



THIRD SPACE
LEARNING

Mathematics

Paper 5

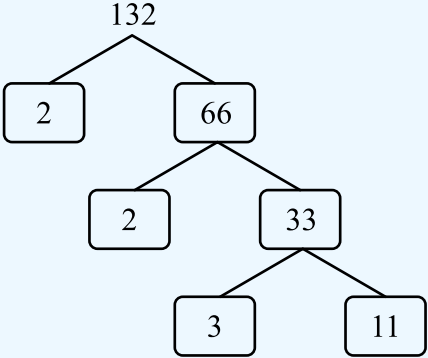
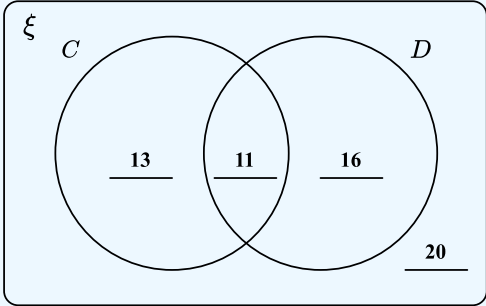
(Non-Calculator)

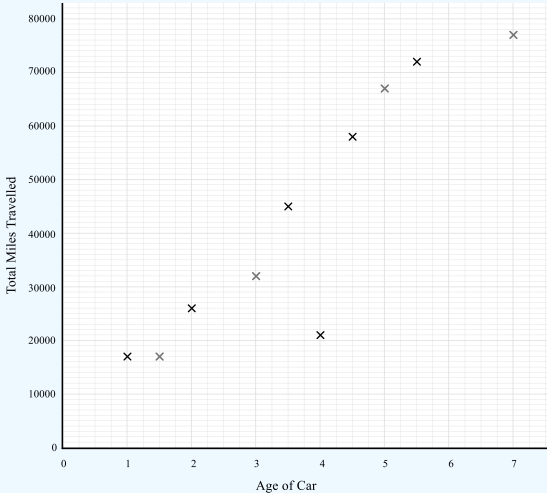
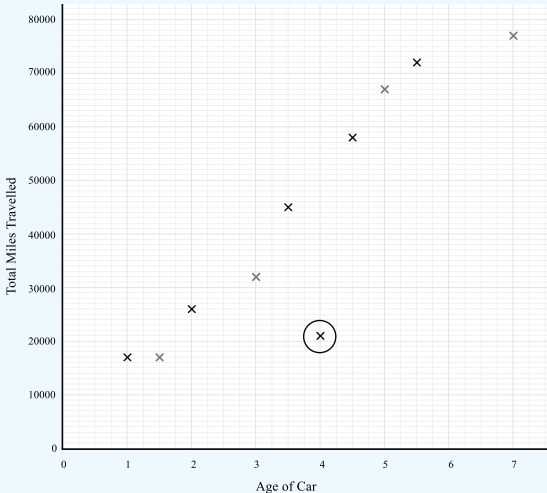
Higher Tier

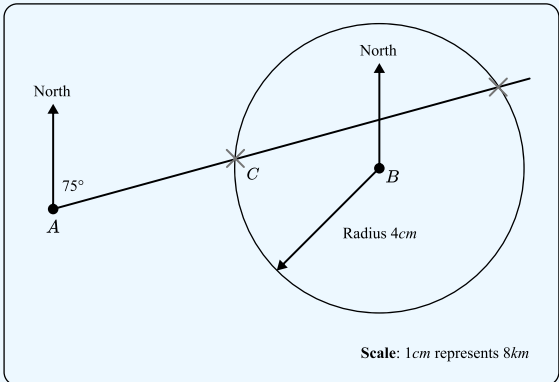
Mark Scheme

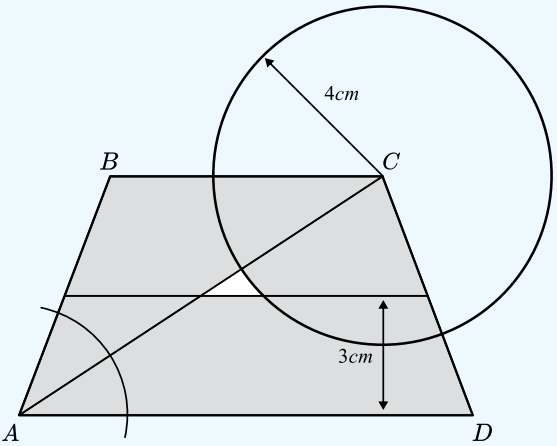
OCR GCSE

SET 4

Question	Working	Answer	Notes
Q1		$2^2 \times 3 \times 11$	M1 Correctly identifies at least 2 prime factors A1 accept $2 \times 2 \times 3 \times 11$
Q2	$5\frac{1}{3} - 2\frac{1}{2} = \frac{16}{3} - \frac{5}{2}$ $= \frac{32}{6} - \frac{15}{6}$ $= \frac{17}{6} = 2\frac{5}{6}$	$2\frac{5}{6}$	M1 $5\frac{1}{3} - 2\frac{1}{2}$ M1 Converts to improper fractions M1 Use of common denominator and subtracts numerators A1 cao
Q3a	$\frac{1}{3}$ 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
Q3b		$\frac{11}{60}$	M1 $\frac{\text{their '11'}}{60}$ A1 cao
Q4a			A1 2 points correct A1 All correct
Q4b		Positive correlation	B1 allow omission of 'correlation'
Q4ci			B1 cao

