7. Mark schemes for Paper 1: arithmetic

Qu.	Requirement	Mark	Additional guidance
1	6,090	**1m**	
2	8,357	**1m**	
3	20	**1m**	
4	336	**1m**	
5	369	**1m**	
6	8.993	**1m**	
7	60	**1m**	
8	10	**1m**	
9	0	**1m**	
10	13	**1m**	
11	22	**1m**	**Do not** accept –22
12	8	**1m**	
13	110	**1m**	
14	253.4	**1m**	
15	10	**1m**	
16	27	**1m**	
17	101,000	**1m**	
18	600	**1m**	**Do not** accept 600%
19	4.75	**1m**	
20	0.009	**1m**	
21	7.1	**1m**	
22	$\frac{6}{7}$	**1m**	Accept equivalent fractions or an **exact** decimal equivalent, e.g. $0.\overline{857142}$ (accept any unambiguous indication of the recurring digits). **Do not** accept rounded or truncated decimals.

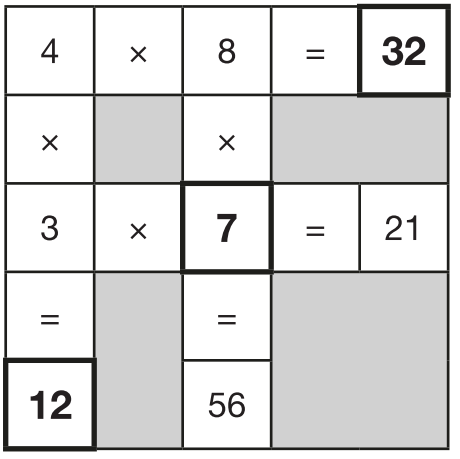
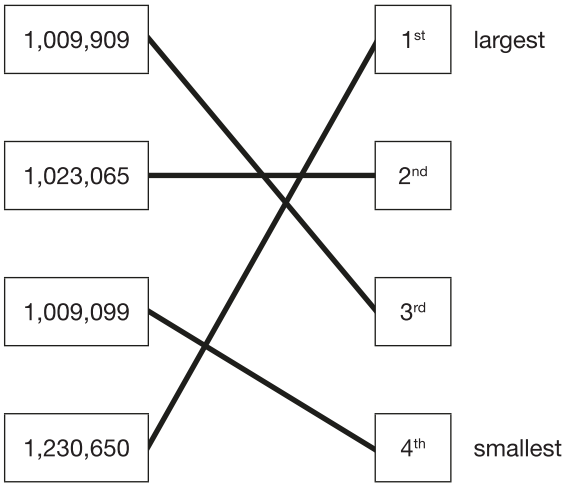
Qu.	Requirement	Mark	Additional guidance
23	Award **TWO** marks for the correct answer of 22,572 If the answer is incorrect, award **ONE** mark for a formal method of long multiplication with no more than **ONE** arithmetic error, e.g. • 836 × 27 = 5852 + 16720 = 22602 *(error)* **OR** • 836 × 27 = 5612 *(error)* + 16720 = 22332	**Up to 2m**	Working must be carried through to reach a final answer for the award of **ONE** mark. **Do not** award any marks if the error is in the place value, e.g. the omission of the zero when multiplying by tens: 836 × 27 = 5852 + 1672 *(place value error)* = 7524
24	$\frac{19}{20}$	**1m**	Accept equivalent fractions or an **exact** decimal equivalent, e.g. 0.95

