



THIRD SPACE  
LEARNING

# Mathematics

## Paper 1

### (Non-Calculator)

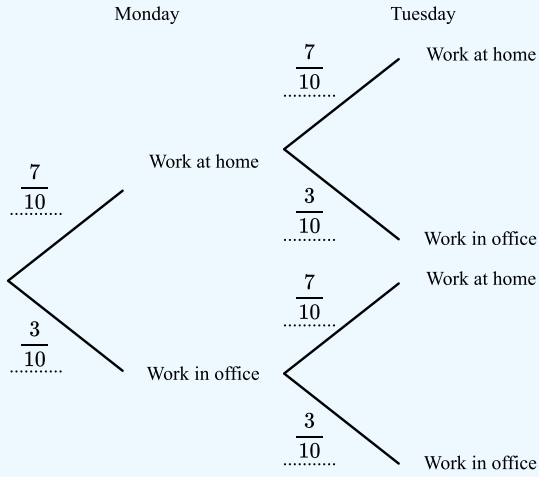
## Higher Tier

## Mark Scheme

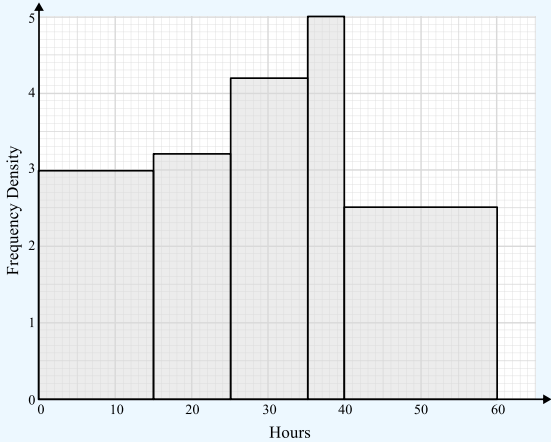
Edexcel GCSE

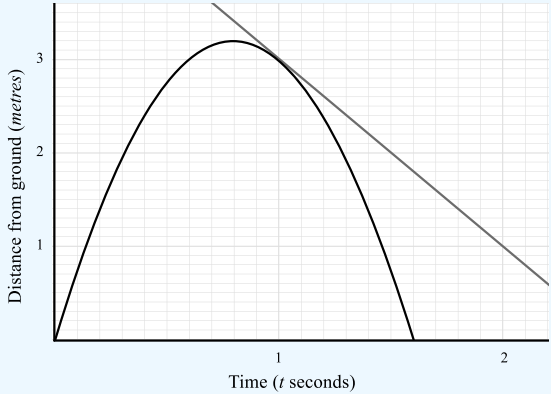
SET 5

Question	Working	Answer	Notes
Q1a	$  \begin{array}{c}  210 \\  \swarrow \quad \searrow \\  70 \qquad 3 \\  \swarrow \quad \searrow \\  10 \qquad 7 \\  \swarrow \quad \searrow \\  5 \qquad 2  \end{array}  $	$2 \times 3 \times 5 \times 7$	M1 Correct prime factors identified A1 cao
Q1b	$90 = 2 \times 3 \times 3 \times 5$ $210 = 2 \times 3 \times 5 \times 7$ $HCF = 2 \times 3 \times 5 = 30$	30	M1 Compares prime factors of 90 and 210 or attempts to list the factors of 90 and 210 A1 cao
Q2a		5, 7, 8, 9, 10, 11	
Q2b	$n(A \cap B) = 3$ $n(\xi) = 12$ $\frac{3}{12} = \frac{1}{4}$	$\frac{3}{12}$	M1 $n(A \cap B) = 3$ seen or implied A1 $\frac{3}{12}$ oe
Q3	$3.15 \times 10^4 = 31500$ $3.15 \times 10^{-2} = 0.0315$ $3.15 \times 10^{-1} = 0.315$ 3150  0.0315, 0.315, 3150, 31500	$3.15 \times 10^{-2}, 3.15 \times 10^{-1}, 3150, 3.15 \times 10^4$	M1 Correctly converts at least two values A1 cao

