



Mathematics

Paper 1

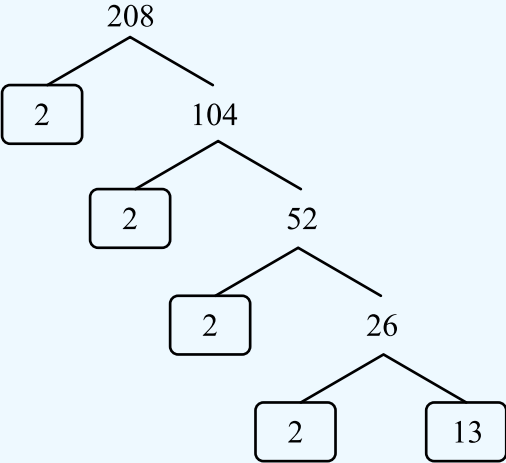
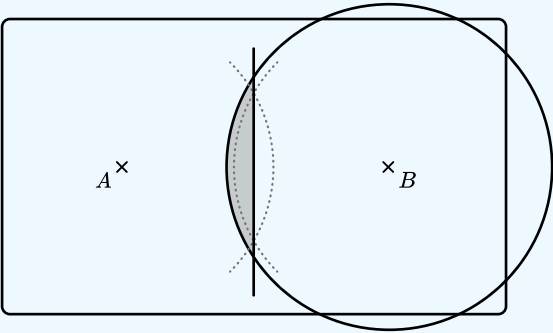
(Non-Calculator)

Higher Tier

Mark Scheme

Edexcel GCSE

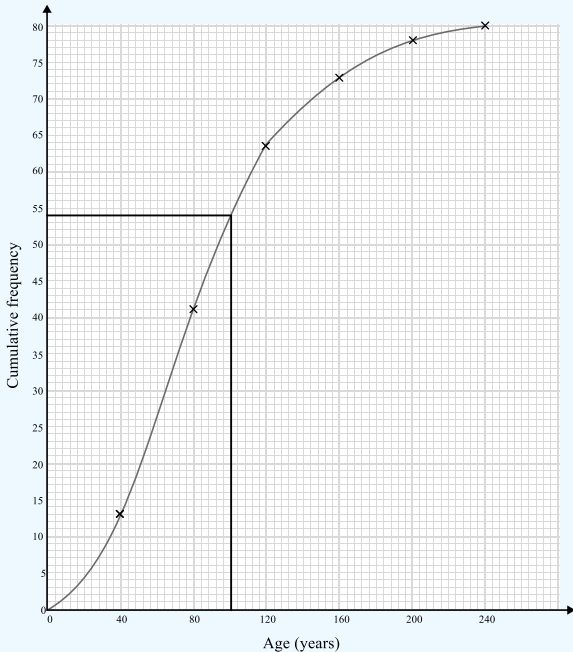
SET 3

Question	Working	Answer	Notes
Q1		$2^4 \times 13$	M1 Attempt at prime factor tree or other valid method A1 $2^4 \times 13$ oe
Q2	$\frac{9}{4} \times \frac{5}{3} = \frac{45}{12} = \frac{15}{4} = 3\frac{3}{4}$	$3\frac{3}{4}$	M1 $\frac{9}{4}$ and $\frac{5}{3}$ M1 Attempts to multiply their numerators and denominators A1 cao
Q3			B1 Perpendicular bisector of AB constructed (construction lines must be seen) B1 Circle or part circle, radius $4cm$ around B B1 Correct area shaded

Question	Working	Answer	Notes
Q4	$300 \div 3 = 100$ $100 \times 50p = £50$ $50 - 40 = 10$, profit = £10 $\frac{10}{40} \times 100 = 25\%$	25%	M1 $300 \div 3 = 100$ M1 $100 \times 50p = £50$ M1 $50 - 40 = 10$, profit = £10 A1 cao
Q5	$3.65 \times 10^5 = 365000$ $36.5 \times 10^{-2} = 0.365$	0.0365 36.5×10^{-2} 365 3.65×10^5	M1 365000 or 0.365 seen A1 cao
Q6	Angle $BHG = 90^\circ$ Interior angle of a hexagon: $\frac{4 \times 180}{6} = 120^\circ$ Angle $ABH = 120 - 90 = 30$ $90 = 3 \times 30$ so angle $BHG = 3 \times$ angle ABH		B1 Angle $BHG = 90^\circ$ M1 Attempt at a correct method to find the interior angle of a hexagon (= 120°) M1 <i>ft</i> Angle $ABH =$ their ' 120 ' $- 90$ B1 Concluding statement
Q7a	$\frac{1}{2} \times 4 \times 7 = 14$ $14 \times 10 = 140m^3$	$140m^3$	M1 Area of cross-section = $14m^2$ A1 cao
Q7b	$60 = \frac{F}{70}$ $F = 60 \times 70 = 4200N$ $P = \frac{4200}{40} = 105 N/m^2$	$105 N/m^2$	M1 $60 = \frac{F}{70}$ oe M1 $F = 4200N$ A1 cao

