

**EDUQAS GCSE MATHEMATICS**

**SUMMER 2022 MARK SCHEME**

<b>Component 2: Foundation Tier</b>	<b>Mark</b>	<b>Comment</b>
1. (a) (£)14.64 or 1464(p)	B1	If units are given, they must be correct. Allow £14.64p
1.(b) $20 - 5 \times 2.49$ = (£) 7.55 or 755(p)	M1 A1	May be seen in stages. If units are given, they must be correct. Allow £7.55p
1.(c) $5 - (2.15 + 0.95) (= (£)1.90)$	M1	Allow for sight of (£)3.10
Stapler and Pen	A1	Allow M1 A0 for 2.15 and 0.95 stated as their answer
	(5)	
2. (a) $a = 43^\circ$  $b = 62^\circ$ $c = 180 - (62 + 42)$ = $76^\circ$	B1  B1 M1 A1	
2.(b) Isosceles	B1	
2.(c) $300^\circ$	B1	$\pm 2^\circ$
	(6)	
3.(a) 8.25 oe	B1	Accept $8 \frac{1}{4}$ and $\frac{33}{4}$
3.(b) 	B1	
	(2)	
4. (a) $0.24 < 0.3$ oe	B1	Allow for the unambiguous sight of < unless used incorrectly.
4. (b) $0.18 \times 160$ oe $\frac{2}{3} \times 43.2$ or $43.2 \div 3 \times 2$ oe $= 28.8$	M1 M1 A1	May be seen in stages. May be seen in stages. Sight of 28.8 is awarded M1 A1. Both calculations needed for full marks.
	(4)	

5. (a)(i) $(13 + 17 =) 30$	B2	Award B1 for either of: <ul style="list-style-type: none"> <li>Identifying 13 AND 17 and no others</li> <li>A correct evaluation of <math>(13 + x)</math> or <math>(17 + y)</math> where x and y are numbers from the cards.</li> </ul>
5. (a)(ii) $(9 \times 36 =) 324$	B2	Award B1 for either of: <ul style="list-style-type: none"> <li>Identifying 9 AND 36 and no others</li> <li>A correct evaluation of <math>(9 \times a)</math> or <math>(36 \times b)</math> where a and b are numbers from the cards</li> </ul>
5. (a)(iii) 24	B2	B1 for an answer of 9, 32 or 36 (a number satisfying one of the conditions) Allow B1 for 24 with one extra providing it is 9, 32 or 36
5.(b) Unambiguously stating or implying 'No' with a reason, e.g.  'the chance is 1/9', 'one cube number not two', '27 is the only cube number so 1/9 chance'	E1	Allow 'No' and '27 is the only cube number' 'only one cube number' 'there are not two cube numbers'  Do not allow '3 x 3 x 3 = 27' '27 = cube number'
	(7)	
6. (a) $30 \times \frac{1}{4}$ oe or $30 \times 0.25$ or $30 \times 25$  = 7.5 (m) or 750 (cm)	M1   A1	
		Mark final answer. If units are given, they must be correct.  If no marks, award SC1 for an answer with the digits 75.
<u>Alternative Method</u> $4\text{cm} = 1\text{m si}$ with calculations that would lead to 7.5 (m) e.g.  $28\text{cm} = 7\text{m}$ AND $2\text{cm} = 0.5\text{m}$ oe  = 7.5 (m) or 750 (cm)	M1   A1	
		Mark final answer. If units are given, they must be correct.
6. (b) $2 \div \frac{1}{4}$ or $2 \div 0.25$ or $200 \div 25$  = 8(cm)	M1   A1	FT 'their 25 cm' or 'their 0.25 m' for M1 only. Allow 2/25  CAO If units are given, they must be correct. If no marks, award SC1 for 0.08 (m) unsupported
<u>Alternative Method</u> $4\text{cm} = 1\text{m si}$ with an attempt to multiply by 2  = 8(cm)	M1   A1	
		CAO If units are given, they must be correct.
	(4)	

