

Mark Scheme (Results)

January 2012

International GCSE Mathematics  
(4MB0) Paper 01

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## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme.

Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- Types of mark
  - M marks: method marks
  - A marks: accuracy marks
  - B marks: unconditional accuracy marks (independent of M marks)
- Abbreviations
  - cao – correct answer only
  - ft – follow through
  - isw – ignore subsequent working
  - SC - special case
  - oe – or equivalent (and appropriate)
  - dep – dependent
  - indep – independent
  - eoo – each error or omission
- No working

If no working is shown then correct answers normally score full marks

If no working is shown then incorrect (even though nearly correct) answers score no marks.
- With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If it is clear from the working that the “correct” answer has been obtained from incorrect working, award 0 marks.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

If there is no answer on the answer line then check the working for an obvious answer.

- Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

- Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: eg. Incorrect cancelling of a fraction that would otherwise be correct.

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

- Probability

Probability answers must be given as fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

- Linear equations

Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

- Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

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Mark Scheme

Question Number	Working	Answer	Mark	Notes
1(a)		0.88	1	B1
Question Number	Working	Answer	Mark	Notes
1(b)		87.5% or 88%	1	B1 ft
Question Number	Working	Answer	Mark	Notes
2	$\frac{40}{360} \times \pi \times 9^2$	28.3 cm <sup>2</sup> (awrt)	2	M1 A1
Question Number	Working	Answer	Mark	Notes
3	$\frac{360}{12}$ (o.e.)	30	2	M1 A1
Question Number	Working	Answer	Mark	Notes
4	Attempt at factorising quadratic  SC: allow M1 for $(x - \frac{4}{3})(x + 11)$	$(3x - 4)(x + 11)$	2	M1 A1
Question Number	Working	Answer	Mark	Notes
5		$x = -3$ $y = \frac{3}{2}$	2	B1 B1
Question Number	Working	Answer	Mark	Notes
6	1 term correctly differentiated	$6x + \frac{2}{x^2}$ (o.e.)	2	M1 A1
Question Number	Working	Answer	Mark	Notes
7(a)	Attempt at arranging numbers in sequential order	5	2	M1 A1
Question Number	Working	Answer	Mark	Notes
7(b)		6	1	B1

Question Number	Working	Answer	Mark	Notes
8	$(\cos \theta =) \tan 40 - \sin 30$ $(\cos \theta =) 0.34\dots(\text{or better})$	$\theta = 70.2$ (awrt)	3	M1 M1dep A1
Question Number	Working	Answer	Mark	Notes
9	$4 \times \frac{70}{100} (=2.8) \quad \text{OR} \quad (0.7)^3$ $\% \text{ decrease} = \frac{ 4^3 - 2.8^3 }{4^3} \times 100$ <b>OR</b> $100 \times (1 - 0.343)$	65.7% (awrt)	3	M1  M1 DEP A1
Question Number	Working	Answer	Mark	Notes
10	$\frac{3x(x-3)}{(x-3)(x+3)}$ factorising numerator factorising denominator (applying usual rule for factorisation)	$\frac{3x}{x+3}$	3	M1 M1 A1
Question Number	Working	Answer	Mark	Notes
11(a)		5, 6, 7, 8, 9, 10	2	B2 (-1 eeo)
Question Number	Working	Answer	Mark	Notes
11(b)		4	1	B1
Question Number	Working	Answer	Mark	Notes
12	$\frac{3^3}{5^3}$ or $\frac{5^3}{3^3}$ or $3^3 : 5^3$ or $5^3 : 3^3$ or 0.216 or 4.63... or better seen $(\text{Vol of } B =) \frac{38 \times 5^3}{3^3}$	176 cm <sup>3</sup> (awrt)	3	B1 M1 A1

