



THIRD SPACE
LEARNING

Mathematics

Paper 3

(Calculator)

Higher Tier

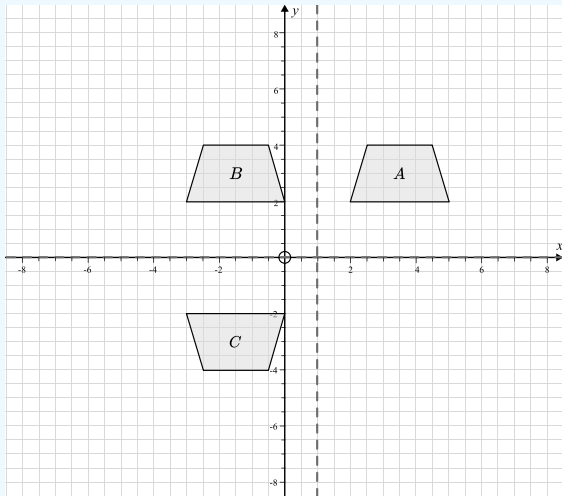
Mark Scheme

AQA GCSE


SET 3

Question	Working	Answer	Notes
Q1		48	A1 cao
Q2		1	B1 cao
Q3		5.402, 5.42, 5.44, 5.4	B1 cao
Q4		$c = \frac{\sqrt{d}}{2} + 3$	B1 cao
Q5	$(5m + 4) - (m + 2) = 4m + 2$ $4m + 2 = 12$ $4m = 10$ $m = 2.5$	$m = 2.5$	A1 cao
Q6	$Q: (\frac{0+12}{2}, \frac{10+2}{2}) = (6, 6)$ $P - Q$: along 6, up 3 $Q - R$: along 12, up 6 $R: (18, 12)$	(18, 12)	M1 Point Q correct A1 x or y coordinate correct A1 cao
Q7a	$8 + 3 \times 10 + 5 \times 12 + 2 \times 14 + 3 \times 16 +$ $2 \times 18 = 210$ $210 \div 16 = 13.125$	13.125	M1 Adds all values and divides by 16 A1 cao
Q7b		*No clothes size 13.125 *Doesn't give us useful information about actual sizes of clothes sold	B1 A relevant statement

Question	Working	Answer	Notes
Q7c		Mode - it gives us information about the most common clothes size - useful for stock	B1 Mode B1 A relevant statement
Q8a	$D = S \times T$ $D = 30 \times \frac{5}{60} = 2.5 \text{ miles}$	2.5 miles	M1 $30 \times \frac{5}{60} (= 2.5)$ A1 cao
Q8b	$T = \frac{D}{S}$ $T = \frac{2.5}{20} = \frac{1}{8} \text{ hour}$ $\frac{1}{8} \times 60 = 7.5 \text{ minutes}$ It will take 2.5 minutes longer	No - it will take 2.5 minutes longer	M1 $\frac{2.5}{20} = \frac{1}{8} \text{ hour or } 7.5 \text{ minutes}$ A1 Correct conclusion following correct working
Q9		4	A1 cao
Q10a		$x = 2$ $y = 3$	B1 cao
Q10b	$5y + 4x - 23 = 0$ $5y = -4x + 23$ $y = -\frac{4}{5}x + \frac{23}{5}$ OR $m = \frac{-1 - 3}{7 - 2} = \frac{-4}{5}$	$-\frac{4}{5}$	M1 Attempt to rearrange the equation into the form $y = mx + c$ or use $\frac{\text{change in } y}{\text{change in } x}$ A1 cao

Question	Working	Answer	Notes										
Q10c	$-\frac{4}{5} \times 3 = -\frac{12}{5} \neq -1$	Neither The lines are not perpendicular as the product of their gradients is not -1 and they are not parallel as their gradients are not equal.	B1 Gradient comparisons B1 Neither										
Q11a	<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>0.25</td><td>0.4</td><td>0.2</td></tr></table>	Colour	red	blue	yellow	green	Probability	0.15	0.25	0.4	0.2	0.4 0.2	M1 $1 - 0.4 (= 0.6)$ A1 cao
Colour	red	blue	yellow	green									
Probability	0.15	0.25	0.4	0.2									
Q11b	$15\% = 135$ $1\% = 135 \div 15 = 9$ $25\% = 9 \times 25 = 225$	225	M1 $15\% = 135$ or equivalent statement A1 cao										
Q12		Rotation 180° around $(1, 0)$	M1 Shapes <i>B</i> and <i>C</i> correctly drawn B1 Rotation B1 180° around $(1, 0)$										

Question	Working	Answer	Notes
Q13	$20\text{m/sec} = 1200\text{m/min}$ $= 72000\text{m/h}$ $= 72\text{km/h}$ $= 45\text{mph}$	45mph	M1 Reaches 72km/hour A1 cao
Q14	$14 \div 4 = 3.5$, scale factor = 3.5 $BC = 6 \times 3.5 = 21$ $EC = 21 - 6 = 15\text{cm}$	15cm	M1 $14 \div 4 (= 3.5)$ M1 $BC = 6 \times 3.5 = 21$ or $21 - 6 (= 15)$ A1 cao
Q15	$2c = 6$ $c = 3$ $b = 3^3 = 27$	$b = 27$ $c = 3$	M1 $2c = 6$ A1 $c = 3$ A1 $b = 27$
Q16a	$2000 \times 1.04^3 = \text{£}2249.728$	£2249.73	M1 1.04^3 seen or valid attempt to find compound interest after 3 years A1 cao
Q16b	$2000 \times \left(\frac{100+x}{100}\right)^3 = 2275.79$ $\left(\frac{100+x}{100}\right)^3 = 1.137895$ $\frac{100+x}{100} = \sqrt[3]{1.137895} = 1.044$ $100+x = 104.4$ $x = 4.4$	4.4%	M1 $2000 \times \left(\frac{100+x}{100}\right)^3 = 2275.79$ seen or implied M1 Reaches 104.4% oe A1 cao

