



THIRD SPACE
LEARNING

Mathematics

Paper 1

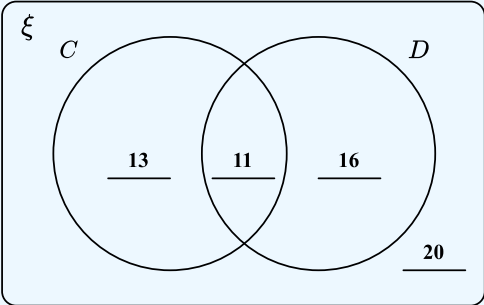
(Non-Calculator)

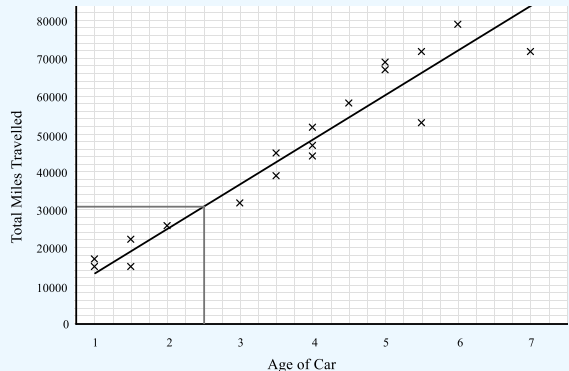
Higher Tier

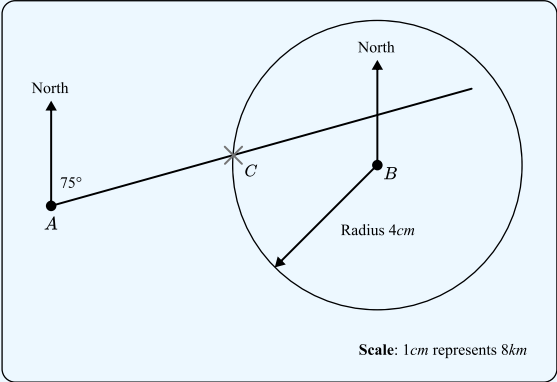
Mark Scheme

AQA GCSE

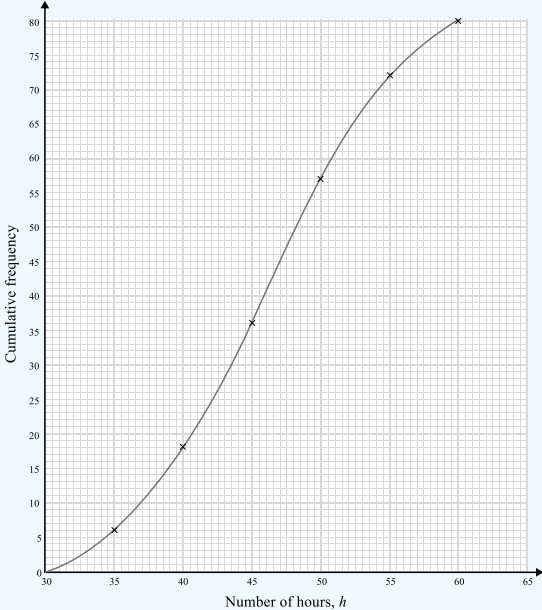
SET 4

Question	Working	Answer	Notes
Q1		4	A1 cao
Q2		Triangular prism	A1 cao
Q3		$x = 3$	A1 cao
Q4		y is inversely proportional to x	B1 correct relationship identified
Q5	$5\frac{1}{3} - 2\frac{1}{2} = \frac{16}{3} - \frac{5}{2}$ $= \frac{32}{6} - \frac{15}{6}$ $= \frac{17}{6} = 2\frac{5}{6}$	$2\frac{5}{6}$	M1 $5\frac{1}{3} - 2\frac{1}{2}$ M1 Converts to improper fractions M1 Use of common denominator and subtracts numerators A1 cao
Q6a	$\frac{1}{3}$ of 60 = 20 $20 + 27 + 24 = 71$ $71 - 60 = 11$ 		M1 20 correctly placed M1 11 in intersection A1 Fully correct

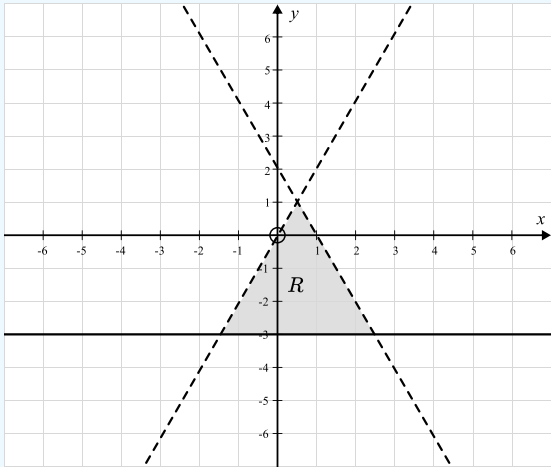
Question	Working	Answer	Notes
Q6b		$\frac{11}{60}$	M1 $\frac{\text{their '11'}}{60}$ A1 cao
Q7a		Positive	B1 correct relationship given
Q7b		31000 miles	M1 Reasonable line of best fit A1 [2900 – 33000] miles
Q8a	$p - 3 < \frac{p + 6}{3}$ $3p - 9 < p + 6$ $2p < 15$ $p < 7.5$	$p < 7.5$	M1 Reaches $3p - 9 < p + 6$ M1 Isolates term in p A1 cao
Q8b		$(x + 8)(x - 5)$	M1 $(x \pm 8)(x \pm 5)$ A1 cao

