



THIRD SPACE  
LEARNING

# Mathematics

## Paper 1

### (Non-Calculator)

### Higher Tier

### Mark Scheme

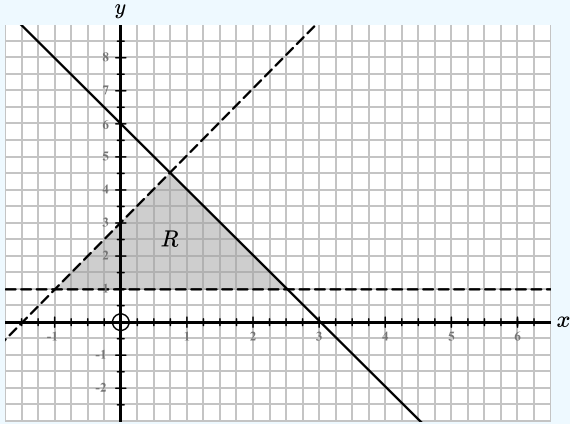
AQA GCSE

SET 2

Question	Working	Answer	Notes
Q1		$\frac{25}{8}$	A1 cao
Q2		11	A1 cao
Q3		(1, 5)	A1 cao
Q4		8	A1 cao
Q5	$\frac{90}{360} = \frac{1}{4}, \frac{1}{4} \text{ of } 60 = 15$ $\frac{60}{360} = \frac{1}{6}, \frac{1}{6} \text{ of } 60 = 10$ $60 - 15 - 10 = 35$ $15 \times 2.1 = 31.5$ $10 \times 3.5 = 35$ $35 \times 4 = 140$ $31.5 + 35 + 140 = 206.5g$	206.5g	M1 Number of small marbles = 15 M1 Number of medium marbles = 10, number of large marbles = 35 M1 <i>ft</i> Attempt to multiply numbers of marbles by weights A1 cao
Q6	$4a + 6b = 0.7$ $0.7 = \frac{7}{10}$	$\frac{7}{10}$	M1 $4a + 6b = 0.7$ A1 cao
Q7a		$3.8 \times 10^4$	B1 cao
Q7b		$p = 2$ $q = -1$	A1 $p$ correct A1 $q$ correct

Question	Working	Answer	Notes
<b>Q8a</b>	Number of prime numbers: 4	$\frac{4}{10}$	M1 4 prime numbers, or 2, 3, 5, 7 seen A1 $\frac{4}{10}$ oe
<b>Q8b</b>	$200 \times 0.50 = £100$ Expected wins: $\frac{4}{10} \times 200 = 80$ $£100 - 80 = £20$	£20	M1 $200 \times 0.50 = £100$ M1 Expected number of wins 80 A1 cao
<b>Q9</b>	$8 \div 2 = 4$ $2 \div 4 = 0.5$	0.5	A1 cao
<b>Q10a</b>		$\frac{1}{2}$	B1 cao
<b>Q10b</b>	$\sin(30) = \frac{6}{H}$ $\frac{1}{2} = \frac{6}{H}$ $H = 12$ $\text{Area} = \frac{1}{2} \times 12 \times 10.4$ $= 62.4\text{cm}^2$	$62.4\text{cm}^2$	M1 $\sin(30) = \frac{6}{H}$ oe seen A1 $H = 12$ M1 <i>ft</i> $\text{Area} = \frac{1}{2} \times 12 \times 10.4$ A1 cao
<b>Q11</b>	$a = 7b, b = 5c$ $a = 7(5c)$ $a = 35c$	$a = 35c$	M1 $a = 7b$ and $b = 5c$ A1 cao
<b>Q12a</b>		1	B1 cao
<b>Q12b</b>	$(\sqrt[3]{125})^2 = 5^2 = 25$	25	M1 5 seen A1 cao

Question	Working	Answer	Notes														
Q12c	$\frac{1}{3^2} = \frac{1}{9}$	$\frac{1}{9}$	A1 cao														
Q13a	<table><tr><th>Amount spent (£s)</th><th>Cumulative frequency</th></tr><tr><td><math>0 \leq s &lt; 20</math></td><td>8</td></tr><tr><td><math>0 \leq s &lt; 40</math></td><td>20</td></tr><tr><td><math>0 \leq s &lt; 60</math></td><td>39</td></tr><tr><td><math>0 \leq s &lt; 80</math></td><td>56</td></tr><tr><td><math>0 \leq s &lt; 100</math></td><td>69</td></tr><tr><td><math>0 \leq s &lt; 120</math></td><td>80</td></tr></table>	Amount spent (£s)	Cumulative frequency	$0 \leq s < 20$	8	$0 \leq s < 40$	20	$0 \leq s < 60$	39	$0 \leq s < 80$	56	$0 \leq s < 100$	69	$0 \leq s < 120$	80		A1 Fully correct table
Amount spent (£s)	Cumulative frequency																
$0 \leq s < 20$	8																
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$0 \leq s < 100$	69																
$0 \leq s < 120$	80																
Q13b			M1 <i>ft</i> At least 4 of their points plotted correctly A1 All points correctly plotted and joined with a curve														
Q13c	Median on Saturday £61 The median on Saturday was much higher		M1 Median for Saturday in range £60 – £63 A1 A correct comparative statement														

