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General Certificate of Secondary Education
June 2013

Applications of Mathematics (Pilot) 9370

Unit 2 Foundation Tier 93702F

Final

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of students' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

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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.
M dep	A method mark dependent on a previous method mark being awarded.
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.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
Q	Marks awarded for quality of written communication.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded for a common misinterpretation which has some mathematical worth.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[*a*, *b*]	Accept values between *a* and *b* inclusive.
25.3 …	Allow answers which begin 25.3 e.g. 25.3, 25.31, 25.378.
Use of brackets	It is not necessary to see the bracketed work to award the marks.

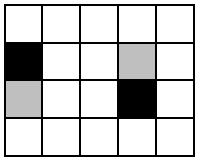
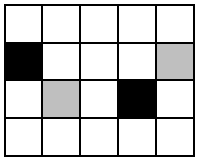
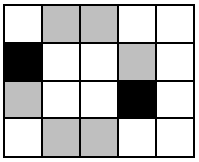
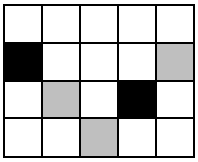
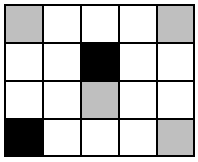
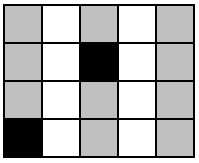
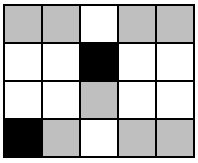
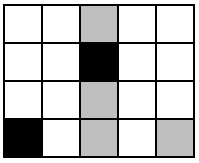
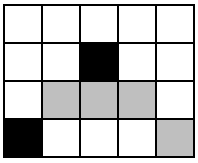
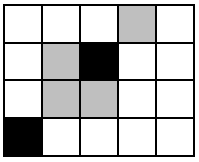
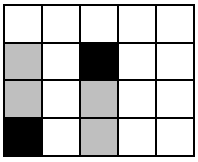
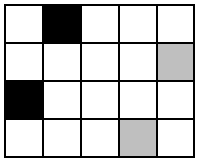
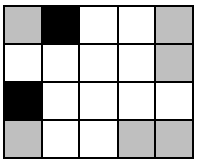
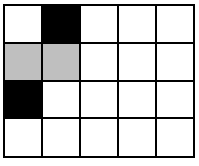
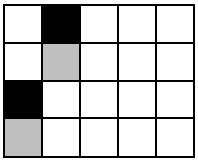
A2 Foundation Tier

Q	Answer	Mark	Comments
1	Yes **and** (120 (cm)) and 126 (cm) **or** 1 m 20 (cm) (and 1 m 26(cm)) **or** 1.2(0) (m) and 1.26 (m) **or** 6 (cm)	B2	oe B1 (120 (cm) and) 126 (cm) **or** 1 m 20 (cm) (and 1 m 26(cm)) **or** 1.2(0) (m) and 1.26 (m) **or** 6 (cm)
2(a)	Indicates top middle and bottom right shapes only	B2	B1 One correct with at most one incorrect **or** Two correct with exactly one incorrect
2(b)	10	B1	
3(a)	D4	B1	Condone 4D
3(b)	Kim written in A5	B1	
3(c)	F5	B2	Condone 5F B1 Any other answer in row 5 **or** any other answer in column F apart from F2 or F7 **or** Sunil written in F5 SC1 C2 or C7
3(d)	6×7 (= 42)	M1	
	3	A1	SC1 their total (>39) – 39 worked out correctly

