



THIRD SPACE  
LEARNING

# Mathematics

## Paper 3

### (Calculator)

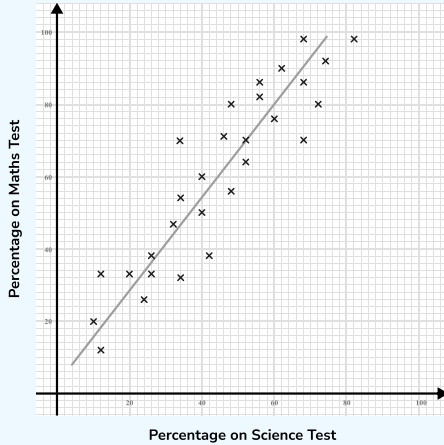
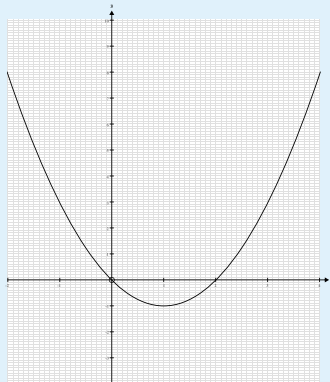
### Higher Tier

### Mark Scheme

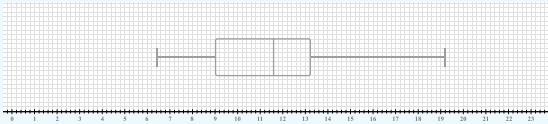
AQA GCSE

SET 1A

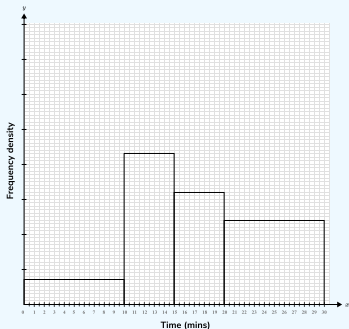
Question	Working	Answer	Notes
Q1a		2	B1
Q1b		36	B1
Q2	$1\,330\,000 \div 45\,000$	29.56	B1
Q3		$y = 2^x$	B1
Q4	$\frac{11}{15} = 0.7333\dots, \frac{7}{9} = 0.777\dots$	$72\%, \frac{11}{15}, 0.77, \frac{7}{9}$	M1 Attempting to convert all values to the same form A1 cao
Q5a		$2n+1$	M1 Finding a common difference of 2 A1 cao
Q5b		All values in the sequence are odd	B1 oe
Q6	$5 + 2 = 7, 35 \div 7 = 5$ $5 \times 5 = 25$ apples, $5 \times 2 = 10$ oranges $25 \times 30p = 750p, 10 \times 40 = 400p$ $750p + 400p = 1150p$	£11.50	M1 Dividing 35 by 7 M1 Correctly finding the number of oranges and the number of apples M1 750p or £7.50 and 400p or £4 seen A1 cao
Q7	$200\,000 \times 1.0229^5$	£223 973	M1 $1.0229^5$ seen A1 cao

Question	Working	Answer	Notes																
Q8a			B1																
Q8b		between 75% and 80%	M1 Drawing horizontal line across from 57% on vertical axis to the line of best fit. B1																
Q8c		outlier	B1																
Q9a	<table border="1" data-bbox="277 930 826 997"><tr><td><math>x</math></td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td><math>y</math></td><td>8</td><td>3</td><td>0</td><td>-1</td><td>0</td><td>3</td><td>8</td></tr></table>	$x$	-2	-1	0	1	2	3	4	$y$	8	3	0	-1	0	3	8	3, -1, 0	M1 at least 2 values correct A1 cao
$x$	-2	-1	0	1	2	3	4												
$y$	8	3	0	-1	0	3	8												
Q9b			M1 Points plotted followed through from their table. Allow one error in plotting A1 fully correct curve																

Question	Working	Answer	Notes																				
Q9c		$x=0$ and $x=2$	A1 cao																				
Q9d		(1, -1)	B1																				
Q10	1 hour 30 mins = 1.5 hours $105 \div 1.5 = 70$	Yes	M1 Using 1.5 hours M1 Dividing distance by time A1 Yes with 70 seen																				
Q11		$345 \leq \text{mass}(kg) < 355$	A1 345 A1 355																				
Q12	$3a = \begin{pmatrix} 12 \\ -3 \end{pmatrix}$ $2b = \begin{pmatrix} 6 \\ 4 \end{pmatrix}$	$\begin{pmatrix} 18 \\ 1 \end{pmatrix}$	M1 For either 3a or 2b or 18 or 1 A1 cao																				
Q13	<table border="1"> <thead> <tr> <th></th><th>Adult</th><th>Child</th><th>Total</th></tr> </thead> <tbody> <tr> <td>First</td><td>37</td><td>3</td><td>40</td></tr> <tr> <td>Business</td><td>30</td><td>19</td><td>49</td></tr> <tr> <td>Economy</td><td>53</td><td>38</td><td>91</td></tr> <tr> <td>Total</td><td>120</td><td>60</td><td>180</td></tr> </tbody> </table>		Adult	Child	Total	First	37	3	40	Business	30	19	49	Economy	53	38	91	Total	120	60	180		M1 for placing at least 3 given numbers correctly M1 for between 7 and 11 entries correct A1 for fully correct table
	Adult	Child	Total																				
First	37	3	40																				
Business	30	19	49																				
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Total	120	60	180																				
Q14		Yes, with reason	B1 Sofia is correct. B1 stating the common ratio is 3																				
Q15	$5 \times 4 \times 10 \times 5 = 1000$	1000	M1 Multiplying 4 numbers M1 At least 3 of those numbers correct A1 cao																				
Q16	Radius = 4cm Volume: $\pi \times 4^2 \times 10 = 160\pi$	$160\pi$ or $502.65 \dots \text{cm}^3$	M1 $\pi \times 4^2$ seen M1 Attempt to multiply area of circle by height A1 cao																				

