

Question		Answer	Marks	Part marks and guidance	
1		$2^2 \times 3 \times 5$ or $2 \times 2 \times 3 \times 5$	2	B1 for only 2, 3 and 5 or M1 for any correct factor pair of 60	Condone inclusion of 1 for B1 Not 1 and 60
2		50 with correct 500 and $\sqrt{100}$ or 10 shown nfw	2	M1 for one of 500 or $\sqrt{100}$ or 10	
3	(a)	$12a^7$ final answer	2	B1 for answer ka^7 or $12a^k$ or for correct answer seen then spoiled	
3	(b)	$4x(x-3)$ final answer	2	B1 for answer $4(x^2-3x)$ or $x(4x-12)$ or $2x(2x-6)$ or for correct answer seen then spoiled	Condone omission of final bracket for 2 marks or B1
4	(a)	No with the graph is not rising month on month as they are flat in June and/or dip in July oe	1		Allow for comment on either the flat or dip in the graph e.g. sales fell between July and August Do not accept incorrect statements See Appendix 1
4	(b)	No with no vertical scale numbering so cannot see if sales have doubled oe	1		Accept: No with no values/data/figures/numbers/%s shown [on sales axis] See Appendix 2
5	(a)	$\binom{1}{3}$	1		Not for $\binom{1}{3}$
5	(b)	$\binom{3}{11}$	2	B1 for either 3 or 11 in correct position or for $\left[\binom{5}{3} + \binom{-2}{8}\right]$ or $\binom{5}{3} - \binom{2}{-8}$	Not for $\binom{3}{11}$

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6		Reflection in $x = 1$	2	<p>B1 for each</p> <p>If 0 scored, SC1 for $x=1$ drawn</p>	<p>Extra transformations score zero</p> <p>Additional properties treat as choice</p> <p>Condone for 2 marks</p> <p>e.g. Reflection, centre $x = 1$</p>
7		50 with correct working	4	<p>B2 for 2400</p> <p>or M1 for $\frac{15}{100} \times 16000$ oe</p> <p>M1 for $(17400 - \textit{their} 2400) \div 300$ oe</p> <p>If 0 or M1 scored, instead award SC2 for answer 50 with no or insufficient working</p> <p>If 0 scored, instead award SC1 for 15 000 with no or insufficient working</p>	<p>“Correct working” requires evidence of at least B2 or M1M1 or alternate convincing approach</p> <p>For M1 not $15\% \times 16000$ alone</p> <p>Allow repeated addition of 300 need 5 additions, condone 1 error. Could e.g. start 2400 and try to add on to make 17400</p> <p>Candidates who use 17400 throughout treat as MR (see marking instructions)</p> <p>B2 for 2610 (15%)</p> <p>and answer 49.3 condone rounded to 49 or 50 if multiples of 300 are used instead of division</p>
8		960	2	M1 for 2.4×400	
9	(a)	25[%]	2	M1 for $\frac{4}{1+4+11} [\times 100]$ oe	
9	(b)	128	4	<p>M1 for $24 \div (4 - 1)$ oe</p> <p>and</p> <p>M2 for $8 \times (1 + 4 + 11)$ oe</p> <p>or 8, 32 and 88</p> <p>or M1 for <i>their</i> $8 \times (1 + 4 + 11)$ oe</p> <p>or <i>their</i> 8, $4 \times \textit{their} 8$ and $11 \times \textit{their} 8$ evaluated</p>	<p>Implied by 8 [red]</p> <p><i>their</i> 8 must be an integer</p> <p>and if 6 or 24 implied by 96 or 384</p>

Question		Answer	Marks	Part marks and guidance	
13	(a)		3	1	
13	(b)	Correct curve	3	B2FT for 7 or 8 correct plots or B1FT for 5 or 6 correct plots	Use overlay as a guide Mark curve first accuracy ± 1 mm, $\frac{1}{2}$ small sq Condone slight feathering Condone ruled segment between $x = -5$ and $x = -4.5$ only If curve incorrect then mark plots accuracy ± 1 mm If no plot, curve implies plot
13	(c)	-1 cao	1		
14	(a)	Any two from Small sample oe Limited to one age group oe May all be one gender oe	2	B1 for each correct reason	Accept e.g: They should have asked more pupils Do not accept they should ask all the pupils They should have asked different age groups They should make sure they ask males and females Accept two disadvantages given in one statement Ignore incorrect statements
14	(b)	The sample is representative of the whole school oe	1		See Appendix 3

