



THIRD SPACE
LEARNING

Mathematics

Paper 5

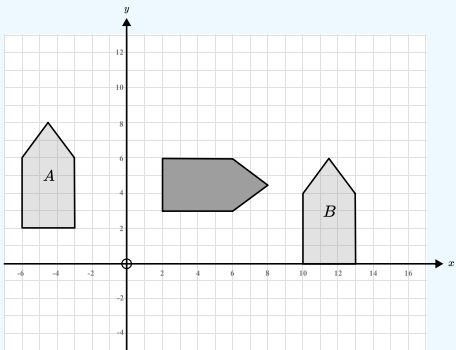
(Non-Calculator)

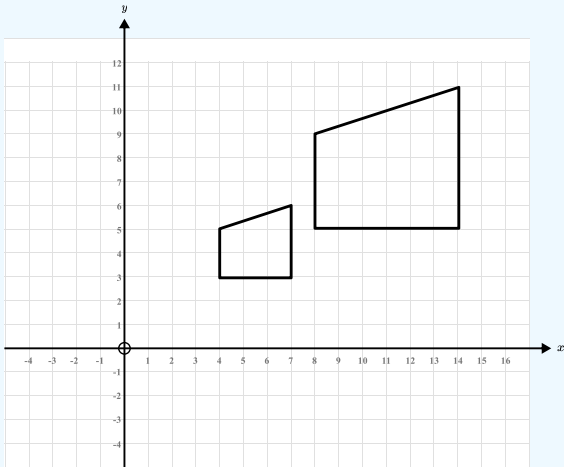
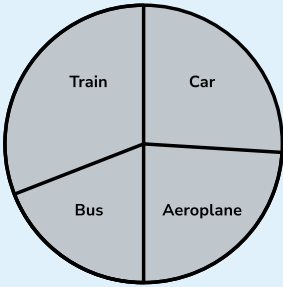
Higher Tier