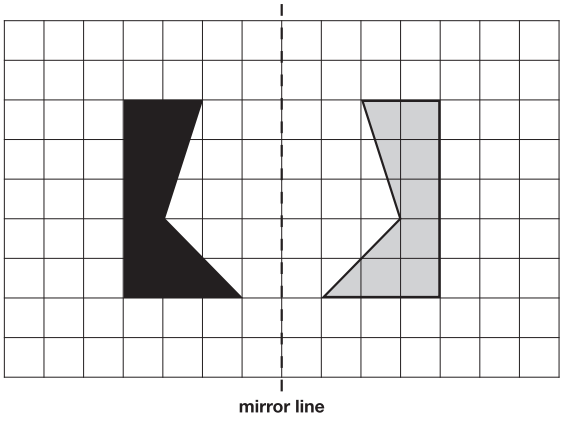
Qu.	Requirement	Mark	Additional guidance
25	Award **TWO** marks for the correct answer of 24 If the answer is incorrect, award **ONE** mark for the formal methods of division with no more than **ONE** arithmetic error, i.e. • long division algorithm, e.g. $\begin{array}{r} 23\ \text{r}29 \\ 37\overline{)888} \\ -\ 740 \\ \hline 140 \\ -\ 111 \\ \hline 29 \end{array}$ *(error)* **OR** $\begin{array}{r} 42 \\ 37\overline{)888} \\ -\ 740 \\ \hline 148 \\ -\ 148 \\ \hline 0 \end{array}$ *(error)* $\quad 20 \times 37 \quad 4 \times 37$ • short division algorithm, e.g. $\begin{array}{r} 2\ 3\ \text{r}27 \\ 37\overline{)88^{14}8} \end{array}$ *(error)*	**Up to 2m**	Working must be carried through to reach a final answer for the award of **ONE** mark. Short division methods **must** be supported by evidence of appropriate carrying figures to indicate the use of a division algorithm, and be a complete method. The carrying figure **must** be less than the divisor.
26	$3\frac{3}{10}$ **OR** $\frac{33}{10}$	**1m**	Accept equivalent mixed numbers, fractions or an **exact** decimal equivalent, e.g. 3.3
27	112	**1m**	**Do not** accept 112%
28	$\frac{23}{36}$	**1m**	Accept equivalent fractions or an **exact** decimal equivalent, e.g. $0.63\dot{8}$ (accept any unambiguous indication of the recurring digits). **Do not** accept rounded or truncated decimals.
29	459	**1m**	**Do not** accept 459%

Qu.	Requirement	Mark	Additional guidance
30	Award **TWO** marks for the correct answer of 215,016 If the answer is incorrect, award **ONE** mark for the formal method of long multiplication with no more than **ONE** arithmetic error, e.g. • $\begin{array}{r} 3468 \\ \times \quad 62 \\ \hline 6936 \\ 208080 \\ \hline 214016 \end{array}$ *(error)* **OR** • $\begin{array}{r} 3468 \\ \times \quad 62 \\ \hline 6934 \\ 208080 \\ \hline 215014 \end{array}$ *(error)*	**Up to 2m**	Working must be carried through to reach a final answer for the award of **ONE** mark. **Do not** award any marks if the error is in the place value, e.g. the omission of the zero when multiplying by tens: • $\begin{array}{r} 3468 \\ \times \quad 62 \\ \hline 6936 \\ 20808 \\ \hline 27744 \end{array}$ *(place value error)*
31	$\frac{2}{9}$	**1m**	Accept equivalent fractions or an **exact** decimal equivalent, e.g. $0.\dot{2}$ (accept any unambiguous indication of the recurring digits). **Do not** accept rounded or truncated decimals.
32	$1\frac{3}{4}$ **OR** $\frac{7}{4}$	**1m**	Accept equivalent mixed numbers, fractions or an **exact** decimal equivalent, e.g. 1.75
33	162	**1m**	**Do not** accept 162%

Qu.	Requirement	Mark	Additional guidance
34	$17\frac{1}{2}$ **OR** $\frac{70}{4}$ **OR** $\frac{35}{2}$	**1m**	Accept equivalent mixed numbers, fractions or an **exact** decimal equivalent, e.g. 17.5
35	450	**1m**	
36	Award **TWO** marks for the correct answer of 97 If the answer is incorrect, award **ONE** mark for the formal methods of division with no more than **ONE** arithmetic error, i.e. • long division algorithm, e.g. 96 r82 83 ⟌ 8051 – 7470 580 *(error)* – 498 82 **OR** • 47 *(error)* 83 ⟌ 8051 – 4150 50 × 83 3901 – 3320 40 × 83 581 581 7 × 83 0 • short division algorithm, e.g. 9 6 r73 83 ⟌ 805^{57}1 *(error)*	**Up to 2m**	Working must be carried through to reach a final answer for the award of **ONE** mark. Short division methods **must** be supported by evidence of appropriate carrying figures to indicate the use of a division algorithm, and be a complete method. The carrying figure **must** be less than the divisor.