Question	Working	Answer	Notes
Q9		See diagram	M1 Bearing of 075° from A M1 Circle or arc, radius $4cm$ A1 Point between A and B correctly marked C
Q10	$5 \text{ miles} = 8km$ so $50mph = 80km/h$ $25 \times 60 = 1500m/min$ $1500 \times 60 = 90000m/h = 90km/h$	Yes	M1 Converts 50 miles to km or 90 km to $miles$ M1 Converts $25m/s$ to km/h A1 Correct conclusion following correct working
Q11a	$3x + 20 + 2x + 10 = 180$ $5x + 30 = 180$ $5x = 150$ $x = 30$	$x = 30$	M1 Forms equation $3x + 20 + 2x + 10 = 180$ oe M1 Isolates term/terms in x A1 cao
Q11b	Similar triangles – scale factor 4 $CE = 4y$	$4y$	M1 scale factor 4 A1 cao
Q12		8:10	A1 cao

Question	Working	Answer	Notes														
Q13	$(2p^2)^3 = 8p^6$ $p^6 : 8p^6$ $1 : 8$	1:8	M1 $8p^6$ seen A1 cao														
Q14a	$25^{\frac{1}{2}} = \frac{1}{\sqrt{25}} = \frac{1}{5}$	$\frac{1}{5}$	M1 $\sqrt{25}$ or $\frac{1}{25^k}$ seen A1 cao														
Q14b	$16^{\frac{3}{2}} = \sqrt{16}^3 = 4^3 = 64$ $27^{\frac{5}{3}} = \sqrt[3]{27}^5 = 3^5 = 243$ $64 + 243 = 307$	307	M1 $16^{\frac{3}{2}} = \sqrt{16}^3 = 4^3 = 64$ M1 $27^{\frac{5}{3}} = \sqrt[3]{27}^5 = 3^5 = 243$ A1 cao														
Q14c	$25^{n+2} = (5^2)^{n+2} = 5^{2n+4}$ $5^n \times 5^{2n+4} = 5^{3n+4}$	5^{3n+4}	M1 Rewrites 25 as 5^2 A1 cao														
Q15	<table><tr><th>Number of hours (h)</th><th>Cumulative frequency</th></tr><tr><td>$30 < h \leq 35$</td><td>6</td></tr><tr><td>$30 < h \leq 40$</td><td>18</td></tr><tr><td>$30 < h \leq 45$</td><td>36</td></tr><tr><td>$30 < h \leq 50$</td><td>57</td></tr><tr><td>$30 < h \leq 55$</td><td>72</td></tr><tr><td>$30 < h \leq 60$</td><td>80</td></tr></table>	Number of hours (h)	Cumulative frequency	$30 < h \leq 35$	6	$30 < h \leq 40$	18	$30 < h \leq 45$	36	$30 < h \leq 50$	57	$30 < h \leq 55$	72	$30 < h \leq 60$	80		A1 fully correct cumulative frequency table
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Question	Working	Answer	Notes
Q15b		$45 < h \leq 50$	A1 cao
Q15c			M1 Points plotted at 6, 18, 36, 57, 72 and 80 A1 All points correct, plotter at upper bound of class interval, and joined with a smooth curve
Q15d	75% of 80 = 60 Line across at 60	Yes	M1 Line across at 60 (or line up at 51) M1 Reads off 51 (or 59) A1 Correct conclusion based on correct working

Question	Working	Answer	Notes
Q16	$x = 0.083333\dots$ $100x = 8.3333\dots$ $1000x = 83.3333\dots$ $900x = 75$ $x = \frac{75}{900} = \frac{1}{12}$ $y = 0.4444\dots$ $10y = 4.4444\dots$ $9y = 4$ $y = \frac{4}{9}$ $\frac{1}{12} \times \frac{4}{9} = \frac{4}{108} = \frac{1}{27}$		<p>M1 Correct method to convert 0.444... to fraction</p> <p>A1 $y = \frac{4}{9}$</p> <p>M1 Multiplies 0.083333... by at least one different power of 10 and attempts to convert to fraction</p> <p>A1 $x = \frac{1}{12}$</p> <p>A1 $\frac{1}{12} \times \frac{4}{9} = \frac{4}{108} = \frac{1}{27}$</p>
Q17	$\frac{3(x+5)}{12} - \frac{4(x-3)}{12}$ $\frac{3x+15-4x+12}{12}$ $\frac{27-x}{12}$	$\frac{27-x}{12}$	<p>M1 Introduces common denominator</p> <p>M1 Correctly expands numerator</p> <p>A1 Single fraction in its simplest form</p>
Q18	$\vec{BC} = 15\mathbf{a} - 10\mathbf{b}$ $\vec{AC} = 24\mathbf{a} - 16\mathbf{b}$	$24\mathbf{a} - 16\mathbf{b}$	<p>M1 Vector of the form $n(3\mathbf{a} - 2\mathbf{b})$</p> <p>A1 cao</p>

