



THIRD SPACE
LEARNING

Mathematics

Paper 2

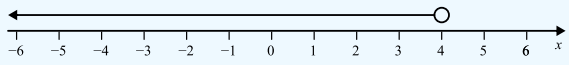
(Calculator)

Higher Tier

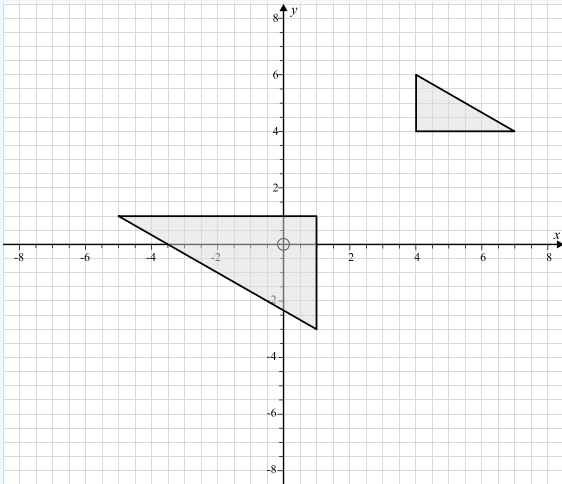
Mark Scheme

Edexcel GCSE

SET 3

Question	Working	Answer	Notes
Q1i	$3x - 6 < 6$ $3x < 12$ $x < 4$	$x < 4$	M1 $3x - 6 < 6$ or $3x < 12$ seen A1 cao
Q1ii			M1 <i>ft</i> correctly represents their answer from <i>i</i> A1 cao
Q2	$\tan(x) = \frac{14}{6}$ $x = \tan^{-1}\left(\frac{14}{6}\right) = 66.80140949$	66.8°	M1 $\tan(x) = \frac{14}{6}$ oe seen M1 Attempts $\tan^{-1}\left(\frac{14}{6}\right)$ A1 cao
Q3a		Jess as she has done the most trials	B1 Jess with the correct reason
Q3bi	$20 \div 6 = 3.33\dots$	Yes - in 20 rolls, we would expect around 3 6s	B1 Yes with a correct conclusion
Q3bii	$1 + 14 + 31 = 46$ $20 + 50 + 200 = 270$ $270 \div 6 = 45$ expected 6s	No - the overall results suggest that the dice is not biased, as we would expect about 45 6s and there were 46	B1 No with a correct conclusion
Q4	$12 \times 8 = 96$ 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
Q5a	$180 - 165 = 15$ $360 \div 15 = 24$	24	M1 $180 - 165 (= 15)$ or $360 \div 15 (= 24)$ seen A1 cao

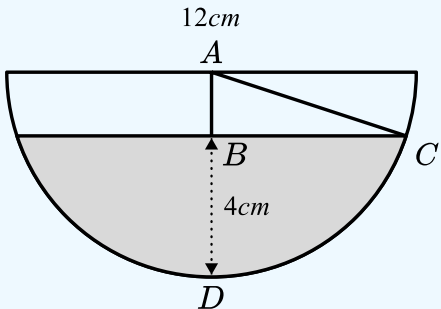
Question	Working	Answer	Notes
Q5b		No	B1 cao
Q6a		2.38×10^{-3}	A1 cao
Q6b	$54000 - 3700 = 50300 = 5.03 \times 10^4$	5.03×10^4	M1 54000 and 3700 or 50300 or 5.03 seen A1 cao
Q6c	$\frac{3 \times 10^p}{10^{p-1}} : \frac{4 \times 10^{p-1}}{10^{p-1}} : \frac{5 \times 10^{p+1}}{10^{p-1}}$ $= 3 \times 10 : 4 : 5 \times 10^2$ $= 30 : 4 : 500$ $= 15 : 2 : 250$	$15 : 2 : 250$	M1 $30 : 4 : 500$ oe A1 Correct simplified answer
Q7a		$\begin{pmatrix} 3x - 2 \\ 15 - 2y \end{pmatrix}$	M1 $3x - 2$ or $15 - 2y$ seen A1 cao
Q7b	$x + 1 = 4, x = 3$ $5 + y = 3, y = -2$	$x = 3, y = -2$	M1 $x + 1 = 4$ or $5 + y = 3$ seen M1 x or y correct A1 cao
Q8	2.474002393	2.47	M1 9.256869... and 3.741657... or 2.474002393 seen A1 2.47
Q9	$20\% = 54$ $100\% = 54 \times 5 = 270, \text{£}270 \text{ interest}$ $\frac{270}{6000} \times 100 = 4.5\% \text{ interest rate}$	4.5%	M1 $20\% = 54$ seen or implied M1 $\text{£}270$ interest M1 Valid attempt to find 270 as a percentage of 6000 A1 cao

