting along the fold.)

Who remembers how to write 1 half without words? T reminds Ps if they have forgotten. T writes on BB, Ps on each half of their 'cheese'.

Barnie Bear was crying because *Arnie*'s piece was bigger than his, so what do you think *Freddie Fox* did then?

He ate the extra on *Arnie*'s piece so that both pieces were the same! *Freddie Fox* said, "Now you both have 2 equal halves of the cheese."

Was he right? (No, because *Freddie Fox* had eaten some of the cheese too, so although the 2 pieces he gave to the bears were equal, they were not halves of the <u>whole</u> cheese!)

5 min

Whole class activity

Ps have circles of paper and scissors on desks.

Drawn or stuck on BB, or use enlarged copy master (or use any cartoon characters and change the context to fit)

Discussion, agreement, praising

In unison

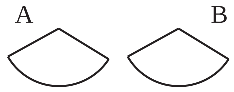
Demonstration, praising

Ps who were wrong try again.

BB: 1 half = 1 ÷ 2 = $\frac{1}{2}$

Ask Ps what they think.

BB:



Discussion, agreement, praising

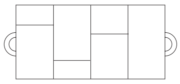
What a wily fox he was!

2

Fractions 2

One day, *Snow White* baked a large apple pie and left it on the kitchen table for the 7 dwarfs. BB:

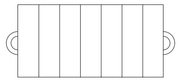
Dopey wanted to divide it up like this. BB:



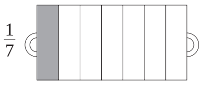
What do you think? (It is not fair, as some pieces are bigger than others.)

How should he do it? (Divide it into 7 <u>equal</u> parts.)

That is just what *Doc* did. He cut it up like this. BB:

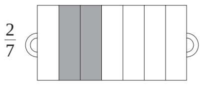


BB:



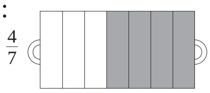
Doc went to pick mushrooms in the wood. He took <u>1 seventh</u> of the pie with him. Who can write 1 seventh beside the diagram?

BB:



Bashful and *Happy* went to pick flowers. They took <u>2 sevenths</u> of the pie with them. Who can write 2 sevenths beside the diagram?

BB:



Sneezy, Dopey, Grumpy and *Sleepy* went to the forest to chop up wood. They took <u>4 sevenths</u> of the pie with them. Who can write 4 sevenths beside the diagram?

Let's look at this fraction more closely. What do the numbers really mean?

10 min

Whole class activity

Drawn on BB or use enlarged copy masters or OHP

(If possible, T has cartoons of *Snow White* and the 7 dwarfs stuck to side of BB, or use any other suitable context)

Reasoning, agreement, praising

Ps come to BB. Class agrees/disagrees.

Praising, encouragement only

Discussion on the meaning and name of the parts:

BB:

$$\text{fraction line} \longrightarrow \frac{4 \longleftarrow \text{numerator}}{7 \longleftarrow \text{denominator}}$$

denominator: number of <u>equal</u> parts the <u>whole</u> has been divided into

numerator: how many of these parts we take.

Y4

Lesson Plan 76

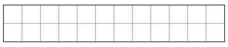
Activity

Notes

3

Fractions 3

Ps each have 5 of these rectangles on their desks.

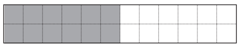


T holds up a rectangle. This is <u>1 whole unit</u>.

1 unit

Colour *red* 1 half of the rectangle. Show me . . . now!

(Accept any 6 of the 12 grid squares.) e.g. $\frac{1}{2}$



Repeat with other fractions: $\frac{1}{4}$, $\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{12}$ each in a different colour.

Let's compare the parts you have coloured and write them in <u>increasing</u> order.. Ps come to BB or dictate to T. Class agrees/disagrees.

BB: $\frac{1}{12} < \frac{1}{6} < \frac{1}{4} < \frac{1}{3} < \frac{1}{2}$

Let's compare the parts which are <u>not</u> coloured and write them in <u>decreasing</u> order. Ps come to BB or dictate to T. Class agrees/disagrees.

BB: $\frac{11}{12} > \frac{5}{6} > \frac{3}{4} > \frac{2}{3} > \frac{1}{2}$

A, come and choose a fraction. Point to the denominator. What does it mean? Point to the numerator. What does it mean? Point to the fraction line. What operation does it mean? (division)

Whole class activity

Use copy master, enlarged and cut out.

In unison

Ps write $\frac{1}{2}$ on coloured part.

Ps use a different rectangle to show each fraction.

Ps lay rectangles out on desks so that they can decide more easily.

Discussion, reasoning, agreement, praising

Ps write these fractions on uncoloured part.

With T's help if necessary.

Reasoning, agreement, praising

20 min

4

PbY4a, page 76

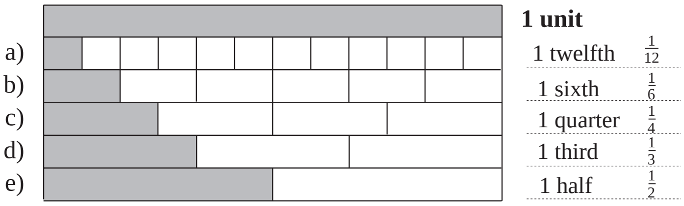
Q.1 Read: *A strip of paper is 1 unit long. What is the value of each shaded part?*

Ps can write fractions as words or numbers. Set a time limit.

Review at BB with whole class. Ps come to BB, say the fractions and write them with numbers. Class agrees/disagrees.

Mistakes discussed and corrected.

Solution:



Individual work. monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correction

Praising, encouragement only

Feedback for T

Extension

T points to 1 sixth in b) on the diagram. Wat other fraction is the same length? (2 twelfths) We can write it like this.

BB: $\frac{1}{6} = \frac{2}{12}$ Elicit other equal fractions. e.g.

$\frac{1}{4} = \frac{3}{12}$; $\frac{1}{3} = \frac{2}{6} = \frac{4}{12}$; $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{6}{12}$

Whole class activity

Ps come to BB or dictate to T

Agreement, praising

Ps point out numerator and denominator. (Remember which is which by thinking of the <u>d</u>enominator as <u>d</u>own.)

26 min

Y4

Lesson Plan 76

Activity | ***Notes***

5

PbY4a, page 76

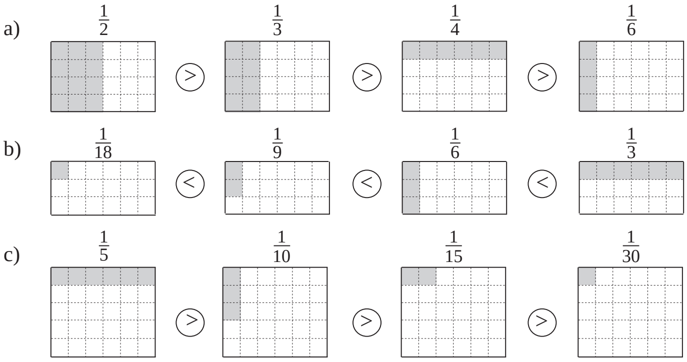
Q.2 Read: *Each rectangle is 1 unit. Colour the parts shown and compare them.*

Deal with one row at a time. Set a time limit. What should you write in the circles? (<, > or =)

Review at BB with whole class. Ps come to BB to colour and write signs, explaining reasoning. Class agrees/disagrees.

