



THIRD SPACE
LEARNING

Mathematics

Paper 4

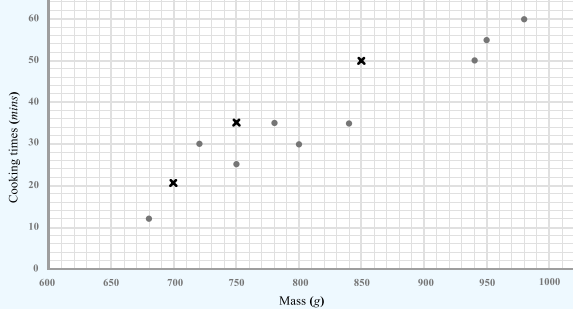
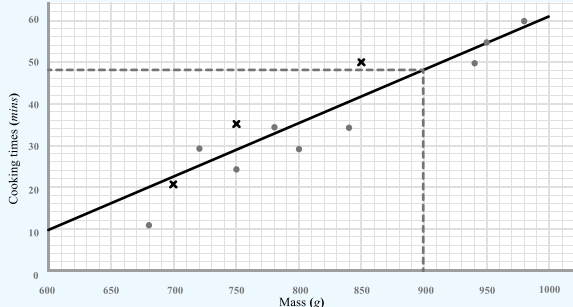
(Calculator)

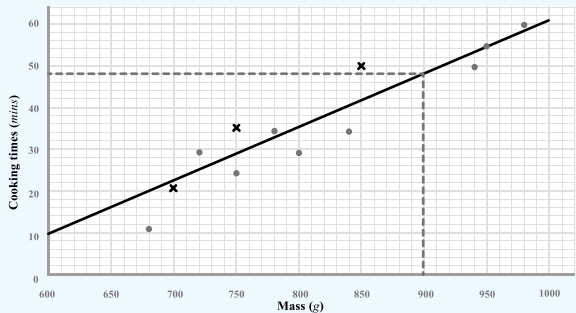
Higher Tier

Mark Scheme

OCR GCSE

SET 2

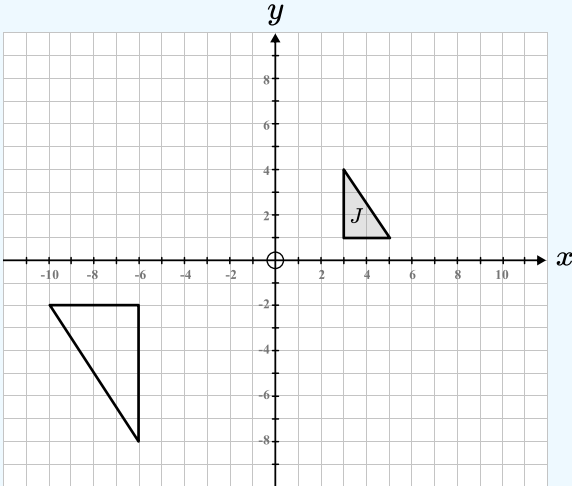
Question	Working	Answer	Notes
Q1	<p>Area of trapezium: $\frac{1}{2} \times (6 + 9) \times 4 = 30\text{cm}^2$</p> <p>40% of 30 = 12</p> <p>Area of rectangle = $30 + 12 = 42\text{cm}^2$</p> <p>$42 \div 4 = 10.5\text{cm}$</p>	10.5cm	<p>A1 Area of trapezium = 30cm^2</p> <p>M1 <i>ft</i> 40% of their area correct</p> <p>M1 Area of rectangle = 42cm^2</p> <p>A1 cao</p>
Q2	<p>$500 \div 5 = 100\text{g}$ to make 4 doughnuts</p> <p>$100 \times 3 = 300\text{g}$ to make 12 doughnuts</p> <p>$30 \times 4 = 1200\text{g}$ to make 4 boxes of doughnuts</p> <p>$1200\text{g} < 1.5\text{kg}$ so she has enough.</p>	Yes	<p>M1 Attempt to use proportion to find the amount for flour for 12 or 48 doughnuts</p> <p>M1 300g for 12 doughnuts</p> <p>M1 1200g or 1.2kg seen</p> <p>A1 Correct statement following correct working</p>
Q3a			<p>M1 One point plotted correctly</p> <p>A1 All three points correct</p>
Q3b		Positive (correlation)	B1 cao
Q3c i			B1 Line of best fit drawn