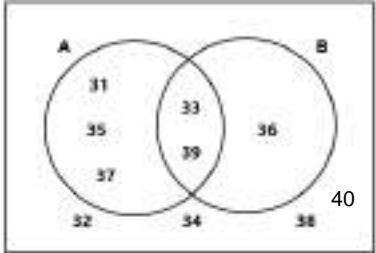
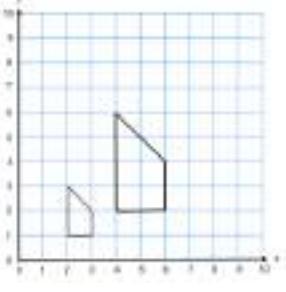
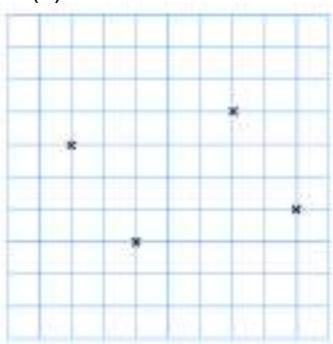
7. (a) Lines 26 AND Circles 17	B2	<p>Award B1 for any one of:</p> <ul style="list-style-type: none"> <li>• Lines 26 OR Circles 17.</li> <li>• 26 and 17 seen as answers without labels.</li> <li>• Lines 17 AND Circles 26 (answers reversed).</li> <li>• Lines 21 AND Circles 14 (pattern 4).</li> </ul>
7. (b) Unambiguously stating or implying 'No' with a reason, e.g.  'when the lines are odd the circles are even' 'when the circles are even the lines are odd' 'both numbers are even' 'one should be even and one should be odd' '(pattern 7 has) 36 lines and 23 circles' 'the circles pattern goes up in 3's but it doesn't start on a multiple of 3'	E1	<p>Allow e.g.</p> <p>'should be 23 circles' 'the difference is always an odd number' 'The circles sequence is 17, 20, 23, 26' '36 lines has 23 circles' 'there cannot be 24 circles'</p> <p>Do not allow 'add three to the circles' 'the circles pattern is going up in threes'</p>
	(3)	
8.(a) (Cost = ) $8.5 \times 5.5 \times 12.48$  $= (\text{£}) 583.44$	M2  A1	<p>May be seen in stages M1 for <math>8.5 \times 5.5 (= 46.75 \text{ m}^2)</math></p>
8. (b) $67.2 \div 10.5$  7 (rolls)	M1  A2	<p>A1 for 6.4</p>
<u>Alternative method</u>  At least two improving trials using values between 5 and 9 rolls inclusive  7 (rolls)	M1  A2	<p>Note: must see answers to their trials or states too small or too big</p> <p>A1 for trials for 6 and 7 rolls with areas 63 and 73.5 (or correct evaluations for trials between 6 and 7 rolls provided one gives an answer &lt; 67.2 and one &gt; 67.2)</p>
	(6)	

9. (a) <b>1440</b> (g of porridge oats) <b>750</b> (g of butter) <b>600</b> (g of brown sugar) <b>12</b> (table spoons of syrup)	B2	B1 for at least two values correct
9. (b) $1.75 \text{ kg} = 1750 \text{ g}$ or $125 \text{ g} = 0.125 \text{ kg}$  $1750 \div 125$ or $1.75(0) \div 0.125$  $= 14$ (batches of 12 flapjacks)	B1  M1  A1	May be implied in working  Allow M1 for $1.75 \div 125$ or similar from incorrect unit conversion e.g. $17.5 \div 125$ CAO
9. (c) A convincing explanation eg.  ‘3 more flapjacks, 3 is 25% of 12’ ‘25% of 12 is 3 and 3 more flapjacks are needed to make 15’ ‘3 out of 12 is 25%’ ‘15 is 125% of 12’	E1	Do not accept $12 + 3$ without further explanation.  Allow ‘25% is 3 (flapjacks)’ ‘ $12/4 = 3$ ’
	(6)	

