

Y7

## WORKING WITH WHOLE NUMBERS

EXERCISE

**Multiplying and dividing by 10 or 100**

Solve the following problems without a calculator.

Use the methods you know for multiplying or dividing by 10 or 100.

- 1 A crate holds 100 cartons of fruit juice, each containing 750 ml.  
How much juice does the crate contain in total?  
75000 ml  
or 75 litres
- 2 A market gardener is planting gooseberry bushes in rows of ten. There are 117 bushes altogether. How many rows will there be?  
12
- 3 Julia has decided to put a fence down each side of her garden. Fencing costs £15 per metre and the garden is 50 metres long. How much will it cost her?  
£1500
- 4 There are 30 chairs in each classroom in the Mathematics Block at Upworth School. There are six classrooms. How many chairs are there in total?  
180
- 5 A car manufacturer turns out 300 cars every week at one of its factories. How many cars will be made over a period of ten years? (Take one year to be 52 weeks.)  
156 000
- 6 A mountaineer needs 30 metres of rope. The rope costs £3.50 per metre. Find the total cost.  
£105
- 7 Leadale School hires ten minibuses for the Year 7 outing. Each minibus takes 16 passengers plus a driver. How many people could go on the outing, including the drivers?  
170
- 8 Rashid has £4. How many 30p bars of chocolate can he buy?  
13
- 9 A florist uses 80 cm of ribbon for each bouquet. At the end of one month 72 m of ribbon have been used. How many bouquets were sold that month?  
90
- 10 An airline catering firm made 36 000 meals in a week. Each flight needs 300 meals. How many flights could be supplied that week?  
120

### Left and right



Numbers in the left-hand grid are multiplied by 10 to give the matching number in the right-hand grid. Fill in the missing numbers. The first one has been done for you.

	Total								
<b>1</b>	3	5	4	<b>12</b>	→ ×10 →	30	50	40	<b>120</b>
	7	2	9	<b>18</b>		70	20	90	<b>180</b>
	1	6	8	<b>15</b>		10	60	80	<b>150</b>
<b>2</b>	3	2	5	<b>10</b>	→ ×10 →	30	20	50	<b>100</b>
	8	7	9	<b>24</b>		80	70	90	<b>240</b>
	4	1	6	<b>11</b>		40	10	60	<b>110</b>
<b>3</b>	2	7	1	<b>10</b>	→ ×10 →	20	70	10	<b>100</b>
	6	3	4	<b>13</b>		60	30	40	<b>130</b>
	8	5	9	<b>22</b>		80	50	90	<b>220</b>
<b>4</b>	8	4	5	<b>17</b>	→ ×10 →	80	40	50	<b>170</b>
	7	2	3	<b>12</b>		70	20	30	<b>120</b>
	6	1	9	<b>16</b>		60	10	90	<b>160</b>

The puzzles below are similar but this time the numbers in the left-hand grid have been multiplied by 4 or 5 to make the numbers in the right-hand grid. Fill in the missing numbers. Once again, the first one has been done for you.

	Total								
<b>5</b>	9	5	1	<b>15</b>	→ ×4 →	36	20	4	<b>60</b>
	7	2	3	<b>12</b>		28	8	12	<b>48</b>
	4	6	8	<b>18</b>		16	24	32	<b>72</b>
<b>6</b>	4	9	2	<b>15</b>	→ ×4 →	16	36	8	<b>60</b>
	1	5	8	<b>14</b>		4	20	32	<b>56</b>
	6	3	7	<b>16</b>		24	12	28	<b>64</b>
<b>7</b>	4	1	5	<b>10</b>	→ ×5 →	20	5	25	<b>50</b>
	2	3	8	<b>13</b>		10	15	40	<b>65</b>
	7	9	6	<b>22</b>		35	45	30	<b>110</b>
<b>8</b>	4	8	9	<b>21</b>	→ ×4 →	16	32	36	<b>84</b>
	6	1	5	<b>12</b>		24	4	20	<b>48</b>
	7	2	3	<b>12</b>		28	8	12	<b>48</b>

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3  
ACTIVITY

### Professor Puzzle's maze



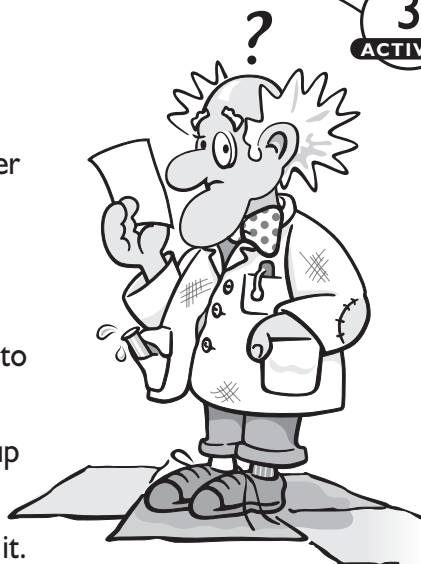
Professor Puzzle has hidden the key to his laboratory under one of the paving slabs of his patio.

He has drawn a map and provided clues to find out which slab it was.

Start at the top left-hand corner (square A1). The answer to the question gives you a clue about where to go next.

When you have gone through all 24 squares you will end up at the place where Professor Puzzle has hidden the key.

Name the square, and give the answer to the question on it.



	A	B	C	D	E	F
1	(1) $7 \times 20$ 140	(17) $42 + 18$ 60	(22) $100 \times 10$ 1000	(5) $200 \div 5$ 40	(7) $1240 - 99$ 1141	(16) $210 \div 5$ 42
2	(13) $30 \times 31 - 30$ 900	(4) $8 \times 25$ 200	(19) $3600 \div 100$ 36	(14) $\sqrt{900} + 5$ 35	(10) $50 \times 24$ 1200	(3) $\sqrt{64}$ 8
3	(21) $6 + 94$ 100	(9) $\sqrt{2500}$ 50	(24) $10 \div 10 - 1$ 0	(2) $140 - 76$ 64	(12) $120 \div 4$ 30	(18) $60^2$ 3600
4	(11) $1200 \div 10$ 120	(23) $\sqrt[3]{1000}$ 10	(6) $40 \times 31$ 1240	(20) $\sqrt{36}$ 6	(15) $35 \times 6$ 210	(8) $1141 + 1359$ 2500

The key is in square     C3    .

The answer to the question is     0    .

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## I WORKING WITH WHOLE NUMBERS

4

ACTIVITY

**What is it?**

To find out, follow these instructions.

In the number grid below, colour in the squares according to these rules.

- If the number can be divided by 3 colour it in blue. Use a lighter blue if it can be divided by 9.
- If the number can be divided by 5 colour it orange or red. Use a lighter shade if it can be divided by 10.
- If the number can be divided by 7 colour it brown.
- If the number can be divided by 11 colour it green.
- If the number can be divided by **two** of the numbers 3, 5, 7, 9, 10 and 11 then colour it half and half. (You may want to look at nearby squares to decide which half gets each colour.)

		27	18	81	12														
	42	63	24	51	57														
	7	30	36	9	39	3													
		25	65	15	96	48	3												
			85	75	78	12	51	69											
			95	60	87	96	12	39	24										
			65	85	75	3	57	93	96	12									
			85	25	5	15	87	51	6	24									
				95	25	85	60	39	87	96	12								
				10	25	20	85	15	48	12	69								
		4	58	29	80	40	20	10	5	15	24	14							
	7	38	76	19	26	4	40	20	110	80	30	49							
	91	64	68	34	13	16	11	44	52	17	40	60	98						
	14	28	49	91	77	22	88	64				80	24	7					
		91	28	49	44	77	14	98					57	87					
						77	14	28					39	51	93				
							98	49							12	24			
							28	49							78	93	3		

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TEACHING RESOURCE 64

Y7

## 2 LONG MULTIPLICATION AND LONG DIVISION

5

EXERCISE

**Long multiplication**

Work out the answers to these problems using long multiplication.  
No calculators! Show your workings on a separate sheet.

- |                            |                                  |                                |                                    |
|----------------------------|----------------------------------|--------------------------------|------------------------------------|
| <b>1</b> $368 \times 6$    | -----<br><b>2208</b><br>-----    | <b>2</b> $502 \times 11$       | -----<br><b>5522</b><br>-----      |
| <b>3</b> $72 \times 38$    | -----<br><b>2736</b><br>-----    | <b>4</b> $602 \times 720$      | -----<br><b>433 440</b><br>-----   |
| <b>5</b> $947 \times 35$   | -----<br><b>33 145</b><br>-----  | <b>6</b> $6004 \times 605$     | -----<br><b>3 632 420</b><br>----- |
| <b>7</b> $264 \times 8$    | -----<br><b>2112</b><br>-----    | <b>8</b> $28 \times 705$       | -----<br><b>19 740</b><br>-----    |
| <b>9</b> $597 \times 429$  | -----<br><b>256 113</b><br>----- | <b>10</b> $3582 \times 38$     | -----<br><b>136 116</b><br>-----   |
| <b>11</b> $826 \times 65$  | -----<br><b>53 690</b><br>-----  | <b>12</b> $38 \times 437$      | -----<br><b>16 606</b><br>-----    |
| <b>13</b> $5 \times 308$   | -----<br><b>1540</b><br>-----    | <b>14</b> $407 \times 396$     | -----<br><b>161 172</b><br>-----   |
| <b>15</b> $49 \times 258$  | -----<br><b>12 642</b><br>-----  | <b>16</b> $306 \times 99$      | -----<br><b>30 294</b><br>-----    |
| <b>17</b> $209 \times 402$ | -----<br><b>84 018</b><br>-----  | <b>18</b> $297 \times 52$      | -----<br><b>15 444</b><br>-----    |
| <b>19</b> $405 \times 36$  | -----<br><b>14 580</b><br>-----  | <b>20</b> $10\ 010 \times 101$ | -----<br><b>1011 010</b><br>-----  |
- 21** In my local supermarket, eggs are supplied in boxes of six. The boxes are then put in layers, each of which has four rows of three boxes. One day there are eight layers on display. How many eggs are there in the display? -----  
**576**
- 22** Next to the eggs are some crates of milk in a stack. Each crate has four rows with five bottles in each row. There are six crates. How many bottles of milk are there? -----  
**120**
- 23** Each bottle of milk weighs 750 grams and each crate weighs 1 kilogram. How much does the whole stack of milk weigh? -----  
**96 kg**
- 24** I have two bookcases, each with three shelves. One shelf has 48 books on it, and all the rest have about the same, although I have not counted them. Roughly how many books do I have? -----  
**300**  
**(or 288)**

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## 2 LONG MULTIPLICATION AND LONG DIVISION

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EXERCISE

**Long division**

Work out the answers to these problems using long division. Once again, no calculators! Remainders should be given as fractions in their lowest terms. Show your workings on a separate sheet.

1  $366 \div 6$        $61$

2  $237 \div 4$        $59 \frac{1}{4}$

3  $72 \div 18$        $4$

4  $612 \div 30$        $20 \frac{2}{5}$

5  $947 \div 35$        $27 \frac{2}{35}$

6  $6006 \div 42$        $143$

7  $7560 \div 105$        $72$

8  $1001 \div 11$        $91$

9  $1002 \div 13$        $77 \frac{1}{13}$

10  $38\,637 \div 79$        $489 \frac{6}{79}$

11  $96\,842 \div 57$        $1698 \frac{56}{57}$

12  $100\,001 \div 11$        $9091$

13  $600\,006 \div 33$        $18\,182$

14  $58\,203 \div 54$        $1077 \frac{5}{6}$

15  $83\,621 \div 71$        $1177 \frac{54}{71}$

16  $284 \div 16$        $17 \frac{3}{4}$

17  $4319 \div 35$        $123 \frac{2}{5}$

18  $16\,896 \div 52$        $324 \frac{12}{13}$

19  $43\,047 \div 27$        $1594 \frac{1}{3}$

20  $21\,930 \div 48$        $456 \frac{7}{8}$

21 604 pupils are going on a school trip. Each coach can take 48 pupils and 3 members of staff. How many coaches are needed to take all of the pupils?

 $13$ 

22 Each pupil on the trip is to be given a packet of crisps for the journey. The crisps come in boxes of 40 packets. How many boxes will be needed?

 $16$

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## 2 LONG MULTIPLICATION AND LONG DIVISION

7

ACTIVITY

**Get across**

A game for two or more players.