Elicit how many grid squares should be shaded. Mistakes discussed and corrected.

Solution: e.g.



Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

(Or T has solution already prepared and uncovers each rectangle as it is dealt with.)

Reasoning, agreement, self-correction, praising

Accept any correct shading. (i.e. the correct number of squares but in any position)

What do you notice?

Elicit that in unit fractions like these (i.e. when the numerator is 1) the greater the denominator, the smaller the part .

Extra praise if Ps notice equal fractions.

36 min

6

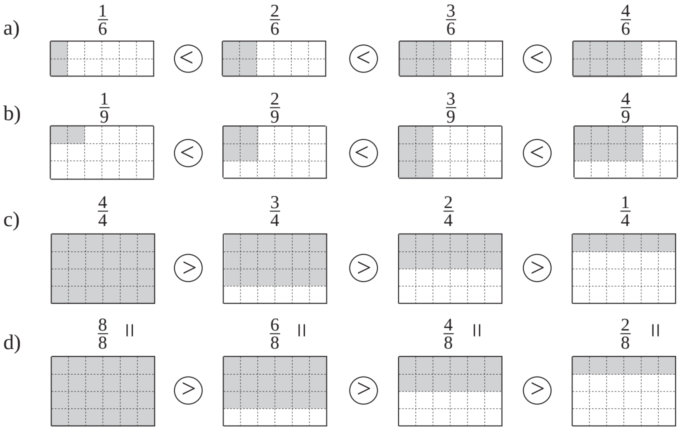
PbY4a, page 76

Q.3 Read: *The area of each rectangle is 1 unit. Colour the parts shown and compare them.*

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

Review at BB with whole class. Ps come to BB to colour and write signs, explaining reasoning. Class agrees on how many grid squares should be shaded. Mistakes discussed and corrected. Draw Ps attention to equal fractions (as below).

Solution: e.g.



Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

(Or T has solution already prepared and uncovers each rectangle as it is dealt with.)

Reasoning, agreement, self-correction, praising

Accept any correct shading.

Ps come to BB to choose a fraction, say it aloud, write it in words, point out the numerator and denominator and say what they mean.

Which rows of rectangles are the same? [c) and d)]

What do you notice? e.g.

$\frac{4}{4} = \frac{8}{8}$; $\frac{3}{4} = \frac{6}{8}$; etc.

Extra praise if Ps notice that numerator and denominator have been multiplied by 2.

45 min

Y4

R: Mental calculation
C: Fractions: equivalent fractions; number line.
E: Models

Lesson Plan
77

Activity

Notes

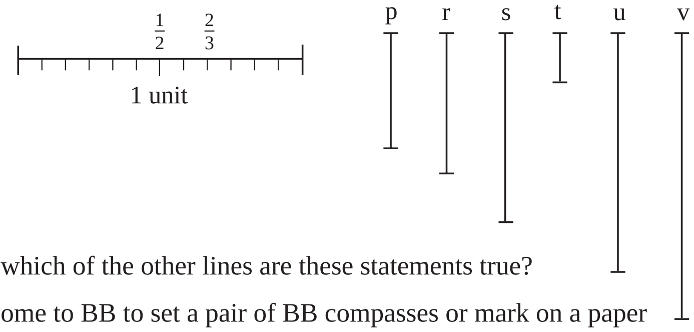
1

Comparing fractions

T has lines drawn (or stuck) on BB. The horizontal line is 1 unit.

Where would $\frac{1}{2}$ and $\frac{2}{3}$ of a unit be? Ps come to BB to label them, explaining reasoning. Class agrees/disagrees and labels their units too.

BB:



For which of the other lines are these statements true?

Ps come to BB to set a pair of BB compasses or mark on a paper strip the relevant fraction of the unit, then hold against each vertical line in turn to see if it satisfies the statement. Class shouts 'yes' or 'no'. T writes it as an inequality on BB.

a) Its length is greater than $\frac{1}{2}$. (s, u, v $> \frac{1}{2}$)

b) Its length is not greater than $\frac{1}{2}$. (p, r, t $\leq \frac{1}{2}$)

c) Its length is less than $\frac{2}{3}$. (p, r, t $< \frac{2}{3}$)

d) Its length is not less than $\frac{2}{3}$. (s, u, v $\geq \frac{2}{3}$)

e) Its length is greater than $\frac{1}{2}$ but less than $\frac{2}{3}$. (none)

Whole class activity

Drawn/written on BB or use enlarged copy master or OHP

Ps could have copies of copy master on desks too.

Agreement, praising

Ps could use rulers or a paper strip to compare the lines on their desks as a check.

(Actual lengths are unimportant, just whether they are more, than, less than or equal to the relevant fraction.)

Agreement, checking praising

6 min

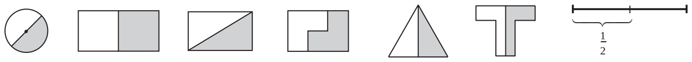
2

Modelling fractions

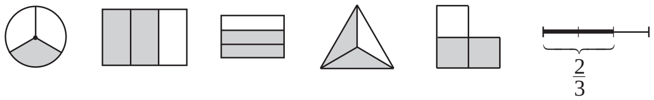
a) Let's show parts of a unit in different ways. T says the fraction and Ps come to BB to write it with words and numbers, then draw a shape and colour the relevant part of it. Who agrees? Who can think of another way to show it? etc. T helps if Ps are stuck for ideas.

BB: e.g.

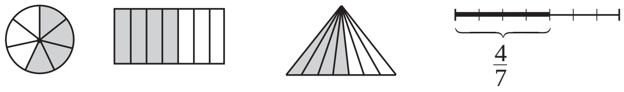
i) 1 half = $\frac{1}{2}$:



ii) 2 thirds = $\frac{2}{3}$:



iii) 4 sevenths = $\frac{4}{7}$:



Whole class activity

(Or Ps could draw shapes on scrap paper or slates and show in unison on command. T chooses one or two Ps to draw their shapes on BB.)

T could suggest the line segment if Ps do not think of it.

Agreement, praising

Extra praise for creative shapes.