Question	Working	Answer	Notes
Q19			<p>M1 Correctly plots at least 2 lines</p> <p>M1 All three lines correct. Must be dotted/solid as shown</p> <p>A1 Correct shading to indicate region (May shade wanted or unwanted area, as long as region is clear.</p>
Q20	<p>Area of sector: $\frac{30}{360} \times \pi \times r^2 = \frac{1}{12} \pi r^2$</p> <p>Area of triangle: $\frac{1}{2} \times r \times r \times \sin(30)$</p> <p>$= \frac{1}{2} r^2 \times \frac{1}{2} = \frac{1}{4} r^2$</p> <p>$\frac{1}{12} \pi r^2 - \frac{1}{4} r^2 = 3\pi - 9$</p> <p>$(\frac{1}{12} \pi - \frac{3}{12}) r^2 = 3\pi - 9$</p> <p>$r^2 = \frac{3\pi - 9}{\frac{1}{12} \pi - \frac{3}{12}} = \frac{12(3\pi - 9)}{\pi - 3} = \frac{36(\pi - 3)}{\pi - 3} = 36$</p> <p>$r = 6$</p>	<p>$r = 6\text{cm}$</p>	<p>M1 Area of sector $\frac{30}{360} \times \pi \times r^2 = \frac{1}{12} \pi r^2$</p> <p>M1 Area of triangle</p> <p>$\frac{1}{2} \times r \times r \times \sin(30)$</p> <p>M1 Forms an equation using the area of the segment</p> <p>M1 Attempts to solve the equation and reaches a value for r</p> <p>A1 cao</p>

Question	Working	Answer	Notes
Q21a	$g(x) = 2\sqrt{x} + 1$ $y = 2\sqrt{x} + 1$ $y - 1 = 2\sqrt{x}$ $\frac{y - 1}{2} = \sqrt{x}$ $\left(\frac{y - 1}{2}\right)^2 = x$ $g^{-1}(x) = \left(\frac{x - 1}{2}\right)^2$	$\left(\frac{x - 1}{2}\right)^2$	A1 cao
Q21b	$2\sqrt{3x + 4} + 1 = 9$ $2\sqrt{3x + 4} = 8$ $\sqrt{3x + 4} = 4$ $3x + 4 = 16$ $3x = 12$ $x = 4$	$x = 4$	M1 $2\sqrt{3x + 4} + 1 = 9$ seen M1 Attempts to solve, reaching a value for x A1 cao

Question	Working	Answer	Notes
Q22	$\sqrt{1\frac{7}{25}} - \frac{1}{\sqrt{2}} = \sqrt{\frac{32}{25}} - \frac{1}{\sqrt{2}}$ $= \frac{\sqrt{32}}{5} - \frac{1}{\sqrt{2}}$ $= \frac{\sqrt{32} \times \sqrt{2}}{5 \times \sqrt{2}} - \frac{5}{5 \times \sqrt{2}}$ $= \frac{8 - 5}{5\sqrt{2}}$ $= \frac{3}{5\sqrt{2}}$ $= \frac{3\sqrt{2}}{10}$	$\frac{3\sqrt{2}}{10}$	<p>M1 $\frac{\sqrt{32}}{5}$ seen</p> <p>M1 attempt of common denominator, eg,</p> $= \frac{\sqrt{32} \times \sqrt{2}}{5 \times \sqrt{2}} - \frac{5}{5 \times \sqrt{2}}$ <p>M1 attempt to rationalise</p> <p>A1 cao</p>
Q23	$(2x^2 + 6x + x + 3)(x - 4)$ $2x^3 - 8x^2 + 7x^2 - 28x + 3x - 12$ $2x^3 - x^2 - 25x - 12$ $a = 2, b = -1, c = -25, d = -12$		<p>M1 $(2x^2 + 7x + 3)(x - 4)$ or $(2x^2 - 7x - 4)(x + 3)$</p> <p>or $(x^2 - x - 12)(2x + 1)$</p> <p>M1 Correct expansion of 3 brackets</p> <p>M1 $2x^3 - x^2 - 25x - 12$ or $a = 2, b = -1, c = -25$ and $d = -12$ seen</p>
Q24a		$0 < \sin x < 1$	B1 correct statement identified
Q24b		$\tan y > 0$	B1 correct inequality

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