Question		Answer	Marks	Part marks and guidance	
15	(a)	Accurate ruled perpendicular from T to AB with correct construction arcs	2	B1 for accurate ruled perpendicular from T to AB with no/incorrect construction arcs $\pm 2^\circ$	For 2 marks or B1 must reach/cross AB Correct arcs could be e.g. Kite method Condone dashed/dotted lines Multiple lines treat as choice
15	(b)	520 000 to 560 000 with correct working oe OR that would be 6 cm on the map but it only measures 5.2 to 5.6 cm oe OR This money would build 3 km but it only measures 2.6 to 2.8 km oe	3	B1FT for [road =] 5.2 to 5.6 [cm] or 2.6 to 2.8 [km] or <i>their</i> (a) measured ± 2 mm M1FT for (<i>their</i> 5.2 to 5.6) $\div 2 \times 200\,000$ oe or $600\,000 \div 200\,000 [\times 2]$	For 3 marks accept e.g. it will be 40 000 to 80 000 less than this B1 may be seen on diagram Accept FT given in km as <i>their</i> (a) $\div 2$ M1 implied by 6 cm or 3 km Method can be implied by correct figures For 3 marks accept e.g. $3 \times 200\,000$ is greater than $2.7 \times 200\,000$
16	(a)	Correct box plot	3	B2 for 4 or 5 correct markers or B1 for 3 correct markers or 16 or 60 soi	Markers must be associated with the correct statistic e.g. do not allow median marked as UQ
16	(b)	11Q [because] it has a smaller IQR oe	1		Accept: 11Q [because] its IQR is 18 but the IQR of 11P is 24 or 25 Do not accept if median also mentioned or if incorrect values given

Question		Answer	Marks	Part marks and guidance									
17		<table border="1"> <tr> <td>x</td> <td>1</td> <td>2</td> <td>5</td> </tr> <tr> <td>y</td> <td>7</td> <td>56</td> <td>875</td> </tr> </table>	x	1	2	5	y	7	56	875	4	<p>B3 for 56 or 5 or M2 for 7×2^3 or $7x^3 = 875$ or M1 for $y = kx^3$</p>	M1 implied by $y = 7x^3$ seen
x	1	2	5										
y	7	56	875										
18		$\frac{8}{11}$ final answer	4	<p>B3 for $\frac{72}{99}$ oe or B2 for $\frac{28}{99}$ oe fraction or for 0.72 or M1 for $[100x =] 28.28....$ or for 0.4</p>	or any pair that allow elimination of recurring decimal								
19		<p>$y = 2$ ruled and $y = -2x - 3$ broken line and correct region indicated</p>	6	<p>B1 for $y = 2$ ruled B2 for $y = -2x - 3$ broken line or B1 for $y = -2x - 3$ solid line</p> <p>AND</p> <p>B1 for R on correct side of $y = x$ B1 for R on correct side of $y = 2$ B1 for R on correct side of <i>their</i> $y = -2x - 3$</p>	<p>Penalise one mark only for good freehand lines Additional lines treat as choice Length of line should be fit for purpose to identify <i>their</i> region</p> <p>See marks on diagram for the final B3 marks provided all lines drawn correctly For region, FT <i>their</i> $y = -2x - 3$ provided line with negative gradient only but no FT for $y = 2$ if incorrect</p> <p>Condone shading in or out of region provided R is clearly identified</p>								
20		$\frac{1}{6}$	2	<p>B1 for answer $\frac{1}{n}$ or for answer with $\sqrt{36}$ or better</p>	<p>After correct answer isw any attempt to convert to decimal Allow B1 for e.g. answer -6</p>								
21	(a)	$y = 4 - x^2$	2	<p>B1 for answer $y = k - x^2$</p>	k is any value including zero								

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21	(b)	Translation $\begin{pmatrix} -3 \\ -14 \end{pmatrix}$	4	B3 for translation $\begin{pmatrix} -3 \\ k \end{pmatrix}$ or translation $\begin{pmatrix} k \\ -14 \end{pmatrix}$ OR M2 for $[y =] (x + 3)^2 - 5 - 3^2$ or better or M1 for $[y =] (x + 3)^2$ seen B1 for translation	If more than one transformation given then M2 maximum
22	(a)	115	4	M1 for $4x - 150 = 2(x + 20)$ oe M1 for $4x - 150 = 2x + 40$ FT <i>their</i> 4 term linear equation with brackets M1 for $x = 95$ FT <i>their</i> 4 term linear equation	FT linear eqn with more than 4 terms but not fewer, must have at least two terms in x
22	(b)	65 and Opposite angles of a cyclic quadrilateral are supplementary	2	FT 180 – <i>their</i> (a) B1 for 65 FT or for correct reason	Accept [Opp angles of] cyclic quad [add up to 180] [Angles in] opposite segments [are supplementary] Accept complete longer reasons Angles at a point add to 360 and angle at centre is twice angle at circumference oe Any incorrect statement does not score for reason