Question	Working	Answer	Notes
<b>Q17a</b>	LQ: 8.9, Median: 11.6, UQ: 13.1 Min value: 6.4, Max value 19.1 		M1 At least two of lower quartile, median and upper quartile correct M1 Highest and lowest values correctly marked on box plot A1 cao
<b>Q17b</b>			B1 A statement comparing the median or highest/lowest values B1 A statement comparing range or interquartile range NOTE - For B2 at least one statement MUST be with context
<b>Q18a</b>	$\sin(x) = \frac{10.5}{12}$ $x = \sin^{-1}\left(\frac{10.5}{12}\right) = 61.0^\circ$	$61.0^\circ$	B1 for the right angle ABC M1 Use of $\sin(x) = \frac{O}{H}$ A1 cao
<b>Q18bi</b>		$61.0^\circ$	B1 cao
<b>Q18bii</b>		Alternate segment theorem	B1 cao
<b>18ci</b>		$86^\circ$	B1 cao
<b>18cii</b>		Opposite angles in a cyclic quadrilateral add to $180^\circ$	B1 cao

Question	Working	Answer	Notes
<b>Q19</b>	$P(Y \text{ and } R): \frac{6}{14} \times \frac{4}{11} = \frac{24}{154}$ $P(R \text{ and } B): \frac{8}{14} \times \frac{7}{11} = \frac{56}{154}$ $P(Y \text{ and } B): \frac{6}{14} \times \frac{7}{11} = \frac{42}{154}$ Total probability: $\frac{24}{154} + \frac{56}{154} + \frac{42}{154} = \frac{122}{154}$ <b>Or</b> $1 - P(R \text{ and } B): 1 - (\frac{8}{14} \times \frac{4}{11})$ $1 - \frac{32}{154}$ $\frac{122}{154}$	$\frac{122}{154}$	M1 one of $\frac{6}{14} \times \frac{4}{11}, \frac{8}{14} \times \frac{7}{11}, \frac{6}{14} \times \frac{7}{11}$ seen M1 all three seen M1 process to add the probabilities A1 oe M1 $1 - (\frac{8}{14} \times \frac{4}{11})$ M1 $1 - \frac{32}{154}$ A1 oe
<b>Q20a</b>	$(5x^2 + 18x - 8)(2x + 3)$ $10x^3 + 15x^2 + 36x^2 + 54x - 16x - 24$ $10x^3 + 51x^2 + 38x - 24$	$10x^3 + 51x^2 + 38x - 24$	M1 Correctly expanding 2 brackets M1 Correctly multiplying by third bracket A1 Fully simplified answer
<b>Q20b</b>		$(2x+5y)(2x-5y)$	M1 Two terms that multiply to $4x^2$ or $-25y^2$ A1 cao
<b>Q21</b>	$2(x^2 + 4) - 1$ $2x^2 + 7$	$g(x) = 2x^2 + 7$	M1 Substituting f into g A1 cao
<b>Q22a</b>	Angle $QPR = 132^\circ - 80^\circ = 52^\circ$ $QR^2 = 15^2 + 14^2 - 2 \times 15 \times 14$ $\times \cos 52$ $QR = 12.744...$	12.7 km	M1 Angle $QPR = 132^\circ - 80^\circ = 52^\circ$ M1 Values substituted into cosine rule $QR^2 = 15^2 + 14^2 - 2 \times 15 \times 14$ $\times \cos 52$ A1 12.7km
<b>Q22b</b>	$\frac{\sin 52}{12.74...} = \frac{\sin PQR}{14}$	$200^\circ$	M1 Use of sine rule $\frac{\sin 52}{12.74...} = \frac{\sin PQR}{14}$ M1 Angle $PQR = 59.9...^\circ$ M1 Angle of $100^\circ$ anticlockwise from North line at Q A1 cao

Question	Working	Answer	Notes
<b>Q23a</b>	$43 \div 5 = 8.6$ Height of 20 minutes to 30 minutes bar is 4.8 $10 \times 4.8 = 48$	48	M1 $43 \div 5 = 8.6$ M1 Bar height 4.8 seen A1 cao
<b>Q23b</b>	Frequency density: $14 \div 10 = 1.4$ 		A1 Correct bar on histogram
<b>Q24</b>	$y = 3x - 5$ $x^2 + (3x - 5)^2 = 25$ $x^2 + 9x^2 - 30x + 25 = 25$ $10x^2 - 30x = 0$ $10x(x - 3) = 0$ $x = 0$ or $x = 3$  When $x=0$ , $y = 3 \times 0 - 5 = -5$ When $x=3$ , $y = 3 \times 3 - 5 = 4$  (0, -5) and (3, 4)	(0, -5) and (3, 4)  OR  $x = 0$ and $y = -5$ or $x = 3$ and $y = 4$	M1 Substituting $3x - 5$ into $x^2 + y^2 = 25$ M1 Simplifying to $10x^2 - 30x = 0$ M1 Solving for $x$ A1 Substituting and finding values of $y$

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