Q	Answer	Mark	Comments
4(a)	28 000	B1	Allow 28 thousand
4(b)	28 400	B1	
4(c)	5.30 + 1 h 45 min (= 7.15)	M1	oe 1 h 45 min + 3 h 30 min (= 5 h 15 min) **or** 105 min + 210 min (= 315 min)
	their 7.15 + 3 h 30 min	M1	5.30 + their 5 h 15 min
	10.45	A1	oe
	Correct decision for their 10.45	Q1ft	Strand (iii) Must score at least M1 SC1 10.05
4(c)	**Alternative 1**		
	10.00 – 3 h 30 min (= 6.30)	M1	oe 1 h 45 min + 3 h 30 min (= 5 h 15 min) **or** 105 min + 210 min (= 315 min)
	Their 6.30 – 1 h 45 min	M1	10.00 – their 5 h 15 min
	4.45	A1	oe
	Correct decision for their 4.45	Q1ft	Strand (iii) Must score at least M1 SC1 10.05
4(c)	**Alternative 2**		
	5.30 + 3 h 30 min (= 9.00)	M1	
	their 9.00 + 1 h 45 min	M1	10.00 – their 9.00
	10.45	A1	1 hour (and 1 h 45 min)
	Correct decision for their 10.45 **or** their 1 hour (and 1 h 45 min)	Q1ft	Strand (iii) Must score at least M1 SC1 10.05
4(c)	**Alternative 3**		
	10.00 – 5.30 (= 4 h 30 min)	M1	
	1 h 45 min + 3 h 30 min	M1	
	5h 15min **and** 4 h 30 min	A1	
	Correct decision for their 5h 15min and their 4 h 30 min	Q1ft	Strand (iii) Must score at least M1 SC1 10.05

Use of incorrect decimal times (1.45 and 3.3). Eg, 5.3 + 1.45 + 3.3 scores M0M0A0Q0 5.3 + 1.45 + 3.3 = 10.05 scores SC1 5.3 + 1.45 → 6.75 + 3.5 = 10.25 scores M0M1A0Q0	**Use of correct decimal times** (1.75 and 3.5). Eg, 5.5 + 1.75 + 3.5 = 10.75 and No scores M1M1A0Q1 5.5 + 1.75 + 3.5 = 10.75 → 10.45 scores M1M1A1Q0

Q	Answer	Mark	Comments
5(a)	False True	B2	B1 For each
5(b)	*DC*	B1	Allow *CD*
5(c)	*BC*	B1	Allow *CB*
5(d)	Line joining the midpoints of *AB* and *DC*	B2	B1 Any one midpoint correctly identified Allow freehand line if intention clear.
6	No Yes (Yes) No No Yes	B5	B1 For each correct part
7(a)	120 ÷ 8 (× 5) (= 15) **or** 120 ÷ 1.6 **or** 120 × 0.625	M1	oe or Complete build-up method (allow one arithmetic slip), eg 8 → 5, 16 → 10, 24 → 15, ... 120 → 75 Allow part build-up method if clear, eg Build-up to 40 → 25 then 25 × 3
	75	A1	
7(b)	48 × 0.22	M1	
	10.56	A1	Accept 10.6 if correct working seen
7(b)	**Allow these alternatives**		
	48 ÷ 4.5 / 48 ÷ 4.55	M1	
	[10.6, 10.7] / [10.5, 10.55]	A1	
7(c)	15 min **or** $\frac{1}{4}$ hour **or** 0.25 hours	B2	B1 15 **or** $\frac{1}{4}$ **or** 0.25

Q	Answer	Mark	Comments
8(a)	Two squares added to make exactly **one** line of symmetry Either  or 	B2	B1 More than two squares added to make exactly **one** line of symmetry in wall. Eg   **or** Two squares added with only **one** in one of the four correct positions **or** with both in two of the correct four positions but from different lines of symmetry.
8(b)	Four squares added to make **two** lines of symmetry within wall 	B2	B1 More than four squares added to make **two** lines of symmetry in wall. Eg   **or** Four squares added to make **one** line of symmetry in wall. Eg   **or** Four squares added to make **two** lines of symmetry in shaded squares. Eg  
8(c)	Two squares added to make rotational symmetry of order 2 	B2	B1 More than two squares added to make rotational symmetry of order 2. Eg  **or** Two squares added but only **one** rotated to correct position **or** Two squares added to make rotational symmetry of order 2 in shaded squares. Eg  