Question	Working	Answer	Notes
Q4cii	$21000 \div 4 = 5250$	<i>5250 miles per year</i>	M1 Calculates distance divided by age A1 cao
Q4d		The oldest car that we have data for is 7 years. 12 years is a long way past the last piece of data so may be inaccurate	B1 Any correct explanation
Q5a	$3x + 20 + 2x + 10 = 180$ $5x + 30 = 180$ $5x = 150$ $x = 30$	$x = 30$	M1 Forms equation $3x + 20 + 2x + 10 = 180$ oe M1 Isolates term/terms in x A1 cao
Q5b	Similar triangles – scale factor 4 $CE = 4y$	$4y$	M1 scale factor 4 A1 cao
Q6		See diagram	M1 Bearing of 075° from A M1 Circle or arc, radius 3.5cm A1 Both points correctly marked

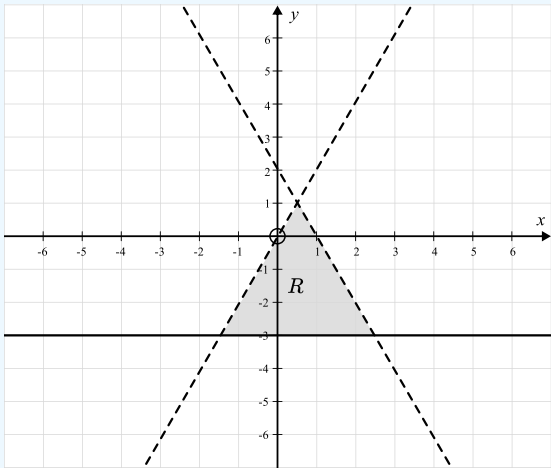
Question	Working	Answer	Notes
Q7	$5 \text{ miles} = 8\text{km}$ so $50\text{mph} = 80\text{km/h}$ $25 \times 60 = 1500\text{m/min}$ $1500 \times 60 = 90000\text{m/h} = 90\text{km/h}$	Yes	M1 Converts 50 miles to km or 90 km to miles M1 Converts 25m/s to km/h A1 Correct conclusion following correct working
Q8	Volume of cuboid: $4 \times 4 \times x = 16x$ Volume of triangular prism: $\frac{1}{2} \times 4 \times 3 \times x = 6x$ $16x + 6x = 198$ $22x = 198$ $x = \frac{198}{22} = 9$	9cm	M1 Volume of cuboid = $16x$ M1 Volume of prism = $6x$ M1 Adds 'their' volumes and sets equal to 198 A1 cao
Q9			M1 Draws line parallel to AD , 3cm from AD M1 Draws circle, centre C , radius 4cm M1 Constructs perpendicular bisector of angle A A1 Shades one region correctly A1 Shades two regions correctly A1 Fully correct diagram
Q10a		$\frac{x-7}{5}$	M1 Evidence of reversing function: subtract 7 and divide by 5 A1 Correct expression

Question	Working	Answer	Notes
Q10b	$x \times 5 + 7 = 5x + 7$ $((5x + 7) - 3) \times 2 = (5x + 4) \times 2$ $= 10x + 8$ $10x + 8 = 6x$ $8 = -4x$ $-2 = x$	$x = -2$	M1 $5x + 7$ M1 Substitutes $5x + 7$ into function 2 A1 $10x + 8$ M1 $10x + 8 = 6x$ A1 $x = -2$
Q11a	$25^{\frac{1}{2}} = \frac{1}{\sqrt{25}} = \frac{1}{5}$	$\frac{1}{5}$	M1 $\sqrt{25}$ or $\frac{1}{25^k}$ seen A1 cao
Q11b	$16^{\frac{3}{2}} = \sqrt{16}^3 = 4^3 = 64$ $27^{\frac{5}{3}} = \sqrt[3]{27}^5 = 3^5 = 243$ $64 + 243 = 307$	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
Q11c	$25^{n+2} = (5^2)^{n+2} = 5^{2n+4}$ $5^n \times 5^{2n+4} = 5^{3n+4}$	5^{3n+4}	M1 Rewrites 25 as 5^2 A1 cao
Q12	$p - 3 < \frac{p+6}{3}$ $3p - 9 < p + 6$ $2p < 15$ $p < 7.5$	$p < 7.5$	M1 Reaches $3p - 9 < p + 6$ M1 Isolates term in p A1 cao