10. (a) $8f - 3g$	B2	B1 for sight of $8f$ or $-3g$ . Mark final answer.
10. (b) $5m - 15$	B1	
10. (c) $32.4$ as their final answer	B2	B1 for $31.2$ or $1.2$ or $6 \times 5.2 + 3 \times 0.4$ Do not allow $31.2x$ or $1.2y$ or $32.4xy$ or $x = 31.2$ or $y = 1.2$ Mark final answer.
10. (d) $\frac{e}{2} = 10$ or $e - 8 = 12$ $e = 20$	B1 B1	FT from $e/2 = k$ OR $e - m = 12$ OR $e - 8 = n$ Allow 2 marks for an embedded answer BUT only 1 mark if contradicted by $e \neq 20$  If no marks, then award SC1 for $e/2 = 6 + 4$ and $e = 6 + 4 \times 2 (=14)$ seen.
10. (e) $10x$	B3	Award B2 for $3y + 4x$ OR $4y + 2x$ OR for a correct answer in terms of $x$ that is not fully simplified e.g. $2x + x + 2x + x + x + x + 2x$  Award B1 for any one of: <ul style="list-style-type: none"><li>• a correct answer in terms of <math>x</math> and <math>y</math> that is not fully simplified e.g. <math>y + x + y + x + x + y + x</math></li><li>• for recognising that <math>y = 2x</math>, may be shown on the diagram e.g. <math>y = x + x</math> or <math>x = 0.5y</math></li></ul> An answer of $5y$ is awarded 2 marks (B3 MR -1) An answer in terms of $y$ that is not fully simplified e.g. $y + y + y + 4 \times 0.5y$ is awarded 1 mark (B2 MR -1)
	(10)	

11.(a) "the probabilities sum to 1" oe	E1	<p>Accept e.g.  <math>0.32 + 0.46 + 0.1 + 0.12 = 1</math> or  <math>32\% + 46\% + 10\% + 12\% = 100\%</math>  as an explanation</p> <p>Allow  <math>32 + 46 + 10 + 12 = 100\%</math>  <math>0.32 + 0.46 + 0.10 + 0.12 = 100\%</math>  'The probability of other colours is 0'  'red + green + yellow + blue = 1'  <math>32 + 46 + 10 + 12 = 100</math> (without % signs)</p> <p>Do not allow e.g.  <math>0.32 + 0.46 + 0.10 + 0.12 = 100</math>  <math>32 + 46 + 10 + 12 = 1</math>  'the numbers are equal to 1'</p>
11. (b) 0.56 oe	B1	ISW. Allow 0.56/1
11. (c) (Expected no. of winners = $0.12 \times 150 = 18$	B1	Working can be in pence or pounds
$0.5(0) \times 150 - 2.95 \times 18$	M2	<p>FT 'their derived 12% of 150'  Allow M2 only if use of inconsistent units is later corrected</p>
$= (\text{£}) 21.9(0) \text{ or } 2190 (p)$	A1	<p>M1 for either <math>0.5 \times 150</math> or <math>2.95 \times \text{their derived 12\% of 150}</math>'  If units are given, they must be correct.</p>
<i>Alternative Method</i> (Expected no. of winners = $0.12 \times 150 = 18$	B1	
$(150 - 18) \times 0.5(0) - 18 \times (2.95 - 0.5(0))$	M2	<p>FT 'their derived 12% of 150'  Allow M2 only if use of inconsistent units is later corrected</p>
$= (\text{£}) 21.9(0) \text{ or } 2190 (p)$	A1	<p>M1 for either <math>(150 - 18) \times 0.5(0)</math> or  <math>18 \times (2.95 - 0.5(0))</math>  If units are given, they must be correct</p>
	(6)	