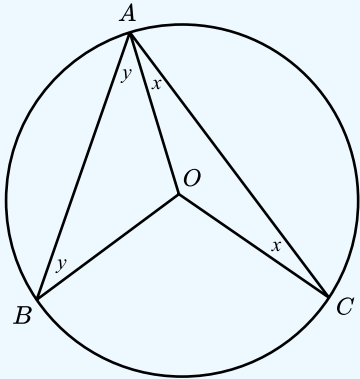
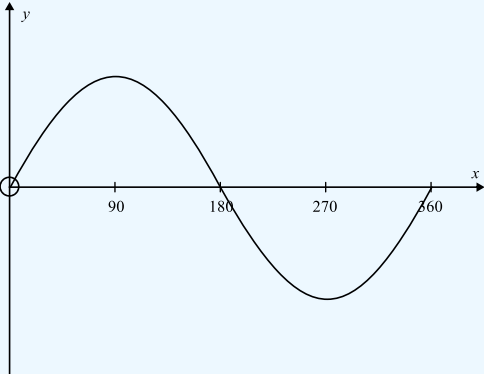
Question	Working	Answer	Notes
Q4	$\frac{7}{4} \times \frac{7}{3} = \frac{49}{12} = 4\frac{1}{12}$	$4\frac{1}{12}$	M1 Correctly converts both to improper fractions A1 cao
Q5	$360 = 60\%$ $60 = 10\%$ $600 = 100\%$	$£600$	M1 360 = 60% seen or implied A1 cao
Q6	Pentagon: $\frac{3 \times 180}{5} = 108$ Triangle: $\frac{180}{3} = 60$ $108 + 60 + 60 = 228$ $360 - 228 = 132$		M1 Interior angle of pentagon = 108 M1 108 + 108 + 60 = 228 A1 Full solution with no errors
Q7a	$p \times p = \frac{49}{100}$ $p = \sqrt{\frac{49}{100}} = \frac{7}{10}$  <p>The tree diagram shows the probability of working at home or in office on Monday and Tuesday. On Monday, the probability of working at home is <math>\frac{7}{10}</math> and working in office is <math>\frac{3}{10}</math>. On Tuesday, if working at home on Monday, the probability of working at home is <math>\frac{7}{10}</math> and working in office is <math>\frac{3}{10}</math>. If working in office on Monday, the probability of working at home is <math>\frac{7}{10}</math> and working in office is <math>\frac{3}{10}</math>.</p>		$M1 p = \sqrt{\frac{49}{100}} = \frac{7}{10}$ $M1 P(\text{work in office}) = \frac{3}{10}$ A1 Correctly completed tree diagram