**Rules**

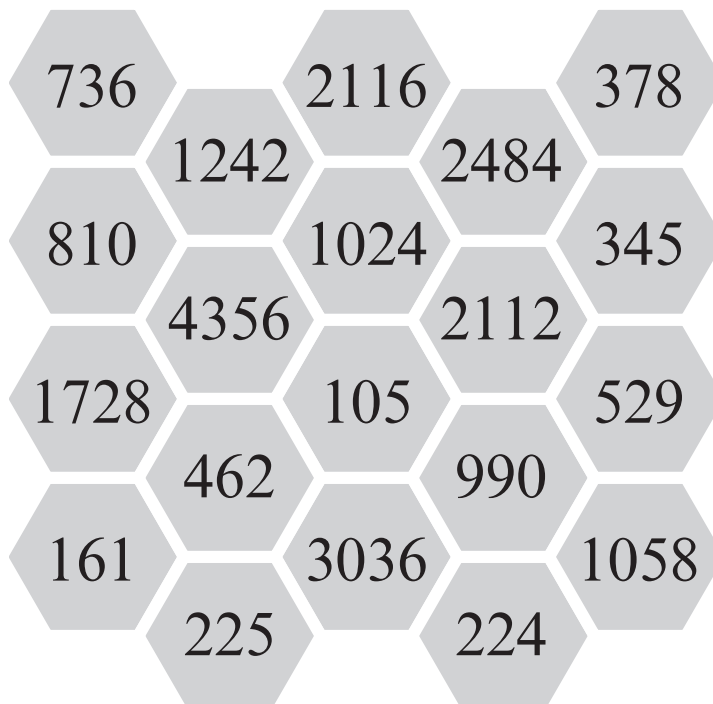
The object is to get a line of hexagons going across the board either from top to bottom or side to side. You could do this activity on your own, but it is more fun to play it as a game with a partner.

To claim a hexagon, you must first of all say which one you want. Then select two of the numbers in the rectangular box and multiply them together, without using a calculator. If the answer matches the hexagon you nominated, then you can claim it.

Play then passes to your opponent.

While one player is doing the long multiplication, the other player can be checking the answer with a calculator.

<b>The numbers</b>	7	15	23	32	46	54	66
--------------------	---	----	----	----	----	----	----

**The Board**

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## 3 WORKING WITH DECIMALS

8

EXERCISE

**Changing units**

- 1 Write 734 mm in centimetres.
- 2 Write 503 cm in metres.
- 3 Henrietta measured the length and breadth of her desk as 1230 mm and 623 mm. Write these measurements in centimetres.
- 4 Ken is designing some shelves. He wants them to be 78.5 cm long and 25.5 cm wide. Write these measurements in millimetres.
- 5 Add together 12 cm, 18 mm and 1.1 metres. Give your answer in centimetres.
- 6 Sadie can throw the javelin 10.76 metres. How far is this in centimetres?
- 7 Colleen is making some curtains which are 132 cm long. Write this measurement in metres.
- 8 Georgie is 1.34 m tall. Change her height into centimetres.
- 9 Afam jumps 432 cm in the long jump on sports day. Write this length in metres.
- 10 Alex can jump 1.87 metres in the high jump. Write this height in centimetres.
- 11 A school running track is 110 metres long. Steve jogs around it 20 times. Work out the total distance he jogs, in metres. Convert your answer to kilometres.
- 12 Emma wants to pour out 30 cups of lemonade, each holding 330 millilitres. How many litre bottles of lemonade will she need to buy?
- 13 The school office has 60 packets of exercise books. Each packet is 12.4 cm high. The books are stacked in three equal piles. Work out the height, in metres, of each pile.

73.4

5.03

123, 62.3

785, 255

123.8

1076

1.32

134

4.32

187

2200, 2.2

10

2.48



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## 3 WORKING WITH DECIMALS

9

EXERCISE

**Weights and measures**

- 1 Felicity has a piece of string 1.95 metres long. She cuts off lengths of 35 cm, 65 cm and 23 cm. How much string will be left over? (Answer in cm.)
- 2 Aaron and Sam are going on a hike. They plan to walk 7.5 km on the first day, 10.3 km on the second and 9.4 km on the third. How far are they going to walk altogether?
- 3 Richard bakes a cake, using 0.25 kg of flour, 0.2 kg of margarine, 0.2 kg of sugar and four eggs that weigh 0.3 kg between them. Find the total weight of all the ingredients.
- 4 Three suitcases weigh 20 kg in total. Two of them are 11.4 kg and 4.7 kg. Find the weight of the third suitcase.
- 5 In a triathlon Andrew ran 15.5 km, swam 2.4 km and cycled 24.7 km. What distance did he cover in total?
- 6 Emma has 3.5 m of material and needs 1.6 m for a skirt and 1.15 m for a jacket. Find the total amount of material she will need to use. Then use your answer to decide whether she has enough left over for a waistcoat, needing 0.9 m of material.
- 7 Baby Tom weighed 2.3 kg when he was born. Six months later he weighed 5.9 kg. How much weight did he gain during the first six months?
- 8 At Easter Sara bought each of her cousins a bag of sweets. They weighed 0.25 kg, 0.5 kg, 0.35 kg and 0.42 kg. What was the total weight of all four bags?
- 9 Marcel wanted to cut some lengths of drainpipe. He has 7.2 m of suitable pipe. He needs to cut three pieces, of lengths 1.4 m, 0.9 m and 1.65 m. How much pipe will he have left over?
- 10 Mark's granny knits him a jumper. She uses 0.25 kg of red wool, 0.05 kg of white wool and 0.3 kg of blue wool. What is the weight of the finished jumper?

72 cm

27.2 km

0.95 kg

3.9 kg

42.6 km

2.75 m, no

3.6 kg

1.52 kg

3.25 m

0.6 kg

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## 3 WORKING WITH DECIMALS

10

EXERCISE

## Place values in decimals



This exercise is about the place value in decimals. For example, in a length of 1.92 m, the 9 represents nine-tenths of a metre, and the 2 represents two-hundredths of a metre.

- 1 For each of these measurements write down the part of a metre represented by the underlined digit.

a) 1.48 metres    b) 18.69 metres    c) 0.27 metres    d) 2.257 metres  
8 hundredths    6 tenths    2 tenths    7 thousandths

- 2 For each of these measurements write down the part of a centimetre represented by the underlined digit.

a) 10.1 cm    b) 19.56 cm    c) 6.08 cm    d) 4.50 cm  
1 tenth    6 hundredths    8 hundredths    0 hundredths

- 3 Write all these measurements in centimetres. Then arrange them in order of size, starting with the largest one.

12.4 m, 1.2 m, 3.07 m, 3.72 m, 2.14 m

1240, 372, 307, 214, 120 cm

- 4 Arrange these measurements in order of size, smallest first.

2.4 m, 2.04 m, 20.4 cm, 20.44 m, 2.04 cm

2.04 cm, 20.4 cm, 2.04 m, 2.4 m, 20.44 m

- 5 Arrange these weights in order of size, largest first.

1.3 kg, 1.03 kg, 2.6 kg, 1.33 kg, 2.61 kg

2.61, 2.6, 1.33, 1.03 kg

- 6 Find the odd one out from this list of lengths.

3.4 m, 340 cm, 3.40 m, 3400 mm, 3.04 m

3.04 m

- 7 Find the odd one out.

702cm, 7.2m, 7200 mm, 7.20 m, 720 cm

702 cm

- 8 Find the longest measurement from this list.

6.09 cm, 699 cm, 6.9 cm, 609 cm, 6.99 cm

699 cm

## Y7 3 WORKING WITH DECIMALS



## Questions and answers



This activity contains 15 questions and answers about decimals. Unfortunately the answers have been jumbled up. Also, one of the answers is completely wrong. Your task is to draw a line connecting each question to its right answer. When you have finished you will discover which one answer is wrong. Work out the correct answer, and write it in the space at the bottom of the page.

### Questions

<b>1</b>	$8.5 + 12.4$
<b>2</b>	$14.4 - 8.8$
<b>3</b>	$44.7 \times 2$
<b>4</b>	$11.9 + 23.2$
<b>5</b>	$3.5 \times 20$
<b>6</b>	$4.3 \times 4$
<b>7</b>	$2.8 - 2.08$
<b>8</b>	$44.3 + 55.2 + 2.4$
<b>9</b>	$35.5 \div 5$
<b>10</b>	$14.3 - 2.8$
<b>11</b>	$16.5 \times 4$
<b>12</b>	$152.6 \div 2$
<b>13</b>	$14.8 \div 10$
<b>14</b>	$15.5 - 4.5$
<b>15</b>	$11.22 \times 6$

### Answers

<b>A</b>	5.6
<b>B</b>	89.4
<b>C</b>	70
<b>D</b>	20.9
<b>E</b>	0.72
<b>F</b>	35.1
<b>G</b>	17.2
<b>H</b>	7.1
<b>I</b>	101.9
<b>J</b>	66
<b>K</b>	76.3
<b>L</b>	11.5
<b>M</b>	67.32
<b>N</b>	1.48
<b>O</b>	20

The wrong answer is

(letter O) 20

It should say

11

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## 4 WORKING WITH FRACTIONS

12

EXERCISE

## Finding fractions of a given amount



Work out the required fractions of these amounts.

- |    |                         |                    |    |                         |                 |
|----|-------------------------|--------------------|----|-------------------------|-----------------|
| 1  | One quarter of 72       | ..... 18 .....     | 2  | Three-quarters of 72    | ..... 54 .....  |
| 3  | $\frac{1}{5}$ of 85     | ..... 17 .....     | 4  | $\frac{3}{5}$ of 85     | ..... 51 .....  |
| 5  | Three-sevenths of 42    | ..... 18 .....     | 6  | $\frac{5}{7}$ of 42     | ..... 30 .....  |
| 7  | $\frac{3}{4}$ of 144    | ..... 108 .....    | 8  | $\frac{2}{5}$ of 600    | ..... 240 ..... |
| 9  | $\frac{1}{9}$ of 720    | ..... 80 .....     | 10 | $\frac{4}{9}$ of 360    | ..... 160 ..... |
| 11 | Four-ninths of 23 202   | ..... 10 312 ..... | 12 | $\frac{5}{8}$ of 1232   | ..... 770 ..... |
| 13 | Five-sixths of 132      | ..... 110 .....    | 14 | $\frac{5}{12}$ of 144   | ..... 60 .....  |
| 15 | $\frac{5}{13}$ of 338   | ..... 130 .....    | 16 | $\frac{5}{8}$ of 256    | ..... 160 ..... |
| 17 | Three-elevenths of 5709 | ..... 1557 .....   | 18 | $\frac{5}{73}$ of 365   | ..... 25 .....  |
| 19 | $\frac{8}{15}$ of 2745  | ..... 1464 .....   | 20 | $\frac{23}{47}$ of 1786 | ..... 874 ..... |

- 21 Freddie earned himself some extra pocket money by washing cars. He spent  $\frac{2}{5}$  on a magazine and  $\frac{1}{5}$  on sweets. What fraction of the money did he have left to save?

 $\frac{2}{5}$ 

- 22 Cressy is going to have 12 months off between school and university. She plans to spend half of it travelling, one third working, and the rest doing unpaid work experience. How many months will she spend on each activity?

6, 4, 2 months

- 23 The pupils at Greenview School carried out a survey on hair colour. They found that  $\frac{1}{5}$  of the pupils had blonde hair,  $\frac{1}{10}$  had auburn hair and the rest were various shades of brown. What fraction had brown hair?

