



THIRD SPACE
LEARNING

Mathematics
Paper 6
(Calculator)
Higher Tier
Mark Scheme

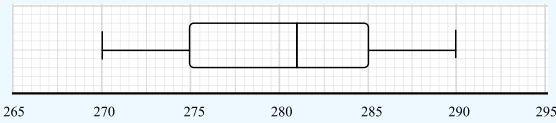
OCR GCSE

SET 5

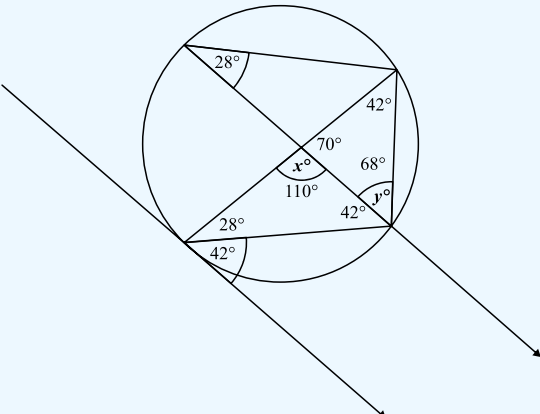
Question	Working	Answer	Notes
Q1a		q^{12}	
Q1b		$2p^7$	M1 2 or 7 correct A1 cao
Q1c	$4 \times 3 = 12$ $2^3 = 8$	$a = 4$ $b = 8$	B1 $a = 4$ B1 $b = 8$
Q2	$\frac{5.2 \times 10^{-10}}{6.2 \times 10^{-11}} = 8.387(\dots)$	8.39	M1 Attempt to divide one value by the other M1 $\frac{5.2 \times 10^{-10}}{6.2 \times 10^{-11}}$ A1 cao
Q3a		The y axis doesn't go down to 0	C1 Valid explanation
Q3b	$360 - 54 - 96 = 210$ $210^\circ = 70 \text{ days}$ $3^\circ = 1 \text{ day}$ $54 \div 3 = 18$	18 days	M1 $360 - 54 - 96 = 210$ M1 $210 \div 70 = 3$ M1 $54 \div 3$ A1 cao
Q4	2% of 125 000 = 2500 5% of 80 000 = 4000 Total stamp duty = 2500 + 4000 = £6500 $\pounds 330\,000 + \pounds 6500 + \pounds 2000 = \pounds 338\,500$ Yes he can afford it	Yes	M1 2% of 125 000 = 2500 M1 5% of 80 000 = 4000 M1 Total stamp duty = 2500 + 4000 = £6500 A1 Correct conclusion from correct working
Q5a		3.4×10^{-5}	

Question	Working	Answer	Notes
Q5b		27100	
Q5c	$\frac{3 \times 10^8}{4.5 \times 10^9} = \frac{3}{45} = \frac{1}{15}$	$\frac{1}{15}$	B1 Fully simplified fraction
Q5d	$\frac{5.2 \times 10^{-10}}{6.2 \times 10^{-11}} = 8.387(\dots)$	8.39	M1 $\frac{5.2 \times 10^{-10}}{6.2 \times 10^{-11}}$ (= 8.387(...)) A1 cao rounded to 3sf
Q6a	$5 + 5 = 10$ $8p = 10$ $p = 10 \div 8 = 1.25$	1.25	M1 $5 + 5 = 10$ M1 $8p = 10$ seen or implied A1 oe
Q6b	$x = (y - 5) \times 3$ $y = \frac{x}{3} + 5$	$x = 3y - 15$	M1 Works backward through function machine. -5 and $\times 3$ seen or $y = \frac{x}{3} + 5$ and attempts to rearrange A1 oe – any correct form acceptable
Q7a	$V = \frac{M}{D} = \frac{3700}{0.8} = 4625\text{cm}^3$	4625cm^3	M1 Converts 3.7kg to 3700g M1 Divides “their 3700” or “3.7” by 0.8 A1 cao
Q7b	$0.8\text{g/cm}^3 = 0.0008\text{kg/cm}^3$ $= 800\text{kg/m}^3$	800	
Q8a	$5^2 + 8^2 = 89$ $\sqrt{89} = 9.433981132$	9.43cm	M1 $5^2 + 8^2 = 89$ A1 cao