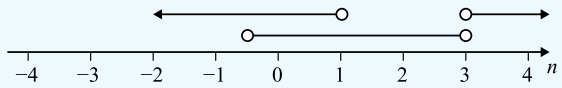
Question	Working	Answer	Notes														
<b>Q7b</b>	$P(\text{office, home}): \frac{3}{10} \times \frac{7}{10} = \frac{21}{100}$ $P(\text{home, office}): \frac{7}{10} \times \frac{3}{10} = \frac{21}{100}$ $\frac{21}{100} + \frac{21}{100} = \frac{42}{100}$	$\frac{42}{100}$ oe	M1 for a correct probability for one day (e.g. “ $\frac{3}{10}$ ” × “ $\frac{7}{10}$ ” or “ $\frac{7}{10}$ ” “ $\frac{3}{10}$ ”) ft their value for p in pt (a) M1 ft their “ $\frac{21}{100}$ ” × 2														
<b>Q8a</b>	$\frac{5^5 \times 5^{-2}}{5} = \frac{5^3}{5} = 5^2 = 25$	25	M1 Numerator simplified to $5^3$ A1 cao														
<b>Q8b</b>		$\frac{1}{8}$															
<b>Q8c</b>	$\sqrt[3]{125} = 5$	5															
<b>Q9</b>	$x^2 - 3x + 10 = 0$ $(x - 5)(x + 2) = 0$ $x = 5 \text{ or } x = -2$	$x = 5 \text{ or } x = -2$	M1 Makes = 0 M1 Factorises correctly A1 both solutions correct														
<b>Q10a</b>	<table border="1" data-bbox="286 1050 846 1110"> <tr> <td>Area of cross-section</td> <td>1</td> <td>2</td> <td>3</td> <td>6</td> <td>12</td> <td>18</td> </tr> <tr> <td>Length</td> <td>18</td> <td>9</td> <td>6</td> <td>3</td> <td>1.5</td> <td>1</td> </tr> </table>	Area of cross-section	1	2	3	6	12	18	Length	18	9	6	3	1.5	1		B2 All correct (B1 At least 3 correct)
Area of cross-section	1	2	3	6	12	18											
Length	18	9	6	3	1.5	1											
<b>Q10b</b>		$18\text{cm}^3$															
<b>Q10c</b>	Length = 2, so area of cross-section = 9 Side length, $x = 3\text{cm}$ Surface area = $2 \times 9 + 4 \times 3 \times 2$ $= 42\text{cm}^2$	$42\text{cm}^2$	B1 Area of cross-section = 9 M1 $x = 3\text{cm}$ M1 Surface area = $2 \times 9 + 4 \times 3 \times 2$ A1 cao														

Question	Working	Answer	Notes
<p><b>Q11</b></p>	$\frac{14}{25} = \frac{56}{100} = 56\%$	<p>No</p>	<p>M1 Sight of <math>\frac{14}{25}</math> oe                      M1 56% correctly calculated                      A1 Correct conclusion from correct working</p>
<p><b>Q12a</b></p>		<p>Frequency densities:                      3, 3.2, 4.2, 5, 2.5</p>	<p>M1 At least 4 correct frequency densities                      M1 Appropriate scale on axes                      A1 Correct histogram</p>
<p><b>Q12b</b></p>	$5 \times 4.2 + 5 \times 5 = 46$	$\frac{46}{194}$	<p>M1 <math>5 \times 4.2</math> seen or implied                      A1 <math>\frac{46}{194}</math> oe</p>
<p><b>Q13</b></p>	$0.688... - 0.122... = 0.566...$ $x = 0.566...$ $10x = 5.666... \text{ or } 100x = 56.666... \text{ oe}$ $9x = 5.1 \text{ or } 90x = 51 \text{ oe}$ $x = \frac{51}{90} = \frac{17}{30}$	$\frac{17}{30}$	<p>M1 <math>0.688... - 0.122... = 0.566...</math>                      M1 Multiplies 0.56666666 by power of 10                      M1 Reaches <math>\frac{51}{90}</math>                      A1 Correct simplified fraction</p>

Question	Working	Answer	Notes
<b>Q14</b>	$y = kx^2$ $36 = k \times 100$ $k = 0.36$ $y = 0.36 \times 3^2 = 0.36 \times 9 = 3.24$	3.24	M1 $36 = k \times 100$ M1 $y = 0.36 \times x^2$ seen or implied A1 cao
<b>Q15</b>	 $\text{Gradient} = \frac{1 - 3}{2 - 1} = -2$	-2	M1 Tangent drawn M1 Calculates gradient of their tangent A1 Answer in range -2.3 to -1.7
<b>Q16</b>	$\frac{x}{360} \times 2 \times \pi \times 6 = 7\pi$ $\frac{12x}{360} = 7$ $\frac{x}{30} = 7$ $x = 210^\circ$ $\text{Area} = \frac{210}{360} \times \pi \times 6^2 = \frac{7}{12} \times \pi \times 36$ $= 21\pi$	$21\pi \text{ cm}^2$	M1 $\frac{x}{360} \times 2 \times \pi \times 6 = 7\pi$ A1 Angle = $210^\circ$ M1 ft Area = $\frac{\text{“their 210”}}{360} \times \pi \times 6^2$ A1 cao