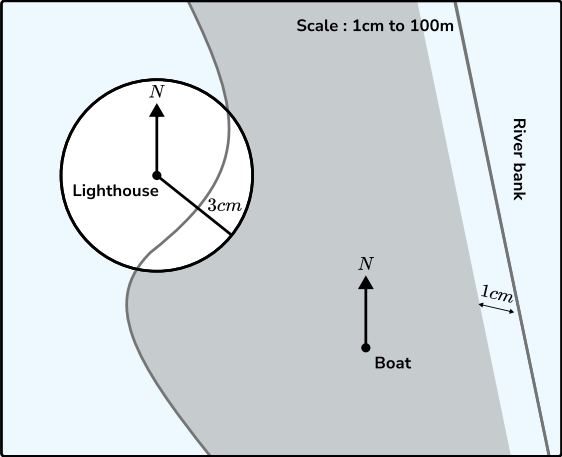
Mark Scheme

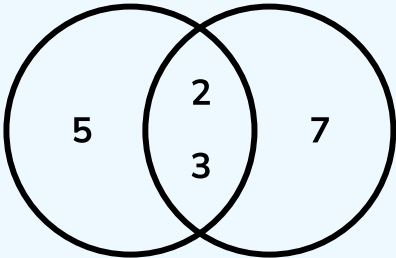
OCR GCSE

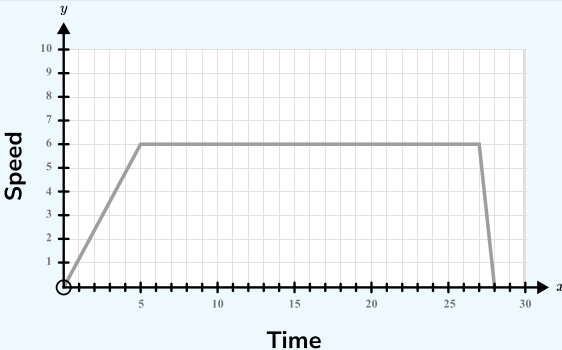
SET 1A

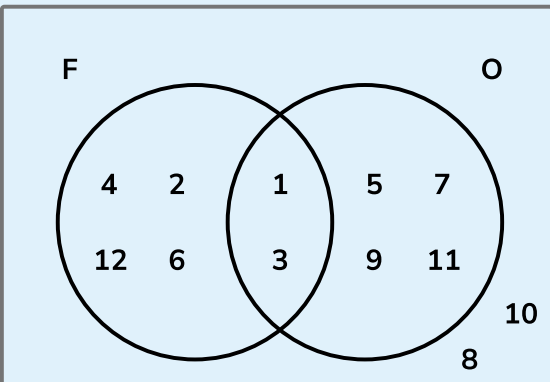
Question	Working	Answer	Notes										
Q1a		June	B1 cao										
Q1b		e.g. People go camping in the summer The shop might be have had a sale	B1 Or other suitable explanation										
Q2a	$\frac{4}{7} \div \frac{2}{3} = \frac{4}{7} \times \frac{3}{2} = \frac{12}{14} = \frac{6}{7}$	$\frac{6}{7}$	M1 $\times \frac{3}{2}$ seen A1 cao										
Q2b	$1\frac{3}{5} + 2\frac{1}{4} = \frac{8}{5} + \frac{9}{4}$ $= \frac{32}{20} + \frac{45}{20} = \frac{77}{20}$ $= 3\frac{17}{20}$	$3\frac{17}{20}$	M1 Correct use of a common denominator A1 cao										
Q3	1-0.16=0.84 P(G)=P(Y), P(R)=2P(Y) P(Y)+P(Y)+2P(Y)=0.84 4P(Y)=0.84 P(Y)=0.21 <table border="1"><tr><td>Colour</td><td>Blue</td><td>Yellow</td><td>Green</td><td>Red</td></tr><tr><td>Probability</td><td>0.16</td><td>0.21</td><td>0.21</td><td>0.42</td></tr></table>	Colour	Blue	Yellow	Green	Red	Probability	0.16	0.21	0.21	0.42		M1 0.84 seen M1 P(Y)=0.21 A1 cao
Colour	Blue	Yellow	Green	Red									
Probability	0.16	0.21	0.21	0.42									
Q4a			M1 Any rotation of 90° clockwise A1 cao										

Question	Working	Answer	Notes
Q4b	Mark has counted the number of squares between the two shapes	No, correct answer is $\begin{pmatrix} 16 \\ -2 \end{pmatrix}$	A1 No A1 A correct explanation
Q4c			M1 An enlargement of scale factor 2 M1 At least one vertex correctly placed A1 cao
Q5a		The frequency starts from 50 so only the tops of the bars are shown	B1 Correct explanation
Q5b		Not enough information	B1 cao
Q5c	Car: $48 \times 2 = 96^\circ$ Aeroplane: $41 \times 2 = 82^\circ$ Bus: $35 \times 2 = 70^\circ$ Train: $56 \times 2 = 112^\circ$		M1 Attempt to double values to find angles (or equivalent method) M1 At least 2 angles correct M1 At least two sections of pie chart correct follow through from their angles A1 cao
Q6a		There may not be an equal number of each prize	B1 Suitable comment

Question	Working	Answer	Notes
Q6b		$\frac{12}{50}$	A1 oe
Q6c	$400 \times \frac{23}{50} = 184$	184	M1 Multiplying 400 by $\frac{23}{50}$ A1 cao
Q7a	20:4000000	1:200000	M1 20:4000000 seen A1 cao
Q7b		700 - 750m	A1 cao
Q7c		130°	M1 line drawn between the lighthouse and the boat A1 allow answer between 127° and 133°
Q7d			M1 Circle (or part circle) of radius 3cm drawn with centre lighthouse M1 Line parallel to bank, 1cm from bank A1 Correct region shaded
Q8a	$3.3 \times 10^4 - 2.9 \times 10^3$ $33000 - 2900 = 30100$	30100	M1 Attempt to subtract 2.9×10^3 from 3.3×10^4 M1 Converting to ordinary numbers or converting to 0.29×10^4 and correctly subtracting