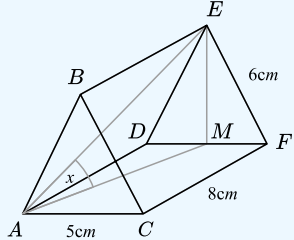
Question	Working	Answer	Notes
Q8b	Area of semi circle: $\frac{1}{2} \times \pi \times \left(\frac{\sqrt{89}}{2}\right)^2$ $= \frac{1}{2} \times \pi \times 124.716992^2$ $= 34.95021827$ Area of triangle: $\frac{1}{2} \times 5 \times 8 = 20$ Shaded area: $34.95021827 - 20 = 14.95021827$	14.95cm ²	M1 ft Radius = their 9.433981132 ÷ 2 M1 ft $\frac{1}{2} \times \pi \times$ their r squared M1 $\frac{1}{2} \times 5 \times 8 = 20$ A1 cao
Q9	$\frac{3a + 5a + 2 + 2a + 8}{3} = 120$ $10a + 10 = 360$ $10 = 350$ $a = 35$ Smallest value: $2 \times 35 + 8 = 78$	78	M1 Sets up equation or multiplies 120 by 3 A1 $a = 35$ M1 Substitutes a into at least one expression A1 cao
Q10a		47 ⁹³	
Q10b		3	
Q11a	2 + 9 3 + 8 4 + 7 5 + 6	6, 7, 8, 9	M1 At least 3 correct values A1 All 4 values with no extras

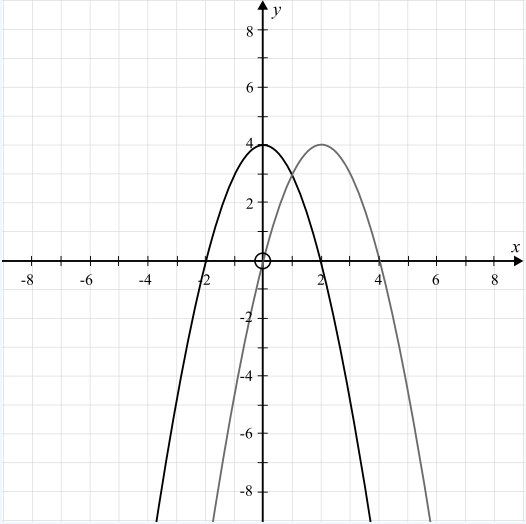
Question	Working	Answer	Notes
<p>Q11b</p>		$x \leq 6$ $y > x$ $x + y > 8$	<p>M1 $x \dots\dots 6$ (any symbol, including =) A1 $x \leq 6$ M1 $y \dots\dots x$ A1 $y > x$ M1 $x + y \dots\dots 8$ A1 $x + y > 8$ oe</p>
<p>Q12</p>	<p>Surface area of cylinder: $2 \times \pi \times 2.5^2 + 2 \times \pi \times 2.5 \times 4.5 = 35\pi$ (=109.9557429...) Surface area of sphere $4\pi r^2 = 250 - 35\pi$ or $250 - 35\pi = 140.0442571$ and $4\pi r^2 = 140.0442571$</p> $r^2 = \frac{250 - 35\pi}{4\pi} \text{ (=11.14436789)}$ $r = \sqrt{\frac{250 - 35\pi}{4\pi}} \text{ (=3.3383181...)}$	<p>3.34m</p>	<p>M1 Calculates surface area of cylinder M1 forms correct equation for SA of sphere or subtracts surface area of cylinder from 250 and interprets this as the maximum surface area of the sphere</p> <p>M1 Solves equation for surface area of sphere to find r A1 cao</p>
<p>Q13a</p>	<p style="text-align: center;">Machine A</p>  <p style="text-align: center;">Weight (grams)</p>		<p>B1 Lowest and highest values correct B1 Median correct B1 Quartiles correct</p>