12.(a) $33\text{mins} + 3\text{hours} + 13\text{mins oe}$ $\text{or } 4\text{hours} - 14\text{mins}$ $= 3 \text{ (hours) } 46 \text{ (minutes)}$	M1  A1	Times may be split up differently  If no marks, award SC1 for an answer of 226 (minutes)
12.(b) 10(:)00 (a.m.)  Bus A: 8:30, 9:00, 9:30, 10:00 Bus B: 8:24, 8:48, <u>9:12</u> , 9:36, 10:00	B3	B2 for correctly listing the times for bus A to 10:00 and to at least 9:12 without error for bus B B1 for correctly listing at least 3 times for bus A and 8:24, 8:48 for bus B
<b>Alternative Method 1: Multiples of 30 &amp; 24</b> 10(:)00 (a.m.)  30, 60, 90, 120 (minutes) 24, 48, 72, 96, 120 (minutes)	B3	<i>B2 for an answer of 120 (minutes) or 2 hours OR for correctly listing to 120 for bus A and to at least 72 without error for bus B</i> <i>B1 for correctly listing at least 30, 60, 90 for bus A and 24, 48 for bus B</i>
<b>Alternative Method 2: LCM of 30 and 24</b> 10(:)00 (a.m.)  (Prime factors of 30) 2, 3, 5 (Prime factors of 24) 2, 2, 2, 3	B3	<i>B2 for an answer of 120 (minutes) or 2 hours OR sight of <math>2^3 \times 3 \times 5</math> oe</i> <i>B1 for at least 2 correct prime factors for each of 30 and 24.</i>
	(5)	
13. $6.23 - 1.32 \times 3.5 (=1.61)$  $\div 2.3$ $= (\text{£})0.7(0) \text{ or } 70(\text{p})$	M2  m1  A1	Allow the marks for the equivalent in pence. M1 for $1.32 \times 3.5 (=4.62)$ FT from M2 only CAO. If units are given, they must be correct.  If no marks, award SC1 for an answer of (£) 2.13(...) from $(6.23 - 1.32) \div 2.3$
	(4)	
14.(a) 9.3	B2	B1 for 9.2(625)  If no marks, SC1 for an answer of 2.6 (from incorrect order of operations $2.6 \times 5.7 \div 3.4 - 1.8$ )
14.(b) 68 000	B1	
14.(c) $6.3 \times 10^6$	B1	
	(4)	

<p>15. (a) A correct Venn diagram</p> 	<p>B2</p>	<p>B1 for 7, 8 or 9 unique numbers correctly placed. OR B1 for everything correct except sets A and B reversed OR B1 for all correct with 32, 34, 38 and 40 missing</p>
<p>15. (b) 3/10 or 0.3 oe</p>	<p>B2</p>	<p>ISW FT either the Venn diagram in (a) or the list BUT not both for B2 or B1 to candidates' advantage  B1 for a numerator of 3 or a denominator of 10 in a fraction <math>&lt; 1</math>. Allow B1 for '3 out of 10' or '3 in 10'.</p>
<p>16. (a) The correct shape in the correct position.</p> 	<p>(4) B3</p>	<p>Allow a good freehand drawing. B2 for a correct enlargement in an incorrect position OR for four correct points plotted but not joined.  B1 for two correct sides in the correct position OR three correct points plotted but not joined.  If no marks allow SC1 for showing at least three correct 'rays' from (0,0). Treat consistent use of a different scale factor (<math>\neq 1</math>) as a misread.</p>
<p>16.(b) Correct vertex</p> 	<p>B1 (4)</p>	

17. Method for finding the area of either circle $\pi \times 3^2$ or $\pi \times 5^2$ (Area of Amy's slice =) $\frac{1}{2} \times \pi \times 3^2$ o.e (Area of Vance's slice =) $\frac{1}{4} \times \pi \times 5^2$ o.e Vance indicated and both areas correct. (Amy) $14.1(37..)$ or $\frac{9}{2}\pi$ or $4.5\pi$ (inches <sup>2</sup> ) (Vance) $19.6(349..)$ or $\frac{25}{4}\pi$ or $6.25\pi$ (inches <sup>2</sup> )	S1 M1 M1 A2 (5)	Sight of 28.2(74....) or 78.5(39....) imply S1    If A2 not awarded award A1 for either area correct.
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18.* Mid-points: 45, 75, 105, 135, 165 $45 \times 9 + 75 \times 33 + 105 \times 38 + 135 \times 8 + 165 \times 2$  $\div 90$ 92 (grams)	B1 M1 m1 A1 (4)	May be implied from correct totals, see below FT 'their mid-points' provided at least 4 of these are at the bounds or within the groups $405 + 2475 + 3990 + 1080 + 330 (= 8280)$  If mid-points are <b>not</b> given, then no marks except for the following cases: <ul style="list-style-type: none"><li>• B1 M0 for five correct products not added</li><li>• B1 M1 for five correct products in an addition</li><li>• B0 M1 for four correct products in an addition</li></ul> FT correct evaluation using their mid-points Allow truncated or rounded decimal answers
19.(a) $2 : 6 : 3$	B2	Must be in the correct order. B1 for any correct but un-simplified ratio e.g. $1 : 3 : 1.5$ , $2x : 6x : 3x$ , $10 : 30 : 15$
19.(b) $\frac{3}{11}$ oe	B1	FT 'their 3' and 'their 11' providing the numerator and denominator in the final fraction are integers FT allowed from non-numeric answers to (a) e.g. $6x : 2x : x$ leading to $\frac{1}{9}$