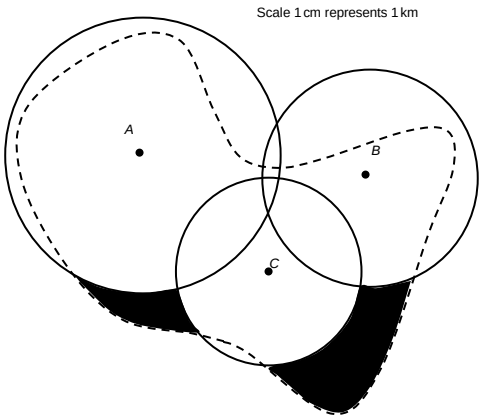
Q	Answer	Mark	Comments
9(a)	150	B1	
9(b)	20 ÷ 5 × 26	M1	oe
	104	A1	SC1 11.5(0)
	46	B1ft	ft their 150 – their 104 If their104 > their 150 do not accept negative value unless it is correctly interpreted. Eg Stating that shop B is not cheaper oe
10	460 – 157 – 148	M1	oe
	B → 155	A1	
	460 + 20 (= 480)	M1	
	their 480 ÷ 3 (= 160)	M1	
	B → 5	A1	
10	**Alternative 1**		
	460 – 157 – 148	M1	oe
	B → 155	A1	
	B → 157 – 155 (= 2) **and** W → 157 – 148 (= 9)	B → 155 – 148 (= 7) **and** W → 157 – 148 (= 9)	M1	oe	Could work with values other than 157 or 148 Trial & improvement from B = 155 scores 0 or 3
	20 – their (2 + 9) (÷ 3) **and** their 3 + 2	20 + their (9 + 7) (÷ 3) **and** their 12 – 7	M1	oe	
	B → 5		A1	
10	**Alternative 2**		
	460 + 20 (= 480)	M1	
	their 480 ÷ 3 (= 160)	M1	
	their 160 – 157 (= 3) **and** their 160 –148 (= 12)	M1	
	20 – their 3 – their 12	M1	
	B → 5	A1	

Q	Answer	Mark	Comments
11(a)	350	B1	
11(b)	10	B1ft	ft their 350 ÷ 35 oe
11(c)	Horizontal axis labelled 40, 45, (50)	B1	45 must be in correct place
	Vertical axis labelled 400, 450, 500, 550, (600)	B1	550 must be in correct place
	Straight line from (35, 350) to (45, 550)	B2	B1 40h → £450 shown in working or on grid **or** 45 h → £550 shown in working or on grid **or** (£)200 Ignore graph beyond 45 hours
12(a)	6.4 × 4.5 (+) 4 × 2.3 **or** 4.5 × 2.4 (+) 4 × 6.8	M1	oe Eg 28.8 (+) 9.2 **or** 10.8 (+) 27.2 Check work on diagram
	38	A1	SC1 28.8 **and** 9.2 **or** 10.8 **and** 27.2 **or** 5.4 **and** 5.4 **and** 27.2
12(a)	**Alternative**		
	6.4 × 6.8 (–) 2.3 × 2.4	M1	oe eg 43.52 (–) 5.52 Check work on diagram
	38	A1	SC1 43.52 **and** 5.52
12(b)	π × 1.7 × 1.7	M1	oe
	[9, 9.1] **or** 2.89π	A1	oe SC1 [2.268, 2.3]

Q	Answer	Mark	Comments
13(a)	90 × 40 × 60 **or** 120 × 60 × 30	M1	
	216 000	A1	
	Both 90 × 40 × 60 = 216 000 **and** 120 × 60 × 30 = 216 000 **and** Volumes are equal or (Tanks hold) same amount (of water)	Q1	
13(b)	(Tank) *A* and valid reason	B1	Examples of valid reasons *A* has a smaller base area *A* is thinner *A* is taller oe