Question	Working	Answer	Notes
Q3c ii		48 minutes	A1 Answer in range 46 – 50 minutes
Q3d	7 cakes took longer than 30 minutes	$\frac{7}{12}$	M1 7 seen A1 cao
Q4a	63, 126, 189, 252, 315, 378, 105, 210, 315, 420,	315 seconds	M1 At least 5 multiples of 63, or prime factors $3 \times 3 \times 7$ M1 At least 3 multiples of 105, or prime factors $3 \times 5 \times 7$ A1 cao
Q4b		They run at a constant speed continuously	B1 Correct statement

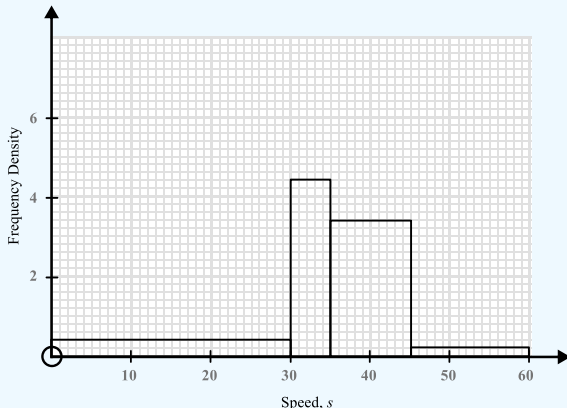
Question	Working	Answer	Notes
Q5	$2a + 3c = 35$ $3a + 4c = 49.50$ $6a + 9c = 105$ $6a + 8c = 99$ $c = £6$ $2a + 18 = 35$ $2a = 17$ $a = £8.50$ Or $8a + 12c = 140$ $9a + 12c = 148.5$ $a = £8.50$ $17 + 3c = 35$ $3c = 18$ $c = £6$	Adult: £8.50 Child: £6	M1 At least one correct equation correct M1 Attempting to make the coefficients of a or the coefficients of c equal M1 Subtracting one equation from the other A1 Correct value for a or c A1 Correct values for both a and c

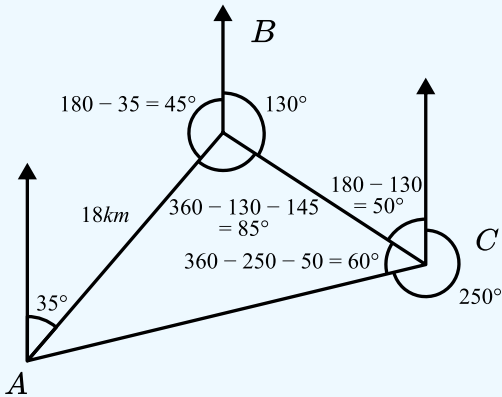
Question	Working	Answer	Notes
Q6a	$15 \div 3 \times 5 = 25$	25	M1 15 = 3 parts seen or implied (e.g. by $15 \div 3$) A1 cao
Q6b	2 new men so 27 men in total $27 \div 3 \times 2 = 18$ women 3 new women	3	M1 Now 27 men M1 $27 \div 3 \times 2 = 18$ women A1 cao
Q7a	$\frac{3}{0.5} = 6$	6	M1 Evidence of calculating change in $\frac{\text{change in } y}{\text{change in } x}$ A1 cao
Q7b		$y = 6x - 1$	B1 cao
Q7c	$6 \times 50 - 1 = 299$	No because when $x = 50$, $y = 299$	M1 $6 \times 50 - 1 = 299$ A1 Correct statement
Q8	$AC^2 = 13^2 - 5^2 = 144$ $AC = 12cm$ $\tan(x) = \frac{12}{10}$ $x = \tan^{-1}\left(\frac{12}{10}\right)$ $x = 50.19442891$	50.2°	M1 $13^2 - 5^2$ seen or implied A1 $AC = 12cm$ M1 $\tan(x) = \frac{\text{their } AC}{10}$ oe A1 cao
Q9	$5ny = 3m + 4$ $5ny - 4 = 3m$ $\frac{5ny - 4}{3} = m$	$m = \frac{5ny - 4}{3}$	M1 Correct first step A1 cao