[Hint: change  $\frac{1}{5}$  into tenths first.] $\frac{7}{10}$

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## 4 WORKING WITH FRACTIONS

12

EXERCISE

**Finding fractions of a given amount (continued)**

- 24** Two-ninths of the trees in a plantation are oak trees. There are 8982 trees in the plantation altogether. How many of them are oak trees?  
----- 1996
- 25** A filling station attendant counted one day and found that three-fifths of the customers paid by credit card and the remainder used cash. If there were 120 customers, how many used cash?  
----- 48
- 26** Two-thirds of the electricity used by a computer and monitor is used by the monitor. The computer and monitor together use 270 watts. How much is used just by the monitor?  
----- 180
- 27** One-eighteenth of the shoes in a shop are size 11. If there are 234 pairs of shoes in stock, how many of them are size 11?  
----- 13
- 28** When I plant lettuce seeds, I expect the birds to eat two-fifths of the seeds before they even start to grow, and slugs to eat half of the seedlings as they start to grow. I planted fifty seeds this year. How many lettuces can I expect to harvest?  
----- 15
- 29** In a mathematics exam there are two parts – Section A and Section B. I scored 42 marks altogether, but  $\frac{5}{7}$  of my marks came from Section A. How many marks did I score on Section B?  
----- 12
- 30** I spent one quarter of my pocket money on Saturday. I spent one third of what was left on Monday. I spent half of what was left on Wednesday. I then had 75 pence remaining. How much did I have before I started spending on the Saturday?  
----- £3.00

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## 4 WORKING WITH FRACTIONS

13

EXERCISE

## Equivalent fractions



Here are some pairs of equivalent fractions. In each case, work out the value of the missing number, represented by the symbol  $\square$ .

1  $\frac{2}{3} = \frac{6}{\square}$  ..... 9

2  $\frac{2}{3} = \frac{\square}{9}$  ..... 6

3  $\frac{5}{12} = \frac{10}{\square}$  ..... 24

4  $\frac{4}{5} = \frac{\square}{15}$  ..... 12

5  $\frac{3}{\square} = \frac{6}{16}$  ..... 8

6  $\frac{1}{\square} = \frac{5}{10}$  ..... 2

7  $\frac{7}{12} = \frac{21}{\square}$  ..... 36

8  $\frac{5}{6} = \frac{35}{\square}$  ..... 42

9  $\frac{5}{6} = \frac{\square}{36}$  ..... 30

10  $\frac{2}{5} = \frac{14}{\square}$  ..... 35

11  $\frac{15}{\square} = \frac{75}{80}$  ..... 16

12  $\frac{3}{4} = \frac{\square}{60}$  ..... 45

13  $\frac{4}{\square} = \frac{8}{14}$  ..... 7

14  $\frac{2}{3} = \frac{60}{\square}$  ..... 90

15  $\frac{\square}{6} = \frac{10}{12}$  ..... 5

16  $\frac{17}{40} = \frac{51}{\square}$  ..... 120

17  $\frac{3}{\square} = \frac{18}{24}$  ..... 4

18  $\frac{11}{16} = \frac{55}{\square}$  ..... 80

19  $\frac{7}{8} = \frac{\square}{72}$  ..... 63

20  $\frac{3}{4} = \frac{\square}{108}$  ..... 81

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## 4 WORKING WITH FRACTIONS

14

EXERCISE

**Cancelling fractions to their simplest form**

Cancel each of these fractions down into its lowest terms (i.e. simplest form.)

Watch out though – some of them are **already** in their lowest terms.

1  $\frac{15}{20}$      $\frac{3}{4}$  .....

2  $\frac{14}{21}$      $\frac{2}{3}$  .....

3  $\frac{17}{18}$      $\frac{17}{18}$  .....

4  $\frac{8}{10}$      $\frac{4}{5}$  .....

5  $\frac{26}{39}$      $\frac{2}{3}$  .....

6  $\frac{15}{21}$      $\frac{5}{7}$  .....

7  $\frac{76}{80}$      $\frac{19}{20}$  .....

8  $\frac{14}{18}$      $\frac{7}{9}$  .....

9  $\frac{22}{32}$      $\frac{11}{16}$  .....

10  $\frac{11}{12}$      $\frac{11}{12}$  .....

11  $\frac{15}{25}$      $\frac{3}{5}$  .....

12  $\frac{7}{70}$      $\frac{1}{10}$  .....

13  $\frac{15}{18}$      $\frac{5}{6}$  .....

14  $\frac{144}{360}$      $\frac{2}{5}$  .....

15  $\frac{35}{45}$      $\frac{7}{9}$  .....

16  $\frac{100}{120}$      $\frac{5}{6}$  .....

17  $\frac{85}{95}$      $\frac{17}{19}$  .....

18  $\frac{14}{17}$      $\frac{14}{17}$  .....

19  $\frac{14}{18}$      $\frac{7}{9}$  .....

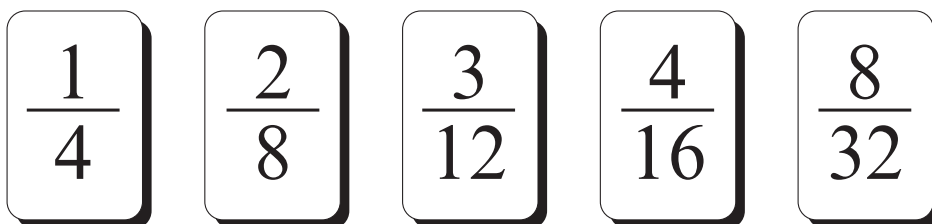
20  $\frac{120}{180}$      $\frac{2}{3}$  .....

### Misprints



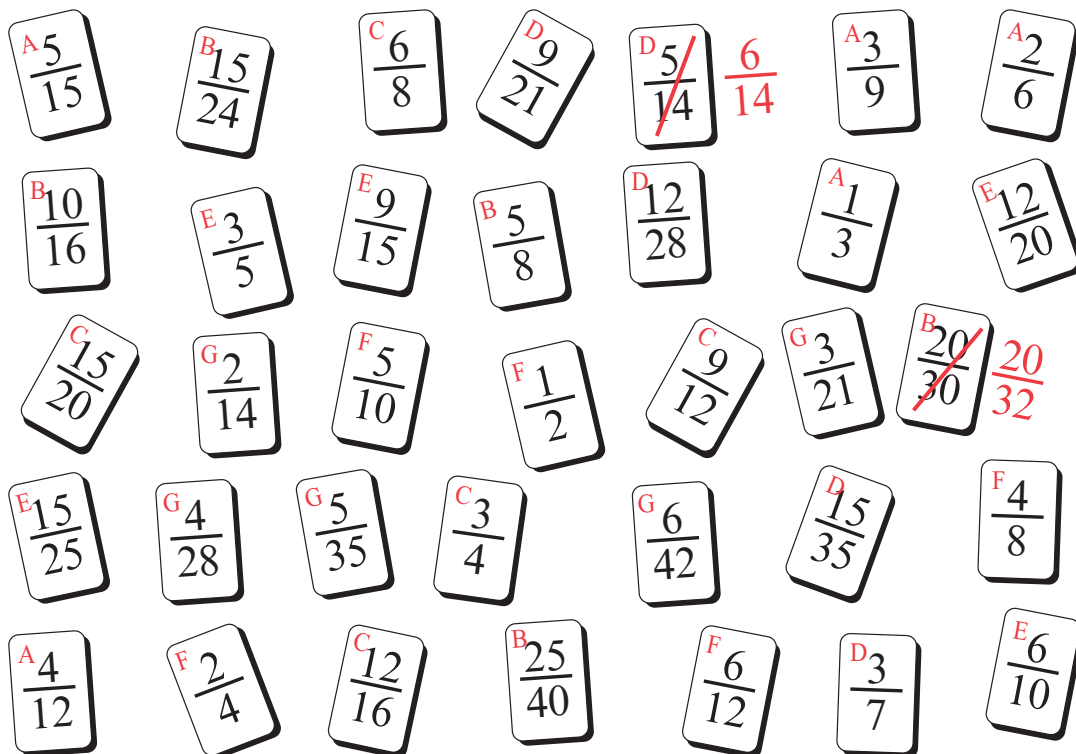
Spokes Card Game Company has produced a new card game. Players have to collect sets of five cards with **equivalent fractions** on them.

Here is one set of five cards:



Unfortunately no one checked the cards for accuracy before they were printed, and two of the cards are printed incorrectly.

The full set of cards, mixed up, is shown below. Group them into their sets of five, and hence identify the two incorrect cards. What do you think they should say?





Y7

## 5 FRACTIONS, DECIMALS AND PERCENTAGES

16

EXERCISE

## Finding a percentage of an amount



Work out the required percentages of these amounts.

- |                                     |                   |                                   |                     |
|-------------------------------------|-------------------|-----------------------------------|---------------------|
| <b>1</b> 20% of 75                  | ..... 15 .....    | <b>2</b> 65% of 120               | ..... 78 .....      |
| <b>3</b> 4% of 175                  | ..... 7 .....     | <b>4</b> 112% of £23.00           | ..... £25.76 .....  |
| <b>5</b> 76% of 3400                | ..... 2584 .....  | <b>6</b> 15% of £3000             | ..... £450 .....    |
| <b>7</b> $66\frac{2}{3}\%$ of 120   | ..... 80 .....    | <b>8</b> $12\frac{1}{2}\%$ of £36 | ..... £4.50 .....   |
| <b>9</b> 35% of 630                 | ..... 220.5 ..... | <b>10</b> 33% of £600             | ..... £198 .....    |
| <b>11</b> $33\frac{1}{3}\%$ of £600 | ..... £200 .....  | <b>12</b> 33.3% of £600           | ..... £199.80 ..... |

Find the result of these percentage increases or decreases.

- |                                     |                    |                                  |                    |
|-------------------------------------|--------------------|----------------------------------|--------------------|
| <b>13</b> Increase 132 by 25%       | ..... 165 .....    | <b>14</b> Decrease £47.00 by 20% | ..... £37.60 ..... |
| <b>15</b> Increase 78 pence by 150% | ..... 195p .....   | <b>16</b> Decrease 440 by 85%    | ..... 66 .....     |
| <b>17</b> Increase £82 by 7%        | ..... £87.74 ..... | <b>18</b> Increase £87.74 by 7%  | ..... £93.88 ..... |
| <b>19</b> Decrease £87.74 by 7%     | ..... £81.60 ..... | <b>20</b> Increase 99 by 1%      | ..... 99.99 .....  |

Y7

## 5 FRACTIONS, DECIMALS AND PERCENTAGES

16

EXERCISE

**Finding a percentage of an amount (continued)**

Solve these problems using percentages.

- 21** Mark scores 24 out of 30 in an examination. What percentage is this? ..... 80%
- 22** Luke scores 85% in a Mathematics test. The test was out of 60 marks. How many marks did Luke score? ..... 51
- 23** A theatre can seat 450 people but only 84% of the seats have been sold for tonight's performance. How many seats have not been sold? ..... 72
- 24** 120 children take a Key Stage 3 examination in Mathematics. 15% of them take the optional Extension Paper. How many children take the Extension Paper? ..... 18
- 25** An astronomer reckons that only 12% of the nights during a year are suitable for his research programme. How many suitable nights is this? ..... 44  
(or 43)
- 26** A film lasts for 110 minutes, and has background music for 32% of the time. How many minutes of background music is this? ..... 35.2
- 27** A recordable CD can hold 800 megabytes of data. It is 20% full at the moment. How many 100 megabyte files can I store on the remaining space on the disc? ..... 6
- 28** A shopkeeper buys some goods for £3.64 each and sells them at a profit of 50%. What is the selling price? ..... £5.46
- 29** A music shop is having a sale. Everything is reduced by 30%. Find the price of a CD that cost £8.00 before the sale. ..... £5.60
- 30** A sweet shop buys boxes of 48 packets of crisps for £11.52 a box. They wish to make a profit of 45%. How much should they charge for a packet of crisps? ..... 35 pence

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TEACHING RESOURCE 78

Y7

## 5 FRACTIONS, DECIMALS AND PERCENTAGES

17

EXERCISE

## Changing fractions into percentages



Change these fractions into percentages.

If the answer is not exact, then give it correct to one decimal place.

1  $\frac{3}{10}$  ..... 30% .....

2  $\frac{3}{20}$  ..... 15% .....

3  $\frac{3}{4}$  ..... 75% .....

4  $\frac{2}{3}$  ..... 66.7% (1 dp) .....

5  $\frac{7}{8}$  ..... 87.5% .....

6  $\frac{5}{6}$  ..... 83.3% .....

7  $\frac{4}{5}$  ..... 80% .....

8  $\frac{11}{20}$  ..... 55% .....

9  $\frac{19}{25}$  ..... 76% .....

10  $\frac{7}{25}$  ..... 28% .....

11  $\frac{4}{25}$  ..... 16% .....

12  $\frac{2}{7}$  ..... 28.6% (1 dp) .....

13  $\frac{3}{7}$  ..... 42.9% (1 dp) .....