8. Mark schemes for Paper 2: reasoning

Qu.	Requirement	Mark	Additional guidance
1	Award **ONE** mark for three correct answers, as shown:  	1m	
2	8,072	1m	
3	Award **ONE** mark for the four numbers matched correctly, as shown:  	1m	Lines need not touch the numbers and ordinals, provided the intention is clear. **Do not** accept any number which has been matched to more than one ordinal.

Qu.	Requirement	Mark	Additional guidance
4	Diagram completed, as shown:  	1m	Accept slight inaccuracies in drawing (see page 13 for guidance). Shape need not be shaded for the award of **ONE** mark.
5	Award **TWO** marks for three correct numbers, as shown: **110** 155 200 245 **290** **335** Award **ONE** mark for: • any two numbers correctly placed **OR** • if box 1 is correct, accept correct follow-through for box 3 from the incorrect value in box 2.	Up to 2m	**Do not** accept misreads for this question.
6	10	1m	
7	2.5 or $2\frac{1}{2}$	1m	Refer to section 6.3 on page 16 for additional guidance on marking answers involving measures.
8a	11 written in the first box, as shown: **11** 25 53	1m	
8b	109 written in the last box, as shown: 25 53 **109**	1m	
9	Award **TWO** marks for the correct answer of 124 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 953 – 85 = 868 868 ÷ 7	Up to 2m	Answer need not be obtained for the award of **ONE** mark. If the pupil's evaluation contradicts the appropriate method, the method mark will not be awarded.

Qu.	Requirement	Mark	Additional guidance
10	Second box only ticked correctly, as shown: number of tickets × 3 + 24 ☐ number of tickets × 24 + 3 ✓ number of tickets + 3 × 24 ☐ number of tickets + 24 × 3 ☐	**1m**	Accept alternative unambiguous positive indication of the correct answer, e.g. Y.
11a	0.25	**1m**	**Do not** accept $\frac{1}{4}$ or any other fraction. Refer to section 6.3 on page 16 for additional guidance on marking answers involving measures.
11b	65(p) **OR** (£)0.65	**1m**	Refer to section 6.1 on pages 14 and 15 for additional guidance on marking answers involving money.
12	Both symbols correct, as shown: $\frac{7}{10}$ [>] 0.07 $\frac{23}{1000}$ [<] 0.23	**1m**	

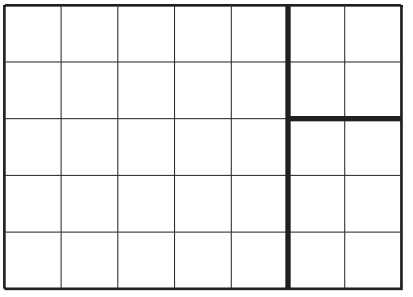
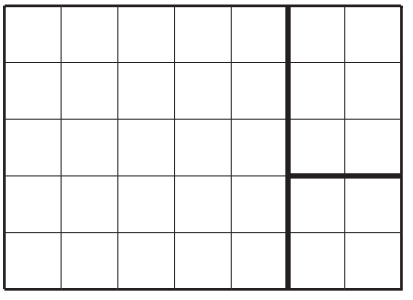
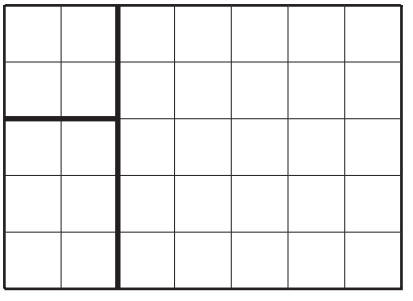
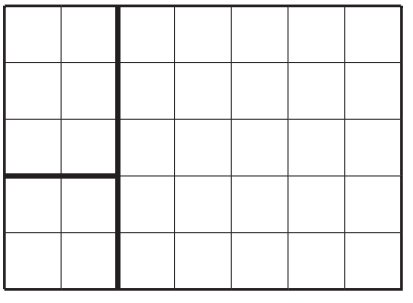
<table>
<tr><th>Qu.</th><th>Requirement</th><th>Mark</th><th>Additional guidance</th></tr>
<tr><td>13</td><td>Award TWO marks for a completed triangle that has all of the following three points:
an angle in the range 33° to 37° inclusive for the angle marked 35°
an angle in the range 88° to 92° inclusive for the right angle
the triangle has been drawn on an 8cm line (either on the given line or a line drawn), provided they have constructed both angles within the tolerance of the line 7.9cm to 8.1cm.
If the answer is incorrect, award ONE mark for a completed triangle and two of the three points correct.</td><td>Up to 2m</td><td>Accept drawings where any side has been extended past a vertex.

