



THIRD SPACE
LEARNING

Mathematics

Paper 3

(Calculator)

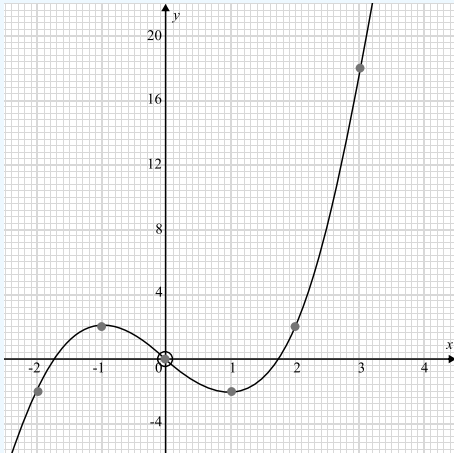
Higher Tier

Mark Scheme

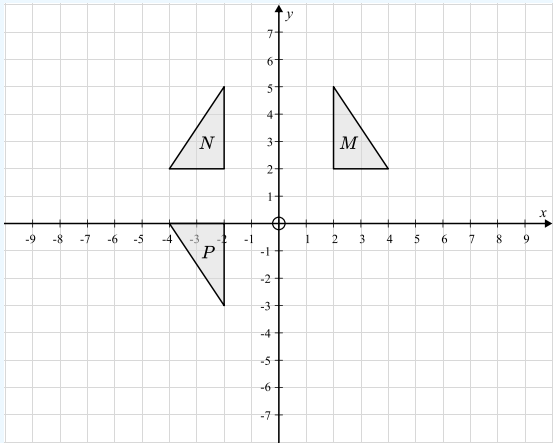
AQA GCSE

SET 4

Question	Working	Answer	Notes										
Q1		$-2 \leq p \leq 3$	B1 correct inequality selected										
Q2		0.0000273	A1 cao										
Q3		$y = \frac{2x^3}{x - 9}$	B1 correct equation identified										
Q4	$18 \times 2.5 = 45$ Circumference = $\pi \times 45 = 141.3716694$ $1km = 1000m = 100,000cm$ $100,000 \div 141.3716694 = 707.3553026$	707	M1 Converts from <i>inches</i> to <i>cm</i> M1 Calculates circumference M1 Divides 100000 by circumference A1 cao										
Q5a	$0.15 + 0.45 = 0.6$ $1 - 0.6 = 0.4$ $0.4 \div 4 = 0.1$ $0.1 \times 3 = 0.3$ <table border="1"><tr><td>Colour</td><td>red</td><td>blue</td><td>yellow</td><td>green</td></tr><tr><td>Probability</td><td>0.15</td><td>0.45</td><td>0.3</td><td>0.1</td></tr></table>	Colour	red	blue	yellow	green	Probability	0.15	0.45	0.3	0.1	Yellow 0.3 Green 0.1	M1 Subtracts 0.15 and 0.45 from 1 A1 cao
Colour	red	blue	yellow	green									
Probability	0.15	0.45	0.3	0.1									
Q5b	$200 \times 0.15 = 30$	30	M1 200×0.15 A1 cao										
Q6a		2	B1 cao										
Q6b	$0 \times 4 + 1 \times 7 + 2 \times 10 + 3 \times 6 + 4 \times 3 = 57$ $\frac{57}{30} = 1.9$	1.9	M1 Multiplies number of siblings by frequencies M1 Divides by 30 A1 Accept 1.9 or 2										