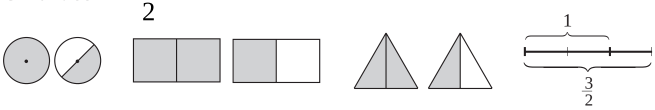
If class is not very able, T has shapes already drawn on BB or OHT and Ps come to BB to colour the fraction required. (Or use enlarged copy master or OHP)

Activity | ***Notes***

2

(Continued)

iv) 3 halves = $\frac{3}{2}$



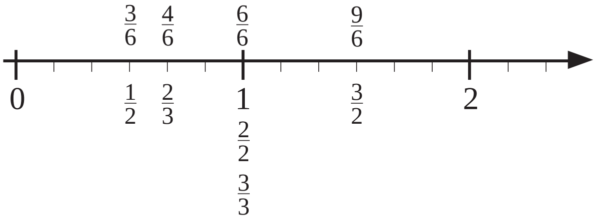
Extra praise if Ps show this fraction without help!

b) Let's show these fractions are on the number line. BB: $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{2}$

Ps come to BB to write fractions above relevant 'tick' Class agrees/ disagrees.

What other fractions could we write above the same tick? We call these <u>equivalent fractions</u> (fractions which are <u>equal</u> to each other).

BB:



Drawn on BB or use enlarged copy master or OHP

Agreement, praising

BB: <u>equivalent fractions</u>

e.g. $\frac{1}{2} = \frac{3}{6}$; $\frac{2}{3} = \frac{4}{6}$, etc.

Extra praise if Ps notice the connection between the fractions (i.e. numerator and denominator multiplied by the same amount)

c) Let's count from 0 to 2 (2 to 0) in sixths (thirds, halves).

In unison. Praising

16 min

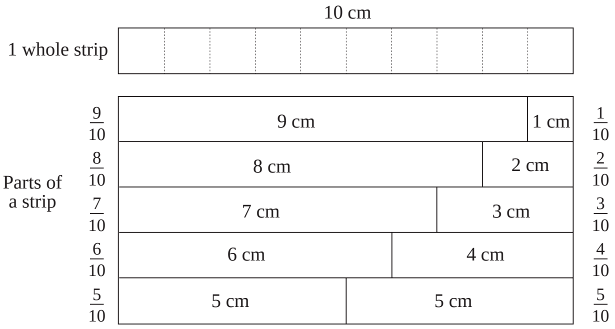
3

Fractions of a quantity

This 10 cm strip has been divided into 2 parts in different ways. Let's measure the parts, then write each part as a fraction of 10 cm.

Ps measure the length of each part with rulers, then dictate what T should write on BB. What fraction of 10 cm is it? Ps come to BB or dictate to T, explaining reasoning. (e.g. 9 cm is 9 tenths of 10 cm because 10 cm has been divided into ten equal parts and we have tkaken 9 of them.) Class agrees/disagrees. BB: 10 cm ÷ 10 = 1 cm, 1 cm × 9 = 9 cm

BB:



Whole class activity

Drawn on BB or use enlarged copy master or OHP (for demonstratino only)

Ps have copy on desks too (either as whole diagram, or cut into strips)

At a good pace

T helps with reasoning.

Agreement, praising

Ps write the fractions on their own strips too.

a) How long is $\frac{3}{10}$ of 10 cm? (3 cm)

b) How long is $\frac{3}{10}$ of a 20 cm strip of paper? (6 cm)

Who can explain it? T helps with reasoning or explains if no P knows.

BB: $\frac{1}{10}$ of 20 cm = 20 cm ÷ 10 = 2 cm

$\frac{3}{10}$ of 20 cm = 2 cm × 3 = <u>6 cm</u>

Ps could show on scrap paper or slates (or T asks several Ps what they think).

Elicit again what the different components of a fraction mean.

Reasoning, agreement, praising

22 min

Y4

Lesson Plan 77

Activity | *Notes*

4

PbY4a, page 77

Q.1 Read: *Each diagram is 1 unit. What part is not shaded?*

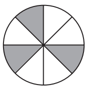
How can we find the denominator of the fraction? (Count how many equal parts the shape has been divided into.)

How can we find the numerator of the fraction? (Count how many white parts there are.)

Set a time limit. Review at BB with whole class. Ps come to BB or dictate to T. Who agrees? Who wrote another fraction? etc. Mistakes discussed and corrected.

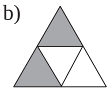
Solution:

a)



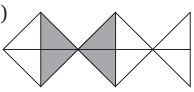
$\frac{5}{8}$

b)



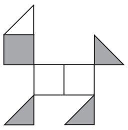
$\frac{2}{4} = \frac{1}{2}$

c)



$\frac{6}{10} = \frac{3}{5}$

d)



$\frac{5}{10} = \frac{1}{2}$

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

T might need to give hint in d) about dividing the squares into 2 equal triangles.

Elicit or demonstrate equivalent fractions if Ps do not suggest them.

Discussion, reasoning, agreement, self-correction, praising

27 min

5

PbY4a, page 77

Q.2 Read: *Each shape is 1 unit. Colour the fractions shown and compare them.*

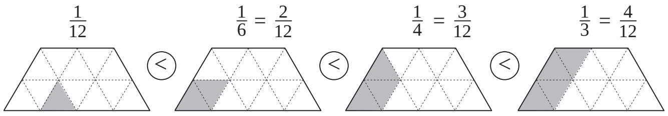
Deal with one row at a time. Set a time limit.

Review at BB with whole class. Ps come to BB, say how many grid triangles should be coloured and why, and colour the fraction. Class dictates the inequality. Mistakes discussed and corrected.

Solution: e.g.

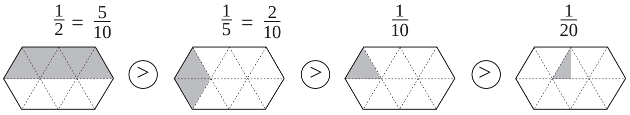
a)

$\frac{1}{12}$ < $\frac{1}{6} = \frac{2}{12}$ < $\frac{1}{4} = \frac{3}{12}$ < $\frac{1}{3} = \frac{4}{12}$



b)

$\frac{1}{2} = \frac{5}{10}$ > $\frac{1}{5} = \frac{2}{10}$ > $\frac{1}{10}$ > $\frac{1}{20}$



$(= \frac{10}{20})$ $(= \frac{4}{20})$ $(= \frac{2}{20})$

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correction, praising

These are all unit fractions, i.e. the numerator is 1.

Could we have written any of these fractions another way?

Elicit or demonstrate equivalent fractions where appropriate.

Extra praise if Ps suggest twentieths!

e.g. $\frac{1}{2} = \frac{5}{10} = \frac{10}{20}$

33 min

6

PY4a, page 77

Q.3 Read: *Draw 1 unit if the diagram is the fraction of a unit shown.*

Do a) to d) as individual work.