When considering whether the triangle is completed, do not accept:
a quadrilateral or another shape drawn
OR
a curved line that is used to complete the shape
OR
sides not meeting to form a vertex.</td></tr>
<tr><td>14</td><td>Award TWO marks for the correct completion of the three numbers in the table, as shown:

<table><tr><th></th><th>Round 39,476</th></tr><tr><td>to the nearest 10,000</td><td>40,000</td></tr><tr><td>to the nearest 1,000</td><td>39,000</td></tr><tr><td>to the nearest 100</td><td>39,500</td></tr></table>
If the answer is incorrect, award ONE mark for any two of the numbers rounded correctly.</td><td>Up to 2m</td><td>Do not accept 9,000 or 500 for the second and third entries.</td></tr>
<tr><td>15</td><td>25</td><td>1m</td><td></td></tr>
<tr><td>16</td><td>4</td><td>1m</td><td></td></tr>
</table>

Qu.	Requirement	Mark	Additional guidance
17	Award **TWO** marks for the correct answer of 144 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 8 × 6 = 48 48 ÷ 4 = 13 *(error)* 13 × 13 = 169 **OR** Award **ONE** mark for: • evidence for the side length of the square calculated correctly, i.e. 12	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark.
18	Award **ONE** mark for a correct explanation of why the 95 **AND** 87 are **NOT** prime, e.g. • 87 is divisible by 3 and/or 29 **AND** 95 is divisible by 5 and/or 19 • 87 is in the 3 times table **AND** 95 is in the 5 times table • 95 is divisible by five because every number in the five times table ends in five or zero. 87 is divisible by three because 9 is in the three times table so is ninety. Ninety minus three is 87 • 8 + 7 = 15 and 15 is divisible by 3 **AND** 95 is divisible by 5	**1m**	No mark is awarded for circling '89' alone. Both non-primes must be explained correctly for the award of the mark. **Do not** accept vague or incomplete explanations, e.g. • The other 2 numbers have more than 2 factors (vague) • 87 is divisible by 3 (incomplete). **Do not** accept explanations which include incorrect mathematics or incorrect information that is relevant to the explanation, e.g. • 3 × 27 = 87 • 89 has three factors • no numbers go into 89

Qu.	Requirement	Mark	Additional guidance
19	Award **TWO** marks for the correct answer of 3.75 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 60 ÷ 4 = 15 250 × 15 = 3750 3750 ml ÷ 1000 = **OR** • 250 ÷ 4 = 62.5 ml per second 62.5 × 60 = 3750 3750 ml ÷ 1000 = **OR** • 60 ÷ 4 = 15, so there are 15 lots of 4 seconds in 1 minute so there are 15 bottles per minute. There are 4 bottles in 1 litre 15 ÷ 4 =	**Up to 2m**	Accept for **TWO** marks, 3,750ml for final answer in working and the answer box blank **OR** 3,750 in the answer box where the litres has been replaced with millilitres. Accept for **ONE** mark 3,750 litres (l) in the answer box **OR** the final answer in working and answer box blank. Answer need not be obtained for the award of **ONE** mark.
20	Award **TWO** marks for two boxes ticked correctly, as shown: $\frac{1}{20}$ ☐ $\frac{20}{40}$ ☐ $\frac{1}{5}$ ☑ $\frac{3}{15}$ ☑ $\frac{2}{100}$ ☐ If the answer is incorrect, award **ONE** mark for: • only one box ticked correctly and no incorrect boxes ticked • two boxes ticked correctly and one incorrect box ticked.	**Up to 2m**	Accept alternative unambiguous positive indication of the correct answer, e.g. Y.

Qu.	Requirement	Mark	Additional guidance
21	Rectangle divided, as shown:  **OR**  **OR**  **OR** 	1m	Accept slight inaccuracies in drawing provided the intention is clear.