Question	Working	Answer	Notes
Q10	$6 \times 350 = \text{£}2100$ $150 \times 2 \times 2 = \text{£}600$ $\text{£}2100 + \text{£}2400 + \text{£}600 = \text{£}5100$ $\text{£}5100 \div \text{£}1200 = 4.25$ $0.25 \text{ years} = 3 \text{ months}$	4 years 3 month	M1 $6 \times 350 = \text{£}2100$ M1 $\text{£}5100$ seen M1 Their total cost divided by $\text{£}1200$ A1 Correct answer in years and months
Q11a	$2.8 \div 3.5 \times 100 = \text{£}80$	$\text{£}80$	M1 Divide by 3.5 or by 0.035 A1 cao
Q11b	$\text{£}130 \times 1.035 \times 1.035 \times 1.035 = \text{£}144.13$	$\text{£}144.13$	M1 1.035 or $\text{£}4.55$ seen M1 Attempt to increase by 3.5% three times using a compound method A1 cao
Q12		C because SAS	A1 C B1 Congruent using SAS
Q13a	$2 \times 1^2 + 1 = 3$ $2 \times 2^2 + 1 = 9$ $2 \times 3^2 + 1 = 19$	3, 9, 19	M1 At least one value correct A1 All three correct
Q13b	3, 5, 7, 9, 11 The n th term is $2n + 1$ 1, 4, 9, 16, 25 The n th term is n^2	$\frac{2n + 1}{n^2}$	M1 $2n + 1$ or n^2 seen M1 Numerator or denominator correct A1 cao

Question	Working	Answer	Notes
Q14	<p>Izzy: probability is $\frac{1}{6}$</p> <p>Jim: possible combinations are $1 + 5, 2 + 4, 3 + 3, 4 + 2$ and $5 + 1$.</p> <p>Each combination has a probability of $\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$ $5 \times \frac{1}{36} = \frac{5}{36}$</p>	Izzy	<p>M1 Probability for Izzy correct</p> <p>M1 5 combinations for Jim identified</p> <p>M1 $\frac{1}{36}$ or $\frac{5}{36}$ seen</p> <p>A1 Correct answer following correct working</p>
Q15	<p>Upper bound for one side is 3.85cm</p> <p>$5 \times 3.85 = 19.25\text{cm}$</p>	19.25cm	<p>M1 Upper bound for one side 3.85cm</p> <p>A1 cao</p>
Q16a		<p>Rotation</p> <p>90° anti-clockwise or 270° clockwise</p> <p>Centre of rotation (0, 1)</p>	<p>B1 Rotation</p> <p>B1 90° anti-clockwise or 270° clockwise</p> <p>B1 Centre of rotation (0, 1)</p>
Q16b			<p>M1 An enlargement of scale factor -2</p> <p>A1 Correct position</p>