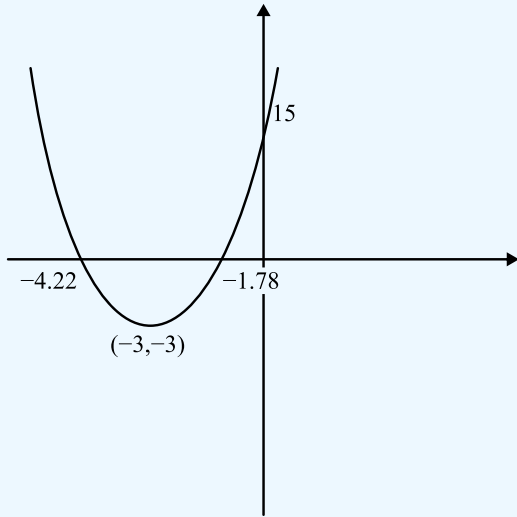
Question	Working	Answer	Notes														
Q7a	$(-2)^3 - 3 \times (-2) = -2$ $0^3 - 3 \times 0 = 0$ $3^3 - 3 \times 3 = 18$ <table border="1"><tr><td>x</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>y</td><td>-2</td><td>2</td><td>0</td><td>-2</td><td>2</td><td>18</td></tr></table>	x	-2	-1	0	1	2	3	y	-2	2	0	-2	2	18	-2, 0, 18	M1 2 values correct A1 All correct
x	-2	-1	0	1	2	3											
y	-2	2	0	-2	2	18											
Q7b			M1 At least 4 points plotted correctly A1 All points correct and joined with a smooth curve														
Q7c		$x = 2.6$	M1 Line $y = 10$ drawn A1 [2.4 – 2.8]														
Q8	$\frac{4 - -2}{3 - a} = 2$ $\frac{6}{3 - a} = 2$ $\frac{6}{2} = 3 - a$ $3 = 3 - a$ $a = 0$	$a = 0$	M1 Attempt at $m = \frac{y_2 - y_1}{x_2 - x_1}$ or evidence of another valid method e.g. sketching graph M1 Fully correct substitution, giving $\frac{4 - -2}{3 - a} = 2$ and attempt to solve for a , or correct step of another method A1 $a = 0$														

Question	Working	Answer	Notes
Q9a		This is a reverse percentage question so $80\% = £360$. 20% of the original is not 20% of the sale price	B1 A correct explanation
Q9b	$£612 = 85\%$ $1\% = \frac{612}{85} = 7.2$ $100\% = 7.2 \times 100 = £720$	£720	M1 Finds 1% or 10% A1 cao
Q10a	Exterior angle of regular octagon: $360 \div 8 = 45^\circ$ $HG = GI$ so angle $GIH = 45^\circ$ Angles in a triangle sum to 180° so $180 - 45 - 45 = 90^\circ$		M1 Calculates exterior angle of octagon M1 States angle $GIH = 45^\circ$ with reason A1 $180 - 45 - 45 = 90^\circ$
Q10b	Angle $EHI = 90^\circ$ so angle $EHG = 45^\circ$ Angle $HGF = 135^\circ$ (interior angle of octagon) Angle $HGC = 135 \div 2 = 67.5^\circ$ Angle $y = 180 - 45 - 67.5 = 67.5^\circ$	67.5°	M1 $EHG = 45^\circ$ M1 $HGC = 135 \div 2 = 67.5^\circ$ A1 Angle $y = 180 - 45 - 67.5 = 67.5^\circ$ (Allow alternative method using BCG is corresponding to angle y as BC is parallel to EH)

Question	Working	Answer	Notes
Q10c	Need length GH $\cos(45) = \frac{GH}{5\sqrt{2}}$ $GH = 5\sqrt{2} \times \cos(45) = 5$ Perimeter = $8 \times 5 = 40cm$	$40cm$	M1 Attempt at a method to find length GH (trigonometry or Pythagoras theorem) A1 $GH = 5$ M1 <i>fit</i> their ' 5 ' $\times 8$ A1 cao
Q11		$\div 2$	A1 cao
Q12		Rotation 180° about $(0, 1)$	M1 Triangle N correctly drawn M1 Triangle P correctly drawn A1 Fully described
Q13	Over 21 angle = 230° Difference = 100° $100^\circ = 3500$ $3500 \div 100 \times 360 = 12600$	12600	M1 $360 - 130 = 230^\circ$ M1 $100^\circ = 3500$ A1 cao

