



THIRD SPACE  
LEARNING

# Mathematics

## Paper 5

### (Non-Calculator)

### Higher Tier

### Mark Scheme

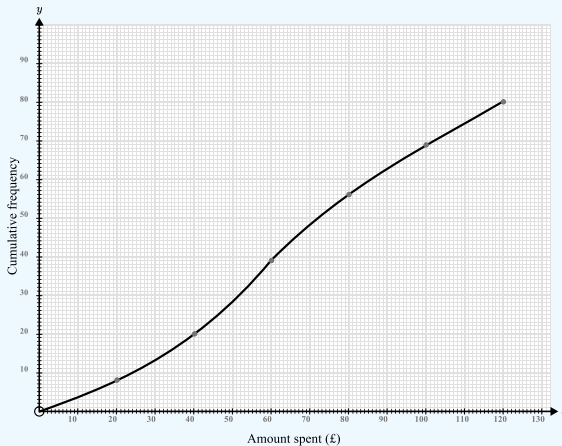
OCR GCSE

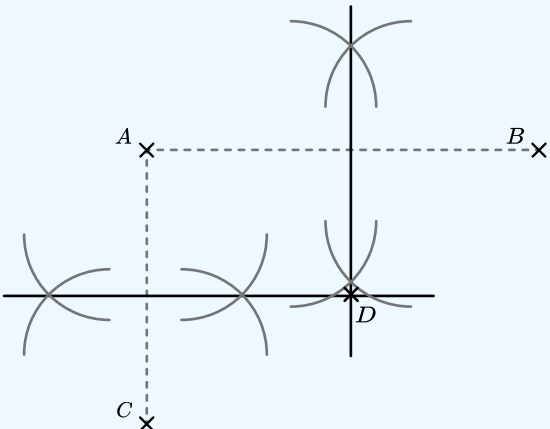
SET 2

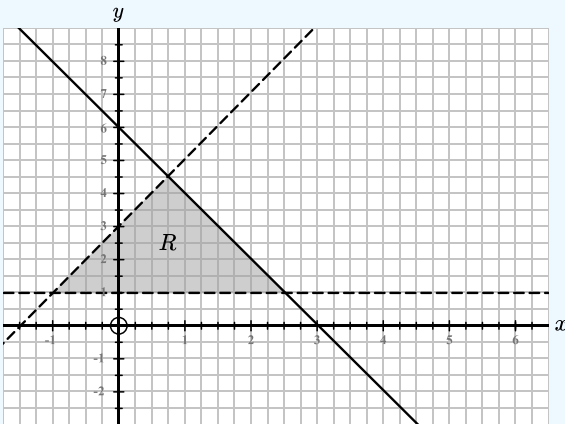
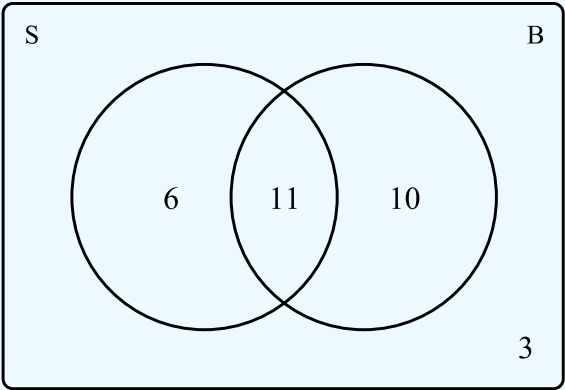
Question	Working	Answer	Notes
<b>Q1a</b>	$\frac{3}{4} - \frac{2}{5} = \frac{15}{20} - \frac{8}{20} = \frac{7}{20}$	$\frac{7}{20}$	M1 Fractions written with common denominator A1 cao
<b>Q1b</b>	$\frac{40 + 200}{10^2} = \frac{240}{100} = 2.4$		M1 All three values rounded to 1sf. Condone one mistake M1 $\frac{240}{100}$ A1 Correct steps to reach 2.4
<b>Q2</b>	Factors of 64: 1, 2, 4, 8, 16, 32, 64 Factors of 80: 1, 2, 4, 5, 8, 10, 16, 20, 40, 80	16	M1 Factors of 64 and 80 listed (allow up to one of each missing) or prime factor trees for both 64 and 80 drawn (allow one minor error) A1 cao
<b>Q3</b>	$\frac{90}{360} = \frac{1}{4}$ , $\frac{1}{4}$ of 60 = 15 $\frac{60}{360} = \frac{1}{6}$ , $\frac{1}{6}$ 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
<b>Q4</b>	$10 - 6 = 4$ which is the length of the longer side $8 - 2 - 4 = 2$ which is the length of the shorter side $8 + 4 = 12$ , $6 - 2 = 4$	(12, 4)	M1 Length or width of the rectangles correct (4 or 2) M1 Length and width of rectangles correct (4 and 2) A1 cao