Question	Working	Answer	Notes
Q17a Median = 33, $LQ = 21$, $UQ = 48$ 			M1 Median correct M1 LQ and UQ correct A1 Fully correct
Q17b 60% of 60 = 36 13 scored over 36 $\frac{13}{27} \times \frac{12}{26} = \frac{2}{9}$		$\frac{2}{9}$	M1 Pass mark = 36 M1 $\frac{13}{27} \times \frac{12}{26}$ A1 $\frac{2}{9}$ oe
Q18 $x_1 = 30$ $x_2 = 0.4 \times 30 + 10 = 22$ $x_3 = 0.4 \times 22 - 10 = 18.8$		22, 18.8	A1 $x_2 = 22$ A1 $x_3 = 18.8$
Q19 $a : a + b = \frac{a}{a} : \frac{a+b}{a} = 1 : \frac{a+b}{a}$ $k = \frac{a+b}{a}$ $ak = a + b$ $ak - a = b$ $a(k - 1) = b$ $a = \frac{b}{k - 1}$			M1 Divides by a to get $1 : \frac{a+b}{a}$ M1 $k = \frac{a+b}{a}$ and attempts to make a the subject A1 Reaches $a = \frac{b}{k - 1}$ through correct working

Question	Working	Answer	Notes
Q20	<p>Angle $ADC = 90^\circ$ as angle subtended from a diameter is 90°</p> <p>Angle $CDE = 90^\circ$ as angles on a straight line sum to 180°</p> <p>Angle $ACE = 90^\circ$ as a diameter meets a tangent at 90°</p> <p>Angle $ACD = 21^\circ$ as angles in the same sector are equal</p> <p>Angle $DCE = 90 - 21 = 69^\circ$</p> <p>Angle $DEC = 180 - 90 - 69 = 21^\circ$ as angles in a triangle sum to 180°</p>	21°	<p>M1 Angle $ACD = 21^\circ$</p> <p>M1 Angle $DCE = 69^\circ$</p> <p>M1 Angle $EDC = 90^\circ$</p> <p>A1 21°</p> <p>B1 At least two correct reasons to accompany working out.</p>
Q21	$\frac{x+1}{x-3} = \frac{x-7}{3x-1}$ $(x+1)(3x-1) = (x-7)(x-3)$ $3x^2 + 2x - 1 = x^2 - 10x + 21$ $2x^2 + 12x - 22 = 0$ $x^2 + 6x - 11 = 0$ $x = 1.472135955... \text{ or } x = -7.472135955...$	$x = 1.47$ or $x = -7.47$	<p>M1 $(x+1)(3x-1) = (x-7)(x-3)$</p> <p>M1 $3x^2 + 2x - 1 = x^2 - 10x + 21$</p> <p>M1 $2x^2 + 12x - 22 = 0$</p> <p>M1 $x^2 + 6x - 11 = 0$</p> <p>A1 $x = 1.47$ or $x = -7.47$</p>
Q22	<p>Area upper bound = 2550</p> <p>Length lower bound = 43.5</p> <p>Width upper bound</p> $= \frac{2550}{43.5} = 58.620889655....$	$58.621m$	<p>M1 At least one of:</p> <p>Area upper bound = 2550</p> <p>Length lower bound = 43.5</p> <p>M1 $\frac{\text{Their upper bound for area}}{\text{Their lower bound for length}}$</p> <p>A1 cao</p>

Question	Working	Answer	Notes
Q23	$\vec{AC} = 6a + 3b$ $\vec{EC} = 2a + b$ $\vec{CD} = -6a$ $\vec{CF} = -3a$ $\vec{EF} = 2a + b - 3a$ $\vec{EF} = b - a$	$b - a$	M1 Vector AC correct and finds vector AE or AC M1 Vector CD correct and finds vector CF or DF M1 Adds vectors to form a path from E to F A1 cao
Q24	$g(49) = \frac{49 - 1}{3} = 16$ $fg(49) = f(16) = 16^2 - 3 = 253$ $g^{-1}(x) = 3x + 1$ $g^{-1}(84) = 3 \times 83 + 1 = 253$	$fg(49) = 253 = g^{-1}(84)$	M1 $g(49) = \frac{49 - 1}{3} = 16$ M1 $fg(49) = f(16) = 16^2 - 3 = 253$ M1 $g^{-1}(x) = 3x + 1$ B1 Correct conclusion following fully correct working
Q25	Distance from centre of octagon to any vertex is $\sqrt{50}$ Area of $\frac{1}{8}$ of octagon = $\frac{1}{2} \times \sqrt{50} \times \sqrt{50} \times \sin(45) = \frac{25}{2} \sqrt{2}$ Total area = $8 \times \frac{25}{2} \sqrt{2} = 100\sqrt{2}$	$100\sqrt{2}$	M1 $\sqrt{50}$ seen M1 Attempt to use area of a triangle with $\sqrt{50}$ and 45° A1 Area of 1 triangle = $\frac{25}{2} \sqrt{2}$ M1 Multiplies by 8 A1 cao

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