Qu.	Requirement	Mark	Additional guidance
22a	$\frac{2}{5}$	**1m**	Accept equivalent fractions and decimals e.g. $\frac{4}{10}$ and 0.4
22b	Award **TWO** marks for the correct answer of 10.7 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 8.1 + 9.3 + 11.9 + 11.8 + 12.4 = 53.5 53.5 ÷ 5	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark. Any correct rounding or truncating does not negate an appropriate method. Any value which does not result from correct rounding or truncating implies an additional step not shown.
23	Award **TWO** marks for the correct answer of 720 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 3 × 4 × 6 = 72 8 × 9 × 11 = 792 792 – 72 = Award **ONE** mark for sight of 792	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark.

9. Mark schemes for Paper 3: reasoning

Qu.	Requirement	Mark	Additional guidance
1	£7,899	1m	Refer to section 6.1 on pages 14 and 15 for additional guidance on marking answers involving money.
2a	7	1m	**Do not** accept 70,000 or 70 thousands.
2b	4,000,000	1m	Accept 4 million or four million **Do not** accept the answer 4
3	Award **ONE** mark for the correct box ticked, as shown: **Tick one.** $10 + a$ ☐ $10 \div a$ ☐ $a - 10$ ☐ $10 - a$ ☑ $a \times 10$ ☐	1m	Accept alternative unambiguous positive indication of the correct answer, e.g. Y.
4	Masses in correct order, as shown: **0.009 kg** | **0.99 kg** | **1.025 kg** | **1.25 kg** **lightest**	1m	All masses must be in the correct order for the award of **ONE** mark. Accept for **ONE** mark the masses written in reverse order **AND** the label lightest has been changed to follow suit. Misreads and transcription errors are **not** allowed.
5	Addition completed, as shown **1** 2 **8** + **7** 2 = 2 0 0	1m	All numbers must be correct for the award of the mark.

<table>
<tr><th>Qu.</th><th>Requirement</th><th>Mark</th><th>Additional guidance</th></tr>
<tr><td>6</td><td>Award TWO marks for the correct answer of £6.87

If the answer is incorrect, award ONE mark for evidence of an appropriate method, e.g.
• £1.49 + £1.64 = £3.13
£10 – £3.13 =
OR
• £10 – £1.49 = £8.51
£8.51 – £1.64 =
OR
• £10 – 164p – 149p =</td><td>Up to 2m</td><td>Answer need not be obtained for the award of ONE mark.

Accept for ONE mark an answer of £687 OR £687p as evidence of an appropriate method.

Refer to section 6.1 on pages 14 and 15 for additional guidance on marking answers involving money.</td></tr>
<tr><td>7a

7b</td><td>155

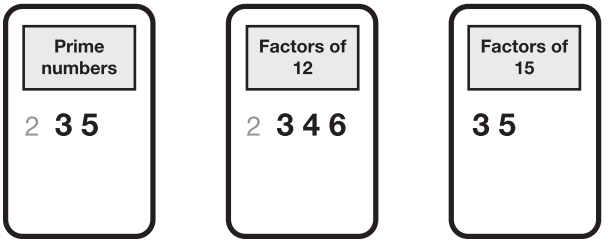
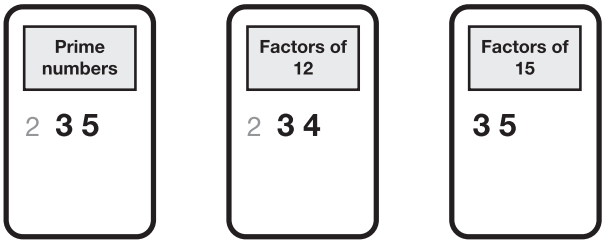
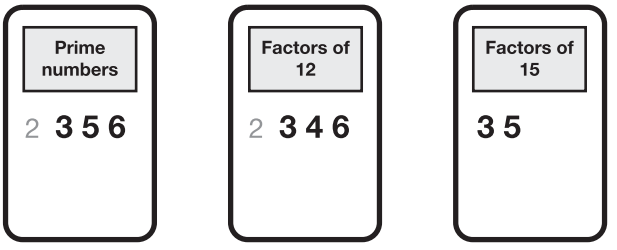
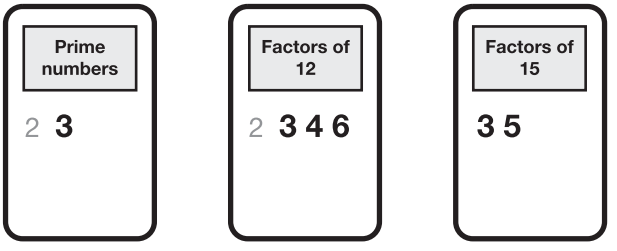
Table completed with three correct numbers, as shown:
<table><tr><th>Mass in g</th><th>Number of kittens</th></tr><tr><td>250–299</td><td>2</td></tr><tr><td>300–349</td><td>3</td></tr><tr><td>350–399</td><td>2</td></tr><tr><td>400–449</td><td>1</td></tr></table></td><td>1m