Ps copy diagrams in squared *Ex. Bks* (or on squared grid sheets), then complete them to make a whole unit. Set a time limit.

Review at BB with whole class. T asks Ps how many grid squares are in each whole unit. Class agrees/disagrees. T has solutions already prepared and uncovers each as it is dealt with. Agree that any shape which encloses the correct number of grid squares is acceptable. Mistakes discussed and corrected.

Do e) to h) with the whole class. Ps come to BB, first to say how many grid squares are in 1 unit, then to colour or draw it.

Discuss equivalent fractions where appropriate.

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Differentiation by time limit.

Reasoning, agreement, self-correction, praising

Whole class activity

Drawings need only be approximate (or T has grid extended beyond the shapes)

Y4

Lesson Plan 77

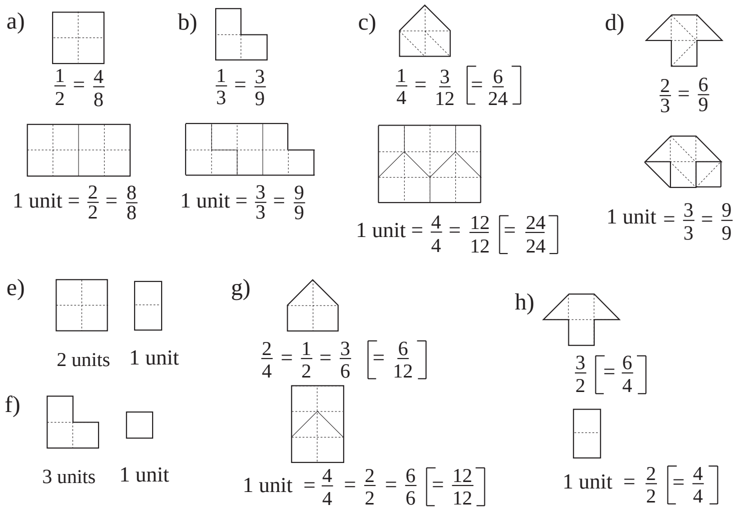
Activity

Notes

6

(Continued)

Solution: e.g.



a) $\frac{1}{2} = \frac{4}{8}$

1 unit = $\frac{2}{2} = \frac{8}{8}$

b) $\frac{1}{3} = \frac{3}{9}$

1 unit = $\frac{3}{3} = \frac{9}{9}$

c) $\frac{1}{4} = \frac{3}{12}\left[= \frac{6}{24}\right]$

1 unit = $\frac{4}{4} = \frac{12}{12}\left[= \frac{24}{24}\right]$

d) $\frac{2}{3} = \frac{6}{9}$

1 unit = $\frac{3}{3} = \frac{9}{9}$

e) 2 units 1 unit

f) 3 units 1 unit

g) $\frac{2}{4} = \frac{1}{2} = \frac{3}{6}\left[= \frac{6}{12}\right]$

1 unit = $\frac{4}{4} = \frac{2}{2} = \frac{6}{6}\left[= \frac{12}{12}\right]$

h) $\frac{3}{2}\left[= \frac{6}{4}\right]$

1 unit = $\frac{2}{2}\left[= \frac{4}{4}\right]$

Only mention the fractions in straight brackets if a P suggests them or if the class is very able.

Fractions in straight brackets obtained by dividing each grid square into 2 equal triangles.

Deal with all cases. Accept <u>any</u> arrangement of the correct number of grid squares.

40 min

7

PbY4a, page 77, Q.4

Read: *Write additions about the diagrams.*

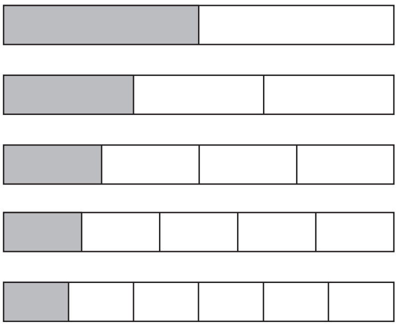
Each strip is 1 unit. What part of it is shaded and what part is not shaded? Who would like to try to write an addition about it?

(Or T could write the first addition as a model for Ps to follow.)

Stress that the denominator shows the number of parts the whole strip has been divided into, so it does not change (unless we divide the strip into more parts). Only the numerator changes according to how many of these parts are taken.

P comes to BB to write each addition, explaining reasoning (with T's help). Ps write addition in *Pbs* too. Let's read it out together.

Solution:



a) $\frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1$

b) $\frac{1}{3} + \frac{2}{3} = \frac{3}{3} = 1$

c) $\frac{1}{4} + \frac{3}{4} = \frac{4}{4} = 1$

d) $\frac{1}{5} + \frac{4}{5} = \frac{5}{5} = 1$

e) $\frac{1}{6} + \frac{5}{6} = \frac{6}{6} = 1$

Whole class activity

Drawn on BB or use enlarged copy master or OHP

Consolidation of numerator and denominator and their meanings.

Reasoning, agreement. praising

In unison. T points to the parts.

Extension

Ps come to BB to point out equivalent fractions. e.g.

$\frac{1}{2} = \frac{2}{4} = \frac{3}{6}; \quad \frac{2}{3} = \frac{4}{6}$

Ps can use BB ruler to line up the equal fraction lines

45 min

Y4

R: Calculation

C: Fractions: equivalent fractions, number line

E: Models. Fractions of quantities.

Lesson Plan 78

Activity

Notes

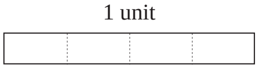
1

Operations with fractions

Let's make true statements about the diagrams. Ps dictate their statements and T writes on BB with words and fraction notation. Who agrees? Who can think of another one? etc.

a) BB:

e.g.



1 quarter + 1 quarter + 1 quarter + 1 quarter = 4 quarters = 1 (unit)

$$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 1$$

1 quarter + 3 quarters = 4 quarters = 1 (unit) $\frac{1}{4} + \frac{3}{4} = \frac{4}{4} = 1$

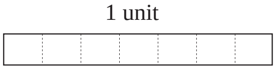
1 quarter × 4 = 4 quarters = 1 (unit) $\frac{1}{4} \times 4 = \frac{4}{4} = 1$

2 quarters + 2 quarters = 4 quarters = 1 (unit) $\frac{2}{4} + \frac{2}{4} = \frac{4}{4} = 1$

1 half + 1 half = 2 halves = 1 (unit) $\frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1$, etc.

b) BB:

e.g.

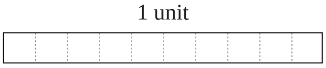


2 sevenths + 5 sevenths = 7 sevenths = 1 (unit) $\frac{2}{7} + \frac{5}{7} = \frac{7}{7} = 1$

7 sevenths – 3 sevenths = 4 sevenths $\frac{7}{7} - \frac{3}{7} = \frac{4}{7}$, etc.

c) BB:

e.g.



