



THIRD SPACE
LEARNING

Mathematics

Paper 2

(Calculator)

Higher Tier

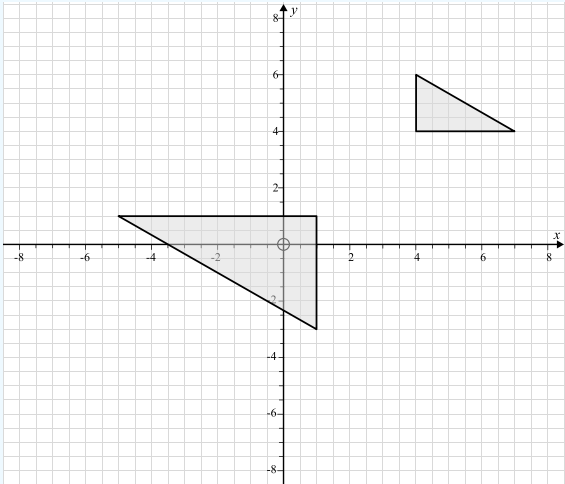
Mark Scheme

AQA GCSE

SET 3

Question	Working	Answer	Notes
Q1		$-3 \leq x < 2$	B1 cao
Q2		y is 62.5% of x	A1 cao
Q3		$\frac{1}{40}$	A1 cao
Q4		$A \cap B'$	B1 cao
Q5	$\tan(x) = \frac{14}{6}$ $x = \tan^{-1}\left(\frac{14}{6}\right) = 66.80140949$	66.8°	M1 $\tan(x) = \frac{14}{6}$ oe seen M1 Attempts $\tan^{-1}\left(\frac{14}{6}\right)$ A1 cao
Q6a		Jess as she has done the most trials	B1 cao
Q6b	$20 \div 6 = 3.33\dots$	Yes - in 20 rolls, we would expect around 3 6s	A1 cao
Q6c	$1 + 14 + 31 = 46$ $20 + 50 + 200 = 270$ $270 \div 6 = 45$ expected 6s	No - the overall results suggest that the dice is not biased, as we would expect about 45 6s and there were 46	A1 cao
Q7	$12 \times 8 = 96$ machine hours $96 \div 9 = 10\frac{2}{3}$ $\frac{2}{3}$ hours = $\frac{2}{3} \times 60 = 40$ minutes	10 hours 40 minutes	M1 $12 \times 8 = 96$ machine hours M1 $96 \div 9 = 10\frac{2}{3}$ A1 cao
Q8		2.38×10^{-3}	A1 cao

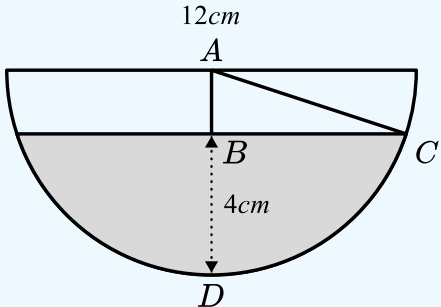
Question	Working	Answer	Notes
Q8b	$54000 - 3700 = 50300 = 5.03 \times 10^4$	5.03×10^4	M1 54000 and 3700 or 50300 or 5.03 seen A1 cao
Q8c	$\frac{3 \times 10^p}{10^{p-1}} : \frac{4 \times 10^{p-1}}{10^{p-1}} : \frac{5 \times 10^{p+1}}{10^{p-1}}$ $= 3 \times 10 : 4 : 5 \times 10^2$ $= 30 : 4 : 500$ $= 15 : 2 : 250$	$15 : 2 : 250$	M1 30:4:500 oe A1 Correct, simplified answer
Q9a	$180 - 165 = 15$ $360 \div 15 = 24$	24	M1 $180 - 165 (= 15)$ or $360 \div 15 (= 24)$ seen A1 cao
Q9b		No	B1 cao
Q10a		$\begin{pmatrix} 3x - 2 \\ 15 - 2y \end{pmatrix}$	M1 Top row or bottom row correct A1 cao
Q10b	$x + 1 = 4, x = 3$ $5 + y = 3, y = -2$	$x = 3, y = -2$	M1 x or y correct A1 cao
Q11	$925 \div 25 = 37$ $925 = 25 \times 37$, 25 is square, 37 is prime	$925 = 25 \times 37$	M1 25 identified as factor of 925 A1 $925 = 25 \times 37$ or $925 = 5^2 \times 37$
Q12	$20\% = 54$ $100\% = 54 \times 5 = 270$, £270 interest $\frac{270}{6000} \times 100 = 4.5\%$ interest rate	4.5%	M1 $20\% = 54$ seen or implied M1 $5 \times 54 (= 270)$ M1 Valid attempt to find 270 as a percentage of 6000 A1 cao