14  $\frac{2}{9}$  ..... 22.2% (1 dp) .....

15  $\frac{4}{9}$  ..... 44.4% (1 dp) .....

16  $\frac{7}{9}$  ..... 77.8% (1 dp) .....

17  $\frac{37}{50}$  ..... 74% .....

18  $\frac{13}{40}$  ..... 32.5% .....

19  $\frac{17}{60}$  ..... 28.3% (1 dp) .....

20  $\frac{11}{70}$  ..... 15.7% .....

21 Put these in order of size, smallest first: 66.7%, 66.6%,  $\frac{2}{3}$  ..... 66.6%,  $\frac{2}{3}$ , 66.7%

22 If four people out of five like chocolate, what is this as a percentage? ..... 80%

23 Sally and Roger have just completed the third hole of an eighteen-hole golf course. What percentage of the course have they completed? ..... 16.7%

24 In a class of 24 pupils, three have forgotten their protractors. What percentage have remembered them? ..... 87.5%

25 Last June there were 24 sunny days. What percentage is that? ..... 80%

Y7

## 5 FRACTIONS, DECIMALS AND PERCENTAGES

18

EXERCISE

## Changing percentages into fractions



Change these percentages into fractions in their lowest terms.

1 20%      $\frac{1}{5}$

2 8%      $\frac{2}{25}$

3 18%      $\frac{9}{50}$

4 72%      $\frac{18}{25}$

5 85%      $\frac{17}{20}$

6 38%      $\frac{19}{50}$

7  $33\frac{1}{3}\%$       $\frac{1}{3}$

8  $3\frac{1}{3}\%$       $\frac{1}{30}$

9 45%      $\frac{9}{20}$

10  $4\frac{1}{2}\%$       $\frac{9}{200}$

11  $37\frac{1}{2}\%$       $\frac{3}{8}$

12  $2\frac{1}{4}\%$       $\frac{9}{400}$

13 30%      $\frac{3}{10}$

14  $3\frac{3}{4}\%$       $\frac{3}{80}$

15 11%      $\frac{11}{100}$

16 22%      $\frac{11}{50}$

17 40%      $\frac{2}{5}$

18  $87\frac{1}{2}\%$       $\frac{7}{8}$

19 125%      $1\frac{1}{4}$

20 210%      $2\frac{1}{10}$

21 In a sale, a shop is giving 25% off all prices. Give this information as a fraction.

$\frac{1}{4}$  off

22 At the time of writing, the government's inflation target is  $2\frac{1}{2}\%$ . What is this figure as a fraction?

$\frac{1}{40}$

23 A new make of batteries is advertised as 'giving 35% extra life'. Write this as a fraction.

$\frac{7}{20}$

24 On take-off the pilot of an aircraft can ask for  $12\frac{1}{2}\%$  over normal power from the engines. What is this as a fraction?

$\frac{1}{8}$

25 On a cold day the demand for power went up by 30%. What fraction is that?

$\frac{3}{10}$

### More misprints



Spokes Card Game Company has produced another card game. Players have to collect sets of four cards with equivalent fractions, decimals and percentages on them.

Here is one set of four cards:

$$\frac{6}{8}$$

$$\frac{12}{16}$$

$$75\%$$

$$0.75$$

Unfortunately no one checked the cards for accuracy before they were printed, and three of the cards are printed incorrectly.

The full set of cards, mixed up, is shown below. (Any decimals have been rounded to three decimal places.) Group them into their sets of four, and hence identify the three incorrect cards. What do you think they should say?

Y7

## 6 INTRODUCING ALGEBRA

20

EXERCISE

## Letters for numbers



Write down an expression for each of the following.

Use  $x$  to represent the original number.

1 Add 3

$x + 3$

2 Multiply by 10

$10x$

3 Multiply by 10, then add 3

$10x + 3$

4 Add 3, then multiply by 10

$10(x + 3)$

5 Divide by 2, then add 4

$\frac{x}{2} + 4$

6 Multiply by 2, then subtract 2

$2x - 2$

Write down an expression for each of the following. Use  $y$  to represent the original number.

7 Add 8, then subtract 5

$y + 3$

8 Multiply by 3, then multiply by 2

$6y$

9 Add 7, then divide by 2

$\frac{(y+7)}{2}$

10 Divide by 2, then add 7

$\frac{y}{2} + 7$

11 Add 3, then double

$2(y + 3)$

12 Multiply by 6, then subtract 6

$6y - 6$

13 Hal is told to think of a number, add 2, then multiply that answer by 3. He gets the answer 21. What number did he think of?

$5$

14 Sandra thinks of a number, adds 5, then squares the result. She ends up with 64. What number did Sandra think of?

$3$

15 Tammy is told to think of a number, add 3, then multiply by 5. Unfortunately Tammy multiplies by 5 first, then adds 3, so her answer of 53 is wrong.

a) What number did Tammy think of?

$10$

b) What would be the correct answer using Tammy's number and the right instructions?

$65$

Y7

## 6 INTRODUCING ALGEBRA

21

EXERCISE

## Formulae



Write algebraic formulae to answer these questions.

- 1** Each person in a family uses 150 ml of milk on their cereal. A full 1136 ml container is on the table at the beginning of breakfast. How much is left after 2 people have had cereal? How much is left after  $p$  people have had cereal?  
836;  $1136 - 150p$
- 2** A phonecard has £4.00 of credit when new. Each time I make a local call it costs 5 pence. How much credit (in pence) is left after I have made four calls? How much is left after  $c$  calls?  
380;  $400 - 5c$
- 3** Linda has a savings account with the Post Office. At present it contains £54, and she is saving £2 every week. How much will she have after three weeks? How much after  $n$  weeks?  
£60;  $£54 + 2n$
- 4** A box contains 54 sweets. How many sweets can six people have if they share them equally? How many sweets can  $n$  people have if they share them equally? Will your formula work if there are seven people?  
 $9; \frac{54}{n}$ ; NO
- 5** I start a journey of 300 miles. I drive at 50 miles per hour. How far do I still have to go after two hours? How far do I still have to go after  $h$  hours?  
200 miles;  $300 - 50h$  miles
- 6** A deep freeze normally keeps a temperature of  $-25^{\circ}\text{C}$ . When it defrosts, the temperature rises by  $3^{\circ}\text{C}$  every hour. What is its temperature after four hours of defrosting? What is its temperature after  $t$  hours of defrosting?  
 $-13^{\circ}$ ;  $-25 + 3t^{\circ}$
- 7** There are 20 biscuits in a packet of digestives and 12 in a packet of chocolate chip cookies. How many biscuits are there in three packets of digestives and two packets of chocolate chip cookies? How many biscuits in  $d$  packets of digestive biscuits and  $c$  packets of chocolate chip cookies?  
84;  $20d + 12c$
- 8** A full bottle of lemonade costs 73 pence including a deposit of 20 pence, which is returned when I take the empty bottle back. How much do I pay if I buy four bottles but take back two empties? How much do I pay if I buy  $n$  bottles but take back  $m$  empties?  
252 pence;  $73n - 20m$  pence

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Y7

## 6 INTRODUCING ALGEBRA

22

EXERCISE

## Calculations and brackets



Work out the values of each of these expressions.

When there are brackets, remember to work out the insides of the brackets first.

Try not to use a calculator for the first 10 questions!

- |   |                          |   |                          |
|---|--------------------------|---|--------------------------|
| <b>1</b> $5 - 3 + 2$                        | ..... <b>4</b> .....     | <b>2</b> $5 \times 3 + 2$                         | ..... <b>17</b> .....    |
| <b>3</b> $5 \times (3 + 2)$                 | ..... <b>25</b> .....    | <b>4</b> $(14 - 3) \times 2$                      | ..... <b>22</b> .....    |
| <b>5</b> $14 - 3 \times 2$                  | ..... <b>8</b> .....     | <b>6</b> $10 - 5 - 3$                             | ..... <b>2</b> .....     |
| <b>7</b> $10 - (5 - 3)$                     | ..... <b>8</b> .....     | <b>8</b> $(8 + 12) \div 4$                        | ..... <b>5</b> .....     |
| <b>9</b> $8 + 12 \div 4$                    | ..... <b>11</b> .....    | <b>10</b> $2.5 \times 10 - 5$                     | ..... <b>20</b> .....    |
| <b>11</b> $2 + 3 \times 4 + 5$              | ..... <b>19</b> .....    | <b>12</b> $(2 + 3) \times (4 + 5)$                | ..... <b>45</b> .....    |
| <b>13</b> $12 + 8 \div 2$                   | ..... <b>16</b> .....    | <b>14</b> $10 - 4 + 2$                            | ..... <b>8</b> .....     |
| <b>15</b> $10 - (4 + 2)$                    | ..... <b>4</b> .....     | <b>16</b> $12 \div 6 \div 2$                      | ..... <b>1</b> .....     |
| <b>17</b> $(8.2 + 3.25) \div (4.1 + 1.625)$ | ..... <b>2</b> .....     | <b>18</b> $5 \times 4 \times 3 \times 2 \times 1$ | ..... <b>120</b> .....   |
| <b>19</b> $13.66 - 10.89$                   | ..... <b>2.77</b> .....  | <b>20</b> $14.2 + 2 \times 3.5$                   | ..... <b>21.2</b> .....  |
| <b>21</b> $17.3 \times 2.4 - 1.1$           | ..... <b>40.42</b> ..... | <b>22</b> $4.5 \times 2 + 8$                      | ..... <b>17</b> .....    |
| <b>23</b> $2 \times (4.5 + 16.4)$           | ..... <b>41.8</b> .....  | <b>24</b> $(2 \times 4.5) + 16.4$                 | ..... <b>25.4</b> .....  |
| <b>25</b> $2 \times 4.5 + 16.4$             | ..... <b>25.4</b> .....  | <b>26</b> $15.2 - 3.9 + 6.6$                      | ..... <b>17.9</b> .....  |
| <b>27</b> $15.2 - (3.9 + 6.6)$              | ..... <b>4.7</b> .....   | <b>28</b> $3.4^2 + 6.7^2$                         | ..... <b>56.45</b> ..... |
| <b>29</b> $4.2 + 14.8 \div 2.5$             | ..... <b>10.12</b> ..... | <b>30</b> $(4.2 + 14.8) \div 2.5$                 | ..... <b>7.6</b> .....   |



Y7

## 6 INTRODUCING ALGEBRA

23

EXERCISE

## Substitution

If  $a = 3$ ,  $b = 5$  and  $c = 6$  then find the values of these expressions:

- |   |              |                |   |                             |                 |
|---|--------------|----------------|---|-----------------------------|-----------------|
| 1 | $4a - c$     | ..... 6 .....  | 2 | $2a + 6b - 5c$              | ..... 6 .....   |
| 3 | $ab - 2c$    | ..... 3 .....  | 4 | $4(a + b - c)$              | ..... 8 .....   |
| 5 | $2a^2$       | ..... 18 ..... | 6 | $(2a)^2$                    | ..... 36 .....  |
| 7 | $4bc - 5a^2$ | ..... 75 ..... | 8 | $(4a + 3b) \times (2b - c)$ | ..... 108 ..... |
| 9 | $a + bc$     | ..... 33 ..... |   |                             |                 |

If  $p = 4$ ,  $q = -7$  and  $r = 8$  then find the values of these expressions:

- |    |             |                 |    |              |                |
|----|-------------|-----------------|----|--------------|----------------|
| 10 | $p + q^2$   | ..... 53 .....  | 11 | $pq + 4r$    | ..... 4 .....  |
| 12 | $(p - q)^2$ | ..... 121 ..... | 13 | $6(4p + 2q)$ | ..... 12 ..... |
| 14 | $q^2 + r^2$ | ..... 113 ..... | 15 | $(q + r)^2$  | ..... 1 .....  |
| 16 | $pq - 4r$   | ..... -60 ..... | 17 | $r^2 - p^2$  | ..... 48 ..... |
| 18 | $r^2 - q^2$ | ..... 15 .....  |    |              |                |

If  $s = -4$ ,  $t = 5$  and  $u = -5$  then find the values of these expressions:

