



THIRD SPACE
LEARNING

Mathematics

Paper 2

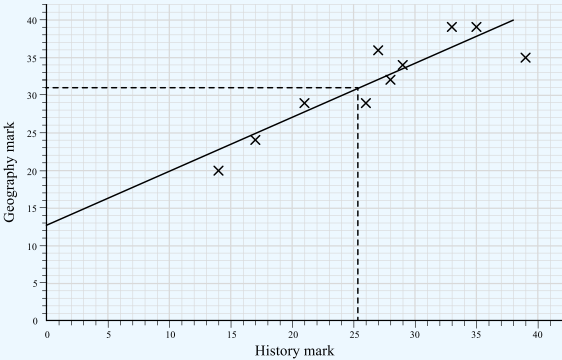
(Calculator)

Higher Tier

Mark Scheme

Edexcel GCSE

SET 5

Question	Working	Answer	Notes
Q1	$\tan(x) = \frac{6}{11}$ $x = \tan^{-1}\left(\frac{6}{11}\right)$ $x = 28.61045967$	$x = 28.6^\circ$	M1 $\tan(x) = \frac{6}{11}$ or $x = \tan^{-1}\left(\frac{6}{11}\right)$ A1 Correct answer, rounded to 3sf
Q2a	$\frac{1}{0.4} = 2.5$	2.5	
Q2b		$5.25 \leq x < 5.35$	B1 5.25 B1 5.35
Q3a	Those with higher marks in history also had higher marks in geography		Accept positive correlation
Q3b		31	M1 For method to read off (e.g. line of best fit or a line up from 25) A1 for an answer in the range 26 - 36
Q3c		Geography seems easier as the marks are generally higher	B1 'Geography seems easier' B1 'Because the marks are generally higher' oe

Question	Working	Answer	Notes
Q4	Co-interior angle = $180 - 121 = 59$ Bearing = $360 - 59 = 301^\circ$	301°	M1 Correct sketch with bearing labelled or correct first step A1 cao
Q5	Try different values: $7000 \times 1.06^4 = 8837.34$ $7000 \times 1.06^5 = 9367.58$ $7000 \times 1.06^6 = 9929.63$	$n = 5$	M1 Tries at least 1 value for n A1 cao
Q6a		1.498828982	M1 $\sqrt[3]{1.4_2 + \tan(30)} = 1.363934374$ correctly calculated for numerator (can be implied by correct final answer) A1 cao
Q6b		1.50	
Q7	$A \text{ to } B = \begin{pmatrix} 4 \\ 6 \end{pmatrix}$ $B \text{ to } C = \begin{pmatrix} 10 \\ 15 \end{pmatrix}$ $C = (16, 24)$	$(16, 24)$	M1 A to B 4 along and 6 up stated M1 Divides by 2 and multiplies by 5 to find BC or by 7 to find AC M1 ft Adds their BC onto B or their AC onto A A1 cao

Question	Working	Answer	Notes												
<p>Q8</p>	<p>Scale factor: $18 \div 12 = 1.5$</p> <p>$1.5(2x + 10) = 5x + 9$</p> <p>$3x + 15 = 5x + 9$</p> <p>$15 = 2x + 9$</p> <p>$6 = 2x$</p> <p>$x = 3$</p> <p>Perimeter = $5 \times 3 + 9 + 3 \times 3 + 4 + 18$</p> <p>= $24 + 13 + 18$</p> <p>= 55cm</p>	<p>55cm</p>	<p>B1 Scale factor: $18 \div 12 (= 1.5)$</p> <p>M1 “Their 1.5” $\times (2x + 10) = 5x + 9$</p> <p>A1 $x = 3$</p> <p>M1 (dep at least M1 previously awarded)</p> <p>Substitutes their “x” to find perimeter</p> <p>A1 cao</p>												
<p>Q9a</p>	<table border="1" data-bbox="286 1029 831 1305"> <thead> <tr> <th>Time, t seconds</th> <th>Cumulative frequency</th> </tr> </thead> <tbody> <tr> <td>$60 \leq t < 90$</td> <td>7</td> </tr> <tr> <td>$60 \leq t < 120$</td> <td>21</td> </tr> <tr> <td>$60 \leq t < 150$</td> <td>44</td> </tr> <tr> <td>$60 \leq t < 180$</td> <td>71</td> </tr> <tr> <td>$60 \leq t < 210$</td> <td>80</td> </tr> </tbody> </table>	Time, t seconds	Cumulative frequency	$60 \leq t < 90$	7	$60 \leq t < 120$	21	$60 \leq t < 150$	44	$60 \leq t < 180$	71	$60 \leq t < 210$	80		
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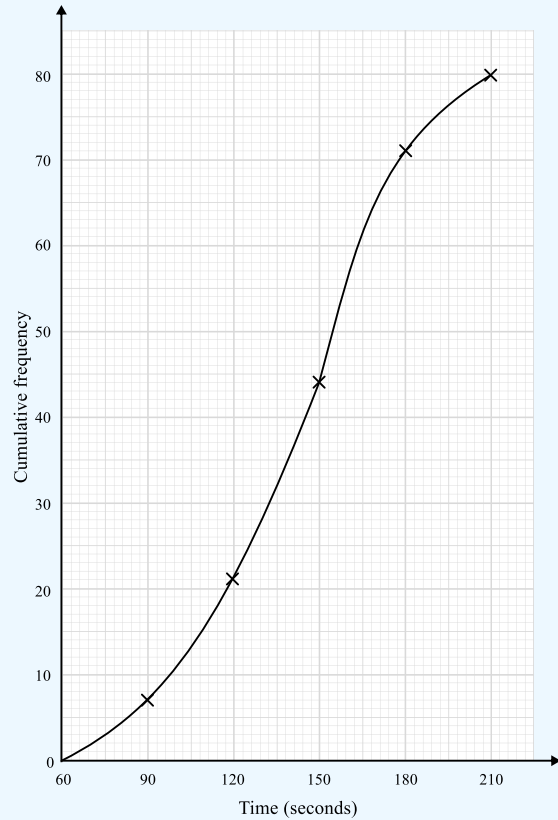
Question