Question	Working	Answer	Notes
Q8b	<p>London: $9.9 \times 10^6 \div 3.3 \times 10^4 = 3 \times 10^2$</p> <p>300 people per police officer</p> <p>Cardiff: $3.6 \times 10^5 \div 3 \times 10^3 = 1.2 \times 10^2$</p> <p>120 people per police officer</p> <p>Edinburgh: $5.8 \times 10^5 \div 2.9 \times 10^3 = 2 \times 10^2$</p> <p>200 people per police officer</p>	Cardiff	<p>M1 At least one division correct</p> <p>M1 Three correct divisions</p> <p>A1 Cardiff selected</p>
Q9ai	<p>$3 \times 8 = 24$ hours of work</p> <p>$24 \div 4 = 6$</p>	6 hours	<p>M1 24 seen</p> <p>A1 cao</p>
Q9aii		24 workers	A1 cao
Q9b	<p>$120 \div 3 = 40$ so 1 worker can sort 40 packages in 8 hours</p> <p>$40 \div 8 = 5$ so 1 worker can sort 5 packages in 1 hour</p> <p>$25 \div 5 = 5$ It would take 1 worker 5 hours to sort 25 packages</p>	5 hours	<p>M1 Dividing 120 by 3 and 5</p> <p>M1 Dividing 25 by their answer</p> <p>A1 cao</p>
Q10	<p>$210 \div 6 = 35$</p> 	30 and 42	<p>M1 Use of a Venn diagram with 6 or 2 and 3 in the intersection</p> <p>M1 $210 \div 6 = 35$ to find the other prime factors</p> <p>A1 cao</p>
Q11a	$v = 0 + 1.2 \times 5 = 6\text{m/s}$	6m/s	<p>M1 $v = 'u' + 1.2 \times 5$</p> <p>A1 cao</p>

Question	Working	Answer	Notes
Q11b			<p>M1 Time on horizontal axis and speed on vertical axis. Appropriate scale used</p> <p>M1 First section of journey correct</p> <p>A1 cao</p>
Q11c	$\frac{1}{2} \times 5 \times 6 + 22 \times 6 + \frac{1}{2} \times 1 \times 6$ $=15+132+3=150\text{m}$	150m	<p>M1 22×6 seen for middle section of journey</p> <p>M1 Attempt to find total area under graph</p> <p>A1 cao</p>
Q11d	$2\text{m/s} = 120\text{m/min}$ $= 7200\text{m/h}$ $= 7.2\text{km/h}$	7.2km/h	<p>M1 Multiplying by 60 twice to convert to hours</p> <p>A1 cao</p>
Q12	<p>R:G G:B R:G:B</p> <p>3:5 4:7 12:20:35</p> <p>12:20 20:35</p> $12 + 20 + 35 = 67$ $536 \div 67 = 8$ $12 \times 8 = 96$	96	<p>M1 Attempting to convert to equivalent ratios with common green value</p> <p>M1 Two correct ratios with common green value or 12:20:35 seen</p> <p>M1 $536 \div 67 = 8$</p> <p>A1 cao</p>

Question	Working	Answer	Notes
Q13	$x=0.45454545\dots$ $100x=45.45454545\dots$ $99x=45$ $x=\frac{45}{99}=\frac{5}{11}$		M1 Subtracting 0.454545.... from 45.454545... A1 $99x=45$ or $\frac{45}{99}$ seen and relevant steps shown
Q14	$(3x-4)(x+10)-(x+4)(x+2)=102$ $(3x^2+26x-40)-(x^2+6x+8)=102$ $2x^2+20x-150=0$ $x^2+10x-75=0$ $(x+15)(x-5)=0$ $x=-15$ (not valid) $x=5$	5cm	M1 Attempting expression for area of each rectangle and subtracting smaller from larger. Setting equal to 102 M1 Correctly expanding brackets and simplifying to $2x^2+20x-150=0$ M1 Correctly factorising or other valid method of solving A1 cao
Q15a		ξ 	M1 At least 8 values correctly placed A1 cao
Q15b		$\frac{2}{12}$	B1 oe
Q15c		$\frac{4}{6}$	M1 correct numerator or denominator A1 oe