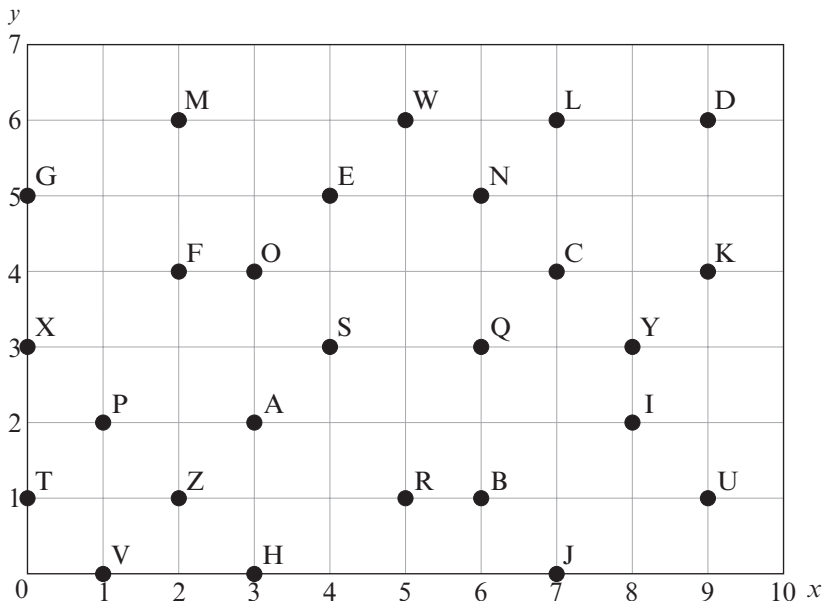
- |    |                        |                 |    |                    |                 |
|----|------------------------|-----------------|----|--------------------|-----------------|
| 19 | $2st$                  | ..... -40 ..... | 20 | $3s + 2(t + u)$    | ..... -12 ..... |
| 21 | $2s + 6t - 3u$         | ..... 37 .....  | 22 | $3(2s + 3t + u)$   | ..... 6 .....   |
| 23 | $s^2 + tu$             | ..... -9 .....  | 24 | $s^2 - tu$         | ..... 41 .....  |
| 25 | $3s - 4t + 5u$         | ..... -57 ..... | 26 | $(5s - 6u) \div t$ | ..... 2 .....   |
| 27 | $15s^2 \times (t + u)$ | ..... 0 .....   |    |                    |                 |

Y7 7 GRAPHS OF STRAIGHT LINES

# Coordinates and codes



Use the grid below to work out the message, which has been coded in coordinates.




(5, 6)	(3, 0)	(4, 5)	(6, 5)		(8, 3)	(3, 4)	(9, 1)		(3, 0)	(3, 2)	(1, 0)	(4, 5)
W	H	E	N		Y	O	U		H	A	V	E
(2, 4)	(8, 2)	(6, 5)	(8, 2)	(4, 3)	(3, 0)	(4, 5)	(9, 6)		(0, 1)	(3, 0)	(8, 2)	(4, 3)
F	I	N	I	S	H	E	D		T	H	I	S
(6, 3)	(9, 1)	(4, 5)	(4, 3)	(0, 1)	(8, 2)	(3, 4)	(6, 5)		(2, 6)	(3, 2)	(9, 4)	(4, 5)
Q	U	E	S	T	I	O	N		M	A	K	E
(9, 1)	(1, 2)		(3, 2)		(7, 4)	(3, 4)	(9, 6)	(4, 5)		(2, 4)	(3, 4)	(5, 1)
U	P		A		C	O	D	E		F	O	R
(8, 3)	(3, 4)	(9, 1)	(5, 1)		(2, 4)	(5, 1)	(8, 2)	(4, 5)	(6, 5)	(9, 6)		
Y	O	U	R		F	R	I	E	N	D		

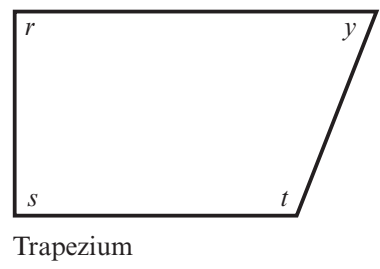
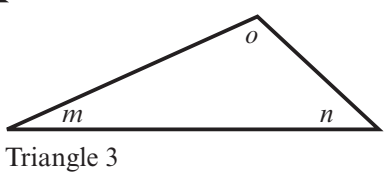
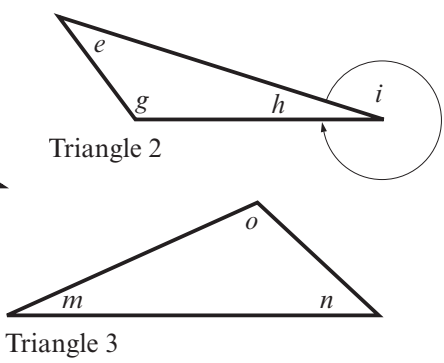
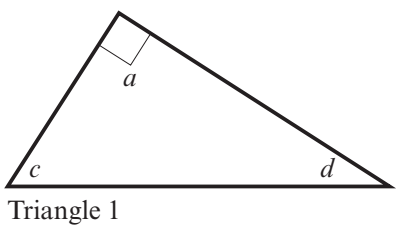
Now try making up a similar coded message problem of your own.

Challenge your classmates to solve it.



### Recognising angles

 Solve each question and write down the single letter answer in the box. When you have finished you should get a fourteen-letter word in which no letter is used twice.



- 1  The smallest angle in triangle 2.
- 2  The acute angle in the trapezium.
- 3  The smaller acute angle in triangle 1.
- 4  The right-angle that has an acute angle next to it in the trapezium.
- 5  The largest angle in triangle 3.
- 6  The smallest angle in triangle 3.
- 7  The right angle in triangle 1.
- 8  The obtuse angle in triangle 2.
- 9  The larger angle on the base of triangle 3.
- 10  The larger acute angle in triangle 2.
- 11  The obtuse angle in the trapezium.
- 12  The reflex angle in triangle 2.
- 13  The larger acute angle in triangle 1.
- 14  The right angle that has an obtuse angle next to it in the trapezium.

PUPIL'S PAGES 58-59

Y7 8 LINES AND ANGLES

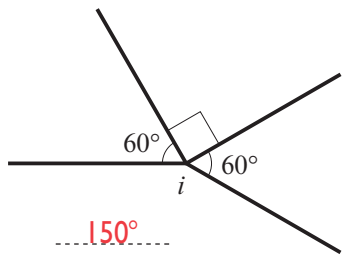
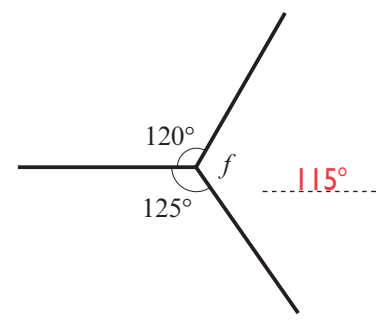
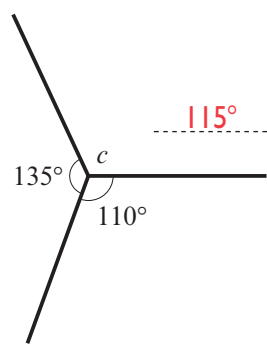
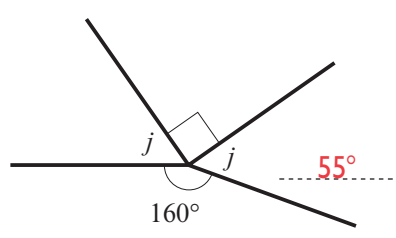
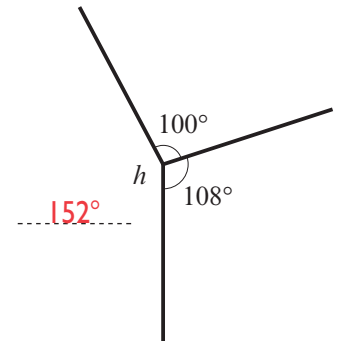
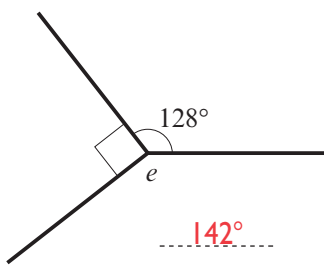
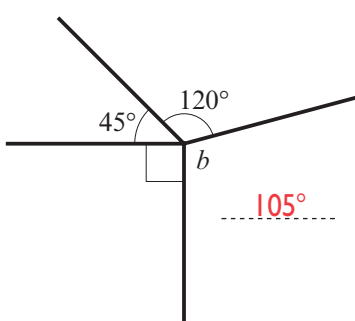
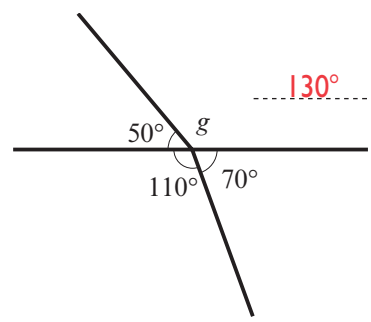
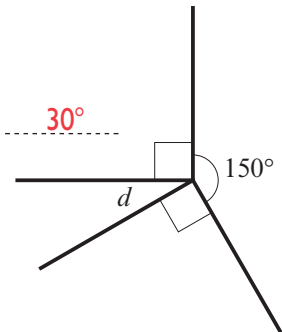
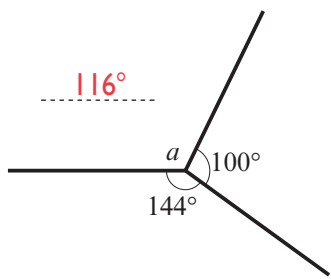
27 EXERCISE

### Angles at a point



Calculate the angles marked by letters.

The diagrams are not to scale, so do not measure them.



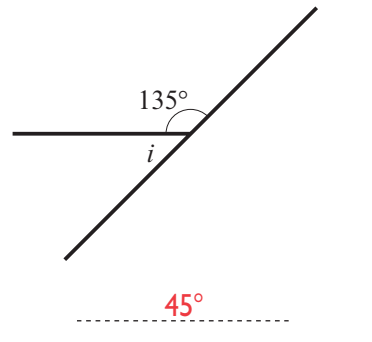
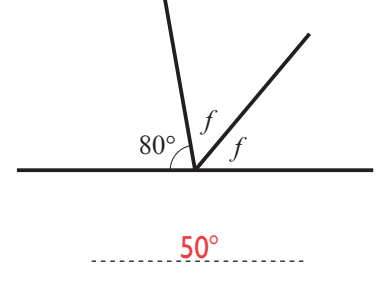
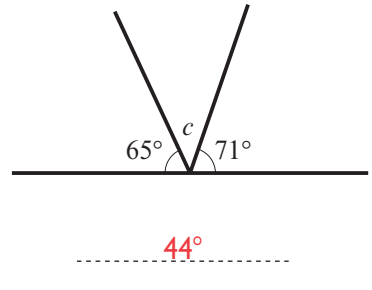
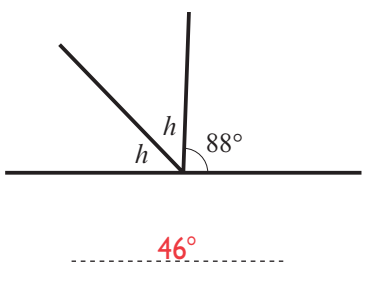
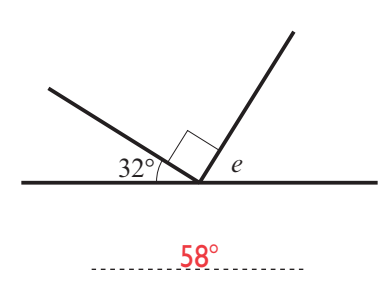
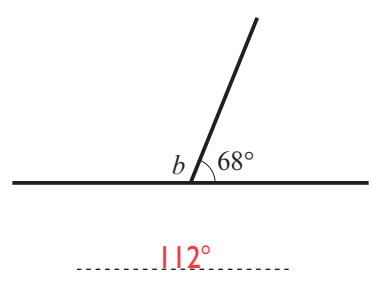
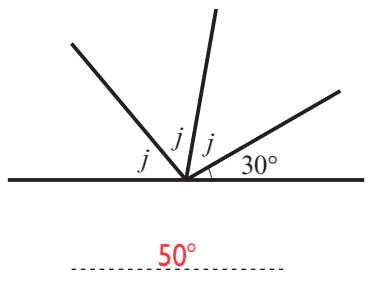
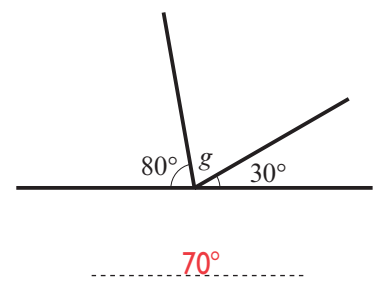
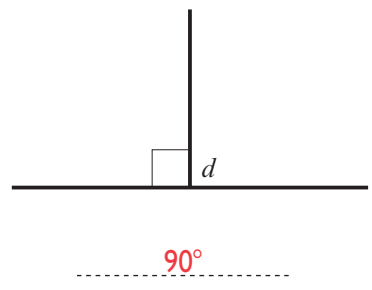
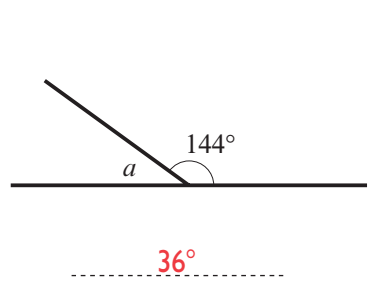
Y7 8 LINES AND ANGLES

