



THIRD SPACE
LEARNING

Mathematics

Paper 6

(Calculator)

Higher Tier

Mark Scheme

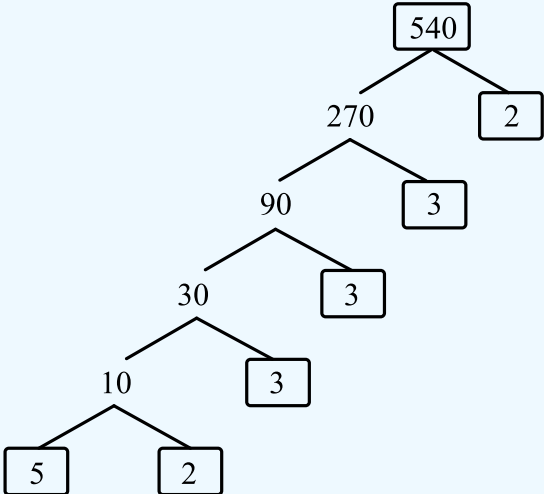
OCR GCSE

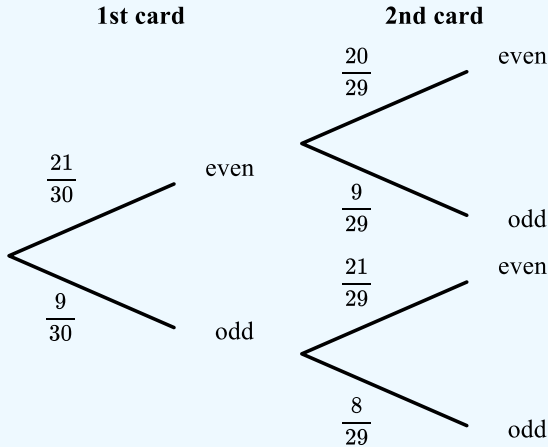
SET 2

Question	Working	Answer	Notes
Q1a		p^7	A1 cao
Q1b		$4q^5$	M1 $4q^x$ or xq^5 A1 cao
Q2	$100\% + 145\% = 245\%$ $245\% = £30625$ $1\% = £125$ $100\% = £12500$ $145\% = £18125$	£18125	M1 245% oe identified M1 $245\% = £30625$ M1 Correct step towards finding 100% (e.g. divide by 245 or 2.45) A1 Price of Yusef's car £18125
Q3a		$8.65 \leq n < 8.75$	A1 8.65 A1 8.75
Q3b		2.85, 2.9	M1 2.85 or 2.9 circled. No more than 3 values circled in total A1 2.85 and 2.9 only circled
Q3c	Upper bound for distance is 35 miles. He can travel $26 \times 1.2 = 31.2$ miles, or he needs $35 \div 26 = 1.3$ gallons	No – he can travel 31.2 miles and the upper bound for the distance is 35 miles	M1 Upper bound for distance is 35 miles M1 He can travel 31.2 miles or he needs 1.3 gallons A1 No with correct explanation
Q4a	$0 \times 8 + 1 \times 13 + 2 \times 7 + 3 \times 3 + 4 \times 1 = 40$ $40 \div 32 = 1.25$	1.25	M1 Multiplying number of siblings by frequencies M1 <i>ft</i> Their sum divided by 32 A1 cao