Working

Answer

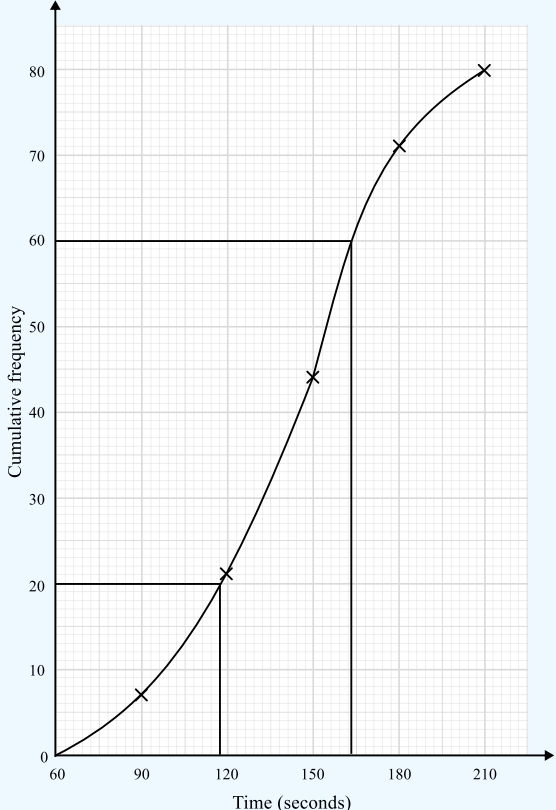
Notes

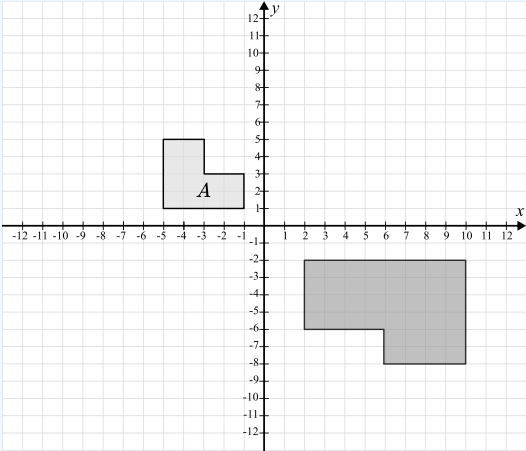
Q9b



M1 All points correctly plotted

A1 Joined with a smooth curve

Question	Working	Answer	Notes
<p>Q9c</p>	 <p>Lower Quartile = 117 Upper Quartile = 164 Interquartile range = 164 – 117</p>	<p>$164 - 117 = 47$</p>	<p>M1 Lower quartile between 114 and 120 Upper quartile between 161 and 167 or ft their graph A1 Answer in the range 41 to 53 or ft their graph</p>
<p>Q10a</p>	<p>$10 = 0.25$ $40 = 1$</p>	<p>40</p>	<p>M1 $10 = \frac{1}{4}$ of cards A1 cao</p>

Question	Working	Answer	Notes
Q10b	Diamond: $\frac{13}{40} = 0.325$ Spade: $1 - 0.325 - 0.275 - 0.25 = 0.15$	0.325, 0.15	A1 Diamond correct A1 Spade correct
Q10c	$\frac{13}{25} = 0.25$	Yes, because in a full pack of cards the probability would be 0.25 and $0.275 > 0.25$	M1 0.25 oe seen A1 Correct comparison and conclusion
Q11	$(2x^2 - 9x - 5)(3x + 2)$ $= 6x^3 - 27x^2 - 15x + 4x^2 - 18x - 10$ $= 6x^3 - 23x^2 - 33x - 10$	$6x^3 - 23x^2 - 33x - 10$	M1 Correctly expands any pair of brackets M1 Attempts to expand third bracket A1 cao
Q12	$L_2: y = -\frac{1}{3}x + \frac{1}{3}$ $m_1 \times m_2 : 3 \times -\frac{1}{3} = -1$	Their gradients multiply to make -1 , therefore perpendicular	M1 Gradient $L_1 = -\frac{1}{3}$ A1 Correct conclusion
Q13			M1 Enlargement scale factor 2 A1 cao