Question	Working	Answer	Notes																																			
Q8	Total height of boys: $6 \times 130 = 780$ Total height of girls: $4 \times 120 = 480$ Total height of 10 players: $780 + 480 = 1260$ Mean height of 10 players: $\frac{1260}{10} = 126$	Yes	M1 $6 \times 130 = 780$ and $4 \times 120 = 480$ M1 Adds their total heights to find the total of all players, 1260, or $1260 \div 10$ seen. B1 Correct conclusion with correct working																																			
Q9	<table border="1"><thead><tr><th>Sequence</th><th>1st term</th><th>2nd term</th><th>3rd term</th><th>4th term</th><th>5th term</th><th>nth term</th></tr></thead><tbody><tr><td>A</td><td>3</td><td>7</td><td>11</td><td>15</td><td>19</td><td>$4n - 1$</td></tr><tr><td>B</td><td>1</td><td>4</td><td>9</td><td>16</td><td>25</td><td>n^3</td></tr><tr><td>C</td><td>$\frac{1}{3}$</td><td>1</td><td>3</td><td>9</td><td>27</td><td>3^{n-2}</td></tr><tr><td>D</td><td>$\frac{2}{3}$</td><td>3</td><td>6</td><td>7</td><td>-2</td><td>$n^2 - 3^{n-2}$</td></tr></tbody></table>	Sequence	1st term	2nd term	3rd term	4th term	5th term	n th term	A	3	7	11	15	19	$4n - 1$	B	1	4	9	16	25	n^3	C	$\frac{1}{3}$	1	3	9	27	3^{n-2}	D	$\frac{2}{3}$	3	6	7	-2	$n^2 - 3^{n-2}$	19, 25 $4n - 1$ n^2 3^{n-2} $n^2 - 3^{n-2}$	A1 1st row correct A1 2nd row correct A1 3rd row correct A1 4th row correct
Sequence	1st term	2nd term	3rd term	4th term	5th term	n th term																																
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B	1	4	9	16	25	n^3																																
C	$\frac{1}{3}$	1	3	9	27	3^{n-2}																																
D	$\frac{2}{3}$	3	6	7	-2	$n^2 - 3^{n-2}$																																
Q10a	$3 \times 4 = 12$ $12p^{2+3}q^{1+2} = 12p^5q^3$	$12p^5q^3$	M1 12 or p^5 or q^3 seen A1 cao																																			
Q10b	$a = 4(2m^2)^3$ $a = 4 \times 8m^6$ $a = 32m^6$	$a = 32m^6$	M1 $a = 4(2m^2)^3$ A1 cao																																			
Q10c	$32^{\frac{1}{2}} \times 2^{-2} = (2^5)^{\frac{1}{2}} \times 2^{-2}$ $= 2^{\frac{5}{2}} \times 2^{-2}$ $= 2^{\frac{1}{2}}$ Or $4\sqrt{2} \times \frac{1}{4} = \sqrt{2} = 2^{\frac{1}{2}}$	$2^{\frac{1}{2}}$	M1 Writes 32 as 2^5 or $4\sqrt{2}$ M1 Writes $\frac{1}{2^2}$ in a form which allows them to simplify the expression A1 cao written in index form																																			

Question	Working	Answer	Notes														
<div>Q11a</div>	<table><tr><th>Age (A years)</th><th>Cumulative frequency</th></tr><tr><td>$0 < A \leq 40$</td><td>13</td></tr><tr><td>$0 < A \leq 80$</td><td>41</td></tr><tr><td>$0 < A \leq 120$</td><td>64</td></tr><tr><td>$0 < A \leq 160$</td><td>73</td></tr><tr><td>$0 < A \leq 200$</td><td>78</td></tr><tr><td>$0 < A \leq 240$</td><td>80</td></tr></table>	Age (A years)	Cumulative frequency	$0 < A \leq 40$	13	$0 < A \leq 80$	41	$0 < A \leq 120$	64	$0 < A \leq 160$	73	$0 < A \leq 200$	78	$0 < A \leq 240$	80		A1 all cumulative frequencies correct
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<div>Q11b</div>			M1 At least 4 points plotted correctly A1 All points correct and joined with an appropriate curve														

Question	Working	Answer	Notes
Q11c	 <p>54 trees less than 100 years old</p> <p>$80 - 54 = 26$ trees over 100 years old</p>	$\frac{26}{80}$	<p>M1 Line drawn at 100 years and value of 25 - 27, read from their graph</p> <p>M1 Subtracts their '26' from 80</p> <p>A1 $\frac{26}{80}$ oe</p>
Q12	$\frac{28}{36} : \frac{22}{40} : \frac{16}{30} = \frac{280}{360} : \frac{198}{360} : \frac{192}{360}$ $= 280 : 198 : 192$ $= 140 : 99 : 96$	$140 : 99 : 96$	<p>M1 $\frac{28}{36} \frac{22}{40}, \frac{16}{30}$</p> <p>M1 Writes fractions with common denominator</p> <p>A1 cao</p>