1m</td><td>All three numbers must be correct for the award of the mark.

Do not accept tally marks on their own.</td></tr>
<tr><td>8</td><td>Award TWO marks for the correct answer of 1,356

If the answer is incorrect, award ONE mark for evidence of an appropriate method, e.g.
• 4289 + 355 = 4644
6000 – 4644 =
OR
• 6000 – 4289 – 355 =

OR
• 6000 – 4289 = 1711
1711 – 355 =</td><td>Up to 2m</td><td>Answer need not be obtained for the award of ONE mark.</td></tr>
</table>

Qu.	Requirement	Mark	Additional guidance
11	Award **TWO** marks for all four given numbers placed completely correctly 7 times, as shown:  If the answer is incorrect, award **ONE** mark for three of the given numbers all placed completely correctly, e.g.  **OR**  **OR**  	**Up to 2m**	Accept the numbers in any order. Ignore any additional numbers not given in the question.

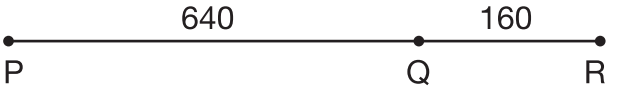
Qu.	Requirement	Mark	Additional guidance
12	Award **ONE** mark for two correct answers, as shown: length = **19 cm** width = **9.1 cm**	**1m**	Refer to section 6.3 on page 16 for additional guidance on marking answers involving measures.
13	An explanation that includes a correct counter example, e.g. • When you double 10° it is not obtuse • 2 × 27° = 54° • Double 45° is a right angle not obtuse **OR** An explanation that demonstrates where the statement in the question is not correct, e.g. • If the acute angle is less than 45° then doubling it will be less than 90°, so it won't be obtuse (more than 90°).	**1m**	**Do not** accept vague or incomplete explanations, e.g. • Sometimes it will be acute • Some acute angles are half an obtuse angle, but not all • When you double an acute angle, you get a right angle **Do not** accept explanations which include incorrect mathematics or incorrect information that is relevant to the explanation, e.g. • 20°C × 2 = 40°C • 20% x 2 = 40%
14	91	**1m**	
15	400	**1m**	

Qu.	Requirement	Mark	Additional guidance
16	Award **TWO** marks for the correct answer of £1.85 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • $1\frac{1}{2} \times$ £1.50 = £2.25 $\frac{1}{2}$ of £1.80 = 70p *(error)* £2.25 + 70p = £2.95 £5 – £2.95 = **OR** • £1.50 + 75 = £2.25 £2.25 + 90 = 415p *(error)* £5.00 – 415p = **OR** • sight of £3.15 **OR** 315p as evidence of evaluating the correct cost of the potatoes and carrots.	**Up to 2m**	**Do not** accept misreads for this question. Answer need not be obtained for the award of **ONE** mark. Accept for **ONE** mark an answer of £185 or £185p as evidence of an appropriate method. Refer to section 6.1 on pages 14 and 15 for additional guidance on marking answers involving money.
17	Award **ONE** mark for any pair of whole numbers less than 10 that satisfy the equation, i.e. $x = 8$ **AND** $y = 6$ **OR** $x = 6$ **AND** $y = 7$ **OR** $x = 4$ **AND** $y = 8$ **OR** $x = 2$ **AND** $y = 9$	**1m**	

Qu.	Requirement	Mark	Additional guidance
18	Award **TWO** marks for three boxes ticked correctly, as shown: $\frac{1}{2}$ ☑ $\frac{2}{8}$ ☑ $\frac{3}{4}$ ☐ $\frac{7}{16}$ ☑ $\frac{24}{32}$ ☐ Award **ONE** mark for: • only two boxes ticked correctly and no incorrect boxes ticked **OR** • three boxes ticked correctly and one incorrect box ticked.	**Up to 2m**	Accept alternative unambiguous positive indication of the correct answer, e.g. Y.