Question	Working	Answer	Notes
<b>Q5a</b>	$120 \div 3 \times 2 = 80$ $80 \times 0.30 = £24$ $25\% \text{ of } 24 = £6$ $£24 + £6 = £30$ $30 \div 120 = 0.25$	$25p$ or £0.25	M1 $80 \times 0.3$ or $80 \times 30p$ seen M1 <i>ft</i> 25% of answer calculated A1 $£24 + £6 = £30$ A1 cao
<b>Q5b</b>	$£64 = 80\%$ $64 \div 8 \times 10 = £80$	£80	M1 $£64 = 80\%$ seen or implied M1 Valid step towards finding 100% e.g. $64 \div 8$ or $64 \div 0.8$ A1 cao
<b>Q6</b>	$4a + 6b = 0.7$ $0.7 = \frac{7}{10}$	$\frac{7}{10}$	M1 $4a + 6b = 0.7$ A1 cao
<b>Q7a</b>		$3.8 \times 10^4$	A1 cao
<b>Q7b</b>		$p = 2$ $q = -1$	A1 $p$ correct A1 $q$ correct
<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

Question	Working	Answer	Notes
<b>Q9a</b>		$\frac{1}{2}$	B1 cao
<b>Q9b</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>Q10a</b>		1	B1 cao
<b>Q10b</b>	$(\sqrt[3]{125})^2 = 5^2 = 25$	25	M1 5 seen A1 cao
<b>Q10c</b>	$\frac{1}{3^2} = \frac{1}{9}$	$\frac{1}{9}$	A1 cao
<b>Q11a i</b>	$1 \div 9 = 0.11111111$	0.111111....	M1 A written method seen with attempt to divide 1 by 9 A1 cao
<b>Q11a ii</b>	$0.1111111 \div 10 = 0.011111111....$	0.01111111....	A1 cao

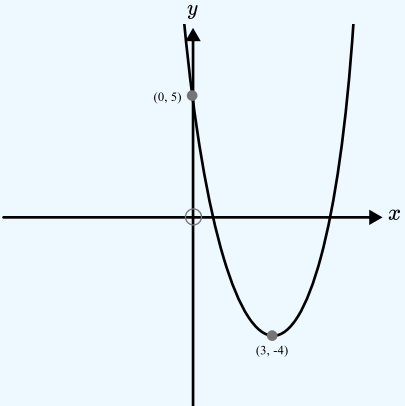
Question	Working	Answer	Notes														
Q11b	0.5144444444... 0.514141414..... 0.514514514..... 0.514	0.514 0.514̇ 0.514̇ 0.514̇	A1 cao														
Q12a	<table><tr><th>Amount spent (£s)</th><th>Cumulative frequency</th></tr><tr><td><math>0 \leq s &lt; 20</math></td><td>8</td></tr><tr><td><math>20 \leq s &lt; 40</math></td><td>20</td></tr><tr><td><math>40 \leq s &lt; 60</math></td><td>39</td></tr><tr><td><math>60 \leq s &lt; 80</math></td><td>56</td></tr><tr><td><math>80 \leq s &lt; 100</math></td><td>69</td></tr><tr><td><math>100 \leq s &lt; 120</math></td><td>80</td></tr></table>	Amount spent (£s)	Cumulative frequency	$0 \leq s < 20$	8	$20 \leq s < 40$	20	$40 \leq s < 60$	39	$60 \leq s < 80$	56	$80 \leq s < 100$	69	$100 \leq s < 120$	80		A1 cao
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Q12b			M1 <i>ft</i> At least 4 of their points plotted correctly A1 All points correct and joined with a curve														