Question	Working	Answer	Notes
Q13	$x = 0.4353535\dots$ $10x = 4.353535\dots$ $1000x = 435.353535\dots$ $1000x - 10x = 431$ $990x = 431$ $x = \frac{431}{990}$	$\frac{431}{990}$	M1 $10x$ and $1000x$ or $4.\dot{3}\ddot{5}$ and $435.\dot{3}\ddot{5}$ seen M1 Attempt to subtract $10x$ from $1000x$ or $4.\dot{3}\ddot{5}$ from $435.\dot{3}\ddot{5}$ A1 Correct fraction with correct steps shown
Q14	$\sin(30) = \frac{1}{2}, \cos(30) = \frac{\sqrt{3}}{2}$ $6 \times \frac{1}{2} \times 2 \times \frac{\sqrt{3}}{2} = 6 \times \frac{\sqrt{3}}{2} = 3\sqrt{3}$	$a = 3$	M1 $\sin(30) = \frac{1}{2}, \cos(30) = \frac{\sqrt{3}}{2}$ seen or implied M1 $6 \times \frac{1}{2} \times 2 \times \frac{\sqrt{3}}{2}$ A1 cao
Q15	$0.6 \times 0.4 + 0.4 \times 0.1 = 0.24 + 0.04$ $= 0.28$	0.28	M1 Tree diagram drawn or attempt at ‘walks and late’ and ‘bus and late’ M1 $0.6 \times 0.4 = 0.24$ M1 $0.4 \times 0.1 = 0.04$ A1 cao
Q16	$P = \frac{k}{Q^2}$ $1.5 = \frac{k}{10^2}, k = 1.5 \times 100 = 150$ $P = \frac{150}{5^2} = \frac{150}{25} = 6$	$P = 6$	M1 $1.5 = \frac{k}{10^2}$ M1 $k = 150$ A1 cao

Question	Working	Answer	Notes
Q17	$(x+5)^2 + (x-2)^2 = (x+6)^2$ $x^2 + 10x + 25 + x^2 - 4x + 4 = x^2 + 12x + 36$ $x^2 - 6x - 7 = 0$ $(x+1)(x-7) = 0$ $x = -1$ (invalid) or $x = 7$	$x = 7$	M1 $(x+5)^2 + (x-2)^2 = (x+6)^2$ oe M1 $x^2 - 6x - 7 = 0$ M1 Valid attempt to solve their quadratic A1 cao (must disregard $x = -1$)
Q18	$b = -6$ $0 = 1^2 + a - 6, a = 5$ $y = x^2 + 5x - 6$ $y = (x + \frac{5}{2})^2 - (\frac{5}{2})^2 - 6$ $y = (x + \frac{5}{2})^2 - \frac{49}{4}$	$(-\frac{5}{2}, -\frac{49}{4})$	M1 $b = -6$ M1 $0 = 1^2 + a - 6, a = 5$ or attempt to identify second factor bracket e.g. $(x-1)(x+6)$ M1 Completes square or uses other method to determine x coordinate $= -\frac{5}{2}$ or -2.5 A1 oe e.g. $(-2.5, -12.25)$
Q19	$x = 3y$ $2x + 2z = 26 \Rightarrow 6y + 2z = 26$ $y + 2z = 11$ $5y = 15$ $y = 3$ $x = 3 \times 3 = 9$ $3 + 2z = 11$ $z = 4$	$x = 9$ $y = 3$ $z = 4$	M1 $2x + 2z = 26$ and $y + 2z = 11$ M1 $x = 3y$ and substitutes into one of the first to equations to get 2 equations in 2 variables M1 Valid attempt to solve simultaneous equations M1 $x = 9$ or $y = 3$ or $z = 4$ seen A1 cao

Question	Working	Answer	Notes
Q20	$M = \frac{\sqrt{90}}{2 + \sqrt{10}} = \frac{3\sqrt{10}}{2 + \sqrt{10}}$ $= \frac{3\sqrt{10}(2 - \sqrt{10})}{(2 + \sqrt{10})(2 - \sqrt{10})}$ $= \frac{6\sqrt{10} - 30}{4 - 10}$ $= \frac{6\sqrt{10} - 30}{-6}$ $= 5 - \sqrt{10}$	$5 - \sqrt{10}$	<p>M1 $M = \frac{\sqrt{90}}{2 + \sqrt{10}}$</p> <p>M1 attempt to rationalise the denominator, e.g., multiplying by $\frac{2 - \sqrt{10}}{2 - \sqrt{10}}$</p> <p>M1 Reaches $\frac{6\sqrt{10} - 30}{-6}$</p> <p>A1 cao</p>
Q21a	$A = h \times b \Rightarrow 54 = h \times b$ $h = \frac{54}{b}$		A1 cao
Q21b	$2h + 2b = 33$ $2\left(\frac{54}{b}\right) + 2b = 33$ $108 + 2b^2 = 33b$ $2b^2 - 33b + 108 = 0$ $(2b - 9)(b - 12) = 0$ $b = \frac{9}{2} \text{ or } b = 12$	$\frac{9}{2}$ and 12	<p>M1 $2h + 2b = 33$ and substitutes $\frac{54}{b}$</p> <p>or $2b^2 - 33b + 108 = 0$ seen</p> <p>M1 Valid attempt to solve quadratic</p> <p>A1 cao</p>

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