



**General Certificate Secondary of Education
January 2012**

Applications of Mathematics (Pilot) 9370

Unit 2 Higher Tier 93702H

Mark Scheme

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Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

- M** Method marks are awarded for a correct method which could lead to a correct answer.
- A** Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
- B** Marks awarded independent of method.
- Q** Marks awarded for quality of written communication. (QWC)
- M Dep** A method mark dependent on a previous method mark being awarded.
- B Dep** A mark that can only be awarded if a previous independent mark has been awarded.
- ft** Follow through marks. Marks awarded following a mistake in an earlier step.
- SC** Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
- oe** Or equivalent. Accept answers that are equivalent.
eg, accept 0.5 as well as $\frac{1}{2}$

A2 Higher Tier

Q	Answer	Mark	Comments
1	$3x + 240 = 525$	M1	oe eg, $x + x + x + 120 + 120 = 525$
	$3x = 525 - 240$	M1	oe eg, $x + x + x = 525 - 120 - 120$
	95	A1 ft	ft From M0 M1 or M1 M0
	Set up and solve a linear equation	Q1	Strand (ii) - Allow one error in the solution of their linear equation
Alt 1	$525 - 240$ (= 285)	M1	
	Their $285 \div 3$	M1	
	95	A1ft	ft From M0 M1 or M1 M0
		Q0	
2	$24 \div (4 + 3 + 1)$ (= 3)	M1	$4 \div (4 + 3 + 1)$ (= $\frac{1}{2}$ oe) or 8 6 2 or 4 (apples) 4 (others)
	$4 \times$ their 3	M1 Dep	$24 \times$ their $\frac{1}{2}$ oe or 12 9 3
	12	A1	
3	One correct arc from correct centre drawn with compasses ie Arc of radius 9 cm (± 2 mm), centre <i>A</i> or arc of radius 6 cm (± 2 mm), centre <i>B</i>	M2	M1 Evidence of using the scale correctly Example 1 Arc of radius 9 cm (± 2 mm) or arc of radius 6 cm (± 2 mm) drawn from any one of the four corners Example 2 180 m is 9 cm
	Two correct arcs from correct centres drawn that intersect inside <i>ABCD</i>	A1	SC2 Intersecting arcs of correct radii but centres transposed SC1 Point indicated inside the tolerance shown on overlay but two arcs not seen

Q	Answer	Mark	Comments
4	4.5 to 4.55 inclusive	B1	
	$52 \div 35$ (= [1.48, 1.5])	M1	
	$1.2(0) \times$ their 4.5 (= 5.4(0))	M1	Their [1.48, 1.5] \div their 4.5 (= [0.32, 0.3])
	No and their [1.48, 1.5] and their 5.4(0)	A1 ft	No (and) their [0.32, 0.3] ft From B0 M2 or B0 M1 M0
Alt 4	4.5 to 4.55 inclusive	B1	
	$1.2(0) \times$ their 4.5 (= 5.4(0))	M1	
	Their $5.4(0) \times 35$ (= 189)	M1	
	No (and) their 189	A1 ft	ft From B0 M2 or B0 M0 M1
5	(Correct area of I-shape =) 9	B1	(Correct volume of I-shape =) 10.8
	$10 \times 7 - 4 \times$ their 9 (= 34)	M1	$4 \times 1.2 \times$ their 9 oe (= 43.2)
	$1.2 \times$ their 34	M1	$10 \times 7 \times 1.2 -$ their 43.2
	40.8	A1ft	ft From B0 M2
	Clear method seen for calculation of the area of the waste wood; then this area $\times 1.2$ [allow arithmetic or counting errors]	Q1	Strand (iii)
Alt 5	Attempt at total area of waste eg, 6 (+) 7 (+) 3 (+) 15 (+) 3	M1	oe Allow one error Allow 3×2 for 6 etc
	34	A1	
	$1.2 \times$ their 34	M1	
	40.8	A1ft	
	Clear method seen for calculation of the area of the waste wood; then this area $\times 1.2$ [allow arithmetic or counting errors]	Q1	Strand (iii)