Question	Working	Answer	Notes
<b>Q14</b>	Area of pentagon A: 100 Area of pentagon B: 150 Area of pentagon C: 40% of 150 = 60, $150 + 60 = 210$ $100 : 150 : 210 = 10 : 15 : 21$	10 : 15 : 21	M1 Scaling up area of pentagon A to give area of pentagon B (150%) M1 Increasing area of pentagon B by 40% to give 210% M1 Writing in a ratio A1 Correct, simplified ratio
<b>Q15</b>			M1 Any one line correctly drawn M1 All three lines correctly drawn A1 Correct region shaded and labelled R
<b>Q16</b>	$\frac{\pi \times 10}{2} = 5\pi$ $\frac{\pi \times 4}{2} = 2\pi$ $5\pi + 2\pi + 6 = 7\pi + 6$	$7\pi + 6$	M1 Outer perimeter $\frac{\pi \times 10}{2} = 5\pi$ M1 Inner perimeter $\frac{\pi \times 4}{2} = 2\pi$ M1 <i>ft</i> their outer + their inner + 6 A1 Correct answer in surd form
<b>Q17</b>	$2 = \frac{k}{6^2}$ $2 \times 36 = k$ $k = 72$	$a = \frac{72}{b^2}$	M1 $2 = \frac{k}{6^2}$ oe A1 A correct equation connecting $a$ and $b$

Question	Working	Answer	Notes
<b>Q18a</b>	$\frac{6x-6}{(x+2)(x-1)} + \frac{5x+10}{(x+2)(x-1)} = \frac{11x+4}{(x+2)(x-1)}$	$\frac{11x+4}{(x+2)(x-1)}$	M1 Correct common denominator of $(x+2)(x-1)$ oe M1 Numerators $6x-6$ and $5x+10$ oe A1 cao
<b>Q18b</b>	$\frac{(x+4)(x-4)}{(x+4)(x-7)} = \frac{x-4}{x-7}$	$\frac{x-4}{x-7}$	M1 Numerator or denominator factorised correctly M1 Both numerator and denominator factorised correctly A1 cao
<b>Q19</b>	$\frac{80}{x} = \frac{6}{120}$ $x = \frac{80 \times 120}{6} = 1600$	1600	M1 $\frac{80}{x} = \frac{6}{120}$ oe M1 A correct equation with $x$ the subject A1 cao
<b>Q20</b>	$\frac{2\sqrt{60} + \sqrt{15}}{\sqrt{5}} \times \frac{\sqrt{5}}{\sqrt{5}} = \frac{2\sqrt{300} - \sqrt{75}}{5}$ $= \frac{2 \times 10\sqrt{3} - 5\sqrt{3}}{5}$ $= \frac{15\sqrt{3}}{5}$ $= 3\sqrt{3}$	$3\sqrt{3}$	M1 Attempt to multiply numerator and denominator by $\sqrt{5}$ or $\frac{3\sqrt{15}}{\sqrt{5}}$ seen M1 $\frac{2\sqrt{300} - \sqrt{75}}{5}$ or $\frac{3\sqrt{75}}{5}$ M1 $\frac{15\sqrt{3}}{5}$ A1 cao following fully correct working

Question	Working	Answer	Notes
<b>Q21</b>	<p>Angle CAD = <math>23^\circ</math> (angles in the same segment are equal)</p> <p>Angle ADC = <math>180 - 67 - 23 = 90^\circ</math></p> <p>The angle subtended by a diameter is <math>90^\circ</math> so AC is a diameter</p>		<p>M1 Angle CAD = <math>23^\circ</math> (angles in the same segment are equal)</p> <p>M1 Angle ADC = <math>180 - 67 - 23 = 90^\circ</math></p> <p>B1 Correctly stating that angle subtended by a diameter is <math>90^\circ</math> so AC is a diameter following correct working</p>
<b>Q22a</b>	$x^2 - 6x + 15 = (x - 3)^2 - 9 + 15$ $= (x - 3)^2 + 6$	$a = 3, b = 6$	<p>M1 <math>(x - 3)^2</math></p> <p>A1 cao</p>
<b>Q22b i</b>		(3, 6)	B1 cao
<b>Q22b ii</b>	<p>The turning point is above the <math>x</math> axis and the coefficient of <math>x^2</math> is positive so</p> <p><math>y = x^2 - 6x + 15</math> doesn't cross the axis and</p> <p><math>x^2 - 6x + 15 = 0</math> has no solutions</p>		B1 Correct explanation
<b>Q23a</b>	$f^{-1}(x) = \frac{x - 2}{3}$ $f^{-1}(44) = 14$	14	<p>M1 <math>f^{-1}(x) = \frac{x - 2}{3}</math></p> <p>M1 <i>ft</i> Substituting 44 into their <math>f^{-1}(x)</math></p> <p>A1 cao</p>

Question	Working	Answer	Notes
<b>Q23b</b>	$gf(x) = (3x + 2)^2 + 3x + 2$ $= 9x^2 + 12x + 4 + 3x + 2$ $= 9x^2 + 15x + 6$ $9x^2 + 15x + 6 = 0$ $3x^2 + 5x + 2 = 0$ $(3x + 2)(x + 1) = 0$ $x = -\frac{2}{3} \text{ or } x = -1$	$x = -\frac{2}{3} \text{ or } x = -1$	M1 $gf(x) = (3x + 2)^2 + 3x + 2$ M1 Simplify to $gf(x) = 9x^2 + 15x + 6$ M1 <i>ft</i> Valid attempt to solve their $gf(x) = 0$ A1 cao
<b>Q24</b>	$20 \times 60 \times 20 = 24000l$ $24000 \div 1000 = 24m^3$ $\frac{1}{2}(h + h - 0.8) \times 10 \times 5 = 24$ $2h - 0.8 = 0.96$ $2h = 1.76$ $h = 0.88m$	$0.88m$	M1 $20 \times 60 \times 20 = 24000l$ M1 $h - 0.8$ identified as height on shallower side of pool M1 $\frac{1}{2}(h + h - 0.8) \times 10 \times 5 (= 24)$ M1 Attempt to solve to give $h$ A1 cao



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