1 tenth × 10 = 10 tenths = 1 (unit) $\frac{1}{10} \times 10 = \frac{10}{10} = 1$

7 tenths + 3 tenths = 10 tenths = 1 (unit) $\frac{7}{10} + \frac{3}{10} = \frac{10}{10} = 1$

8 tenths – 3 tenths = 5 tenths = 1 half $\frac{8}{10} - \frac{3}{10} = \frac{5}{10} = \frac{1}{2}$

etc.

Whole class activity

Rectangles drawn on BB or SB or OHT

Agreement, praising

Extra praise for correct but unexpected statements.

T might give hints if Ps keep suggesting only one type of operation

N.B.

This is not meant to be an exercise where Ps learn how to add, subtract, multiply or divide fractions, but just to familiarise Ps with notation of fractions and with what operations using fractions look like.

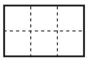
Keep referring to the diagrams and occasionally ask Ps to explain the meaning of the components of the fractions in their statements.

10 min

2

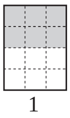
Modelling fractions

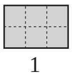
T draws on BB (or holds up) this rectangle:

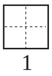


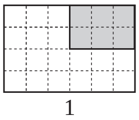
Draw 1 unit if this rectangle is worth:

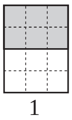
a) i) $\frac{1}{2}$ ii) $\frac{2}{2}$ iii) $\frac{3}{2}$ b) i) $\frac{1}{4}$ ii) $\frac{2}{4}$ iii) $\frac{3}{4}$

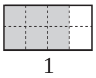




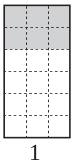


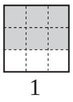


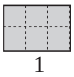




c) i) $\frac{1}{3}$ ii) $\frac{2}{3}$ iii) $\frac{3}{3}$







Ps come to BB or OHP to draw shapes on square grid, explaining reasoning. Class agrees/disagrees.

Whole class activity

T should have BB prepared with a square grid or draw grid on an OHT.

Reasoning, agreement, praising

(or Ps draw individually on large grid sheets and show in unison on command)

Feedback for T

16 min

Y4

Lesson Plan 78

Activity

Notes

3

Fractions of 1 km

How many metres are in 1 km? (1000 m) BB: 1 km = 1000 m

Write on your slates (or scrap paper) how many metres you think are in these parts of a km and show me when I say.

Ps responding correctly explain reasoning to rest of class. T helps them to write it as an operation on BB.

How many metres are in:

a) i) half of 1 km (500 m) ii) 2 halves of 1 km (1000 m)
iii) 3 halves of 1 km (1500 m)

b) i) 1 tenth of 1 km (100 m) ii) 2 tenths of 1 km (200 m)
iii) 7 tenths of 1 km (700 m) iv) 12 tenths of 1 km (1200 m)

c) i) 1 hundredth of 1 km (10 m) ii) 5 hundredths of 1 km (50 m)
iii) 50 hundredths of 1 km (500 m)

d) i) 1 thousandth of 1 km (1 m) ii) 10 thousandths of 1 km (10 m)
iii) 800 thousandths of 1 km (800 m)
iv) 1000 thousandths of a km (1000 m) (= 1 km)

Whole class activity

Ps show results in unison on command.

Reasoning, agreement, praising

Show details on BB. e.g.

$$\frac{1}{2} \text{ of } 1 \text{ km} = 1000 \text{ m} \div 2 = \underline{500 \text{ m}}$$

$$\frac{1}{10} \text{ of } 1 \text{ km} = 1000 \text{ m} \div 10 = \underline{100 \text{ m}}$$

$$\frac{7}{10} \text{ of } 1 \text{ km} = 1000 \text{ m} \div 10 \times 7 = 100 \text{ m} \times 7 = \underline{700 \text{ m}}$$

22 min

4

PbY4a, page 78

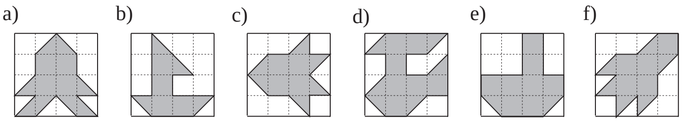
Q.1 Read: *Each large square is 1 unit. What part of the unit is shaded? Is it more or less than 1 half, or equal to 1 half? Write the fraction and the missing sign.*

Elicit that the whole unit has been divided into 16 grid squares, so each grid square is 1 sixteenth of the whole unit.

Deal with one part at a time. Do part a) with whole class first as a model for Ps to follow if Ps are unsure what to do.

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

Solution:



$\frac{8}{16} \boxed{=} \frac{1}{2}$ $\frac{6}{16} \boxed{<} \frac{1}{2}$ $\frac{7}{16} \boxed{<} \frac{1}{2}$ $\frac{10}{16} \boxed{>} \frac{1}{2}$ $\frac{9}{16} \boxed{>} \frac{1}{2}$ $\frac{8}{16} \boxed{=} \frac{1}{2}$

Individual (or paired) work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Ps can discuss with their neighbours if they wish.

Discussion, reasoning, agreement, self-correcting, praising

Agree that:

$$\frac{1}{2} \text{ of } 16 = 16 \div 2 = \underline{8}$$

(grid squares)

27 min

Y4

Lesson Plan 78

Activity

Notes

5

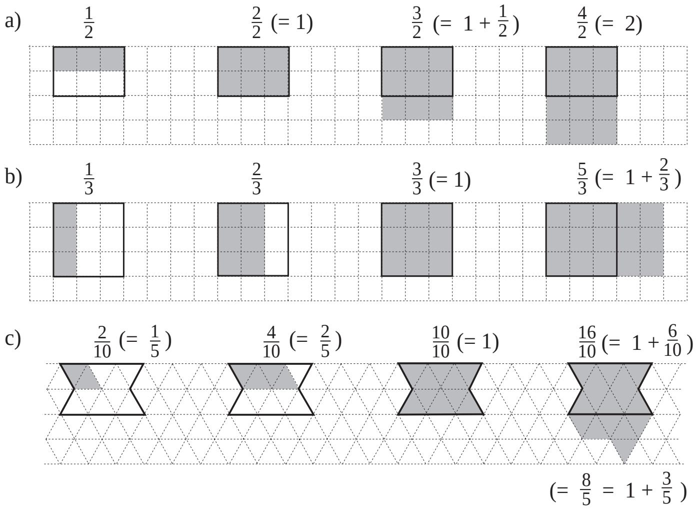
PbY4a, page 78

Q.2 Read: *Each shape is 1 unit. Colour the fraction shown above each unit.*

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

Review at BB with whole class. Ps dictate how many grid squares should be coloured and why. Class agrees/disagrees. T could have a solution already prepared and uncover each shape as it is dealt with. Mistakes discussed and corrected.