28 EXERCISE

### Angles on a line



Calculate the angles marked by letters.  
*The diagrams are not to scale, so do not measure them.*



Y7

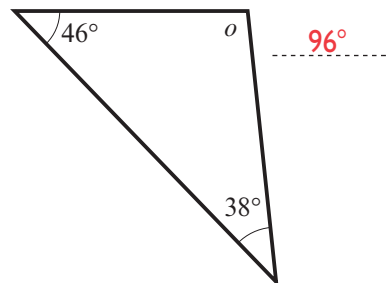
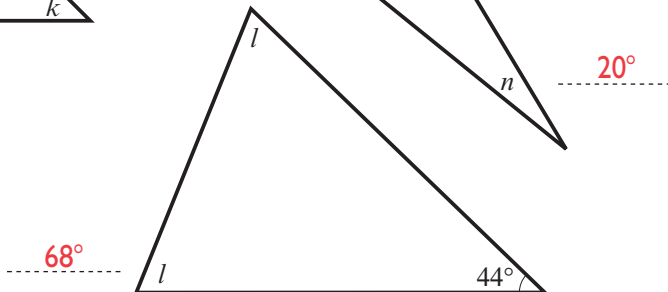
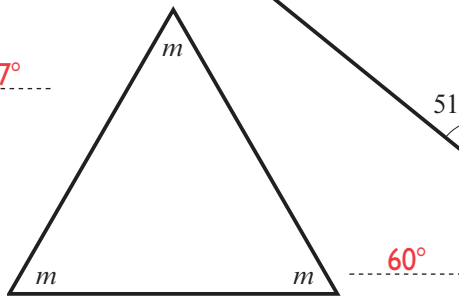
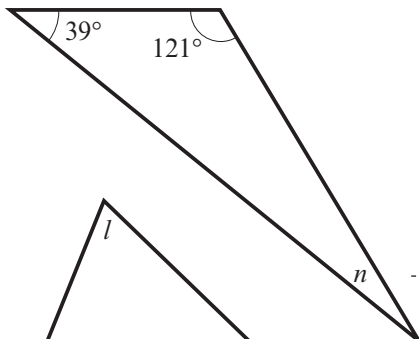
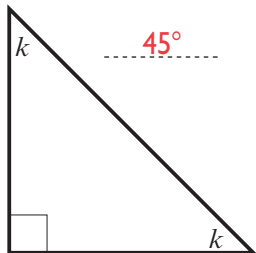
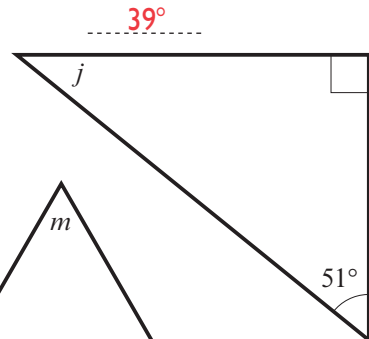
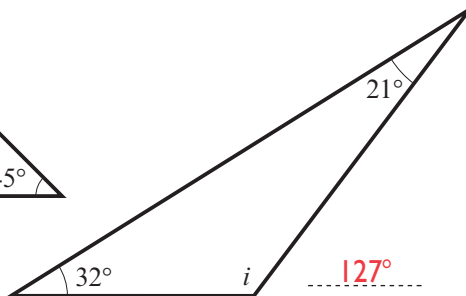
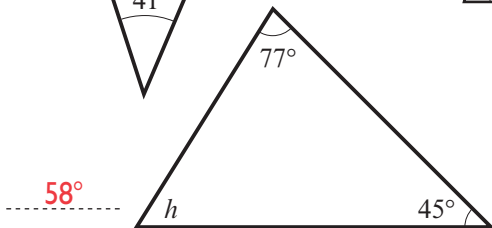
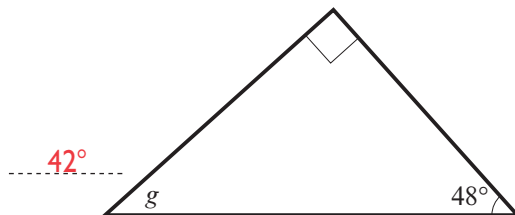
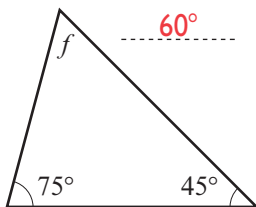
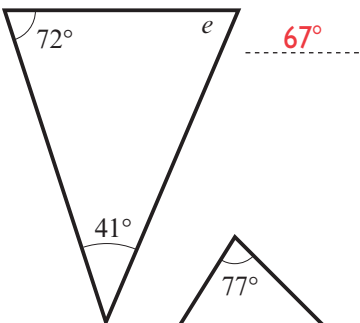
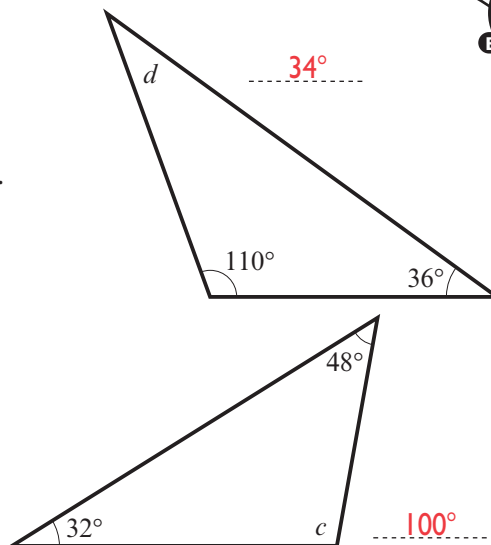
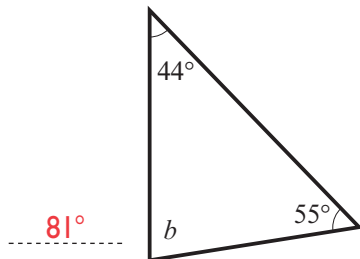
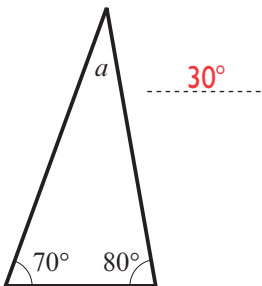
8 LINES AND ANGLES

Angles in a triangle



Calculate the angles marked by letters.

The diagrams are not to scale, so do not measure them.

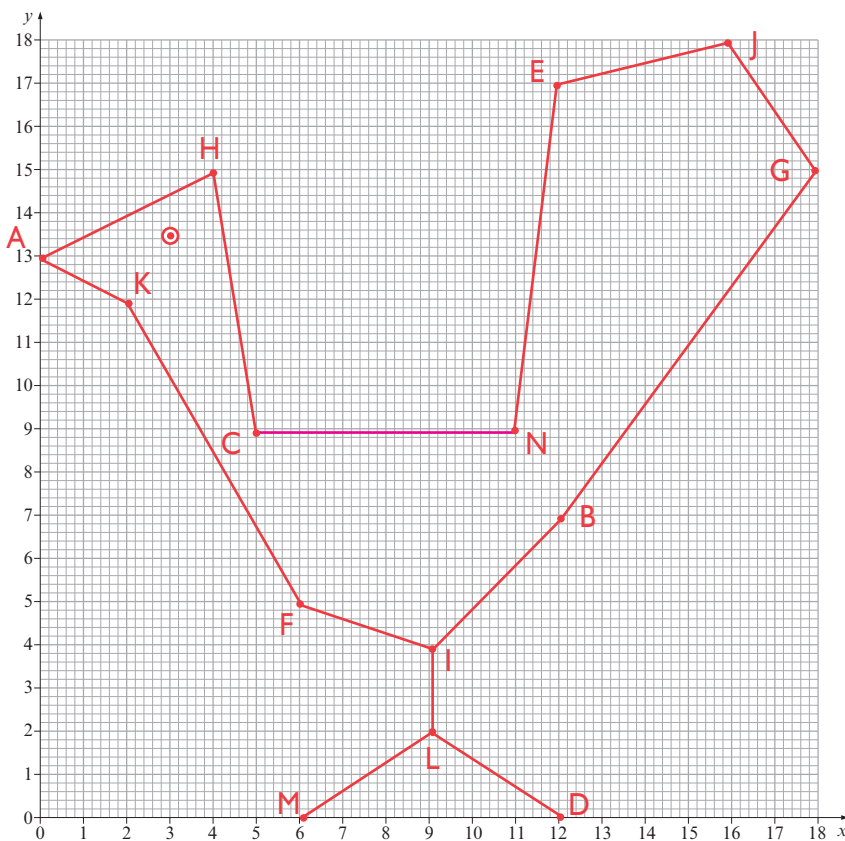


### Measuring and drawing angles



Mark these points on the grid below.  
Do not join them up yet.

- |                  |                   |                  |                  |                   |
|------------------|-------------------|------------------|------------------|-------------------|
| <b>A</b> (0, 13) | <b>B</b> (12, 7)  | <b>C</b> (5, 9)  | <b>D</b> (12, 0) | <b>E</b> (12, 17) |
| <b>F</b> (6, 5)  | <b>G</b> (18, 15) | <b>H</b> (4, 15) | <b>I</b> (9, 4)  | <b>J</b> (16, 18) |
| <b>K</b> (2, 12) | <b>L</b> (9, 2)   | <b>M</b> (6, 0)  | <b>N</b> (11, 9) |                   |



Now join the points as necessary to answer the rest of these questions.

Measure each of these angles (acute or obtuse unless stated):

- |                                |   |                                       |
|--------------------------------|---|---------------------------------------|
| <b>1</b> Angle AHC $72^\circ$  | <b>2</b> Angle MLD $112^\circ$              | <b>3</b> Reflex angle EJK $250^\circ$ |
| <b>4</b> Angle LIF $108^\circ$ | <b>5</b> Reflex angle CNE $263^\circ$       | <b>6</b> Angle AKF $148^\circ$        |
| <b>7</b> Angle IBG $172^\circ$ | <i>All answers <math>\pm 1^\circ</math></i> |                                       |

Draw a small circle centre (3, 14). What have you drawn? (You might have time to finish it off.)



Y7

## 9 METRIC UNITS

31

EXERCISE

**What's better?**

For each of these quantities, decide which is the better measurement to use.

- 1 The length of a car (metres or centimetres). .....metres.....
- 2 The weight of a bag of potatoes (kilograms or grams). .....kilograms.....
- 3 The distance from London to Liverpool (kilometres or metres). .....kilometres.....
- 4 The time taken to run 200 metres (seconds or minutes). .....seconds.....
- 5 The amount of liquid in a tumbler (millilitres or litres). .....millilitres.....

Estimate the following measurements in metric units.

- 6 The height of a lamp post. .....10 metres.....
- 7 The weight of a large bunch of bananas. .....2 kilograms.....
- 8 The height of a door. .....2 metres.....
- 9 The time taken to count to 150. .....60 seconds.....
- 10 The volume of liquid in a full coffee mug. .....300 millilitres.....