Question	Working	Answer	Notes
Q13	$10 \times 9 \times 5 = 450$	450	M1 10, 9 or 5 seen M1 $10 \times 9 \times 5$ A1 cao
Q14	$m^2 = \frac{3p}{4}$ $4m^2 = 3p$ $p = \frac{4m^2}{3}$	$p = \frac{4m^2}{3}$	M1 $m^2 = \frac{3p}{4}$ or $4m^2 = 3p$ seen A1 cao
Q15a	$m = \frac{75 - 55}{2 - 1} = 20$	20	M1 Attempt at change in $\frac{\text{change in } y}{\text{change in } x}$ A1 [18 - 22]
Q15b		Gradient: Hourly charge Y intercept: Fixed initial charge	B1 Gradient correct interpretation B1 Y intercept correct interpretation
Q16			M1 An enlargement, scale factor 2 M1 An enlargement, scale factor -2 A1 Fully correct enlargement

Question	Working	Answer	Notes
Q17a	$y^3 + 296 = (y + 2)^3$ $y^3 + 296 = (y^2 + 4y + 4)(y + 2)$ $y^3 + 296 = y^3 + 6y^2 + 12y + 8$ $6y^2 + 12y - 288 = 0$ $y^2 + 2y - 48 = 0$		M1 $y^3 + 296 = (y + 2)^3$ oe M1 $6y^2 + 12y - 288 = 0$ A1 Reaches $y^2 + 2y - 48 = 0$ with no incorrect working
Q17b	$y^2 + 2y - 48 = 0$ $(y + 8)(y - 6) = 0$ $y = -8$ (invalid) or $y = 6$ Volume: $6^3 = 216$	216cm^3	M1 Valid attempt to solve $y^2 + 2y - 48 = 0$ M1 $y = 6$ A1 cao
Q18	Single : twin = $1 : 6 = 5 : 30$ Twin : family = $5 : 2 = 30 : 12$ Single : twin : family = $5 : 30 : 12$ $12 - 5 = 7$ $21 \div 7 = 3$ $3 \times (5 + 30 + 12) = 141$	141	M1 Single : twin : family = $5 : 30 : 12$ oe M1 $21 \div 7 = 3$ A1 cao
Q19	$(2n + 1)$ and $(2n + 3)$ are consecutive odd numbers: $(2n + 1)^2 + (2n + 3)^2$ $= 4n^2 + 4n + 1 + 4n^2 + 12n + 9$ $= 8n^2 + 16n + 10$ $= 2(4n^2 + 8n + 5)$ It has a factor of 2 and so it is even for all n		M1 Correctly uses two consecutive odd numbers, e.g. $(2n + 1)$ and $(2n + 3)$ or $(2n - 1)$ and $(2n + 1)$ M1 Squares both terms and expands each to form two correct quadratics B1 Factorises by 2 and concludes that it is always even