Question	Working	Answer	Notes																		
<p>Q13b</p>	<p>e.g. The median weight of cakes produced by machine B is greater than the median weight of cakes produced by machine A.</p> <p>e.g. The interquartile range for machine B is smaller than the interquartile range for machine A.</p>		<p>C1 Correct comparison of medians</p> <p>C1 Correct comparison of measure of spread (range or IQR)</p>																		
<p>Q14</p>	$5 \times 8 + 8 \times 4 + 5 \times 8 \times 4 = 232$		<p>M1 Uses multiplicative method for counting</p> <p>A1 cao</p>																		
<p>Q15</p>	<p>First differences: 4, 6, 8, 10</p> <p>Second differences 2, 2, 2</p> <table border="1" data-bbox="286 1220 840 1364"> <tr> <td>S</td> <td>7</td> <td>11</td> <td>17</td> <td>25</td> <td>35</td> </tr> <tr> <td>n^2</td> <td>1</td> <td>4</td> <td>9</td> <td>16</td> <td>25</td> </tr> <tr> <td>$S - n^2$</td> <td>6</td> <td>7</td> <td>8</td> <td>9</td> <td>10</td> </tr> </table>	S	7	11	17	25	35	n^2	1	4	9	16	25	$S - n^2$	6	7	8	9	10	$n^2 + n + 5$	<p>M1 Finds second differences and halves to give n^2</p> <p>M1 Subtracts n^2 from S and attempts to find nth term</p> <p>A1 cao</p>
S	7	11	17	25	35																
n^2	1	4	9	16	25																
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Question	Working	Answer	Notes																																																	
<p>Q16</p> <table border="1" data-bbox="286 256 730 703"> <tr> <td>÷</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> </tr> <tr> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> </tr> <tr> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>9</td> </tr> <tr> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>9</td> <td>10</td> </tr> <tr> <td>5</td> <td>6</td> <td>7</td> <td>8</td> <td>9</td> <td>10</td> <td>11</td> </tr> <tr> <td>6</td> <td>7</td> <td>8</td> <td>9</td> <td>10</td> <td>11</td> <td>12</td> </tr> </table> <p>or lists combinations (e.g. 2 + 6 3 + 5 3 + 6...)</p>	÷	1	2	3	4	5	6	1	2	3	4	5	6	7	2	3	4	5	6	7	8	3	4	5	6	7	8	9	4	5	6	7	8	9	10	5	6	7	8	9	10	11	6	7	8	9	10	11	12	$\frac{15}{36}$	$\frac{15}{36}$	<p>M1 P(each combination) = $\frac{1}{36}$ (can be implied by a denominator of 36) M1 Uses a table to show options or lists combinations, identifying at least 12 different combinations A1 $\frac{15}{36}$ or equivalent fraction</p>
÷	1	2	3	4	5	6																																														
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<p>Q17a</p>		$(p + q)(p - q)$																																																		
<p>Q17b</p>	$(51 + 49)(51 - 49) = 100 \times 2 = 200$	200	<p>M1 $(51 + 49)(51 - 49)$ A1 cao</p>																																																	
<p>Q18ab</p>		$x = 110^\circ$ $y = 68^\circ$	<p>M1 Correctly labels at least one other angle A1 Correct x M1 Correctly labels at least 1 other angle A1 Correct y</p>																																																	