*(nb. these answers are suggestions only)*

Y7

## 9 METRIC UNITS

32

EXERCISE

**Inappropriate units**

Look at the following sentences and change the length, weight or capacity into a more appropriate unit.

- 1 Zoë measured a piece of string and found that it was 1230 mm long. ..... 1.23 metres .....
- 2 Joe bought a bag of potatoes that weighed 1500 grams. ..... 1.5 kilograms .....
- 3 Rana has been on a run, and estimated that she ran 3200 m. ..... 3.2 km .....
- 4 Jake has measured the length of his stride, and found it to be 0.000 63 km. ..... 63 cm .....
- 5 Martin shares a bag of sweets with his sister. He has weighed them, and his sister gets 0.035 kg. ..... 35 g .....
- 6 Susie has been swimming in the local pool. Each length is 2500 cm. ..... 25 m .....
- 7 Zac weighs 35 730 g. ..... 35.73 kg .....
- 8 Chris is trying to calculate the height of a tree in his back garden. He works it out to be 0.0195 km high. ..... 19.5 m .....
- 9 Mars bars should weigh about 0.065 kg. ..... 65 g .....
- 10 Rachel's baby brother weighed 0.0032 tonnes when he was born. ..... 3.2 kg .....
- 11 Abdul has a bottle of coke. It contains 2000 ml. ..... 2 litres .....
- 12 Esther lives 348 200 cm away from her best friend. ..... 3.482 km .....

Y7

## 9 METRIC UNITS

33


EXERCISE

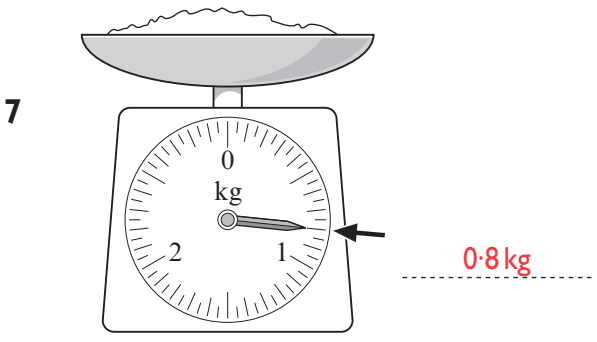
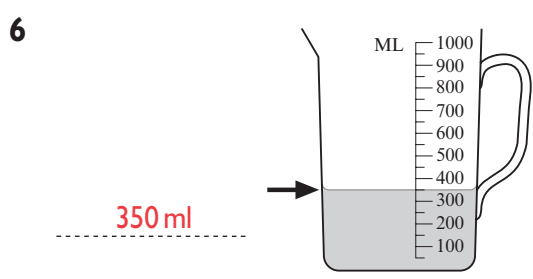
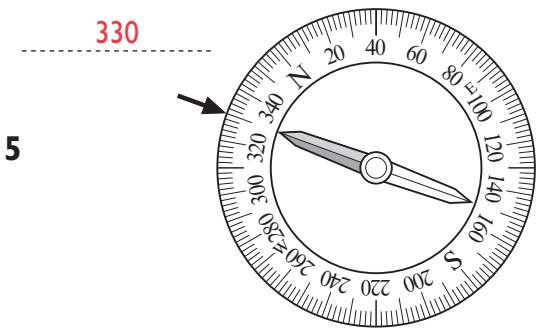
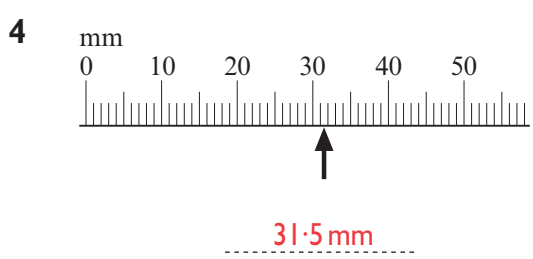
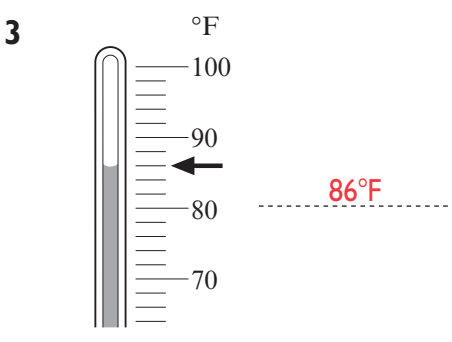
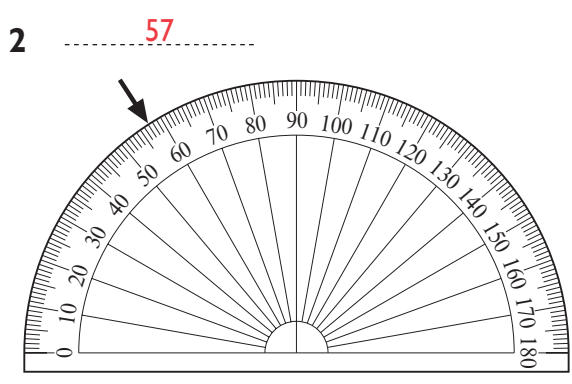
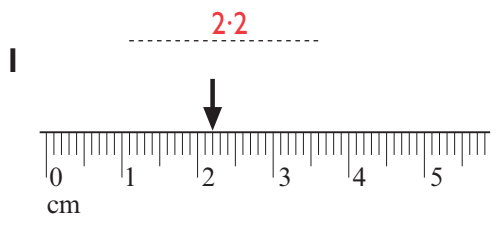
**There's a time for everything...**

Look at the following sentences and change the times into more appropriate units.

- 1 Sarah phoned her mother and said that she would be home in 900 seconds. 15 minutes
- 2 Linda has to take a biology exam which will be 135 minutes long.  $2\frac{1}{4}$  hours
- 3 Samantha and her brother Jonathan are going on holiday for 240 hours. 10 days
- 4 Lee is going to visit a friend for a holiday. It will take him 0.25 of a day to get there. 6 hours
- 5 Rana says it will take her 1800 seconds to walk home from work. 30 minutes
- 6 Paul and Ravi are having a competition to see who can put up a tent faster. It takes Paul 0.1 of an hour and it takes Ravi 350 seconds. 6 mins, 5 mins 50 secs
- 7 Sean is writing an essay. He reckons it will take him 210 minutes.  $3\frac{1}{2}$  hours
- 8 It takes 3600 seconds for a train to travel from Horsham to London Victoria. 1 hour
- 9 Guy and Lois have cooked a meal. It has taken them 1320 seconds. 22 minutes
- 10 Richard is 288 months old. 24 years
- 11 Marion is watching a TV programme which is 2400 seconds long. 40 minutes
- 12 Dave has lived in the same house for 182 weeks.  $3\frac{1}{2}$  years

### Reading scales

 Read the values on these scales. Write your answer to a sensible level of accuracy.



Y7

## 9 METRIC UNITS

35

ACTIVITY

**The school bus**

The bus that goes past Greenview School stops at various places on the way.

The first bus leaves Castle Street at 7.40 a.m. and then they leave at 20-minute intervals.

Castle Street	7:40	8:00	8:20	8:40	9:00	9:20	9:40
Park Place	7:48	8:08	8:28	8:48	9:08	9:28	9:48
Larnett Square	7:55	8:15	8:35	8:55	9:15	9:35	9:55
West Road	8:04	8:24	8:44	9:04	9:24	9:44	10:04
Telford Lane	8:09	8:29	8:49	9:09	9:29	9:49	10:09

- Fill in the gaps in the timetable above.
- Greenview School is a 15-minute walk from the West Road stop and a five-minute walk from the Telford Lane stop. Which would be the better place to get off if you were late for school?

Telford Lane

In the afternoon the buses leave Telford Lane at 3.15 p.m. and every 20 minutes after that. Each section of the journey takes the same length of time as in the morning.

Telford Lane	3:15	3:35	3:55	4:15	4:35	4:55	5:15
West Road	3:20	3:40	4:00	4:20	4:40	5:00	5:20
Larnett Square	3:29	3:49	4:09	4:29	4:49	5:09	5:29
Park Place	3:36	3:56	4:16	4:36	4:56	5:16	5:36
Castle Street	3:44	4:04	4:24	4:44	5:04	5:24	5:44

- Fill in the gaps in the second timetable.

Y7

## 9 METRIC UNITS

35

ACTIVITY

**The school bus (continued)**

- 4 Sanjay arrives at the Larnett Square bus stop at 4.00 p.m. and catches the next bus to come along. If the bus is on time, what time will he arrive at Castle Street? **4:24 p.m.**

The buses can each carry 42 people. The fuel tank holds 280 litres of diesel fuel, and can travel 1.5 km on one litre of fuel. Diesel fuel costs 78 pence per litre.

The buses travel at an average speed of 28 kilometres per hour.

Use this information to answer the following questions.

- 5 How far can a bus travel on a full tank of fuel? **420 km**
- 6 How much does it cost to fill the tank from empty? **£218.40**
- 7 On an average morning the seven buses are half full when they arrive at Telford Lane. How many passengers are on these buses, in total? **147**
- 8 On an average afternoon the seven buses are two-thirds full when they arrive at Castle Street. How many passengers are on these buses, in total? **196**
- 9 Approximately how far does a bus travel in half an hour? **14 km**
- 10 Approximately how far is it from Castle Street to Larnett Square? **7 km**

Y7

## 10 AVERAGES AND SPREAD

36

EXERCISE

**Mean and range**

In questions 1 to 12 find the mean and range of the data.

- 1** 5, 3, 8, 6, 3 mean 5, range 5
- 2** 3, 7, 4, 4, 7 mean 5, range 4
- 3** 1, 9, 5, 3, 4, 8 mean 5, range 8
- 4** 13, 17, 14, 14, 17 mean 15, range 4
- 5** 10, 6, 16, 12, 6 mean 10, range 10
- 6** 4, -1, 6, -3, 3, 3 mean 2, range 7
- 7** 8.2, 7.3, 9.2, 5.7, 6.7, 7.8 mean 7.48, range 3.5
- 8** 5, -1, -2, 4, 3, 4 mean 2.17, range 7
- 9** 1 h 17 min, 1 h 57 min, 2 h 3 min, 1 h 32 min mean 1 h 42.25 min, range 46 min
- 10**  $1\frac{1}{2}$  min, 45 sec, 2 min 20 sec, 1 min 15 sec mean 1 min 27.5 sec, range 1 min 35 sec
- 11** 2 kg, 1 kg, 1 kg,  $2\frac{1}{2}$  kg, 500 g, 2 kg mean 1.5 kg, range 2 kg
- 12** 45p, 73p, 110p, £1.23, 84p, £0.99 mean 89 p, range 78 p
- 13** What number needs to be added to these data so that they have a range of 7?  
24, 28, 28, 25, 23, 26, 27 30 (or 21)
- 14** What number needs to be added to these data so that they have a mean of 15?  
10, 17, 12, 19, 18 14
- 15** A drink-can filling machine is thought to need servicing if a sample of five filled cans has a mean mass outside the interval from 335 grams to 340 grams, or has a range of more than 5 grams. A sample of five cans is taken, and their masses are 333 g, 338 g, 335 g, 334 g and 334 g. Does the machine need servicing?  
YES  
(mean just too low)
- 16** Four golfers estimate the length of a golf shot. The estimates are 110 m, 135 m, 125 m and 130 m. Find the mean and range of their estimates. mean 125 m, range 25 m

PUPIL'S PAGES 72-75

TEACHING RESOURCE 99

## Median and mode



In questions 1 to 10 find the median and mode of the data.

- |           |  |                          |
|-----------|--|--------------------------|
| <b>1</b>  | 2, 3, 4, 4, 7                                  | median 4, mode 4         |
| <b>2</b>  | 4, 6, 8, 8, 14                                 | median 8, mode 8         |
| <b>3</b>  | 0, 1, 2, 2, 5                                  | median 2, mode 2         |
| <b>4</b>  | 4, 7, 8, 8, 8, 11                              | median 8, mode 8         |
| <b>5</b>  | 1, 3, 3, 3, 6, 7, 9, 9, 9                      | median 6, modes 3 & 9    |
| <b>6</b>  | 3, 3, 5, 6, 8, 10                              | median 5.5, mode 3       |
| <b>7</b>  | 8, 3, 6, 5, 4, 6, 0                            | median 5, mode 6         |
| <b>8</b>  | 7, 1, 2, 8, 6, 2, 8, 2, 8                      | median 6, modes 2 & 8    |
| <b>9</b>  | 27, 21, 22, 28, 26, 22, 28, 22, 28             | median 26, modes 22 & 28 |
| <b>10</b> | 31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31 | median 31, mode 31       |

For questions 11–14 show your answers on a separate sheet.