Question Number	Working	Answer	Mark	Notes
13	$5\sqrt{5}$ $4\sqrt{5}$ $9\sqrt{5}$	$m = 9$	4	M1 M1 A1 A1
Question Number	Working	Answer	Mark	Notes
14	$10 = \frac{k}{2^3}$ $k = 80$ $x = \sqrt[3]{\frac{80}{1.25}}$	$x = 4$	4	M1 A1 M1 (DEP) A1
Question Number	Working	Answer	Mark	Notes
15(a)		$\begin{pmatrix} 17 & -7 \\ 9 & 8 \end{pmatrix}$	2	B2 (-1 eeo)
Question Number	Working	Answer	Mark	Notes
15(b)		$\begin{pmatrix} -9 & 7 \\ -10 & 0 \end{pmatrix}$	2	B2 (-1 eeo)
Question Number	Working	Answer	Mark	Notes
16	$\angle ACB = 58^\circ$ or $\angle BAC = 58^\circ$ $\angle AOD = 92^\circ$ or $\angle AOB = 88^\circ$ $\angle CAD = 44^\circ$ $\angle BAD = (58^\circ + 44^\circ)$	$102^\circ$	4	B1 B1 B1 ft B1 ft
Question Number	Working	Answer	Mark	Notes
17(a)	$\frac{30000 \times 4}{100000}$ (o.e.)	1.2 km	2	M1 A1
Question Number	Working	Answer	Mark	Notes
17(b)	$\left(\frac{100000}{30000}\right)^2 \times 1.08$ (o.e.)	$12 \text{ cm}^2$	2	M1 A1

Question Number	Working	Answer	Mark	Notes
<b>18(a)</b>	$4x$	$4x+18$	<b>2</b>	<b>B1</b>
Question Number	Working	Answer	Mark	Notes
<b>18(b)</b>	$2(x+18) = "4x+18"$ SC: allow M1 for $2 \times ("4x+18") = (x+18)$	$x=9$	<b>2</b>	<b>M1</b> <b>A1</b>
Question Number	Working	Answer	Mark	Notes
<b>19(a)</b>		$8-15x$	<b>1</b>	<b>B1</b>
Question Number	Working	Answer	Mark	Notes
<b>19(b)</b>	$15x=8-y$	$(fg)^{-1}$ : $x \mapsto \frac{8-x}{15}$ (o.e.)	<b>2</b>	<b>M1</b> <b>A1</b>
Question Number	Working	Answer	Mark	Notes
<b>19(c)</b>		$\frac{1}{3}$	<b>1</b>	<b>B1ft</b>
Question Number	Working	Answer	Mark	Notes
<b>20</b>	$6 \times 4 \times 4 (=96 \text{ cm}^2)$ Either $\pi \times (1.5)^2$ or $\frac{1}{2} \times 4\pi \times (1.5)^2$ "96" - $\pi \times (1.5)^2 + \frac{1}{2} \times 4\pi \times (1.5)^2$	$103 \text{ m}^2$ (awrt)	<b>4</b>	<b>M1</b> <b>M1</b> <b>M1 (DEP)</b> <b>A1</b>



Question Number	Working	Answer	Mark	Notes
<b>21(a)</b>	$red \rightarrow blue\left(\frac{4}{13}\right), yellow\left(\frac{7}{13}\right)$	$\frac{4}{13}, \frac{7}{13}$	<b>2</b>	<b>B1</b>
	$yellow \rightarrow red\left(\frac{3}{13}\right), yellow\left(\frac{6}{13}\right)$	$\frac{3}{13}, \frac{6}{13}$		<b>B1</b>
Question Number	Working	Answer	Mark	Notes
<b>21(b)</b>	$\frac{3}{14} \times \frac{2}{13}$	$\frac{3}{91}$ (o.e.) or 0.033 or better	<b>2</b>	<b>M1</b>  <b>A1</b>
Question Number	Working	Answer	Mark	Notes
<b>22</b>	Either: Correctly balancing both equations (to eliminate either $x/y$ ) (no slips)  Or  Making $x$ or $y$ the subject of one of the equations (one sign slip)  Correctly deciding whether to add or subtract (one sign slip)  Or  Substitution their equation in $x$ (or $y$ ) into second equation.	$x = \frac{7}{8}$ (oe) $y = -\frac{5}{8}$ (oe)	<b>4</b>	<b>M1</b>  <b>M1(DEP)</b>  <b>A1</b>  <b>A1</b>
Question Number	Working	Answer	Mark	Notes
<b>23(a)</b>	$\frac{5}{30} \times 360$	$60^\circ$	<b>2</b>	<b>M1</b>  <b>A1</b>