Question	Working	Answer	Notes
Q10	$10 \times 9 \times 5 = 450$	450	M1 10, 9 or 5 seen M1 $10 \times 9 \times 5$ A1 cao
Q11	$m^2 = \frac{3p}{4}$ $4m^2 = 3p$ $p = \frac{4m^2}{3}$	$p = \frac{4m^2}{3}$	M1 $m^2 = \frac{3p}{4}$ or $4m^2 = 3p$ seen A1 cao
Q12a	$m = \frac{75 - 55}{2 - 1} = 20$	20	M1 Attempt at change in $\frac{\text{change in } y}{\text{change in } x}$ A1 cao
Q12b		Gradient: Hourly charge Y intercept: Fixed initial charge	B1 Gradient correct interpretation B1 Y intercept correct interpretation
Q13			M1 An enlargement, scale factor 2 M1 An enlargement, scale factor -2 A1 Fully correct

Question	Working	Answer	Notes
Q14	<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 $ADC = 90^\circ$</p> <p>M1 Angle $DAC = 69^\circ$</p> <p>B1 At least 2 reasons correctly described</p> <p>A1 cao, dependent on M1M1M1</p>
Q15a	<p>$y^3 + 296 = (y + 2)^3$</p> <p>$y^3 + 296 = (y^2 + 4y + 4)(y + 2)$</p> <p>$y^3 + 296 = y^3 + 6y^2 + 12y + 8$</p> <p>$6y^2 + 12y - 288 = 0$</p> <p>$y^2 + 2y - 48 = 0$</p>		<p>M1 $y^3 + 296 = (y + 2)^3$ oe</p> <p>M1 $6y^2 + 12y - 288 = 0$</p> <p>A1 Reaches $y^2 + 2y - 48 = 0$ with no incorrect working</p>
Q15b	<p>$y^2 + 2y - 48 = 0$</p> <p>$(y + 8)(y - 6) = 0$</p> <p>$y = -8$ (invalid) or $y = 6$</p> <p>Volume: $6^3 = 216$</p>	216cm^3	<p>M1 Valid attempt to solve $y^2 + 2y - 48 = 0$</p> <p>M1 $y = 6$</p> <p>A1 cao, must have discounted $y = -8$</p>

Question	Working	Answer	Notes
Q16	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
Q17	$F_0 = 50$ $F_1 = 1.4 \times 50 - 10 = 60$ $F_2 = 1.4 \times 60 - 10 = 74$ $F_3 = 1.4 \times 74 - 10 = 93.6$	94	M1 $F_1 = 1.4 \times 50 - 10 = 60$ M1 Attempts to apply iteration 2 more times A1 cao
Q18	$\frac{10x - 5}{4x + 3} \div \frac{8x^2 - 10x + 3}{16x^3 - 9x}$ $= \frac{10x - 5}{4x + 3} \times \frac{16x^3 - 9x}{8x^2 - 10x + 3}$ $= \frac{5(2x - 1)}{4x + 3} \times \frac{x(4x + 3)(4x - 3)}{(4x - 3)(2x - 1)}$ $= 5x$	5x	M1 Flips second fraction and multiplies M1 Factorised at least two expressions correctly M1 All expressions factorised and an attempt at cancelling A1 cao following correct working

Question	Working	Answer	Notes
Q19a			M1 Translation by 2 units in positive or negative x direction A1 Translation by -2 units in x direction
Q19b		(180, 0)	A1 x coordinate correct A1 y coordinate correct
Q20	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
Q21	 <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 </p>

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