Q	Answer	Mark	Comments
14	$\frac{20}{40} \times 60$ (= 30) **or** $\frac{20}{40} \times 120$ (= 60) **or** $\frac{20}{40} \times 180$ (= 90)	M1	oe eg 1 60 ÷ 2 eg 2 60 ÷ 40 (= 1.5) **and** their 1.5 × 20
	$\frac{15}{20} \times 60$ (= 45) **or** $\frac{15}{20} \times 120$ (= 90) **or** $\frac{15}{20} \times 180$ (= 135)	M1	oe eg 1 180 ÷ 4 × 3 eg 2 60 ÷ 20 (= 3) **and** their 3 × 15
	their 30 + their 45 **or** their 60 + their 90 **or** their 90 + their 135	M1dep	dep on at least one M1
	(Sugar) 75 (Butter) 150 (Flour) 225	A1	All 3 correct SC2 No working with two correct answers SC1 No working with one correct answer
14	**Alternative**		
	$\frac{20}{40}$ **and** $\frac{15}{20}$	M1	oe eg 0.5 **and** 0.75
	their $\frac{20}{40}$ + their $\frac{15}{20}$ $(=\frac{5}{4})$	M1	oe eg 1.25
	their $\frac{5}{4} \times 60$ (= 75) **or** their $\frac{5}{4} \times 120$ (= 150) **or** their $\frac{5}{4} \times 180$ (= 225)	M1dep	oe eg 1.25 × 60
	(Sugar) 75 (Butter) 150 (Flour) 225	A1	All 3 correct SC2 No working with two correct answers SC1 No working with one correct answer

Q	Answer	Mark	Comments
15	At least 6 squares drawn on gold grid **and** 6 large triangles **and** 24 small triangles drawn on silver grid **and** answer 6	B4	B3 At least 4 large triangles **and** at least 16 small triangles drawn on silver grid B2 At least 2 large triangles **and** at least 8 small triangles drawn on silver grid B1 At least 1 large triangle **and** at least 4 small triangles drawn on silver grid **or** At least 1 square drawn on gold grid SC2 Answer 6 **and** at least 6 squares drawn on gold grid **and** 6 three by two rectangles drawn on silver grid SC2 Answer 6 **and** at least 6 squares drawn on gold grid **and** one three by two rectangle drawn on silver grid with 4 small and 1 large triangle shown SC1 Answer 6 with no valid diagrams

Q	Answer	Mark	Comments
16	Completely correct ie Circle radius 4.5 cm centre *A* Circle radius 3.5 cm centre *B* Circle radius 3 cm centre *C* Shades both correct regions  	B4	All radii ± 2 mm Full circles do not have to be drawn but arcs inside the town must be seen B3 3 circles correct **and** only 1 correct region shaded (no incorrect regions) **or** 3 circles correct **and** both correct regions shaded **and** one extra region shaded **or** 2 circles correct **and** 1 incorrect **and** correct ft regions shaded B2 3 circles correct with no or incorrect shading **or** 2 circles correct **and** 1 incorrect **and** correct ft regions shaded **and** one extra region shaded **or** 1 circle correct **and** 2 incorrect **and** correct ft regions shaded **or** 2 circles correct **and** none incorrect **and** correct ft regions shaded B1 3 incorrect circles **and** correct ft regions shaded **or** At least 1 circle correct

Q	Answer	Mark	Comments
17(a)	$4x + 7 = 21$	M1	oe eg $2x + 1 + x + x + 6 = 21$
	$4x = 21 - 7$	M1	oe eg $2x + x + x = 21 - 1 - 6$ ft their equation of form $ax + b = c$ $a \neq 0$ $b \neq 0$
	3.5 **or** $3\frac{1}{2}$ **or** $\frac{7}{2}$	A1ft	ft from M0 M1 or M1 M0
	Sets up and solves their linear equation	Q1	Strand (iii) Allow one error in the solution of their equation
17(a)	**Alternative**		
	21 – 7 (= 14)	M1	
	their 14 ÷ 4	M1	
	3.5	A1ft	ft from M0 M1 or M1 M0
		Q0	
17(b)	9.5	B1 ft	ft their x in (a) if $x > 0$