Question	Working	Answer	Notes
Q20	<p>Let M be the midpoint of AC and N be the midpoint of AD.</p> <p>$MN = 3\text{cm}$, $ME = 9\text{cm}$</p> <p>$NE = \sqrt{3^2 + 9^2} = 3\sqrt{10}$</p> <p>Area $ADE = \frac{1}{2} \times 6 \times 3\sqrt{10} = 9\sqrt{10}$</p> <p>Total surface area $= 36 + 4 \times 9\sqrt{10}$</p> <p>$= 36 + 36\sqrt{10}$</p>	$36 + 36\sqrt{10} \text{ cm}^2$	<p>M1 $NE = \sqrt{3^2 + 9^2} = 3\sqrt{10}$</p> <p>M1 Area $ADE = \frac{1}{2} \times 6 \times 3\sqrt{10} = 9\sqrt{10}$</p> <p>M1 Total surface area $= 36 + 4 \times 9\sqrt{10}$</p> <p>A1 Correct exact answer</p>
Q21	$\frac{10x - 5}{4x + 3} \div \frac{8x^2 - 10x + 3}{16x^3 - 9x}$ $= \frac{10x - 5}{4x + 3} \times \frac{16x^3 - 9x}{8x^2 - 10x + 3}$ $= \frac{5(2x - 1)}{4x + 3} \times \frac{x(4x + 3)(4x - 3)}{(4x - 3)(2x - 1)}$ $= 5x$	$5x$	<p>M1 Flips second fraction and multiplies</p> <p>M1 Factorises at least two expressions correctly</p> <p>M1 All expressions factorised and an attempt at cancelling</p> <p>A1 cao following correct working</p>
Q22		$\frac{k}{2}$	A1 cao

Question	Working	Answer	Notes
Q23a			M1 Translation by 2 units in positive or negative x direction A1 Translation by -2 units in x direction
Q23b		(135, 0)	A1 x coordinate correct A1 y coordinate correct
Q24	Frequencies: $1 \times 10 = 10$ $0.5 \times 58 = 29$ $0.5 \times 98 = 49$ $2 \times 6 = 12$ $(10 \times 2) + (29 \times 2.75) + (49 \times 3.25)$ $+ (12 \times 4.5) = 313$ $313 \div 100 = 3.13$	3.13kg	M1 Frequencies found and at least 3 correct M1 Midpoints used M1 Sum of frequencies \times midpoints M1 Divide by 100 A1 cao

Question	Working	Answer	Notes
Q25	 <p> $AC = 6\text{cm}$ $AB = 2\text{cm}$ $\text{Angle } BAC =$ $\cos^{-1}\left(\frac{2}{6}\right) = 70.528779\dots$ $\text{Area of sector } ACD =$ $\frac{70.528779\dots}{360} \times \pi \times 6^2 = 22.157269\dots$ $BC = \sqrt{6^2 - 2^2} = 4\sqrt{2}$ $\text{Area of triangle } ABC = \frac{1}{2} \times 4\sqrt{2} \times 2 = 4\sqrt{2}$ $\text{Area of } BCD = 22.157269\dots - 4\sqrt{2}$ $= 16.50041475\dots$ $\text{Total shaded area} = 2 \times 16.50 =$ $33.0008295\dots$ $\text{Volume} = 33.0 \times 20 = 660.01659\dots$ $660 \div 1000 = 0.66001659 \text{ litres}$ </p>	0.66l	<p>M1 Angle $BAC =$ $\cos^{-1}\left(\frac{2}{6}\right) = 70.528779\dots$ M1 Area of sector $ACD =$ $\frac{70.528779\dots}{360} \times \pi \times 6^2 = 22.157269\dots$ M1 Area of triangle $ABC =$ $\frac{1}{2} \times 4\sqrt{2} \times 2 = 4\sqrt{2}$ M1 Total shaded area = $2 \times 16.50 = 33.0008295\dots$ M1 Volume = $33.0 \times 20 = 660.01659\dots$ A1 cao given to 2sf </p>

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