Question	Working	Answer	Notes
Q16a	$\sqrt{16^3} = 4^3 = 64$	64	M1 $\sqrt{64} = 4$ or $16^3 = 4096$ seen A1 cao
Q16b	$\frac{2^3 \times 2^{-1}}{2^4} = 2^{-2} = \frac{1}{2^2} = \frac{1}{4}$	$\frac{1}{4}$	M1 Simplified to 2^{-2} A1 cao
Q17	$(3 + \sqrt{2})(4 + \sqrt{8}) = 12 + 4\sqrt{2} + 3\sqrt{8} + \sqrt{16}$ $= 12 + 4\sqrt{2} + 3 \times 2\sqrt{2} + 4$ $= 16 + 10\sqrt{2}$	$16 + 10\sqrt{2}$	M1 At least three terms correct in the expansion M1 $\sqrt{8} = 2\sqrt{2}$ A1 cao
Q18a	$x^3 - 5x + 2 = 0$ $0^3 - 5 \times 0 + 2 = 2$ $1^3 - 5 \times 1 + 2 = -2$	Change of sign indicates solution between 0 and 1	M1 Substituting 0 and 1 into $x^3 - 5x + 2$ A1 Correct statement about change of sign
Q18b	$x^3 - 5x = -2$ $5x = x^3 + 2$ $x = \frac{x^3}{5} + \frac{2}{5}$		M1 Rearranging to $5x = x^3 + 2$ M1 Dividing by 5
Q18c	$x_1 = \frac{0}{5} + \frac{2}{5} = \frac{2}{5}$ $x_2 = \frac{(\frac{2}{5})^3}{5} + \frac{2}{5} = \frac{\frac{8}{125}}{5} + \frac{2}{5}$ $= \frac{8}{625} + \frac{2}{5} = \frac{8}{625} + \frac{250}{625} = \frac{258}{625}$		M1 Substituting 0 to give $x_1 = \frac{0}{5} + \frac{2}{5} = \frac{2}{5}$ M1 Substituting $\frac{2}{5}$ A1 cao
Q19a		\sqrt{m}	B1 cao

Question	Working	Answer	Notes
Q19b	Gradient of radius: $\frac{8}{6} = \frac{4}{3}$ Gradient of tangent: $-\frac{3}{4}$ $y = -\frac{3}{4}x + c$ $3 = -\frac{3}{4} \times 1 + c$ $c = 3 + \frac{3}{4} = \frac{15}{4}$ $y = -\frac{3}{4}x + \frac{15}{4}$	$y = -\frac{3}{4}x + \frac{15}{4}$	M1 Gradient of radius: $\frac{8}{6}$ M1: Gradient of tangent: $-\frac{3}{4}$ M1: Substituting m, x and y into $y=mx+c$ or equivalent method to find equation of line M1 $c = \frac{15}{4}$ A1 $y = -\frac{3}{4}x + \frac{15}{4}$ oe
Q20a	$\sin(60) = \frac{x}{12}$ $x = 12 \times \sin(60)$ $x = 12 \times \frac{\sqrt{3}}{2} = 6\sqrt{3}$	$6\sqrt{3}$ cm	M1 Use of $\sin(x) = \frac{O}{H}$ M1 $\sin(60) = \frac{\sqrt{3}}{2}$ seen or implied A1 cao
Q20b	Length of arc: $\frac{60}{360} \times 2 \times \pi \times 12 = 4\pi$ Base of triangle: $\cos(60) = \frac{x}{12}$ $x = 12 \times \cos(60) = 12 \times 0.5 = 6$ Base of shaded area: $12 - 6 = 6$ Perimeter = $6 + 6\sqrt{3} + 4\pi$		M1 Circumference of circle: $2 \times \pi \times 12 = 24\pi$ seen or implied M1 Length of arc: $\frac{60}{360} \times 24\pi = 4\pi$ M1 Base of triangle $12 \times \sin(60) = 6$ A1 Adding the three values and all previous steps correct

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