Q	Answer	Mark	Comments
6	5 (packs of drinks) and 4 (packs of chocolate bars)	B2	B1 60 oe seen or 5n (packs of drinks) and 4n (packs of chocolate bars) where n is an integer >1 SC1 4 (packs of drinks) and 5 (packs of chocolate bars)
7	$2.5 \times 1000 (= 2500)$	M1	$720 \times 8 (= 5760)$
	Their $2500 \div 720 (= [3.47, 3.5])$	M1	$720 \times 8 (= 5760)$ Their $5760 \div 1000 (= 5.76)$
	[3.47, 3.5] and No	A1ft	5760 and 2500 and No ft From incorrect conversion factor but not from conversion factor of 1 5.76 and No ft From incorrect conversion factor but not from conversion factor of 1
Alt 7	$2.5 \times 1000 (= 2500)$	M1	$8 \div 1000 (= 0.008)$
	Their $2500 \div 8 (= 312.5)$	M1	$2.5 \div \text{their } 0.008 (= 312.5)$
	312.5 and No	A1ft	ft From incorrect conversion factor but not from conversion factor of 1
8	$28 \times 16 (= 448)$	M1	
	$\pi \times \left(\frac{25}{2}\right)^2 (= [490.6, 490.94])$	M1	
	$390 + 50 (= 440)$	M1	
	Calculations that enable a comparison to be made eg, (cm ² per penny) their $448 \div 390$ and their $[490.6, 490.94] \div (390 + 50)$	M1	Calculations that enable a comparison to be made eg, (cost per cm ²) $390 \div \text{their } 448$ and $(390 + 50) \div \text{their } [490.6, 490.94]$
	[1.14, 1.15] and [1.11, 1.12]	A1	[0.87, 0.871] and [0.89, 0.9]
	Rectangle	Q1 ft	Strand (iii) - Clear strategy seen for comparison with correct conclusion from their figures

Q	Answer	Mark	Comments
9(a)	$882 \times \frac{2}{3} \times \frac{2}{3}$	M2	oe eg, $588 \times \frac{2}{3}$ M1 $882 \times \frac{2}{3}$ oe eg, $882 - 882 \times \frac{1}{3}$ Condone use of 0.66 or 0.67 for M2 or M1 Condone use of 0.33 for M2 or M1
	392	A1	
9(b)(i)	882	B1	
9(b)(ii)	Smooth curve continued to age = 6 years (± 2 mm) that has decreasing slope	B1	B0 Curve that touches x -axis
9(c)(i)	30	B2	B1 Indication that 1 litre (of petrol) is used in half an hour or Indication that 15 miles is travelled in half an hour or 15×2 oe or 0.5 oe
9(c)(ii)	20	B1	Allow $\frac{1}{3}$ h(our)
9(c)(iii)	Graph drawn from (11:20, 1) to (x , 4) where $11:20 \leq x \leq 11:30$	B1	

Q	Answer	Mark	Comments
10(a)	112 (and) 118	B1	
10(b)	$h = 88 + 6n$	B2	oe eg, $h = 94 + 6(n - 1)$ B1 For $6n$ Must have $h =$ for B2
10(c)	A, B and C chosen so $ABC = 120$ (A and B are number of stacks in length and width, C is number of beakers in stack)	B1	For example $A = 4, B = 3, C = 10$ $A = 8, B = 3, C = 5$ $A = 6, B = 2, C = 10$ $A = 3, B = 2, C = 20$
	Their $A \times 86$ and their $B \times 86$	M2	M1 Their $A \times 86$ or their $B \times 86$ Maximum M1 if $A = B$
	$88 + 6 \times$ their C	M1	oe Correct or ft Their formula in (b)
	Their length, their width and their height For example (344, 258, 148) (688, 258, 118) (516, 172, 148) (258, 172, 208)	A1 ft	ft Their L, W and H if M3 gained Condone rounding up eg, Allow (350, 260, 150) for method that would give (344, 258, 148)
11	$30.4 \div 8.8$ (= [3.45, 3.5])	M1	$8.8 \div 30.4$ (= [0.28, 0.29])
	$5.5 \times$ their [3.45, 3.5]	M1 Dep	$5.5 \div$ their [0.28, 0.29]
	[18.9, 19.1]	A1	
Alt 11	$8.8 \div 5.5$ (= [1.6])	M1	$5.5 \div 8.8$ (= 0.625)
	$30.4 \div$ their 1.6	M1 Dep	$30.4 \times$ their 0.625
	[18.9, 19.1]	A1	