Question	Working	Answer	Notes
<b>Q17</b>	$r = \frac{7(2p+1)}{5p-3}$ $r(5p-3) = 7(2p+1)$ $5pr - 3r = 14p + 7$ $5pr - 14p = 7 + 3r$ $p(5r - 14) = 7 + 3r$ $p = \frac{7 + 3r}{5r - 14}$	$p = \frac{7 + 3r}{5r - 14}$	M1 Multiplies by $5p - 3$ M1 Expands and attempts to move $p$ terms to one side M1 Factorises A1 $p = \frac{7 + 3r}{5r - 14}$ oe
<b>Q18</b>	$5x + 10y = 210$ $x = 5y$ $25y + 10y = 210$ $35y = 210$ $y = 6$ $x = y \times 6 = 30$	30 5p coins 6 10p coins	M1 Attempts 2 equations A1 2 correct equations M1 Attempts to solve equations A1 cao

Question	Working	Answer	Notes
Q19	 <p>                         Angle <math>OAC = \text{angle } OCA = x</math>                          Angle <math>OAB = \text{angle } OBA = y</math>                          Angle <math>BAC = x + y</math>                          Angle <math>AOC = 180 - 2x</math>                          Angle <math>AOB = 180 - 2y</math>                          Angle <math>BOC = 360 - (180 - 2x) - (180 - 2y)</math>  <math>= 2x + 2y</math>  <math>= 2 \times \text{angle } BAC</math> </p>		<p>                             M1 Splits into 2 isosceles triangles and identifies that Angle <math>OAC = \text{angle } OCA</math> and Angle <math>OAB = \text{angle } OBA</math>                              M1 Finds expressions for <math>AOB</math> and <math>AOC</math>                              M1 Finds expression for <math>BOC</math>                              A1 Correctly compares to <math>BAC</math>.                              Must follow fully correct working                         </p>
Q20a			<p>                             M1 Shape correct                              A1 All points of intersection with axes correct and <math>-1</math> and <math>1</math> labelled                         </p>


Question	Working	Answer	Notes
Q20b		45	
Q21a	$h^{-1}(x) = x - 3$ $h^{-1}(7) = 7 - 3 = 4$	4	
Q21b	$f(x) < g(x)$ $x^2 - 3 < 5x - x^2$ $2x^2 - 5x - 3 < 0$ $(2x + 1)(x - 3) < 0$ $-\frac{1}{2} < x < 3$ $g(x) < h(x)$ $5x - x^2 < x + 3$ $x^2 - 4x + 3 > 0$ $(x - 3)(x - 1) > 0$ $x < 1 \text{ or } x > 3$ 	$-\frac{1}{2} < x < 1$	<p>M1 Attempts to solve <math>f(x) &lt; g(x)</math>, rearranges to get <math>2x^2 - 5x - 3 &lt; 0</math></p> <p>M1 Valid method to solve <math>2x^2 - 5x - 3 &lt; 0</math> e.g. factorising to <math>(2x \pm 1)(x \pm 3)</math> or correct substitution into quadratic formula. Don't be concerned with incorrect inequality signs or = signs at this point</p> <p>M1 Valid method to solve <math>x^2 - 4x + 3 &gt; 0</math> e.g. <math>(x \pm 3)(x \pm 1)</math> or correct substitution into quadratic formula. Don't be concerned with incorrect inequality signs or = signs at this point</p> <p>M1 <math>-\frac{1}{2} &lt; x &lt; 3</math> <b>or</b> <math>x &lt; 1, x &gt; 3</math> seen</p> <p>A1 cao</p>

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