



**General Certificate of Secondary Education
June 2011**

Applications of Mathematics (Pilot) 93702F
(Specification 9370)

Unit 2: Applications of Mathematics
Written Paper (Foundation)

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 candidates' 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 candidates' 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.
- 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 Foundation Tier

Q	Answer	Mark	Comments
1(a)	$2 \times 90 (= 180)$	M1	Condone any number in table $\times 2$
	1.80	A1	1.8 is M1 A0 SC1 122 or 94 or 152 or 248 or 208 or 354 or 302 oe
1(b)	61 – 47 (= 14) or 124 – 104 (= 20) or 177 – 51 (= 26) or 90 – 76 (= 14)	M1	oe Sum of any three of 61, 124, 177, 90 (= 362 if correct three used) or Sum of any three of 47, 104, 151, 76 (= 302 if correct)
	Their 14 (+) their 20 (+) their 26	M1	Their 362 (–) their 302
	60	A1	
2(a)(i)	D9 (and) D10 or D10 (and) D9	B1	Allow eg, d9 (and) d10 and 9D (and) 10D
2(a)(ii)	Shades exactly 4 consecutive squares in column H	B2	B1 4 consecutive squares not all in column H or Exactly 3 consecutive squares or exactly 5 consecutive squares in column H Ignore shaded squares on or next to B2
2(a)(iii)	Two correct pairs from A2 C2 C2 D2 B1 B3 B3 B4	B2	B1 Only one correct pair or Two pairs from A2 B2 B2 C2 B1 B2 B2 B3
2(b)	Three vertical squares symmetric with given cruiser	B1	SC1 No B marks gained but final diagram is symmetric
	Two horizontal squares symmetric with given destroyer	B1	
	Pair of ships (horizontal or vertical) symmetrically positioned	B1	

Q	Answer	Mark	Comments
3(a)	Bev and 8 (m) → [26, 27] (feet) or 30 (feet) → 9 (m)	B1	Allow conversions shown on graph
3(b)(i)	33 to 33.5 inclusive	B1	
3(b)(ii)	50 ÷ 10 × their [31, 35]	M1	or 50 ÷ 1 × [1, 5] or 50 ÷ 2 × [5, 9] or 50 ÷ 4 × [11, 15] or 50 ÷ 5 × [15, 19] oe ft Their (b)(i)
	165 to 170 inclusive	A1	
3(c)	Shows the rule being applied for any number of feet eg, 30 (ft) × 3 ÷ 10 (= 9 (m))	B1	Both the rule and graph conversions must be correct for both marks to be awarded
	Shows the same number of feet correctly converted to metres from or on the graph	B1	

Q	Answer	Mark	Comments															
4(a)	72 ± 2 or 108 ± 2	B1																
	Selects the acute angle	Q1																
4(b)	Midpoint of AB marked ± 2 mm	B1																
4(c)(i)	[3.8, 4.2]	B1																
4(c)(ii)	8	B1 ft	ft 2 x their [3.8, 4.2]															
4(c)(iii)	2 cm by 2 cm square drawn in bottom left hand corner of field	B2	Allow tolerance of ± 1 mm for lengths and $\pm 2^\circ$ for right angles B1 Any sized square drawn in field															
4(d)	$11 + 9.5 + 14 + 9 (- 2)$ (= [40.5, 42.5] or [42.7, 44.3])	M1	oe eg, $11 + 2 + 6.5 + 14 + 5 + 3$ Allow ± 2 mm on each measurement															
	2 x their 41.5 (= their [81, 85])	M1																
	$\frac{20}{60}$ x their 83 (= [27, 28.34])	M1	oe															
	15.5(0) x their [27, 28.34]	M1																
	Integer values within [419, 439]	A1																
	Their [419, 439]	Q1	An organised response leading to an answer															
5(a)	Top left and bottom right shapes indicated with no others	B2	B1 Top left or bottom right shapes indicated with at most one other															
5(b)(i)	Cuboid	B1																
5(b)(ii)	12	B1																
5(c)(i)	cm^3 or cubic centimetres	B1	Allow cubic cm															
5(c)(ii)	Two dimensions correct	B2	B1 One dimension correct For B2 and B1 the numbers can be in any order															
	<table style="border: none; margin-left: 20px;"> <tr> <td>24</td><td>8</td><td>6</td><td>12</td><td>6</td><td>4</td> </tr> <tr> <td>1</td><td>3</td><td>2</td><td>2</td><td>4</td><td>3</td> </tr> <tr> <td>1</td><td>1</td><td>2</td><td>1</td><td>1</td><td>2</td> </tr> </table>			24	8	6	12	6	4	1	3	2	2	4	3	1	1	2
24	8	6	12	6	4													
1	3	2	2	4	3													
1	1	2	1	1	2													

Q	Answer	Mark	Comments
6	$1 + 1 + 0.50 + 0.20 + 0.20 + 0.10 + 0.05 + 0.05 + 0.02 + 0.02 (= 3.14)$	M1	
	Their $3.14 - 1.98 (= 1.16)$	M1	
	£1 10p 5p 1p	A1	SC2 £1 10p 5p 2p
Alt 6	Pays with 7 coins and states change eg, £1, 50p, 20p, 20p, 5p, 2p and 2p Change, 1p	M2	M1 Pays with 7 coins but does not state change or Pays with 6 coins and states change eg, £1, 50p, 20p, 20p, 5p and 5p Change, 2p
	£1 10p 5p 1p	A1	
7(a)(i)	45×32	M1	
	1440	A1	
7(a)(ii)	Their $1440 \div 10$	M1	
	144	A1 ft	ft Their (a)(i) even if a perimeter Must round down
7(b)	80	B1	
	$50 + 60 + 20 + 20 + 30 +$ their 80 (= 260)	M1	ft Their 80 even if their $80 = 0$
	60	A1 ft	ft Their $260 - 200$ from B0M1 only

