



THIRD SPACE
LEARNING

Mathematics

Paper 2

(Calculator)

Higher Tier

Mark Scheme

AQA GCSE

SET 4

Question	Working	Answer	Notes
Q1		206	A1 cao
Q2		$\frac{4}{9}$	A1 cao
Q3		ASA	B1 correct answer circled
Q4a	$7 - 3 = 4$	p^4	A1 cao
Q4b	$3 \times 5 = 15$	q^{15}	A1 cao
Q4c	$2 \times 3 = 6$ so it should be $6x^7$		B1 correct explanation
Q5	5 litres of blue paint = £17.50 1 litre of blue paint = $£17.50 \div 5 = £3.50$ $£3.50 \div 5 \times 6 = £4.20$ 1 litre of yellow paint = £4.20 $£4.20 \times 8 = £33.60$	£33.60	M1 1 litre of blue paint = £3.50 M1 1 litre of yellow paint = £4.20 M1 $£4.20 \times 8$ A1 cao
Q6	Factors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48 Factors of 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72	24	M1 Lists the factors of 48 and 72 or draws prime factor trees A1 cao
Q7a	$\frac{1}{0.4} = 2.5$	2.5	A1 cao
Q7b		$225 \leq x < 235$	B1 Lower bound correct B1 Upper bound correct

Question	Working	Answer	Notes
Q8	$3t + 4c = 10.80$ $2t + 5c = 11.40$ $6t + 8c = 21.60$ $6t + 15c = 34.20$ $7c = 12.60$ $c = £1.80$ $3t + 4 \times 1.80 = 10.80$ $3t = 3.60$ $t = £1.20$ $4t + c = 4 \times 1.20 + 1.80$ $= £6.60$	£6.60	M1 Forms 2 equations M1 Multiplies equations to give equal coefficients of 't' or 'c' M1 Subtracts equations and solves for t or c M1 Substitutes their value and solves for the other variable A1 cao
Q9	Planet B $9.05 \times 10^{11} = \frac{4}{3} \pi r^3$ $r = \sqrt[3]{\frac{9.05 \times 10^{11}}{\frac{4}{3} \pi}} = 6000.489175$ $\frac{6000.489175}{4 \times 10^3} = 1.500122294$	1.5	M1 $9.05 \times 10^{11} = \frac{4}{3} \pi r^3$ A1 radius of planet B = 6000 M1 Divides by 4000 to find scale factor A1 cao

Question	Working	Answer	Notes
Q10	60% of 80% = 48%	48%	M1 60% of 80% oe seen A1 cao
Q11	$5x = 2f - p$ $5x + p = 2f$ $\frac{5x + p}{2} = f$	$f = \frac{5x + p}{2}$	M1 Correct first step A1 cao
Q12	$8 \times m \times d = 360$ $m \times d = 45$ $m = 9, d = 5$	5	M1 $360 \div 8 = 45$ seen or implied A1 cao
Q13a		Yes – 2 was rolled considerably more times than any other number	B1 A correct statement
Q13b		Repeat the experiment more times	B1 A correct statement
Q14a		More than 75% of patients were seen in under 30 minutes	B1 correct statement identified
Q14b	*The median time was lower after *The least and greatest waiting times were lower after *The lower quartile and upper quartile were lower after	The waiting time was lower	B1 A correct statement comparing location
Q14c	*The range was smaller after *The inter quartile range was smaller after	The waiting times were more consistent	B1 A correct statement comparing spread

Question	Working	Answer	Notes
Q15	$BC^2 = 7^2 + 11^2 - 2 \times 7 \times 11 \cos(65)$ $BC^2 = 170 - 154 \cos(65)$ $BC = \sqrt{170 - 154 \cos(65)}$ $BC = 10.24288962$	10.2cm	M1 Correct substitution of values into cosine rule M1 Attempt to solve, reaching $BC =$ A1 cao
Q16a	$\sqrt{(3 - -6)^2 + (-8 - 4)^2}$ $= \sqrt{81 + 144}$ $= 15$	15cm	M1 Attempts to use Pythagoras theorem with x coordinates and y coordinates A1 cao
Q16b	<p>Gradient of AB: $\frac{4 - -8}{-6 - 3} = \frac{12}{-9} = -\frac{4}{3}$</p> <p>Gradient of line: $4y = 3x + 34$</p> $y = \frac{3}{4}x + \frac{34}{4}$ <p>Gradient = $\frac{3}{4}$</p> $-\frac{4}{3} \times \frac{3}{4} = -1 \text{ therefore perpendicular}$		M1 Correct gradient for AB or the line $4y = 3x + 34$ M1 Both gradients correct A1 Both gradients correct and conclusion given
Q17		$n^2 + 3n + 1$	A1 cao
Q18a		$2\sqrt{29}$	A1 cao