Question	Working	Answer	Notes														
Q13a	<table><thead><tr><th>Number of hours (h)</th><th>Cumulative frequency</th></tr></thead><tbody><tr><td>$h \leq 35$</td><td>6</td></tr><tr><td>$h \leq 40$</td><td>18</td></tr><tr><td>$h \leq 45$</td><td>36</td></tr><tr><td>$h \leq 50$</td><td>57</td></tr><tr><td>$h \leq 55$</td><td>72</td></tr><tr><td>$h \leq 60$</td><td>80</td></tr></tbody></table>	Number of hours (h)	Cumulative frequency	$h \leq 35$	6	$h \leq 40$	18	$h \leq 45$	36	$h \leq 50$	57	$h \leq 55$	72	$h \leq 60$	80		M1 Attempts to add each value onto the previous total A1 All values correct
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Q13b			M1 Points plotted at 6, 18, 36, 59, 74 and 80 M1 At least 3 points plotted correctly A1 All points correctly and joined with a smooth curve														
Q13c	75% of 80 = 60 Line across at 60	Jana is correct	M1 Line across at 60 and read off 51 A1 Correct conclusion based on the correct working														

Question	Working	Answer	Notes
Q14	$y = \frac{k}{x^3}$ $10 = \frac{k}{4^3}$ $k = 10 \times 4^3 = 640$ $y = \frac{640}{x^3}$ $y = \frac{640}{10^3} = 0.64$	0.64	<p>M1 $10 = \frac{k}{4^3}$ or $k = 640$</p> <p>M1 $y = \frac{640}{10^3}$ oe</p> <p>A1 cao</p>
Q15	$\frac{3(x+5)}{12} - \frac{4(x-3)}{12}$ $\frac{3x+15-4x+12}{12}$ $\frac{27-x}{12}$	$\frac{27-x}{12}$	<p>M1 Introduces common denominator</p> <p>M1 Correctly expands numerator</p> <p>A1 Single fraction in its simplest form</p>
Q16a	$5 \div 11 = 0.45454545....$	0.454545....	<p>M1 Attempt to divide 5 by 11</p> <p>A1 accept 0.454545..... or $0.\dot{4}\dot{5}$</p>

Question	Working	Answer	Notes
Q16b	$x = 0.083333...$ $100x = 8.3333....$ $1000x = 83.3333...$ $900x = 75$ $x = \frac{75}{900} = \frac{1}{12}$ $y = 0.4444....$ $10y = 4.4444....$ $9y = 4$ $y = \frac{4}{9}$ $\frac{1}{12} \times \frac{4}{9} = \frac{4}{108} = \frac{1}{27}$		<p>M1 Correct method to convert 0.444... or 0.083333.... to fraction</p> <p>A1 $y = \frac{4}{9}$</p> <p>A1 $x = \frac{1}{12}$</p> <p>M1 attempts to multiply 'their' $\frac{1}{12} \times \frac{4}{9}$</p> <p>A1 shows $\frac{1}{12} \times \frac{4}{9} = \frac{1}{27}$ with correct working</p>
Q17	$\vec{BC} = 15\mathbf{a} - 10\mathbf{b}$ $\vec{AC} = 24\mathbf{a} - 16\mathbf{b}$		<p>M1 Vector $BC = 15\mathbf{a} - 10\mathbf{b}$</p> <p>M1 Adds vector AB and vector BC</p> <p>A1 cao</p>

Question	Working	Answer	Notes
Q18			<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>
Q19	<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>$r = 6cm$</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
Q20a	$(-3)^2 + (3\sqrt{5})^2 = 9 + 45 = 54$	$x^2 + y^2 = 54$	M1 Attempts to substitute -3 and $3\sqrt{5}$ into $x^2 + y^2$ M1 $(-3)^2 + (3\sqrt{5})^2 = 54$ M1 Attempts to use their 54 in the equation for a circle A1 cao
Q20b	Distance from $(0, 0)$ to $(2, 4)$: $\sqrt{3^2 + 4^2} = \sqrt{25} = 5$ Radius of circle is 6	Yes	M1 Distance from $(0, 0)$ to $(2, 4)$: $\sqrt{3^2 + 4^2} = 5$ M1 Compares with radius = 6 A1 Correct conclusion following correct working
Q21	$\frac{10 - \sqrt{20}}{3 + \sqrt{5}} \times \frac{3 + \sqrt{5}}{3 - \sqrt{5}}$ $= \frac{30 - 3\sqrt{20} - 10\sqrt{5} + \sqrt{100}}{9 - 5}$ $= \frac{40 - 6\sqrt{5} - 10\sqrt{5}}{4}$ $= \frac{40 - 16\sqrt{5}}{4}$ $= 10 - 4\sqrt{5}$	$10 - 4\sqrt{5}$	M1 $\times \frac{3 - \sqrt{5}}{3 - \sqrt{5}}$ M1 Denominator $9 - 5$ seen or implied M1 Numerator $30 - 3\sqrt{20} - 10\sqrt{5} + \sqrt{100}$ seen or implied A1 cao
Q22	$6x^2 + 13xy - 5y^2 = 0$ $(3x - y)(2x + 5y) = 0$ $3x = y$ or $2x = -5y$ $x : y = 1 : 3$	1:3	M1 $(3x - y)(2x + 5y) = 0$ M1 $3x = y$ A1 cao

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