Question		Answer	Marks	Part marks and guidance	
23	(a)	$[AC =] \frac{4}{\cos 30}$ oe	M2	M1 for $\frac{4}{AC} = \cos 30$ oe or for $\frac{\sin 60}{4} = \frac{\sin 90}{AC}$ oe	Accept any variable for AC provided not incorrect length Accept longer methods using 4 tan 30 to find BC then Pythagoras' or sine rule M2 for AC explicit
		$(AC =) \frac{8}{\sqrt{3}}$ or better	A2	B1 for $\cos 30 = \frac{\sqrt{3}}{2}$ oe	oe for B1 e.g. $\sin 60 = \frac{\sqrt{3}}{2}$
		$\frac{45}{360} \times \pi \times \left(\text{their } \frac{8}{\sqrt{3}}\right)^2$	M1		dep on at least M1
		$\frac{45}{360} \times \pi \times \frac{64}{3}$ or better or $\frac{1}{8} \times \pi \times \frac{8}{\sqrt{3}} \times \frac{8}{\sqrt{3}}$ $= \frac{8}{3} \pi$	A1	with no errors seen	Accept $\frac{1}{8} \times \pi \times \frac{8^2}{3}$
23	(b)	$\frac{8\sqrt{3}}{3} + \frac{8}{3}\pi$	3	M1 for $\frac{1}{2} \times 4 \times \frac{8}{\sqrt{3}} \times \sin 30$ FT <i>their</i> AC from (a) or for $\frac{1}{2} \times 4 \times 4 \times \tan 30$ B1 for $\sin 30 = \frac{1}{2}$ oe or for $\tan 30 = \frac{\sqrt{3}}{3}$ oe	Accept e.g. $\frac{16\sqrt{3}}{6} + \frac{8}{3}\pi$ for 3 marks
24		$a = 11$ $b = -6$	3	B2 for $a - 3 = 8$ or $7 - b = 13$ or better or M1 for $x^2 + ax + 7 = 3x + b$ oe	B2 implied by one correct value e.g. $0 = 3x + b - x^2 - ax - 7$

Question	Answer	Marks	Part marks and guidance
25	Yes and $\frac{336}{720}$ oe or better with correct working	5	<p>“Correct working” requires M4 For 5 marks oe or better e.g. $\frac{7}{15}, \frac{21}{45}$ 0.467 or 0.4666..</p> <p>where $k = 1$ or 2</p> <p>M4 for $3 \times \frac{8}{10} \times \frac{7}{9} \times \frac{2}{8}$ oe or M3 for $k \times \frac{8}{10} \times \frac{7}{9} \times \frac{2}{8}$ oe or M2 for $\frac{8}{10}, \frac{7}{9}$ and $\frac{2}{8}$ oe used or M1 for $\frac{8}{10}$ oe seen or for three combinations soi BBR, BRB, RBB</p> <p><u>Alternative Method:</u></p> <p>M4 for $3 \times \frac{\frac{8}{22} \times \frac{7}{21} \times \frac{2}{20}}{\frac{10}{22} \times \frac{9}{21} \times \frac{8}{20}}$ oe or M3 for $k \times \frac{\frac{8}{22} \times \frac{7}{21} \times \frac{2}{20}}{\frac{10}{22} \times \frac{9}{21} \times \frac{8}{20}}$ oe or M2 for $\frac{10}{22} \times \frac{9}{21} \times \frac{8}{20}$ oe or $\frac{8}{22} \times \frac{7}{21} \times \frac{2}{20}$ oe or M1 for $\frac{10}{22}$ oe seen or $\frac{8}{22}$ oe seen</p> <p>If 0 or M1 scored, instead award SC2 for answer $\frac{336}{720}$ oe (or better) with no or insufficient working</p> <p>If 0 scored, instead award SC1 for answer $\frac{112}{720}$ or $\frac{224}{720}$ oe (or better) with no or insufficient working</p> <p>where $k = 1$ or 2</p> <p><u>With replacement</u> (apply similar to the alternative method): SC2 for $3 \times \frac{8}{10} \times \frac{8}{10} \times \frac{2}{10}$ oe $\left[\frac{48}{125} \right]$ or SC1 for $k \times \frac{8}{10} \times \frac{8}{10} \times \frac{2}{10}$ oe ($k = 1$ or 2)</p> <p><u>Circle condition missed</u> (apply similar to the alternative method): SC2 for $3 \times \frac{11}{22} \times \frac{10}{21} \times \frac{11}{20}$ oe $\left[\frac{11}{28} \right]$ or SC1 for $k \times \frac{11}{22} \times \frac{10}{21} \times \frac{11}{20}$ oe ($k = 1$ or 2)</p>