Question	Working	Answer	Notes
Q18b	$2^2 + 5^2 = 29$	Any two of (2, 5), (-2, 5), (2, -5), (-2, -5)	A1 Any one correct coordinate A1 Any two correct coordinates
Q19a	$x_1 = \sqrt[3]{8 - 3 \times 2} = 1.25992105$ $x_2 = \sqrt[3]{8 - 3 \times 1.25992105} = 1.616015822$ $x_3 = \sqrt[3]{8 - 3 \times 1.616015822} = 1.466200026$	$x_1 = 1.25992105$ $x_2 = 1.616015822$ $x_3 = 1.466200026$	A1 x_1 = correct A1 x_2 = correct A1 x_3 = correct
Q19b		The values are getting closer to a solution to the equation $x^3 + 3x - 8 = 0$	B1 correct explanation
Q20	<p>Angle $ABC = 90 + 21 = 111^\circ$ Angle $ADC = 90 + 55 = 145^\circ$ Angle $BCD = 21 + 55 = 76^\circ$ Angle $DAB = 360 - 111 - 145 - 76 = 28^\circ$</p> <p>Or</p> <p>Angle $BCD = 21 + 55 = 76^\circ$ Angle $BOD = 2 \times 76 = 152^\circ$ Angle $ABO = 90^\circ$ Angle $ADO = 90^\circ$ Angle $ABD = 360 - 90 - 90 - 152 = 28^\circ$</p>	28°	M1 Angle $BCO = 21^\circ$ or Angle $DCO = 55^\circ$ M1 Angle $BCD = 76^\circ$ M1 Angles ABO and ADO or ABC and ADC identified A1 cao with correct working shown

Question	Working	Answer	Notes
Q21	<p>Curved surface area of whole cone</p> $\pi \times 12 \times 30 = 360\pi$ <p>Curved surface area of small cone</p> $\pi \times 6 \times 15 = 90\pi$ <p>Curved surface area of frustum</p> $360\pi - 90\pi = 270\pi$ <p>Area of base $\pi \times 12^2 = 144\pi$</p> <p>Area of top $\pi \times 6^2 = 36\pi$</p> <p>Total:</p> $270\pi + 144\pi + 36\pi = 450\pi = 1413.716694$	1410cm^2	<p>M1 Curved surface area of whole cone</p> $\pi \times 12 \times 30 = 360\pi$ <p>M1 Curved surface area of frustum</p> $360\pi - 90\pi = 270\pi$ <p>M1 Area of base $\pi \times 12^2 = 144\pi$ or</p> <p>Area of top $\pi \times 6^2 = 36\pi$</p> <p>A1 cao</p>
Q22	<p>Frequency density for</p> $180 < t \leq 210 = \frac{18}{30} = 0.6$ <p>Height = $3 \times FD$</p> <p>Frequency density for</p> $210 < t \leq 240 = \frac{12}{30} = 0.4$ <p>Height = $3 \times 0.4 = 1.2$</p>	1.2cm	<p>M1 Calculates frequency density for</p> $180 < t \leq 210$ <p>M1 Realises that height = $3 \times FD$</p> <p>A1 $3 \times 0.4 = 1.2$</p>

Question	Working	Answer	Notes
Q23	$P(gg) = 0.4 \times 0.4 = 0.16$ $24 = \frac{16}{100}$ of spins Total spins = $24 \times 100 \div 16 = 150$ $P(yy) = 0.6 \times 0.6 = 0.36$ $0.36 \times 150 = 54$	54	M1 $P(gg) = 0.4 \times 0.4 = 0.16$ M1 Calculates 150 spins A1 cao
Q24	$7x = 3y$ $y = \frac{7x}{3}$ $2x + \frac{7x}{3} = 117$ $\frac{13x}{3} = 117$ $x = 117 \times 3 \div 13 = 27$ $y = 27 \div 3 \times 7 = 63$ $x + 2y = 27 + 2 \times 63 = 153$	153	M1 $2x + \frac{7x}{3} = 117$ M1 $x = 27$ $y = 63$ A1 cao
Q25a	$\sqrt{(2x)^2 + (x+5)^2 + x^2} > 7$ $4x^2 + x^2 + 10x + 25 + x^2 > 49$ $6x^2 + 10x - 24 > 0$		M1 Uses Pythagoras theorem to obtain an expression for the length of AG M1 Sets length of $AG > 7$ A1 Reaches $6x^2 + 10x - 24 > 0$ with no errors

Question	Working	Answer	Notes
Q25b	$3x^2 + 5x - 12 > 0$ $(3x - 4)(x + 3) > 0$ $x < -3$ or $x > \frac{4}{3}$ $x < -3$ not valid as cannot have negative length	$x > \frac{4}{3}$	M1 Finds critical values -3 and $\frac{4}{3}$ A1 $x > \frac{4}{3}$ only, and $x < -3$ A1 $x > \frac{4}{3}$ only
Q26a	$\vec{BC} = -10\mathbf{a} + 20\mathbf{b}$ $\vec{BM} = -5\mathbf{a} + 10\mathbf{b}$ $\vec{AM} = 10\mathbf{a} - 5\mathbf{a} + 10\mathbf{b}$ $\vec{AM} = 5\mathbf{a} + 10\mathbf{b}$		M1 Finds vector BM A1 Correct working
Q26b	$\vec{BD} = -10\mathbf{a} + \frac{40}{3}\mathbf{b}$ $\vec{BN} = \frac{3}{5}(-10\mathbf{a} + \frac{40}{3}\mathbf{b})$ $\vec{BN} = -6\mathbf{a} + 8\mathbf{b}$ $\vec{AN} = 10\mathbf{a} - 6\mathbf{a} + 8\mathbf{b} = 4\mathbf{a} + 8\mathbf{b}$ $\vec{AN} = 4(\mathbf{a} + 2\mathbf{b})$ $\vec{AM} = 5(\mathbf{a} + 2\mathbf{b})$	Both lines are multiples of $\mathbf{a} + 2\mathbf{b}$ therefore parallel, and they share the point A . Therefore ANM is a straight line	M1 Finds vector BN M1 Finds vector AN M1 Compares AN and AM A1 Correct conclusion

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