Solution: e.g.



34 min

Individual (or paired) work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Ps can discuss solutions with their neighbours.

Reasoning, agreement, self-correcting, praising

Discuss equivalent (equal) fractions.

Allow Ps to suggest them if they can, by counting the grid squares within each unit

e.g. $\frac{1}{2} = \frac{3}{6}$; $\frac{2}{2} = \frac{6}{6} = 1$, etc.

and as shown in the solution.

or $\frac{16}{10} = \frac{8}{5} = 1 + \frac{3}{5}$

6

PbY4a, page 78**, **Q.3

Read: *Join up each fraction to the matching point on the number line.*

Elicit that each unit on the number line has been divided into 4 equal parts, so each part is 1 quarter.

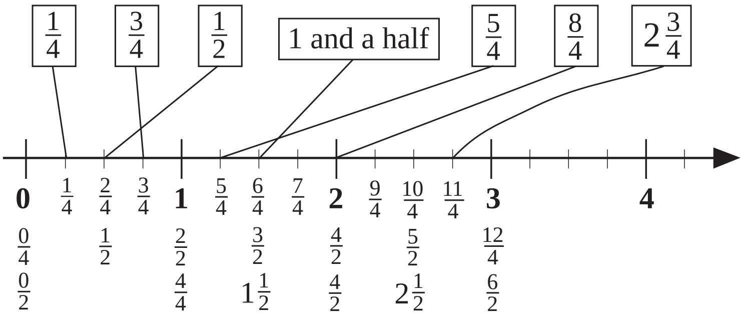
Ps come to BB to choose a fraction and join it to the number line, explaining reasoning. Class agrees/disagrees. Ps work in *Pbs* too.

T explains that:

1 and a half $= 1 + \frac{1}{2} = 1\frac{1}{2}$; $2\frac{3}{4} = 2 + \frac{3}{4} =$ 2 and three quarters

Who notices any equal fractions? Ps come to BB to point and write. Class agrees/disagrees. T shows some if Ps are unsure. e.g.

Solution:



39 min

Whole class activity

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, praising

Reiterate what the components of each fraction mean.

e.g.

$\frac{3}{4}$: 4 is the denominator; it shows the number of equal parts 1 unit has been divided into.

3 is the numerator; it shows how many of these parts we are taking.

Y4

Lesson Plan 78

Activity

Notes

7

PbY4a, page 78

Q.4 What kind of measures are these? (Capacity – how much liquid a container can hold). Elicit the relationship between units. (BB)

Set a time limit. Allow Ps to discuss with neighbours if they are unsure.

Review at BB with whole class. Ps come to BB or dictate to T, explaining reasoning. Class agrees/disagrees. Mistakes discussed and corrected. Show calculations in detail if problems.

Solution:

$\frac{1}{2}$ litre = $\underline{50}$ cl = $\underline{500}$ ml $\frac{1}{5}$ litre = $\underline{20}$ cl = $\underline{200}$ ml

$\frac{5}{2}$ litre = $\underline{250}$ cl = $\underline{2500}$ ml $\frac{1}{10}$ litre = $\underline{10}$ cl = $\underline{100}$ ml

$\frac{3}{10}$ litre = $\underline{30}$ cl = $\underline{300}$ ml $\frac{1}{100}$ litre = $\underline{1}$ cl = $\underline{10}$ ml

$\frac{8}{100}$ litre = $\underline{8}$ cl = $\underline{80}$ ml $\frac{70}{100}$ litre = $\underline{70}$ cl = $\underline{700}$ ml

Individual work, monitored, helped

(or whole class activity if time is short or Ps are unsure)

Written on BB or use enlarged copy master or OHT

BB:

1 litre = 100 cl = 1000 ml

1 cl = 10 ml

Reasoning, agreement, self-correction, prraising

Details: e.g.

$\frac{1}{2}$ litre = 100 cl $\div$ 2 = $\underline{50 \text{ cl}}$

$\frac{5}{2}$ litre = 50 cl $\times$ 5 = $\underline{250 \text{ cl}}$

Extension

a) How many litres (cl, ml) are in 2 hundred hundredths of a litre?

(BB: $\frac{200}{100}$ litre = $\underline{2}$ litres = $\underline{200}$ cl = $\underline{2000}$ ml)

b) How many litres (cl, ml) are in 1 thousandth of a litre?

(BB: $\frac{1}{1000}$ litre = $\underline{1 \text{ ml}}$ [1000 ml $\div$ 1000 = 1 ml])

Discussion, reasoning, agreement, praising

Agree that there are not enough ml in 1 thousandth of a litre to make either a cl or a litre.

45 min

Y4

R: Calculations
C: Fractions: equivalent fractions; number line
E: Models. Problems

Lesson Plan 79

Activity ***Notes***

1

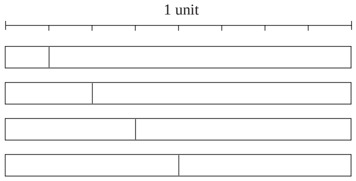
Fractions 1

Let's make true statements about the diagrams.

For each diagram, elicit how many equal parts the whole unit has been divided into and what each part is called. Ps dictate statements to T. Class agrees/disagrees. T writes on BB in words and with fraction notation. Class reads it aloud from the words, then from the numbers.

BB: e.g.

a)



$\frac{1}{8}+\frac{7}{8}=\frac{8}{8}=1$ 1 eighth + 7 eights = 8 eighths = 1

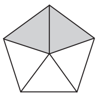
$\frac{2}{8}+\frac{6}{8}=\frac{8}{8}=1$ 2 eighths + 6 eights = 8 eighths = 1

$\frac{3}{8}+\frac{5}{8}=\frac{8}{8}=1$ 3 eighths + 5 eights = 8 eighths = 1

$\frac{4}{8}+\frac{4}{8}=\frac{8}{8}=1$ 4 eighths + 4 eights = 8 eighths = 1

(or, e.g. $1-\frac{7}{8}=\frac{1}{8}$, $1-\frac{1}{4}=\frac{3}{4}$, $2\times\frac{1}{2}=\frac{2}{2}=1$, etc.)

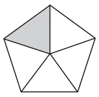
b)



2 fifths + 3 fifths = 5 fifths = 1

$\frac{2}{5}+\frac{3}{5}=\frac{5}{5}=1$

$1-\frac{2}{5}=\frac{3}{5}$



1 fifth + 4 fifths = 5 fifths = 1

$\frac{1}{5}+\frac{4}{5}=\frac{5}{5}=1$

$1-\frac{1}{5}=\frac{4}{5}$

(or, e.g. $5\times\frac{1}{5}=\frac{5}{5}=1$, $1\div 5=\frac{1}{5}$, etc.)

