



**General Certificate of Secondary Education
June 2011**

Methods in Mathematics (Pilot) 93652F
(Specification 9365)

Unit 2: Methods in 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 $\frac{1}{2}$

M2 Foundation Tier

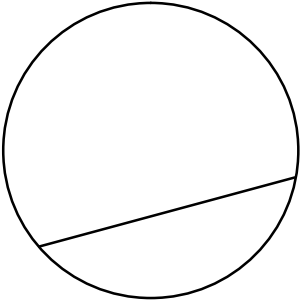
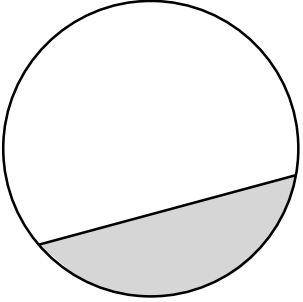
Q	Answer	Mark	Comments
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Note: Consistent use of coordinates the wrong way round. Deduct 1 mark.

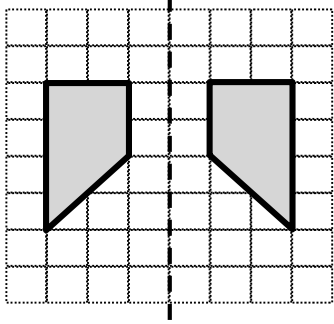
1(a)	(2, 4)	B1	
1(b)	Correct plot	B1	
1(c)	(2, 7), (5, 7)	B2	B1 Each (square need not be shown)
Alt 1 1(c)	(2, 1), (5, 1)	B2	(square need not be shown)
Alt 2 1(c)	(3.5, 5.5), (3.5, 2.5)	B2	(square need not be shown)
Alt 3 1(c)	Follow through their plot for <i>B</i>	B2	SC1 For correct square drawn but wrong coordinates written down. For example plotting <i>B</i> at (4,5) gives a square at (3,2) and (5,3) or (1,6) and (3,7)

2	£1 – 72p (= 28) in either (a) or (b)	B1	
2(a)	10(p), 5(p), 5(p), 5(p), 1(p), 1(p), 1(p) or 5(p), 5(p), 5(p), 5(p), 5(p), 2(p), 1(p) or 20(p), 1(p), 1(p), 1(p), 1(p), 2(p), 2(p) or 10(p), 10(p), 2(p), 2(p), 2(p), 1(p), 1(p) or 10(p), 5(p), 5(p), 2(p), 2(p), 2(p), 2(p)	B1 ft	ft On their '28' if calculation seen, eg, £1 – 72 = 32p, but only for 1 mark maximum in (a) or (b) Their 28 can be found by adding coins ie, do not need to see working.
2(b)	20(p), 5(p), 2(p), 1(p)	B1 ft	If their 4 coins total is the same as the seven coin total in (a) only if no calculation seen in (a)

3(a)	3480	B1	
3(b)	3500	B1	
3(c)	8734	B2	B1 For 8374 or 8743

Q	Answer	Mark	Comments
4(a)	Radius is half of the diameter or diameter is twice the radius or $d = 2r$ or $r = \frac{1}{2}d$	Q1	Strand (iii) - Correct grammar or notation
4(b)		B1	Any chord, including one that looks as though it may be a diameter Freehand lines must be straight to within 1mm tolerance Accept lines beyond circle No shading
4(c)		B1	Either side of chord must be shaded or clearly indicated Any segment including a semi-circle Freehand lines must be straight to within 1 mm tolerance
5	110 – 10 – 10 (= 90)	M1	$20 + 3d = 100$ oe Sight of 90 implies M1
	Their '90' ÷ 3	M1	$3d = 90$
	30	A1	
Alt 5	Any value chosen for d , multiplied by 3 and 20 added	M1	oe
	Another value chosen for d , multiplied by 3 and 20 added that gives a value closer to 110	M1	$3d = 90$
	30	A1	
6	E, B, A, D, C	B2	B1 For any of these seen in the order EB, BA, AD, DC

Q	Answer	Mark	Comments
7(a)	12	B1	
	cm ³	B1	
7(b)	2 + 3 + 2 + 3 + 2 + 3	M1	oe At least 5 seen
	15	A1	

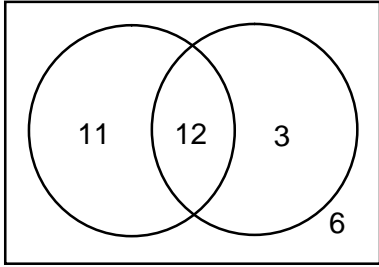
8(a)		B2	B1 For reversed shape anywhere
8(b)(i)	2	B1	
8(b)(ii)	2	B1	

9	Any two numbers that total 10 multiplied together, eg $6 \times 4 = 24$	M1	Product total must be seen
	Second attempt with both values closer to actual answers	M1	
	3.5 and 6.5	A1	
Alt 9	$a + b = 10$ or $ab = 22.75$	M1	
	$a(10 - a) = 22.75$	M1	oe
	3.5 and 6.5	A1	