- 11** Question 10 was about the number of days in each month of the year. Work out new answers to this question if it had been a leap year. **median 31, mode 31**
- 12** The number of people in eight vehicles passing under a motorway bridge was counted. The numbers were 1, 1, 2, 52, 4, 1, 1, and 3. Find the mean, median and mode. Which of them do you think is the most useful measure? **mean 8.125, median 1.5, mode 1.**  
**Median or mode is the most useful.**
- 13** In question 12, the 52 was a guess. It was a coach that seemed full, but there was not time to count the number of people exactly. Suppose that the real number was 48. Which of your answers would have to be changed? **Only the mean would change.**
- 14** For a week, I counted the number of pieces of junk mail in my post each day. The values were 2, 0, 3, 1, 2 and 0, there being no delivery on Sunday. Find the mean, median and mode. Which do you think is the most useful measure in this case? **mean 1.33, median 1.5, modes 0 & 2**  
**All of them convey useful information in this case.**



**Y7 10 AVERAGES AND SPREAD**

## Tally charts and frequency diagrams



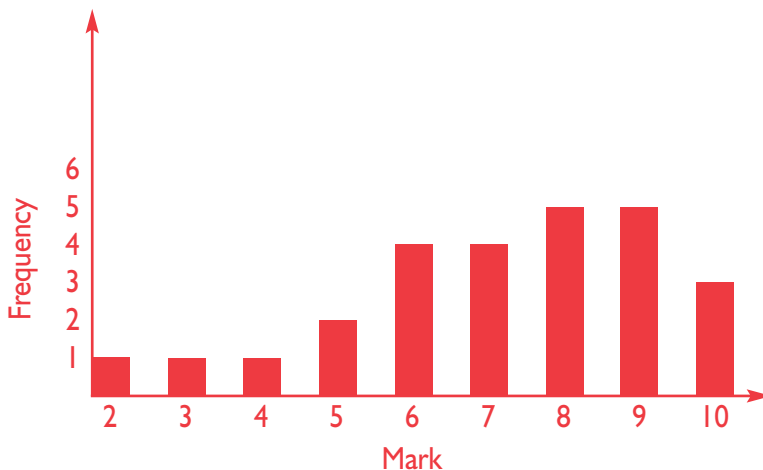
For questions 1 to 4 make a tally chart of the data. Then illustrate the data with a frequency diagram.

1 The students in class 7D obtain these marks in a mathematics test:

**7 4 8 5 10 9 6 8 9 7 6 8 9 3 10 8 9 5 6 9 7 8 7 2 6**

- a) Make a tally chart of the data, and illustrate it with a frequency diagram.
- b) Find the mode and the range of the marks. mode 8 and 9.....
- c) How many students are there in the class? 25.....
- d) The teacher gives a merit certificate to everyone who scored 9 or 10.  
How many merits will be given? 7.....
- e) What percentage of the class scored full marks? 8%.....

Mark	Tally	Frequency
2		1
3		1
4		1
5		2
6		4
7		4
8		5
9		5
10		2



2 The number of shopping bags carried (or wheeled) by shoppers leaving a supermarket are as follows:

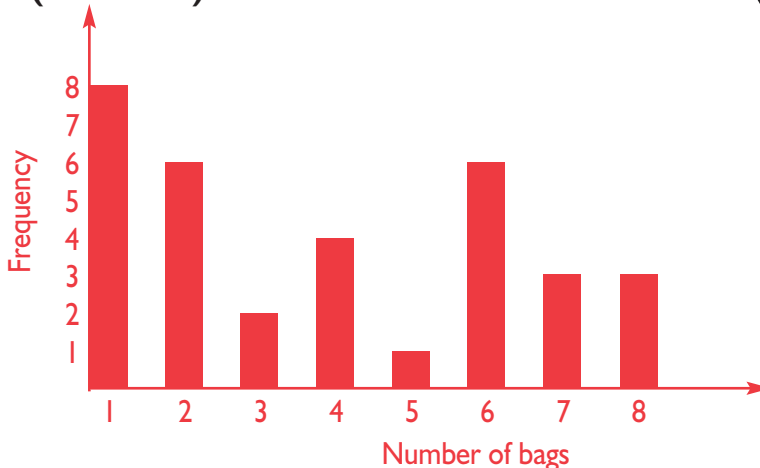
**1 3 1 2 6 1 2 7 4 7 1 2 6 4 2 4 6 8 6 1 2 8 1 6 7 2 8 1 4 6 3 1 5**

- a) Make a tally chart of the data, and illustrate it with a frequency diagram.
- b) Find the mode and the range of the number of bags. mode 1, range 7.....

Y7 10 AVERAGES AND SPREAD

Tally charts and frequency diagrams (continued)

Mark	Tally	Frequency
1		8
2		6
3		2
4		4
5		1
6		6
7		3
8		3



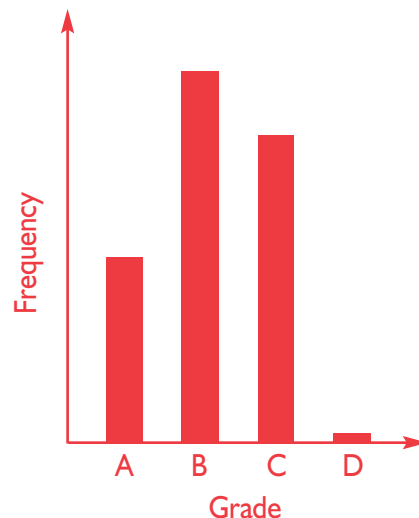
3 Here are the grades obtained by a class of Year 7 students at the end of their first term:

B A A B C	A B A A B	B B B B A	A B B B B	C C B C B
A B A C C	C C B B C	B B B A C	B B B B C	A C C B C
C C C C C	A B B B C	B C C C A	B B C B B	B A C B B
A A B D A	A A C C A	C A B C C	B C B C C	C C C B B
B A B C A	C C A C C	B B B B B		

- Make a tally chart of the data, and illustrate it with a frequency diagram.
- A is the best grade. Do you think this year group should be satisfied with their performance as a whole?

*No – modal grade is B, but there are more C's than A's.*

Grade	Tally	Frequency
A		24
B	9 x	49
C	8 x	41
D		1



**Is it likely?**

For each of the following scenarios say whether the outcome is likely, has an even chance, is unlikely, or whether you don't have enough information to tell.

- 1 Jacqueline throws two dice and gets two sixes. ..... unlikely .....
- 2 Paul has six blue socks and six red socks in a drawer. He picks one at random and it is red. ..... even chance .....
- 3 Year 3 at Greenview School have a mathematics lesson sometime this week. ..... likely .....
- 4 Usha has a bag with one yellow counter and twelve blue counters in it. She chooses a counter at random and it is yellow. ..... unlikely .....
- 5 Dilip decides to wear a pair of green shorts. ..... cannot tell .....
- 6 Doreen tosses a coin and gets heads. ..... even chance .....
- 7 Phillip has 20 cards numbered 1 to 20. He picks one at random and gets a multiple of 9. ..... unlikely .....
- 8 Tim shuffles a pack of playing cards. He picks one at random and finds that it is red. ..... even chance .....
- 9 Farnborough Town football club win the FA Cup Final. ..... unlikely .....
- 10 Joy has a purse full of coins. She takes one out and finds that it is a 5 pence piece. ..... cannot tell .....
- 11 Anne drops a piece of toast and it lands butter side down. ..... even chance .....
- 12 Mr Todd, who buys one National Lottery 'Lotto' ticket every week, will not win this Saturday. ..... likely .....
- 13 Two dice are thrown and the total of the two scores is an even number. ..... even chance .....
- 14 Two dice are thrown and the total of the two scores is a double. ..... unlikely .....
- 15 Mrs Jones will go to the Post Office next Thursday. ..... cannot tell .....

Y7

## 11 INTRODUCING PROBABILITY

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EXERCISE

**Is it likely? (continued)**

For each of these scenarios say whether the outcome is certain, very likely, reasonably likely, unlikely or impossible.

- |    |   |                               |
|----|---|-------------------------------|
| 16 | England will be hit by a hurricane tomorrow.                                | ..... unlikely .....          |
| 17 | I will cast a shadow on a sunny day.  | ..... certain .....           |
| 18 | A card drawn from an ordinary pack will be black.                           | ..... reasonably likely ..... |
| 19 | My pencil will need sharpening one day.                                     | ..... very likely .....       |
| 20 | A telephone call will result in a 'wrong number'.                           | ..... unlikely .....          |
| 21 | Someone in my class will be Prime Minister one day.                         | ..... unlikely .....          |
| 22 | A letter chosen at random from the alphabet will be a Q.                    | ..... unlikely .....          |
| 23 | The postman will deliver some mail to my school today.                      | ..... very likely .....       |
| 24 | I will obtain a score of 6 when I roll a fair die.                          | ..... unlikely .....          |
| 25 | I will obtain a score of 6 or less when I roll a fair die.                  | ..... certain .....           |
| 26 | It will snow in central London on Christmas Day next year.                  | ..... unlikely .....          |
| 27 | A parcel will arrive safely at its destination.                             | ..... very likely .....       |
| 28 | England will win the next World Cup soccer competition.                     | ..... unlikely .....          |
| 29 | My bicycle will slow down when I apply the brakes.                          | ..... very likely .....       |
| 30 | Houses in England will be more expensive next year than they are this year. | ..... very likely .....       |

Y7

## 11 INTRODUCING PROBABILITY

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EXERCISE

**Theoretical probability**

Work out the following probabilities. Give your answers as fractions.



In questions 1 to 6 a counter is drawn at random from a bag containing 20 counters.

There are 8 red, 6 blue, 3 white and 3 green counters in the bag.

- 1 What is the probability that the counter is red?  $\frac{8}{20} = \frac{2}{5}$
- 2 What is the probability that it is blue or white?  $\frac{9}{20}$
- 3 What is the probability that it is not white?  $\frac{17}{20}$
- 4 What is the probability that it is yellow? 0
- 5 What is the probability that it is red or green?  $\frac{11}{20}$
- 6 What is the probability that it is neither red nor green?  $\frac{9}{20}$

In questions 7 to 12 a card is drawn at random from an ordinary pack of 52 playing cards.

- 7 What is the probability that the card is a Jack?  $\frac{4}{52} = \frac{1}{13}$
- 8 What is the probability that it is an even-numbered card?  $\frac{20}{52} = \frac{5}{13}$
- 9 What is the probability that it is a spade?  $\frac{13}{52} = \frac{1}{4}$
- 10 What is the probability that it is the Queen of spades?  $\frac{1}{52}$
- 11 What is the probability that it is an even-numbered club?  $\frac{5}{52}$
- 12 What is the probability that it is a 15? 0

**Theoretical probability (continued)**

In questions **13** to **18** a regular tetrahedron is made into a die, and the four faces are numbered 1, 2, 3 and 4.

When the tetrahedron is thrown, the score is the number showing on the bottom face.

**13** What is the probability that the score is an even number?

$\frac{1}{2}$

**14** What is the probability that the score is a prime number?

$\frac{1}{2}$

**15** What is the probability that the score is a square number?

$\frac{1}{2}$

**16** What is the probability that the score is more than 1?

$\frac{3}{4}$

**17** What is the probability that the score is less than 6?

1

**18** What is the probability that the score is the same as the score the last time the die was thrown?

$\frac{1}{4}$

In questions **19** to **25** an ordinary six-sided die is renumbered, so that the faces now show 1, 1, 2, 3, 3, 3.

**19** What is the probability that the score is a 1?

$\frac{1}{3}$

**20** What is the probability that the score is more than 1?

$\frac{2}{3}$

**21** What is the probability that the score is not 3?

$\frac{1}{2}$

**22** What is the probability that the score is an odd number?

$\frac{5}{6}$

**23** What is the probability that the score is 4?

0

**24** What is the mean of the six possible scores?

$2\frac{1}{6}$

**25** What is the mode of the six possible scores?

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