Question Number	Working	Answer	Mark	Notes
<b>23(b)</b>	Bus $144^\circ$ Cycle $60^\circ$ Train $36^\circ$ Walk $120^\circ$  one correct sector ( $\pm 1^\circ$ )  one correct sector ( $\pm 1^\circ$ ) + all labels  all correct ( $\pm 1^\circ$ ) (with/without labels)		<b>3</b>	<b>B1</b> <b>B1</b> <b>B1</b>
Question Number	Working	Answer	Mark	Notes
<b>24(a)</b>	Attempt at bisector of $\angle ACB$	drawn $\pm 1$ mm on $AB$	<b>2</b>	<b>M1</b> <b>A1</b>
Question Number	Working	Answer	Mark	Notes
<b>24(b)</b>	Complete arc drawn inside triangle, centre $A$ , any radius	radius 5 cm ( $\pm 1$ mm)	<b>2</b>	<b>M1</b> <b>A1</b>
Question Number	Working	Answer	Mark	Notes
<b>24(c)</b>	Correct region shaded		<b>1</b>	<b>A1 ft</b>
Question Number	Working	Answer	Mark	Notes
<b>25(a)</b>	$\tan \theta = \frac{2}{4}$	$26.6^\circ$ (awrt)	<b>2</b>	<b>M1</b> <b>A1</b>

Question Number	Working	Answer	Mark	Notes
<b>25(b)</b>	$ \overline{OB}  = \sqrt{(3^2 + 3^2)} = (\sqrt{18})$ $ \overline{OA}  = \sqrt{4^2 + 2^2} (= \sqrt{20})$  $\Delta OAB = \frac{1}{2} \times \sqrt{18} \times \sqrt{20} \times \sin(45 - 26.6)$  Or:  Area of any rectangle/triangle/trapezium which would lead to a solution  A second rectangle/triangle/trapezium which leads further towards a solution.  Complete method involving simple areas			<b>M1</b>  <b>M1</b>  <b>M1 (DEP)</b>  <i>M1</i>  <i>M1</i>  <i>M1 (DEP)</i>
		2.99/3.00/3	<b>4</b>	<b>A1</b>
Question Number	Working	Answer	Mark	Notes
<b>26(a)</b>		One line correct  All 3 lines correct	<b>2</b>	<b>B1</b>  <b>B1</b>
Question Number	Working	Answer	Mark	Notes
<b>26(b)(i)</b>		5m/s <sup>2</sup>	<b>1</b>	<b>B1</b>
Question Number	Working	Answer	Mark	Notes
<b>26(b)(ii)</b>		(-)2.5m/s <sup>2</sup>	<b>1</b>	<b>B1</b>
Question Number	Working	Answer	Mark	Notes
<b>26(c)</b>	$\frac{1}{2} \times 25 \times (20 + 35)$			<b>M1</b>
		687.5 m	<b>2</b>	<b>A1ft</b>

Question Number	Working	Answer	Mark	Notes
27(a)	$(AC^2 =) 3^2 + 5^2 - 2 \times 3 \times 5 \times \cos 68$ (=22.76) $AC = \sqrt{34 - 30 \cos 68}$ or better	4.77 cm (cc)	3	<b>M1</b> <b>M1 (DEP)</b> <b>A1</b>
Question Number	Working	Answer	Mark	Notes
27(b)	$\frac{\sin \angle BCA}{3} = \frac{\sin 68}{4.77}$ $\sin \angle BCA = \frac{3 \times \sin 68}{4.77}$	35.6/35.7	3	<b>M1</b> <b>M1 (DEP)</b> <b>A1</b>
Question Number	Working	Answer	Mark	Notes
27(c)	$\cos 35.7 = \frac{CD}{5}$	4.06 cm / 4.07 cm	2	<b>M1</b> <b>A1ft</b>

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