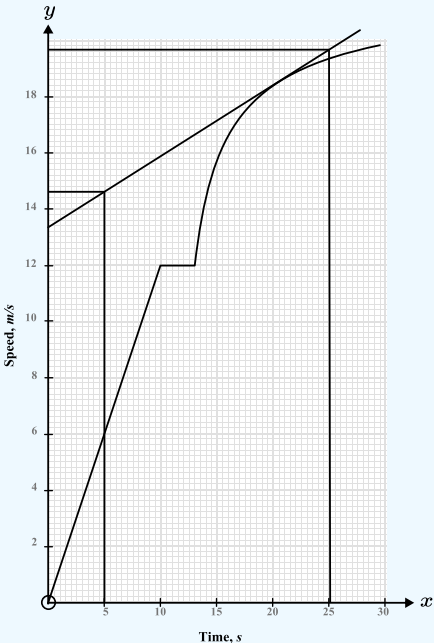
Question	Working	Answer	Notes
Q4b		-It is between 0 and 4 -The most common number of siblings was 1 so you would expect it to be around 1	A1 A correct explanation
Q5a	Angle sum is $(n - 2) \times 180 = 4 \times 180 = 720^\circ$ 6 angles so interior angle is $720 \div 6 = 120^\circ$ Isosceles triangle so angles ABF and AFB equal $180 - 120 = 60$ $60 \div 2 = 30^\circ$	30°	M1 A correct method to find interior or exterior angle of hexagon M1 Exterior angle = 60° or Interior angle = 120° M1 $\frac{180 - 120}{2}$ oe with either 'angles in a triangle add up to 180° ' or 'isosceles triangle' A1 Correct answer following correct reasoning
Q5b	$180 - 90 - 60 = 30$	30°	M1 Angle CBF = 90° or angle BCF = 60° or indication that AB and CF parallel so alternate angles A1 cao
Q6a	Surface area: $2 \times 9 \times 16 = 288$ $2 \times 9 \times x = 18x$ $2 \times 16 \times x = 32x$ $18x + 32x + 288 = 50x + 288$		M1 Attempt to find area of each face M1 Adds all 6 areas M1 Reaches $50x + 288$ following correct method A1 Sets $50x + 288 < 900$
Q6b	$50x < 612$ $x < 12.24$	$x < 12.24$	M1 Subtracting 288 A1 cao

Question	Working	Answer	Notes
Q6c		12	B1 cao
Q7a	$2y = 1.2 \times 10^4$ $4 \times 10^5 + 1.2 \times 10^4$ $400000 + 12000 = 412000$	4.12×10^5	M1 Evidence of correct substitution into $x + 2y$ A1 cao
Q7b	$20 \times 6.25 \times 10^{-4} = 1.25 \times 10^{-2}$	A grain of rice	M1 $20 \times 6.25 \times 10^{-4} = 1.25 \times 10^{-2}$ A1 cao
Q8	Area of garden: $24 \times 10.5 = 252$ $252 \div 20 = 12.6\text{kg}$ of seed needed 12.6 in ratio 2 : 5 is 3.6 : 9 3.6kg of wildflower seed: $4 \times \text{£}21 = \text{£}84$ 9kg of grass seed: $2 \times 32 = \text{£}64$ $\text{£}84 + \text{£}64 = \text{£}148$	£148	M1 24×10.5 or $252(m)$ seen M1 $252 \div 20 = 12.6\text{kg}$ of seed needed M1 12.6 divided in ratio 2 : 5 to give 3.6 : 9 M1 2 bags of grass seed and 4 bags of wildflower seed A1 cao
Q9a	$1^3 + 6 \times 1 - 10 = -3$ $2^3 + 6 \times 2 - 10 = 10$	Change of sign shows there is a root	M1 Substitutes 1 or 2 into $x^3 + 6x - 10$ or -3 or 10 seen M1 Substitutes both 1 and 2 into $x^3 + 6x - 10 = 0$ or -3 and 10 seen A1 States that a change of sign implies there is a root