Q	Answer	Mark	Comments
8(a)	2.5	B2	oe B1 Digits 25 or Conversion factor 1000 seen or used
8(b)	Set of given units with total length 4300 mm eg, 4 × 900 (+) 1 × 400 (+) 1 × 300 6 × 600 (+) 1 × 400 (+) 1 × 300 3 × 1200 (+) 1 × 400 (+) 1 × 300 4 × 1000 (+) 1 × 300	B2	B1 Set of given units with 4100 mm ≤ total length ≤ 4500 mm eg, 6 × 600 (+) 2 × 300
	Different set of given units with total length 4300 mm	B2	B1 Different set of given units with 4100 mm ≤ total length ≤ 4500 mm
9(a)	$x + 4x = 180$ or $5x = 180$	M1	oe equation
	$(x =) 180 \div 5$	M1	ft If their equation uses x and their obtuse angle
	36	A1ft	ft If one method mark gained
	Set up a linear equation and solves their equation correctly	Q1	36 obtained without an algebraic equation seen is M1M1A1Q0 SC1 $4x$ seen in correct place on diagram
9(b)	4 × their 36 (= 144) or 180 – their 36 (= 144)	M1	May be seen on diagram $\frac{1}{2}y =$ their 36
	360 – 2 × their 144	M1	2 × their 36 (if this is first step award M2)
	72	A1 ft	ft Their 36 in part (a)
10	84 seen	B1	
	$250 \div 2 (= 125)$	M1	Their $84 \times 2 (= 168)$ Their 84 can be any other stopping distance from the table 168 seen is B1 M1
	Above and 125 and 84	A1	Above and 168

Q	Answer	Mark	Comments
11(a)	70	B1	Allow £0.70 B0 £70 or £0.7 or 0.70 or 0.7
11(b)	Straight line from (0, 4.8) to (5, 9.8) or Plots all 6 correct points (± 2 mm) (0, 4.8) (1, 5.8) (2, 6.8) (3, 7.8) (4, 8.8) and (5, 9.8)	B2	B1 Any line of gradient 1 (or any 6 points that would make a line of gradient 1 if joined) B1 Plots at least 3 correct points (± 2 mm)
11(c)	Valid example eg 1 4 (toppings cost the) same eg 2 5 (toppings costs) more	B1ft	oe ft From their points or line in (b)

Q	Answer	Mark	Comments
12(a)	$125 \div (21 + 14) (= 3.57\dots)$	M1	$125 \div (3 + 2) (= 25)$
	Their $3.57\dots \times 21$ or Their $3.57\dots \times 14$	M1	$125 \div$ their $(3 + 2) \times$ their 3 or $125 \div$ their $(3 + 2) \times$ their 2
	75 and 50	A1	(small) 50 (large) 75 M1M1A0
Alt 12(a)	$\frac{21}{35} (= 0.6)$ or $\frac{14}{35} (= 0.4)$	M1	At least two equivalent ratios for 21 : 14 seen eg, 3 : 2 30 : 20
	Their 0.6×125 or their 0.4×125	M1	Equivalent ratios seen up to 75 : 50 eg, 30 : 20 60 : 40 75 : 50
	(small) 75 (large) 50	A1	(small) 50 (large) 75 M1M1A0
12(b)	$200 \times 21 \times 0.05 (= 210)$ or $200 \times 14 \times 0.09 (= 252)$	M1	oe Allow working in pence
	$200 \times 0.87 (= 174)$	M1	oe Allow working in pence
	Their 210 + their 252 + their 174 (= 636)	M1	Must be the sum of 3 amounts of money
	Their $636 + 0.85 \times$ their 636 (= their $636 + 540.6(0)$)	M1	oe eg, $1.85 \times$ their 636 Allow working in pence
	1176.60	A1	1176.6 is A0 Allow 1176 or 1177 or 1180
Alt 12(b)	$21 \times 0.05 (= 1.05)$ or $14 \times 0.09 (= 1.26)$	M1	oe Allow working in pence
	Their $1.05 +$ their $1.26 + 0.87$ (= 3.18)	M1	Must be the sum of 3 amounts of money Allow working in pence
	$200 \times$ their 3.18 (= 636)	M1	Allow working in pence
	Their $636 + 0.85 \times$ their 636 (= their $636 + 540.6(0)$)	M1	oe eg, $1.85 \times$ their 636 Allow working in pence
	1176.80	A1	1176.6 is A0 Allow 1176 or 1177 or 1180

Q	Answer	Mark	Comments
13	$24 \div 20 (= 1.2)$	M1	$30 \div 24 (= 1.25)$ or $20 \div 24 (= 0.83 \dots)$
	$30 \div \text{their } 1.2$	M1	$20 \times \text{their } 1.25$ or $30 \times \text{their } 0.83 \dots$
	25	A1	
Alt 1 13	$20 \div 4 (= 5)$	M1	
	$5 \times \text{their } 5$	M1	oe eg, $20 + \text{their } 5$
	25	A1	
Alt 2 13	$24 \times \frac{60}{20} (= 72)$	M1	oe
	$\frac{30}{\text{their } 72} \times 60$	M1	oe
	25	A1	