Question	Working	Answer	Notes
Q17	$\frac{52}{360} \times \pi \times 18 = 8.16814\dots$ $8.16814\dots + 9 + 9 = 26.16814\dots$	26.2cm	M1 arc length = 8.16814... M1 'their' arc length + 9 + 9 (= 26.16814...) A1 cao
Q18	Katie: $9^4 = 6561$ Nelly: $10^4 = 10000$ $10000 - 6561 = 3439$	3439	M1 $9^4 = 6561$ or $10^4 = 10\,000$ M1 $10\,000 - 6561 (= 3439)$ A1 cao
Q19	2 litres in the ratio 11 : 29 $2000 \div 40 = 50$ $50 \times 11 = 550\text{ml}$, $50 \times 29 = 1450\text{ml}$ In jug A: 600ml in ratio 1 : 3 $600 \div 4 = 150$ $1 \times 150 = 150\text{ml}$, $3 \times 150 = 450\text{ml}$ Jug B: $550 - 150 = 400\text{ml}$ syrup $1450 - 450 = 1000\text{ml}$ sparkling water Ratio is 400 : 1000 = 2 : 5	2:5 oe	M1 550ml syrup and 1450ml sparkling water in final mixture M1 150ml syrup and 450ml sparkling water in jug A M1 400ml syrup and 1000ml sparkling water in jug B A1 Correct ratio
Q20a	$4x^2 - 8x - 7 = 0$ $x = \frac{8 \pm \sqrt{(-8)^2 - (4 \times 4 \times -7)}}{2 \times 4}$ $= \frac{8 \pm \sqrt{176}}{8}$ $= 2.66 \text{ or } -0.66$	$x = 2.66$ or $x = -0.66$	M1 Rearranging equation so that one side is 0 M1 Correctly substituting values into quadratic formula A1 Two correct solutions

Question	Working	Answer	Notes															
Q20b	$2^{2x-3} = 2^5$ $2x - 3 = 5$ $x = 4$	$x = 4$	M1 Simplifying LHS to 2^{2x-3} M1 Using the fact that $32 = 2^5$ A1 cao															
Q21a	<table border="1"><thead><tr><th>Speed, (<i>s mph</i>)</th><th>Frequency</th><th>Frequency Density</th></tr></thead><tbody><tr><td>$0 \leq s < 30$</td><td>12</td><td>0.4</td></tr><tr><td>$30 \leq s < 35$</td><td>22</td><td>4.4</td></tr><tr><td>$35 \leq s < 45$</td><td>34</td><td>3.4</td></tr><tr><td>$45 \leq s < 60$</td><td>3</td><td>0.2</td></tr></tbody></table> 	Speed, (<i>s mph</i>)	Frequency	Frequency Density	$0 \leq s < 30$	12	0.4	$30 \leq s < 35$	22	4.4	$35 \leq s < 45$	34	3.4	$45 \leq s < 60$	3	0.2		M1 Frequency densities correctly calculated M1 <i>ft</i> their frequency densities used to plot histogram A1 Fully correct histogram
Speed, (<i>s mph</i>)	Frequency	Frequency Density																
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$30 \leq s < 35$	22	4.4																
$35 \leq s < 45$	34	3.4																
$45 \leq s < 60$	3	0.2																
Q21b	Most cars are under 40 <i>mph</i> . Not many are under 30 <i>mph</i> or up to 60 <i>mph</i> .	40 <i>mph</i>	B1 cao															
Q22	$2n^2 + 8n + n^2 - 4n - 4n + 16$ $3n^2 + 16$ $n^2 > 0$ so multiplying by 3 then adding 16 means the solution is always positive.		M1 Brackets expanded correctly to give $2n^2 + 8n + n^2 - 8n + 16$ M1 Simplified to $3n^2 + 16$ A1 Correct statement following correct working															

Question	Working	Answer	Notes
Q23a	$V = \frac{1}{3} \times \pi \times 5^2 \times 12 = 314.159\dots$	314.2cm^3	M1 Attempt to substitute values into formula for volume of a cone A1 cao
Q23b	Area scale factor 4 so length scale factor $\sqrt{4} = 2$ Volume scale factor $2^3 = 8$ Volume is $8 \times 314.159\dots = 2513.274\dots$	2513 or 2514cm^3	M1 Length scale factor 2 seen or implied M1 Volume scale factor 2^3 or 8 seen or implied A1 Correctly rounded from their working (use of 314.2 gives 2514cm^3 or 314.1592654.. gives 2513cm^3)
Q24	 $\frac{x}{\sin(85)} = \frac{18}{\sin(60)}$ $x = \frac{18}{\sin(60)} \times \sin(85) = 20.7\text{km}$	20.7km	M1 A roughly correct sketch with the given bearings reasonably correctly drawn M1 Angle ABC = 85° M1 Angle BCA = 60° M1 <i>ft</i> Use of sine rule with their values correctly substituted A1 cao

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