10	$6 \times 30 (= 180)$	M1	$\frac{6}{5}$ or 1.2
	Their $180 \div 5$	M1	$\frac{6}{5} \times 30$ is M2
	36	A1	

11(a)	2, -4	B2	B1 Each
11(b)	Odd, or all terms even	B1	oe

Q	Answer	Mark	Comments
12(a)	Reference to sides being 4 and 3 or areas of other shapes and P being 36	B1	
12(b)	C and E or A and C or A and E	B1	Allow more than one correct answer but any 2 answers, with one wrong is B0
12(c)	Sight of 36 and 4 (cm^2)	M1	3^2
	9	A1	
13	w and $4w$ and attempt to add or dashes marked on diagram	M1	Any multiple of 22 seen implies M1
	$22w$	A1	
	(Width =) $2.5, \frac{55}{22}$ or equivalent	A1 ft	ft If M awarded. 2.5 seen then 10 (3 marks) 10 from valid working but no 2.5 seen (2 marks)
Alt 13	Values for length and width chosen in ratio 4:1 and perimeter of large rectangle correctly calculated ($22 \times$ width)	M1	
	Another pair of values for length and width chosen in ratio 4:1 and perimeter of large rectangle correctly calculated ($22 \times$ width) giving an answer closer to 2.5	M1	
	(Width =) $2.5, \frac{55}{22}$ or equivalent	A1	
14	Any three different acute angles that add up to 180° (accept 90° as acute)	B2	B1 For any three acute angles or any three angles that add up to 180°
15(a)	5.24913....	B1	
15(b)	5.25	B1 ft	ft Their (a) if at least 3 dp

Q	Answer	Mark	Comments
*16	Sight of 1.035 or 103.5	B1	Sight of digits 4968 implies B1
	480×1.035	M1	oe
	496.80	Q1	496.8 is Q0 SC1 for 648 (from 0.35)
Alt 16	$480 \times 3.5 \div 100$	M1	oe
	16.8	M1	
	496.80	Q1	496.8 is Q0. SC1 for 648 (from 0.35)
17(a)		B3	Part marks to a maximum of 2 for 6 in 'outside' B1 12 in overlap B1 26 total in both circles B1
Alt 17(a)	x marked in intersection, $23 - x$ in History, $15 - x$ in French	M1	
	$x + 23 - x + 15 - x + 6 = 32$	M1	
	$x = 12$	A1	
17(b)	3	B1 ft	ft Their Venn diagram if the intersection is populated.
18(a)	Evidence of counting squares or breaking shape into squares and triangles/trapezia, etc	M1	Can draw a rectangle round the outside and use a 'subtraction' method If perimeter indicated in working M0A0
	Correct area shown for at least 2 of the shapes	A1	15 to 17 (if M1 awarded)
	16	A1	
18(b)	Right or 90°	B1	
*18(c)	Shapes fit together (to cover plane) or shapes leave no gaps or all shapes fitting together at a point have angle total 360°	Q1	Strand (i)

Q	Answer	Mark	Comments
19	$\pi \times 9^2$	M1	$\pi \times 4.5^2$ or $\pi \times 18^2$
	254.3 to 254.5 or 81π	A1	254 with working
20(a)	18	B1	
20(b)	2	B1	
20(c)	Evidence of trying any number between their 20(a) and their 20(b)	M1	
	2.4	A1	
Alt 20(c)	$6x - 12 = x$	M1	
	2.4	A1	
21	Rotation	B1	Do not accept 'turn'
	(Anticlockwise) 90°	B1	Clockwise 270° (Do not accept -90° or 90°C)
	(Centre or about) (2, -2)	B1	
22	Other two vertices plotted at (1, 4) and (5, 4) and all sides drawn	B3	Part marks to maximum of 2/3 B1 Any kite with AB as long diagonal B1 For two vertices plotted on $y = 4$ and not symmetrical. B2 For other two vertices plotted on $y = 4$ and symmetrical about (3, 4) B2 For any kite with area 10 cm^2 (ie vertices plotted on $x = 1$ and $x = 5$)
23(a)	4	B1	
23(b)	5	B1	
23(c)	$3y - 6 = 4 - 2y$	M1	Accept one error as long as intention to expand bracket is clear, eg $3y - 5 = \dots$
	$3y + 2y = 4 + 6$	M1 Dep	Allow one sign or rearrangement error
	2	A1 ft	ft On one error only SC1 $3y - 2 = 4 - 2y$ leading to $y = 1.2$

Q	Answer	Mark	Comments
24(a)	Triangle (C) drawn at (8, 5), (8, 13) and (16, 5)	B2	B1 For at least 2 rays from (0, 9) through corners of triangle B or any triangle of correct size or triangle with two of (8, 5), (8, 13), (16, 5) as vertices SC1 Enlarging A by sf 2 to triangle at (10, 1), (14, 1) and (10, 5)
24(b)	(Scale factor) 4	B1ft	ft For their triangle
	(Centre) (4, 5)	B1ft	ft If rays drawn