8 min

Whole class activity

Drawn on BB or use enlarged copy master or OHP

Agreement, praising

In unison

Extra praise for unexpected but correct statements

T need only write the first equation in b) in words.

T gives hints if Ps only think of addition.

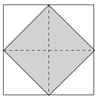
2

Fractions 2

What part of the square has been shaded? Ps come to BB to count the grid squares in each large square and say what part each grid square is of the whole square. How many of them are shaded? If Ps are stuck, T helps by pointing out grid squares which can be combined to make a more manageable section, as below.

BB:

a)

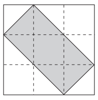


1 half

$\frac{2}{4}=\frac{1}{2}$

2 out of 4 shaded

b)

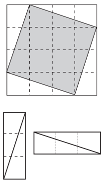


4 ninths

$\frac{4}{9}$

4 out of 9 shaded

c)

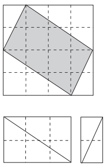


10 sixteenths

$\frac{10}{16}$

10 out of 16 shaded

d)

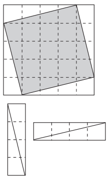


8 sixteenths

$\frac{8}{16}\ (=\frac{1}{2})$

8 out of 16 shaded

e)



17 twenty-fifths

$\frac{17}{25}$

17 out of 25 shaded

Extension

What part is not shaded?

a) $\frac{1}{2}$ b) $\frac{5}{9}$ c) $\frac{6}{16}$ d) $\frac{8}{16}=\frac{1}{2}$ e) $\frac{8}{25}$

16 min

Whole class activity

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, praising

Discussion on strategy for determining how many shaded grid squares there are.

T has the various parts already cut out and shaded appropriately to lay on top of diagram, then remove and combine them to make easier sections (see copy master)

Extra praise if Ps notice equivalent fractions

T asks Ps at random.

Reasoning, agreement, praising

Y4

Lesson Plan 79

Activity / ***Notes***

3

Fractions of time

Let's change the quantities to different units. Ps come to BB to write missing numbers and explain reasoning. Class agrees/disagrees.

Show some calculations in detail on BB.

BB: $\boxed{\text{1 hour} = \underline{60}\text{ minutes}}$

a) $\frac{1}{4}$ of an hour = $\underline{15}$ minutes $\frac{3}{4}$ of an hour = $\underline{45}$ minutes

b) $\frac{1}{2}$ an hour = $\underline{30}$ minutes $\frac{2}{2}$ of an hour = $\underline{60}$ minutes

c) $\frac{1}{3}$ of an hour = $\underline{20}$ minutes $\frac{4}{3}$ of an hour = $\underline{80}$ minutes

d) $\frac{1}{6}$ of an hour = $\underline{10}$ minutes $\frac{9}{6}$ of an hour = $\underline{90}$ minutes

e) $\frac{1}{5}$ of an hour = $\underline{12}$ minutes $\frac{3}{5}$ of an hour = $\underline{36}$ minutes

Whole class activity

Written on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, praising

Details: e.g.

$$\frac{1}{5}\text{ of an hour} = 60\text{ min.} \div 5 = 12\text{ min.}$$

$$\frac{3}{5}\text{ of an hour} = 12\text{ min} \times 3 = \underline{36\text{ min.}}$$

Feedback for T

22 min

4

PbY4a, page 79, Q.1

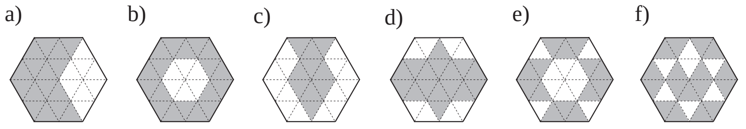
Read: *Each hexagon is 1 unit. What part of the unit is shaded?*
Is it more or less than 2 thirds, or equal to 2 thirds?
Write the fraction and the missing sign.

How many equal parts has the hexagon been divided into? (24 equal triangles) What is the value of each triangle? (1 twenty-fourth)

How many triangles are in 1 third of the hexagon? (24 ÷ 3 = 8)
How many triangles are in 2 thirds of the hexagon? (8 × 2 = $\underline{16}$)

Ps come to BB to count the shaded triangles, write them as a fraction of the whole hexagon, then compare with 2 thirds of it (i.e. 16 triangles). Class points out errors or suggests equivalent fractions.

Solution:



a) $\frac{16}{24}\ \boxed{=}\ \frac{2}{3}$ $\left(= \frac{8}{12} = \frac{4}{6}\right)$

b) $\frac{18}{24}\ \boxed{>}\ \frac{2}{3}$ $\left(\frac{9}{12} > \frac{8}{12}\right)$

c) $\frac{10}{24}\ \boxed{<}\ \frac{2}{3}$ $\left(\frac{5}{12} < \frac{8}{12}\right)$

d) $\frac{16}{24}\ \boxed{=}\ \frac{2}{3}$ $\left(= \frac{8}{12} = \frac{4}{6}\right)$

e) $\frac{14}{24}\ \boxed{<}\ \frac{2}{3}$ $\left(\frac{7}{12} < \frac{8}{12}\right)$

f) $\frac{17}{24}\ \boxed{>}\ \frac{2}{3}$ $\left(\frac{17}{24} > \frac{16}{24}\right)$

Whole class activity

(or individual work after initial discussion if Ps wish)

Drawn on BB or use enlarged copy master or OHP

Discussion about the unit hexagon. Involve several Ps.

Reasoning (with T's help) agreement, praising

Ps work in *Pbs* too.

Extra praise for equivalent fractions.

What can you say about all the designs? (They are all symmetrical.)

This is a difficult problem.
T helps Ps throughout!

28 min

Y4

Lesson Plan 79

Activity | ***Notes***

5

PbY4a, page 79

Q.2 Read: *Write the fraction marked by each dot below the number line.*

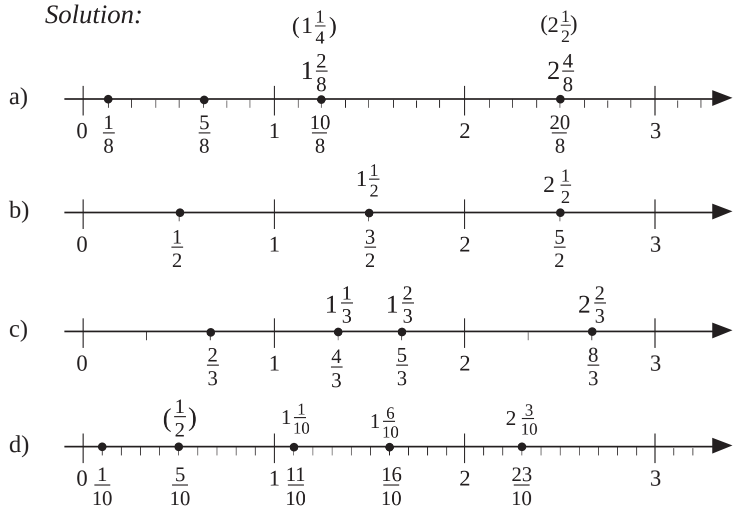
Elicit that all 4 number lines show the same whole numbers but that the numbers have been divided into different fractions on each number line.