Question	Working	Answer	Notes
<b>Q12c</b>	Median on Saturday £61 The median on Saturday was much higher		M1 Median for Saturday in range £60 – £63 A1 A correct comparative statement
<b>Q13</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>Q14</b>			M1 Perpendicular bisector of AC or AB drawn M1 At least two perpendicular bisectors drawn with construction line visible A1 Correct point marked and labelled D

Question	Working	Answer	Notes
<b>Q15</b>			<p>M1 One line correctly drawn</p> <p>M1 All three lines correctly drawn</p> <p>A1 Correct use of dashed/solid lines and correct region shaded</p>
<b>Q16</b>	 $\frac{11}{30} \times \frac{10}{29} = \frac{110}{870} = \frac{11}{87}$	$\frac{11}{87}$	<p>M1 Attempt at Venn diagram with at least 2 values correct</p> <p>M1 11 identified as number of students with both brother and sister</p> <p>M1 <math>\frac{11}{30}</math> seen</p> <p>M1 <math>\frac{11}{30} \times \frac{10}{29}</math></p> <p>A1 <math>\frac{11}{87}</math> oe</p>
<b>Q17a</b>	$\frac{6x-6}{(x+2)(x-1)} + \frac{5x+10}{(x+2)(x-1)} = \frac{11x+4}{(x+2)(x-1)}$	$\frac{11x+4}{(x+2)(x-1)}$	<p>M1 Correct common denominator of <math>(x+2)(x-1)</math> oe</p> <p>M1 Numerators <math>6x-6</math> and <math>5x+10</math> oe</p> <p>A1 <math>\frac{11x+4}{(x+2)(x-1)}</math> or <math>\frac{11x+4}{x^2+x-2}</math></p>

Question	Working	Answer	Notes
<b>Q17b</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>Q18</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 exact form
<b>Q19</b>	Angle CAD = $23^\circ$ (angues in the same segment are equal) Angle ADC = $180 - 67 - 23 = 90^\circ$ The angle subtended by a diameter is $90^\circ$ so AC is a diameter		M1 Angle CAD = $23^\circ$ (angues in the same segment are equal) M1 Angle ADC = $180 - 67 - 23 = 90^\circ$ B1 Correctly stating that angle subtended by a diameter is $90^\circ$ so AC is a diameter, following correct working
<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 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>Q21a</b>	$f^{-1}(x) = \frac{x-2}{3}$ $f^{-1}(44) = 14$	14	M1 $f^{-1}(x) = \frac{x-2}{3}$ M1 <i>ft</i> Substituting 44 into their $f^{-1}(x)$ A1 cao
<b>Q21b</b>	$gf(x) = (3x+2)^2 + 3x + 2$ $= 9x^2 + 12x + 4 + 3x + 2$ $= 9x^2 + 15x + 6$ $9x^2 + 15x + 6 = 0$ $3x^2 + 5x + 2 = 0$ $(3x+2)(x+1) = 0$ $x = -\frac{2}{3}$ or $x = -1$	$x = -\frac{2}{3}$ 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>Q22a i</b>	$x^2 - 6x + 15 = (x-3)^2 - 9 + 15$ $= (x-3)^2 + 6$	$(x-3)^2 - 4$ $a = 3, b = -4$	M1 $(x-3)^2$ A1 cao
<b>Q22a ii</b>			M1 Correct shape A1 Correct y intercept A1 Correct turning point

Question	Working	Answer	Notes
<b>Q22b</b>	<p>The turning point is above the <math>x</math> axis and the coefficient of <math>x^2</math> is positive so <math>y = x^2 - 6x + 15</math> doesn't cross the axis and <math>x^2 - 6x + 15 = 0</math> has no solutions</p>	0 solutions	<p>B1 Correct explanation A1 0 solutions indicated</p>
<b>Q23</b>	<p> <math>20 \times 60 \times 20 = 24000l</math>  <math>24000 \div 1000 = 24m^3</math>  <math>\frac{1}{2}(h + h - 0.8) \times 10 \times 5 = 24</math>  <math>2h - 0.8 = 0.96</math>  <math>2h = 1.76</math>  <math>h = 0.88m</math> </p>	0.88m	<p> M1 <math>20 \times 60 \times 20 = 24000l</math>  M1 <math>h - 0.8</math> identified as height on shallower side of pool  M1 <math>\frac{1}{2}(h + h - 0.8) \times 10 \times 5 (= 24)</math>  M1 Attempt to solve to give <math>h</math>  A1 cao </p>

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