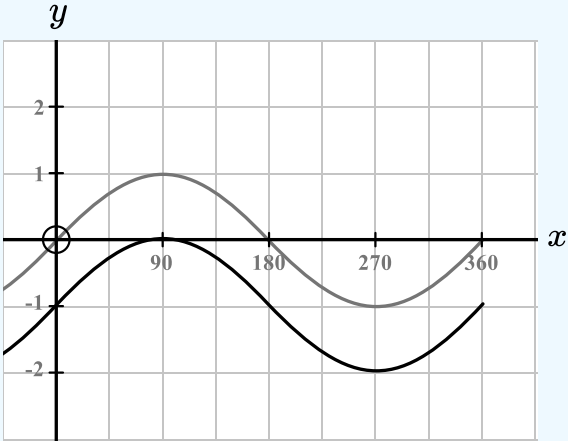
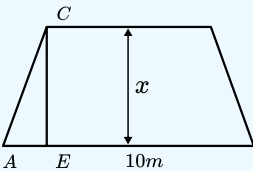
Question	Working	Answer	Notes																		
Q9b	<table><thead><tr><th>x</th><th>$x^3 + 6x - 10$</th><th></th></tr></thead><tbody><tr><td>1.5</td><td>2.375</td><td>Too high</td></tr><tr><td>1.4</td><td>1.144</td><td>Too high</td></tr><tr><td>1.3</td><td>-0.003</td><td>Too low</td></tr><tr><td>1.2</td><td>-1.072</td><td>Too low</td></tr><tr><td>1.35</td><td>0.560375</td><td>Too high</td></tr></tbody></table>	x	$x^3 + 6x - 10$		1.5	2.375	Too high	1.4	1.144	Too high	1.3	-0.003	Too low	1.2	-1.072	Too low	1.35	0.560375	Too high	1.3	M1 At least two trials between 1 and 2 M1 Values correct for 1.3 and 1.4 M1 Value for 1.35 calculated A1 cao following correct working
x	$x^3 + 6x - 10$																				
1.5	2.375	Too high																			
1.4	1.144	Too high																			
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1.2	-1.072	Too low																			
1.35	0.560375	Too high																			
Q10a		$2^2 \times 3^3 \times 5$	M1 Attempt at a prime factor tree or equivalent method, with at least two prime factors correctly reached A1 cao																		
Q10b		15	A1 cao																		

Question	Working	Answer	Notes
Q11	<p>1st card</p> <p>2nd card</p>  <p>Odd = odd \times odd</p> $\frac{9}{30} \times \frac{8}{29} = \frac{72}{870} = \frac{12}{145}$	$\frac{12}{145}$	<p>M1 9 odd cards seen or implied</p> <p>M1 Probability first card odd = $\frac{9}{30}$</p> <p>M1 Probability second card odd = $\frac{8}{29}$</p> <p>M1 Need both card to be odd so $\frac{9}{30} \times \frac{8}{29}$</p> <p>A1 $\frac{12}{145}$ oe</p>
Q12	<p>Pressure = $\frac{80}{16} = 5\text{N/cm}^2$</p> <p>20% of 5 = 1</p> <p>5 - 1 = 4N</p> <p>$4 = \frac{80}{A}$</p> <p>$A = 20\text{cm}^2$</p> <p>$20 - 16 = 4, \frac{4}{16} \times 100 = 25\%$</p>	25%	<p>M1 Original pressure = 5N/cm^2</p> <p>M1 $4 = \frac{80}{A}$ oe seen</p> <p>M1 New area = 20cm^2</p> <p>A1 $\frac{4}{16} \times 100 = 25\%$</p>

Question	Working	Answer	Notes
Q13		$x = 0.45454545\dots$ $100x = 45.454545\dots$ $99x = 45$ $x = \frac{45}{99} = \frac{5}{11}$	M1 $x = 0.45454545\dots$ and $100x = 45.454545\dots$ seen or implied M1 $99x = 45$ A1 $x = \frac{45}{99} = \frac{5}{11}$
Q14a		$\frac{73}{150}$	A1 cao
Q14b		$\frac{85}{150}$	A1 oe
Q14c		$\frac{53}{150}$	A1 cao
Q14d	The denominator should be the number who study German – not the full number of students. It should be $\frac{11}{61}$.		B1 A correct explanation
Q15a	$M_2 = 0.8 \times 4500 = 3600$	3600g	A1 cao
Q15b	$0.8 \times 3600 = 2880$ $0.8 \times 2880 = 2304$ $0.8 \times 2304 = 1843.2$ $2304g > 2250g > 1843.2g$ oe or $0.512 > 0.5 > 0.4096$ oe	Yes	M1 2304 or 0.512 seen M1 1843.2 or 0.4096 seen A1 Correct statement following correct working