Qu.	Requirement	Mark	Additional guidance
19	Award **THREE** marks for the correct answer of 7,174 If the answer is incorrect, award **TWO** marks for: • evidence of an appropriate complete method which contains no more than one arithmetic error, e.g. $\begin{array}{r} 53 \\ \times\ 68 \\ \hline 3504 \end{array}$ *(error)* $\qquad \begin{array}{r} 105 \\ \times\ 34 \\ \hline 3570 \end{array}$ 3,504 + 3,570 = 7,074 Award **ONE** mark for: • evidence of an appropriate method with more than one arithmetic error. **OR** • sight of 3,604 as evidence of long multiplication step (68 × 53) completed correctly. **OR** • sight of 3,570 as evidence of long multiplication step (105 × 34) completed correctly.	**Up to 3m**	Answer need not be obtained for the award of **ONE** mark. A misread of a number may affect the award of marks. No marks are awarded if there is more than one misread or if the mathematics is simplified. **TWO** marks will be awarded if an appropriate method with the misread number is followed through correctly. **ONE** mark will be awarded for evidence of an appropriate method with the misread number followed through correctly with no more than one arithmetic error.

Qu.	Requirement	Mark	Additional guidance
20	Award **TWO** marks for the correct answer of 29 If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, e.g. • 2 × 500 = 1,000 1,000 ÷ 34 = **OR** • 2 × 500 ÷ 34 = **OR** • 500 ÷ 34 = 14 r23 *(error)* 14 r23 × 2 = 28 r46 **OR** • 34 × 10 = 340 34 × 30 = 1,020 Answer = 30 booklets *(error)*	**Up to 2m**	Answer need not be obtained for the award of **ONE** mark. Answer does not need to have been rounded or rounded correctly for the award of **ONE** mark. If a pupil reaches a non-integer answer, for example 28 r2 and expresses it as 28.2 without further working, this is considered a notation error and is condoned. Within an appropriate method, if the pupil's remainder from 500 divided by 34 is less than 17 and this remainder is ignored before doubling, this is acceptable for **ONE** mark. If the pupil's remainder is 17 or more and it has been ignored before doubling, this is **not** acceptable for **ONE** mark. **Do not** accept a trial and improvement method.
21a	Award **ONE** mark for **B** is (55, 30)	**1m**	
21b	Award **ONE** mark for **D** is (55, 14) If B and D are incorrect, **ONE** mark may be given for the correct y coordinate for both B and D and the same x coordinate (incorrect) for both points, i.e. • D is (same x as B, 14)	**1m**	
22	10.5 (cm)	**1m**	Accept $10\frac{1}{2}$

Qu.	Requirement	Mark	Additional guidance
23	An explanation that gives the correct values for PQ and/or QR, e.g. • PQ = 640m • QR is 160, 160 times 4 is not 600m •  **OR** An explanation recognising PR is 800m and must be 5 times QR, e.g. • the total distance is 800m. Divide by 5 to give 160 for distance between Q and R, so P and Q is 4 × 160 = 640m (not 600m) • if QR is 200m, then PR is 1000m not 800m • if PQ is 600m then QR is 800 – 600 = 200m. Then PR is 5 × 200 = 1000m but it is only 800m. **OR** An explanation that PQ is not 600m, e.g. • if it was 600m then the shorter distance would be 200m if added to make 800m, 600m is 3 times 200, not 4 times • Olivia is not correct because 600 ÷ 4 = 150 and 600 + 150 doesn't equal 800 • Olivia is not correct because 800 – 600 = 200 and 600 is not 4 times 200	1m	**Do not** accept vague, incomplete or incorrect explanations, e.g. • Olivia is not correct because you can't divide 600 by 4 like you can for 800 **Do not** accept explanations which include incorrect mathematics or incorrect information that is relevant to the explanation.