Question	Working	Answer	Notes						
Q14	$(2x^2 + 4x - x - 2)(3x + 2)$ $(2x^2 + 3x - 2)(3x + 2)$ $6x^3 + 9x^2 - 6x + 4x^2 + 6x - 4$ $6x^3 + 13x^2 - 4$	$6x^3 + 13x^2 - 4$	M1 Correctly expands any 2 brackets A1 cao						
Q15	<table><tr><td>m</td><td>2</td></tr><tr><td>n</td><td>2</td></tr><tr><td>p</td><td>1</td></tr></table>	m	2	n	2	p	1		B1 cao
m	2								
n	2								
p	1								
Q16	Red $\frac{2}{7} \times \frac{2}{7} = \frac{4}{49}$ Green $\frac{2}{7} \times \frac{1}{7} = \frac{2}{49}$ Blue $\frac{1}{7} \times \frac{1}{7} = \frac{1}{49}$ Yellow $\frac{1}{7} \times \frac{1}{7} = \frac{1}{49}$ $\frac{4}{49} + \frac{2}{49} + \frac{1}{49} + \frac{1}{49} = \frac{8}{49}$	$\frac{8}{49}$	M1 Correct probability for any one colour M1 Correct probabilities for 4 colours A1 Adds 4 correct probabilities						
Q17	$10.56 \div 4 = \text{€}2.64$ $2.64 \div 1.20 = \text{£}2.20$ per drink in France $13.50 \div 4 = \text{£}2.27^*$ per drink in the UK *rounded	France	M1 Converts euros to pounds or pounds to euros M1 Finds cost of equal number of drinks in each country A1 Correct conclusion following correct working						

Question	Working	Answer	Notes
Q18	$m^2 - n^2 = (m - n)(m + n)$ $9 = 2(m + n)$ $m + n = 4.5$	4.5	M1 $m^2 - n^2 = (m - n)(m + n)$ A1 cao
Q19	Upper bound density = $\frac{\text{Upper bound mass}}{\text{Lower bound volume}}$ Lower bound volume: $2.65 \times 3.45 \times 8.15 = 74.511375$ Upper bound mass: 77.5 Upper bound density: $\frac{77.5}{74.511375} = 1.040109648$	No – the upper bound for the density is 1.04, in which case the block will sink.	M1 Upper bound mass: 77.5g M1 Lower bound volume: $2.65 \times 3.45 \times 8.15$ M1 Upper bound density: $\frac{77.5}{74.511375} = 1.040109648$ A1 Correct conclusion following correct working
Q20	$4000 \times n^6 = 4638.77$ $n^6 = 1.1596925$ $n = \sqrt[6]{1.1596925} = 1.024999865$ $n = 1 + \frac{x}{100}$ $1.024999865 = 1 + \frac{x}{100}$ $0.024999865 = \frac{x}{100}$ $x = 2.4999865$ $x = 2.5\%$	2.5%	M1 $4000 \times n^6 = 4638.77$ M1 Divides by 4000 and takes 6th root A1 cao

Question	Working	Answer	Notes
Q21a	$2[x^2 + 6x] + 15$ $2[(x + 3)^2 - 9] + 15$ $2(x + 3)^2 - 3$	$2(x + 3)^2 - 3$	M1 Takes out factor of 2 M1 Halves coefficient of x A1 cao
Q21b	$2(x + 3)^2 - 3 = 0$ $(x + 3)^2 = \frac{3}{2}$ $x + 3 = \pm \sqrt{\frac{3}{2}}$ $x = -3 + \sqrt{\frac{3}{2}} = -1.775255129$ $x = -3 - \sqrt{\frac{3}{2}} = -4.224744871$	$x = -1.78$ $x = -4.22$	M1 Attempts to solve using part a or using the quadratic formula A1 Both solutions correct
Q21c			M1 Positive quadratic curve with at least two key points correctly labelled A1 Correct curve with all four points correctly labelled

Question	Working	Answer	Notes
Q22	Volume scale factor: $\frac{128}{54}$ Linear scale factor: $\frac{4}{3}$ Area scale factor: $\frac{16}{9}$ Surface area of A : $160 \div \frac{16}{9} = 90$	90cm^2	M1 Volume scale factor: $\frac{128}{54}$ oe M1 Linear scale factor: $\frac{4}{3}$ M1 Area scale factor: $\frac{16}{9}$ A1 cao
Q23a		3	B1 cao
Q23b		270	B1 cao
Q24	Sequence n th term: $8n + 3$ $(8(n + 1) + 3)^2 - (8n + 3)^2$ $= (8n + 11)^2 - (8n + 3)^2$ $= 64n^2 + 176n + 121 - 64n^2 - 48n - 9$ $= 128n + 112$ $= 16(8n + 7)$ Therefore it is always a multiple of 16		M1 n th term of sequence $8n + 3$ M1 $(8(n + 1) + 3)^2 - (8n + 3)^2$ M1 Attempts to expand and simplify A1 $128n + 112 = 16(8n + 7)$ A1 Conclusion following correct working

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