20.* $10000 \div 1250 (= 8)$ $35950 \times (1 - 0.18)^8$  $7348.69$ or $7348.68(\dots)$ or $7348.7$ or $7349$ or $7350$ $(35950 - 7348.69 = )(\text{£}) 28601.31$	M1	
	M2	FT for possible M2 for sight of one of: <ul style="list-style-type: none"> <li><math>35950 \times (1 - 0.18)^8</math> 'their <math>10000 \div 1250</math>'</li> <li><math>35950 \times 0.82</math> 'their <math>10000 \div 1250</math>'</li> </ul> May be seen in stages but the method must be seen and fully correct e.g. 8 stages with $\times 0.82$ seen at each stage.  M1 for sight of $35950 \times (1 - 0.18)$ oe complete and correct method or sight of 29479
	A1	CAO A1 only from fully correct working.
	B1	If M1 M2 A1, accept answer in range 28600 to 28602;  FT 'their 7348.69' provided M1 M2 awarded  If M1 M2 A1 B0 awarded, then award further SC1 for an answer of 79(.5...)% or 80% decrease from $\left( \frac{35950 - 7348.69}{35950} \times 100 = \right)$
	(5)	
21.* (a)  $\frac{42}{60} \times 360$ or $42 \times 6$ or $360 \times 0.7$ oe  $252^\circ$	M2	M1 for appropriate sight of $\frac{42}{60}$ or 0.7 oe or $42 \times 360 (= 15120)$
	A1	CAO
21.(b)(i) A valid assumption e.g. 'The wheel spins at a constant speed.' or 'The wheel is spinning at the same rate all the time'	E1	Allow e.g. 'Each turn takes the same amount of time' 'The wheel is spinning at the same speed' 'We do not know precisely how many degrees it turns in a second' 'The wheel turns every second' 'The wheel never stops and starts' 'The wheel is always spinning'  Allow answers that state that the timing must not vary e.g. 'Each second must be accurate'  Do not allow, 'The wheel turns $252^\circ$ each second'.
21.(b)(ii) A valid impact based on their valid assumption e.g. 'If it was spinning faster, it may have turned through more degrees' or 'If it was spinning more slowly, it may have turned through fewer degrees.'	E1	If no valid assumption is made, then this mark cannot be awarded. Cannot award E0 E1. Allow e.g. 'My answer would be different.'
	(5)	

22.(a) $5 - 11 = 5x - 2x$ or $2x - 5x = 11 - 5$ $x = -2$	B1 B1	FT from $ax = \pm 6$ , $a \neq 1$ or $\pm 3x = b$ accept $\frac{\pm 6}{a}$ or $\frac{b}{\pm 3}$ but if on FT either simplifies to an integer the answer must be given as an integer. ‘x =’ can be omitted but must not be wrong if there. Correct answer implies first B1.
22.(b) $8x - 3x - 1 = 2$ or $8x = 2 + 3x + 1$ or better $5x = 2 + 1$ or better $x = \frac{3}{5}$ or equivalent fraction	B1 B1 B1	Expands the brackets Only FT from $8x - 3x + 1 = 2$ to obtain $5x = 2 - 1$ or better FT answer of $\frac{1}{5}$ or equivalent fraction only
22.(c) Yes indicated and clear explanation e.g. ‘-1 should not be included.’ ‘x can only be 0, 1, 2 or 3’ ‘ $1 < -1 + 2 \leq 5$ is incorrect’ ‘ $1 < 1 \leq 5$ is incorrect’	E1	Yes may be implied if a box is not ticked Allow Yes with ‘x can be 0, 1, 2 or 3’
22.(d) Empty circle at -2 with arrow right	B1	If a line not an arrow, then line must extend to near the end of the number line; must be no indication of termination on the right.
		(7)