Deal with one number line at a time. Elicit what each tick shows. Set a time limit. Ps write fractions in any form.

Review at BB with whole class. Ps come to BB or dictate to T. Class agrees/disagrees or suggests equivalent fractions.

T makes Ps count along the number line, pointing to each 'tick' and saying the appropriate fraction.

Solution:



35 min

Notes:

Individual work, monitored, helped

(or whole class activity if Ps are unsure)

Drawn on BB or use enlarged copy master or OHP

Discussion, reasoning, agreement, self-correction, praising

Class could count in unison too.

6

PbY3a, page 79

Q.3 Read: *Each rectangle is 1 unit. Colour the fraction of the unit shown.*

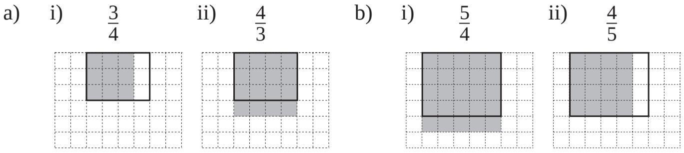
Deal with parts a) and b) separately. Set a time limit.

Review at BB with whole class. Ps dictate how many grid squares should be shaded and why. T could have a solution already prepared and uncover each as it is dealt with. Mistakes discussed and corrected.

What do you notice about parts i) and ii)? (Both fractions have the same numbers but in different positions.)

Reiterate what the numerator and denominator of a fraction mean.

Solution:



40 min

Notes:

Individual work, monitored, helped

Drawn on BB or use enlarged copy master or OHP

Reasoning, agreement, self-correction, praising

Discussion, agreement

Y4

Lesson Plan 79

Activity

7

PbY4a, page 79**, **Q.4

Read: *Change the quantities. Fill in the missing numbers.*

T divides class into 2 teams of 8 Ps each. *Team A* has to complete part a) and *Team B* part b). I will give you 2 minutes! Start . . now!

First P in each team runs to BB, fills in a missing number and runs back to touch the next person in their team, etc. Ps who are not in either team fill in the numbers in their *Pbs* so that they can check the teams' responses. . . . Stop!

Review wwith whole class. T points to each response in turn. Do you agree? Class shouts Yes or No. If No, a P not in a team corrects it, explaining reasoning..

Let's give the winning team a round of applause!

Solution:

a) $\frac{1}{2}$ kg = $\boxed{500}$ g $\quad$ $\frac{3}{2}$ kg = $\boxed{1500}$ g $\quad$ $\frac{1}{4}$ kg = $\boxed{250}$ g $\quad$ $\frac{1}{10}$ kg = $\boxed{100}$ g

$\frac{1}{5}$ kg = $\boxed{200}$ g $\quad$ $\frac{3}{5}$ kg = $\boxed{600}$ g $\quad$ $\frac{1}{100}$ kg = $\boxed{10}$ g $\quad$ $\frac{75}{100}$ kg = $\boxed{750}$ g

b) $\frac{1}{2}$ km = $\boxed{500}$ m $\quad$ $\frac{3}{2}$ km = $\boxed{1500}$ m $\quad$ $\frac{3}{5}$ km = $\boxed{600}$ m $\quad$ $\frac{1}{10}$ km = $\boxed{100}$ m

$\frac{4}{10}$ km = $\boxed{400}$ m $\quad$ $\frac{3}{100}$ km = $\boxed{30}$ m $\quad$ $\frac{60}{100}$ km = $\boxed{600}$ m $\quad$ $\frac{523}{1000}$ km = $\boxed{523}$ m

Notes

Whole class activity

Choose teams of roughly equal ability, the weakest P in each going first.

Teams should not be able to see the other's responses.

If a P does not know the answer, he must run back and next P completes or corrects it but misses his own turn.

In good humour!

Reasoning, agreement, correcting, praising

(Or done as individual work, monitored, helped and reviewed at BB with whole class)

45 min

Y4

Lesson Plan
80

Activity

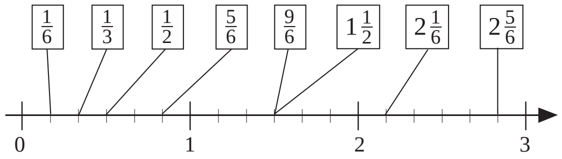
Notes

Revision, consolidation, activities

PbY4a, page 80

Solutions:

Q.1



Q.2

a) $\frac{1}{2} = \frac{\boxed{2}}{4} = \frac{4}{\boxed{8}} = \frac{\boxed{3}}{6} = \frac{\boxed{5}}{10} = \frac{10}{\boxed{20}} = \frac{\boxed{50}}{100} = \overset{\text{e.g.}}{\frac{\boxed{500}}{\boxed{1000}}}$

b) $\frac{1}{4} = \frac{\boxed{4}}{16} = \frac{2}{\boxed{8}} = \frac{\boxed{5}}{20} = \frac{8}{\boxed{32}} = \frac{25}{\boxed{100}} = \overset{\text{e.g.}}{\frac{\boxed{100}}{\boxed{400}}} = \overset{\text{e.g.}}{\frac{\boxed{50}}{\boxed{200}}}$

c) $\frac{1}{3} = \frac{2}{\boxed{6}} = \frac{\boxed{4}}{12} = \frac{3}{\boxed{9}} = \frac{\boxed{5}}{15} = \frac{\boxed{8}}{24} = \frac{\boxed{10}}{30} = \frac{100}{\boxed{300}} = \overset{\text{e.g.}}{\frac{\boxed{1000}}{\boxed{3000}}}$

Q.3

a) 1 hour = 60 minutes

b) $\frac{1}{4}$ hour = 15 minutes

c) $1\frac{1}{2}$ hours = 90 minutes

d) $\frac{1}{5}$ hour = 12 minutes

e) $2\frac{1}{4}$ minutes = 135 seconds

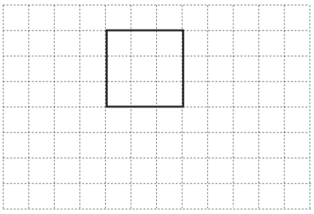
f) $\frac{3}{5}$ minute = 36 seconds

g) $1\frac{1}{6}$ minutes = 70 seconds

h) $\frac{1}{10}$ minute = 6 seconds

Q.4 a) smallest possible perimeter b) largest possible perimeter

$P = 4 \times 3$ units $= 12$ units



$P = 2 \times (1 + 9) = 20$ units