Q	Answer	Mark	Comments
12	$28 + 62$ (= 90)	M1	
	$\frac{80}{360} \times \pi \times \text{their } 90^2$ (= [5652, 5656])	M1	M2 $\pi \times \text{their } 90^2 - \pi \times 28^2$
	$\frac{80}{360} \times \pi \times 28^2$ (= [547, 547.4])	M1	(= [22972, 22986]) M0 $\frac{80}{360} \times \pi \times 62^2$
	$\frac{80}{360} \times \pi \times \text{their } 90^2 - \frac{80}{360} \times \pi \times 28^2$	M1 Dep	oe eg $\frac{80}{360} \times (\pi \times \text{their } 90^2 - \pi \times 28^2)$ Dep on 2nd and 3rd M1
	[5104.6, 5109]	A1	
13(a)(i)	Plots at least 5 points correctly (± 2 mm)	M1	(0, 0) can be implied
	Plots all 6 points correctly (± 2 mm) and joins with a smooth curve	A1	(0, 0) can be implied
13(a)(ii)	2.2 to 2.25	B1 ft	ft Their graph
13(b)	Substitutes a non-zero pair of values from the table or their graph into the equation eg, $1.4 = k(x)1^2$ or $3.15 = k(x)1.5^2$	M1	
	(k =) 1.4	A1	
	Their 1.4×5^2	M1	
	35	A1ft	ft From M1 A0 M1

Q	Answer	Mark	Comments
14(a)(i)	25×2	M1	
	50	A1	
14(a)(ii)	$\sin 60 = \frac{\text{East}}{\text{their } 50}$ and $\cos 60 = \frac{\text{North}}{\text{their } 50}$	M2	M1 $\sin 60 = \frac{\text{East}}{\text{their } 50}$ or $\cos 60 = \frac{\text{North}}{\text{their } 50}$
	East = their 50 \times sin 60 or North = their 50 \times cos 60	M1	oe
	East = [43.3, 43.3013] and North = 25	A1	
Alt 14(a)(ii)	$\sin 60 = \frac{\text{East}}{\text{their } 50}$	M1	$\cos 60 = \frac{\text{North}}{\text{their } 50}$
	East = their 50 \times sin 60 (= [43.3, 43.3013])	M1	North = their 50 \times cos 60 (= 25)
	$\sqrt{50^2 - \text{their } [43.3, 43.3013]^2}$	M1	$\sqrt{50^2 - \text{their } 25^2}$
	East = [43.3, 43.3013] and North = 25	A1	

Q	Answer	Mark	Comments
14(b)	(BY =) 28×1.5 (= 42)	M1	
	(East =) their $42 \times \sin 60$ and (South =) their $42 \times \cos 60$	M1	Their $42 \times \cos 30$ and their $42 \times \sin 30$ oe eg uses trigonometry and Pythagoras
	(East =) [36.37, 36.4] and (South =) 21	A1	
	Their [43.3, 43.3013] – their [36.37, 36.4] (= [6.9, 6.9313])	M1	oe
	$55 - \text{their } (25 + 21)$ (= 9)	M1	oe
	$\sqrt{\text{their } [6.9, 6.9313]^2 + \text{their } 9^2}$	M1	
	[11.3, 11.4]	A1	Allow 11 with valid working seen Scale drawing is zero marks
Alt 14(b)	(BY =) 28×1.5 (= 42)	M1	
	$55 - 42$ and $55 - 50$	M1	
	13 and 5	A1	
	$13^2 + 5^2 - 2 \times 13 \times 5 \times \cos 60$	M1	
	$\sqrt{13^2 + 5^2 - 2 \times 13 \times 5 \times \cos 60}$	M1	
	[11.3, 11.4]	A2	Allow 11 with valid working seen Scale drawing is zero marks
15	All of the area considered eg, $20 \times 10 \div 2$ (+) 20×15 (+) 17.5 $\times 10$ (+) 10×15 (+) $15 \times 10 \div 2$	M2	oe eg, Counting squares Allow one error but no omissions for M2 M1 Any 2 correct area calculations
	800	A1	32 if counting squares
	Their $800 \div 2$ (= 400)	M1 Dep	Their $32 \div 2$ (= 16) Dep on M2
	25	A1	