Question	Working	Answer	Notes
Q16a	The train is going at a constant speed		B1 Correct statement
Q16b	$\frac{1}{2} \times 10 \times 12 = 60$ $3 \times 12 = 36$ $60 + 36 = 96m$	96m	M1 Attempt to find area under graph A1 cao
Q16c		$0.26m/s^2$	M1 Appropriate tangent line drawn with a valid attempt to find gradient A1 $0.24 - 0.28m/s^2$
Q17	$46 = \frac{k}{\sqrt[3]{125}}$ $k = 46 \times 5 = 230$ $m = \frac{230}{\sqrt[3]{8}} = 115$	115	M1 $46 = \frac{k}{\sqrt[3]{125}}$ oe seen M1 $k = 230$ A1 cao

Question	Working	Answer	Notes
Q18	<p>Angle ABC = 42°</p> <p>(Angles in the same segment are equal)</p> <p>ABC is an isosceles triangle</p> <p>(could be indicated on diagram)</p> <p>Angle ACB = $(180 - 42) \div 2 = 69^\circ$</p> <p>Angle CBF is alternate to angle ACB</p>	69°	<p>M1 Angle ABC = 42°</p> <p>M1 Angle ACB = 69°</p> <p>A1 cao</p>
Q19a	<p>Radius of circle: $\frac{20\pi}{2\pi} = 10$</p> <p>Equation of circle: $x^2 + y^2 = 10^2$</p>	$x^2 + y^2 = 100$	<p>M1 Dividing by 2π to find radius</p> <p>M1 Equation of form $x^2 + y^2 = a^2$</p> <p>A1 cao</p>
Q19b	<p>Distance of (7, 8) from centre of circle, (0, 0):</p> <p>$\sqrt{7^2 + 8^2} = 10.63\dots$</p> <p>Radius of circle is 10</p> <p>It is not inside the circle</p>	It is outside the circle	<p>M1 $\sqrt{7^2 + 8^2} = 10.63\dots$</p> <p>M1 Comparison of 10.63... to the radius of the circle, 10</p> <p>A1 Correct conclusion</p>
Q20a		$-\mathbf{b} + \mathbf{a}$	A1 cao
Q20b	<p>$\overrightarrow{AE} = \mathbf{a} + \frac{2}{3}\mathbf{b}$</p> <p>$\overrightarrow{EF} = \frac{1}{2}\mathbf{a} + \frac{1}{3}\mathbf{b}$</p> <p>AE is a multiple of EF and they share the point E therefore AEF is a straight line</p>		<p>M1 $\overrightarrow{DE} = \frac{2}{3}\mathbf{b}$ or $\overrightarrow{CF} = \frac{1}{2}\mathbf{a}$ oe seen</p> <p>M1 $\overrightarrow{AE} = \mathbf{a} + \frac{2}{3}\mathbf{b}$</p> <p>M1 $\overrightarrow{EF} = \frac{1}{2}\mathbf{a} + \frac{1}{3}\mathbf{b}$</p> <p>B1 One is a multiple of the other</p> <p>B1 They share the point B and form a straight line</p>

Question	Working	Answer	Notes
Q21a			A1 Translation 1 unit down drawn
Q21b		$y = -\cos(x)$ $y = \cos(x) + 2$	A1 One correct equation A1 Two correct equations
Q22	$AC = \sqrt{(1.1x)^2 + 2^2}$ $= \sqrt{1.21x^2 + 4}$  $AE = \sqrt{1.21x^2 + 4 - x^2}$ $= \sqrt{0.21x^2 + 4}$ $CF = 10 - 2\sqrt{0.21x^2 + 4}$		M1 Length of AC or BC $= \sqrt{1.21x^2 + 4}$ M1 AC is common side of triangle and trapezium so recognised as length of diagonal of trapezium M1 'AE' $= \sqrt{1.21x^2 + 4 - x^2}$ A1 Subtract 2AE from CF to give $10 - 2\sqrt{0.21x^2 + 4}$ Working must be correct throughout to achieve final mark

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