23.(a) 17 (seconds)	B1	Allow answers in the range 17 to 17.4
23.(b)  'Unlikely' and valid explanation e.g. 'The line of best fit predicts 64°C at 70 seconds' or "The temperature has stayed the same (but the line of best fit is increasing)" or 'The line of best fit predicts just over 50 seconds for 52°C'. 'The temperature is 50 degrees at 50 seconds (so at 70 seconds it would be a lot more)'	E1	Ignore additional comments if correct statement seen. Allow 'unlikely' with explanations that imply the use of the line of best fit e.g. 'The temperature should have raised a lot more and be way past 52' 'The temperature is 51 degrees at 50 seconds'  Do not allow e.g. 'The data is unreliable as it only goes to 50 seconds.'
23.(c)  $y = \frac{7}{10}x + 15 \text{ oe}$	B3	Must be given as an equation. If B3 not awarded award one of the following: B2 for sight of $y = \frac{7}{10}x + c$ or (gradient) = $\frac{7}{10}$ or $(m=) \frac{7}{10}$ B1 for sight of $y = mx + 15$ or $c = 15$  For B2 or B1, m or c in the equation could be algebraic or numeric
23.(d)  Valid explanation e.g. 'The increase in temperature per 1 second' 'The rate of increase in temperature' 'How quickly the temperature increases with time'	E1	Allow explanations that consider both the steepness of the line and the variables, e.g. 'How steep the line is so as time increases so does temperature.' 'A change in temperature as the time goes up.'  Do not allow, e.g. 'The steepness' 'As time increases temperature increases'
	(6)	

<p>24.*</p> <p><math>(BC = ) 4.8 \tan 57^\circ</math> or <math>\frac{4.8}{\tan (180-90-57)}</math></p> <p>7.39 to 7.4 si</p> <p><math>(\text{Area} = ) \frac{1}{2} \times 7.39135... \times 4.8</math></p> <p>17.7(392...) (cm<sup>2</sup>)</p>	<p>M2</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>M1 for <math>\tan 57^\circ = \frac{BC}{4.8}</math> si or <math>\tan (180-90-57) = \frac{4.8}{BC}</math> si</p> <p>CAO</p> <p>FT '<math>\frac{1}{2} \times</math> their derived <math>BC \times 4.8</math>' provided 'their derived BC' is from use of trigonometry</p> <p>FT 'their derived BC'</p> <p>If correct, accept answer in range 17.7 to 17.8; accept 18 following correct working</p>
<p><u>Alternative (Higher tier) method 1</u></p> <p><math>(BC = ) \frac{4.8 \times \sin 57}{\sin(90-57)}</math></p> <p>7.39 to 7.4 si</p> <p><math>(\text{Area} = ) \frac{1}{2} \times 7.39135... \times 4.8</math></p> <p>17.7(392...) (cm<sup>2</sup>)</p>	<p>M2</p> <p>A1</p> <p>M1</p> <p>A1</p>	<p>M1 for <math>\frac{BC}{\sin 57} = \frac{4.8}{\sin(90-57)}</math></p> <p>CAO</p> <p>FT '<math>\frac{1}{2} \times</math> their derived <math>BC \times 4.8</math>' provided 'their derived BC' is from use of trigonometry</p> <p>FT 'their derived BC'</p> <p>If correct, accept answer in range 17.7 to 17.8; accept 18 following correct working</p>
<p><u>Alternative (Higher tier) method 2</u></p> <p><math>\text{Area of } ABC = \frac{1}{2} \times 4.8 \times AC \times \sin 57</math></p> <p><math>(AC = ) \frac{4.8}{\cos 57}</math></p> <p>8.8 to 8.81(3...) si</p> <p><math>\text{Area of } ABC = \frac{1}{2} \times 4.8 \times 8.81... \times \sin 57</math>  <math>= 17.7(392...) \text{ (cm}^2\text{)}</math></p>	<p>M1</p> <p>m2</p> <p>A1</p> <p>A1</p>	<p>Not awarded until <math>AC = \frac{4.8}{\cos 57}</math> oe substituted.</p> <p><math>m1</math> for <math>\cos 57 = \frac{4.8}{AC}</math></p> <p>CAO</p> <p>FT 'their derived AC'</p> <p>If correct, accept answer in range 17.7 to 17.8; accept 18 following correct working</p>
<p>(5)</p>		