Question	Working	Answer	Notes
Q14	$360 \div 1.16 = \text{£}310.34(\dots)$ $385 \div 1.37 = \text{£}281.02(\dots)$	London	M1 Converts € to £ M1 Convert \$ to £ A1 Correct conclusion from correct working
Q15	$\pi \times (1.12r)^2 = 1.2544\pi r^2$ % increase is 25.44%	25.44%	M1 $\pi \times (1.12r)^2$ M1 $1.2544\pi r^2$ A1 cao
Q16a	$2^3 - 2 \times 2^2 - 1 = -1$ $3^3 - 2 \times 3^2 - 1 = 8$	Change of sign shows root	M1 Substitutes 2 and 3 into $x^3 - 2x^2 - 1$ A1 Correct conclusion
Q16b	$x^3 - 2x^2 - 1 = 0$ $x^3 = 2x^2 + 1$ $x = \sqrt[3]{2x^2 + 1}$		A1 Fully correct with at least 2 steps
Q16c	$x_1 = \sqrt[3]{2 \times 2.5^2 + 1} = 2.3811$ $x_2 = 2.3108$ $x_3 = 2.2689$ $x_4 = 2.2437$		M1 Attempts to substitute 2.5 into $x_{n+1} = \sqrt[3]{2x_n^2 + 1}$ A1 $x_1 = \sqrt[3]{2 \times 2.5^2 + 1} = 2.3811(\dots)$ A1 All values correct to 4 decimal places

Question	Working	Answer	Notes
Q17a	$a^2 = 8.1^2 + 11.3^2 - 28.1 \times 11.3 \cos(72)$ $a^2 = 136.731349$ $a = 11.69321808$	11.7cm	M1 Correct substitution into cosine rule M1 $a^2 = 136.731349$ A1 cao
Q17b	$A = \frac{1}{2} \times 8.1 \times 11.3 \sin(72)$ $A = 43.52510147$	43.5cm ²	M1 Correct substitution into area formula A1 cao
Q18	$\vec{DE} = -\mathbf{a} - 3\mathbf{b} + 3\mathbf{a} + 4\mathbf{b}$ $\vec{DE} = 2\mathbf{a} + \mathbf{b}$ $\vec{DC} = \frac{9}{4} (2\mathbf{a} + \mathbf{b})$ $\vec{DC} = \frac{9}{2} \mathbf{a} + \frac{9}{4} \mathbf{b}$ $\vec{AC} = \mathbf{a} + 3\mathbf{b} + \frac{9}{2} \mathbf{a} + \frac{9}{4} \mathbf{b}$ $\vec{AC} = \frac{11}{2} \mathbf{a} + \frac{21}{4} \mathbf{b}$		M1 Correct expression for DE M1 Uses ratio to get correct expression for DE or DC M1 Adds vectors using a correct pathway A1 cao


Question	Working	Answer	Notes
Q19a	$-2x^2 + 12x + 11 = -2[x^2 - 6x] + 11$ $= -2[(x - 3)^2 - 9] + 11$ $= -2(x - 3)^2 + 29$	$29 - 2(x - 3)^2$	M1 Factorises out -2 M1 Completes square A1 cao
Q19b		$(3, 29)$	
Q20	$\frac{1 + \sqrt{9a}}{b - \sqrt{4a}} \times \frac{b + \sqrt{4a}}{b + \sqrt{4a}}$ $= \frac{b + 2\sqrt{a} + 3b\sqrt{a} + 6a}{b^2 - 4a}$ $= \frac{b + 6a + (2 + 3b)\sqrt{a}}{b^2 - 4a}$	$m = b + 6a$ $n = 2 + 3b$ $p = b^2 - 4a$	M1 Attempts to multiply by $\frac{b + \sqrt{4a}}{b + \sqrt{4a}}$ M1 Correctly multiplies (may not be simplified) A1 Reaches $\frac{b + 2\sqrt{a} + 3b\sqrt{a} + 6a}{b^2 - 4a}$ M1 Groups terms A1 cao
Q21	$x^2 + (2x - 5)^2 = 25$ $x^2 + 4x^2 - 20x + 25 = 25$ $5x^2 - 20x = 0$ $5x(x - 4) = 0$ $x = 0 \text{ or } x = 4$ $y = -5 \text{ or } y = 3$ $(0, -5) \text{ and } (4, 3)$ $\text{Length: } \sqrt{4^2 + 8^2} = \sqrt{80} = 4\sqrt{5}$	$4\sqrt{5}$	M1 Substitutes and attempts to solve M1 Reaches $5x^2 - 20x = 0$ M1 Solves for x M1 Finds values for y M1 Use of Pythagoras theorem A1 cao

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