Question	Working	Answer	Notes
Q19a		4200	
Q19b	$4032 = 4200 \times a$ $a = \frac{4032}{4200} = 0.96$		M1 $4032 = 4200 \times a$ A1 $a = \frac{4032}{4200} = 0.96$
Q19c	When $n = 10$: $F = 4200 \times 0.96^{10}$ (= 2792.297...) Decrease is $4200 - 4200 \times 0.96^{10}$ (= 1407.702...) $\frac{4200 - 4200 \times 0.96^{10}}{4200} \times 100$ = 33.5 (...) % decrease	33.5% decrease which is more than 30%	M1 Calculates $F = 4200 \times 0.96^{10} = 2792$ M1 Calculates either percentage decrease or percentage remaining A1 Correct conclusion
Q20	$\frac{448}{1008} = \frac{4}{9}$ SA scale factor V scale factor = $\frac{8}{27}$ $1134 \times \frac{8}{27} = 336$	336cm ³	M1 Finds SA scale factor M1 Finds volume scale factor A1 cao

Question	Working	Answer	Notes
<p>Q21</p>	$\frac{x}{x+3} + \frac{2x}{3x-1} - 5$ $= \frac{x(3x-1) + 2x(x+3) - 5(x+3)(3x-1)}{(x+3)(3x-1)}$ $= \frac{3x^2 - x + 2x^2 + 6x - 15x^2 - 40x + 15}{(x+3)(3x-1)}$ $= \frac{-10x^2 - 35x + 15}{(x+3)(3x-1)} \left(= \frac{-5(2x^2 + 7 - 3)}{(x+3)(3x-1)} \right)$	$= \frac{-10x^2 - 35x + 15}{(x+3)(3x-1)}$	<p>M1 $\frac{x(3x-1) + 2x(x+3) - 5(x+3)(3x-1)}{(x+3)(3x-1)}$</p> <p>M1 $\frac{3x^2 - x + 2x^2 + 6x - 15x^2 - 40x + 15}{(x+3)(3x-1)}$</p> <p>A1 Correct simplified fraction</p>
<p>Q22</p>	$W = \frac{14.05 - 2.355}{0.475} = 24.62105263$	<p>24.62</p>	<p>M1 Correct use of bounds for u or v or t</p> <p>M1 Correct use of bound for two of u, v and t</p> <p>A1 cao</p>
<p>Q23</p>	 <p>$AM^2 = 8^2 + 2.5^2$ or $AE^2 = 8^2 + 6^2$</p> <p>$AM = 8.382$ or $AE = 10$</p> <p>$EM^2 = 6^2 - 2.5^2$</p> <p>$EM = 5.454(\dots)$</p> <p>$\tan(x) = \frac{5.454(\dots)}{8.382(\dots)}$ or $\sin(x) = \frac{5.454(\dots)}{10}$</p> <p>$x = 33.0512$</p>	<p>33.1°</p>	<p>M1 Calculates length AM or length AE</p> <p>M1 Calculates length EM</p> <p>M1 ft $\tan(x) = \frac{\text{“their } EM\text{”}}{\text{“their } AM\text{”}}$</p> <p>or $\sin(x) = \frac{\text{“their } EM\text{”}}{\text{“their } AE\text{”}}$</p> <p>(their values for EM, AM or AE must be from a valid method)</p> <p>A1 cao</p>


Question	Working	Answer	Notes
<p>Q24</p>	$x = \frac{-6 \pm \sqrt{6 - 4ac}}{2a}$ $2a = 6 \text{ so } a = 3$ $\sqrt{36 - 4ac} = 2\sqrt{42}$ $36 - 4ac = 168$ $4ac = -132$ $c = \frac{-132}{12} = -11$	$a = 3$ $c = -11$	<p>M1 $2a = 6$ so $a = 3$</p> <p>M1 $\sqrt{36 - 4ac} = 2\sqrt{42}$</p> <p>A1 cao</p>
<p>Q25a</p>			<p>B2 Translation 2 units right (B1 Translation 2 units left)</p>
<p>Q25b</p>		$y = f(x + 3) + 1$	<p>B1 +3 or +1 correctly placed</p> <p>B1 fully correct</p>

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