

Mark Scheme (Results)

January 2013

International GCSE Mathematics B
(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
- eeoo – 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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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.

- **Parts of questions**

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

**4MB0 January 2013
Paper 1
Mark Scheme**

1.	23, 29, 31, 37	B1, B1			Total 2 marks
<hr/>					
2.	$6(3) - p(2) = 4$	(subst.)	M1		
	$p = 7$		A1	2	2
					Total 2 marks
<hr/>					
3.	$6 = 2 \times 3, 15 = 3 \times 5, 27 = 3 \times 3 \times 3$				
	At least two correct decompositions		M1		
	270		A1	2	2
					Total 2 marks
<hr/>					
4.	(a) 3		B1	1	
	(b) 3		B1	1	2
					Total 2 marks
<hr/>					
5.	$\sqrt{3}, \sqrt{2.5}, \pi$		B1, B1		2
					Total 2 marks
<hr/>					
6.	$360 - 112$ OR $180 + 68$		(o.e)	M1	
	248° or $S68^\circ W$			A1	2
					Total 2 marks
<hr/>					
7.	A correct decomposition of 500 into 2 or more numbers leading to 10 and “n”		M1		
	$10\sqrt{5}$			A1	2
					Total 2 marks
<hr/>					

8.	30	B1		
	150	B1	2	2
Total 2 marks				

9.	(a) 30, 42	B1,B1	2	
	(b) Accept...			
	<i>differences</i> increase by 2	B1	1	3
	<i>differences</i> are 2,4,6,8,10,12,...			
	sequence is going up plus 2 then plus 4 then plus 6			
	$(u_n =)n^2 - n$			
Total 3 marks				

10.	Sight of -12 (but not for $x^2 - 12$)	M1		
	Accept $f(0) = -12$			
	$f \dots -12$ or $[-12, \infty)$ or $x^2 - 12 \geq -12$	A1	2	2
Total 2 marks				

11.	$3d = (v - 2u)t$ (removing denominator)	M1		
	$3d - vt = -2ut$ (o.e: isolating term involving u)	M1dep		
OR:	$d = \frac{vt}{3} - \frac{2}{3}ut$	(M1)		
	$\frac{2}{3}ut = \frac{vt}{3} - d$	(M1dep)		
OR:	$v - 2u = 3\frac{d}{t}$	(M1)		
	$-2u = \frac{3d}{t} - v$	(M1dep)		
	$u = -\frac{3d - vt}{2t} = \frac{vt - 3d}{2t}$ (o.e $u = \frac{v}{2} - \frac{3d}{2t}$)	A1	3	3
Total 3 marks				

12.	circumference = $2\pi \times 6378000\text{m}$	M1		
	$= \frac{2\pi \times 6378000}{1000} \text{ km}$ (converting metres to km)	M1		
	$12\,756\pi$ OR $12\,800\pi$ (cao)	A1	3	3

Total 3 marks

13.	(a) 23.95 (o.e. $23\frac{19}{20}$)	B1	1	
	(b) 2.395×10^1 OR 2.395×10	B1 ft	1	
	(c) 24.0	B1 ft	1	3

Total 3 marks

14.	(a) f, g	B1	1	
	(b) a, b, c, f, g, h	B1	1	
	(c) h	B1	1	3

Total 3 marks

15.	(a) $\begin{pmatrix} 3 & -1 \\ 1 & -1 \end{pmatrix}$	B1	1	
	(b) $\begin{pmatrix} -10 & -7 \\ 30 & 21 \end{pmatrix}$	B2(-1ee)	2	3

Total 3 marks

16.	(a) $42 \text{ (cm}^2\text{)}$	B1	1	
	(b) perp dist $\times 8 = "42"$	M1		
	or perp dist = $7 \times \sin " \angle ABC "$	(M1)		
	perp dist = 5.25 cm (awrt)	A1	2	3

Total 3 marks

17.	$4x-4-6x-3$ (o.e.)	M1		
	Correctly removing denominators	M1ind		
	$-\frac{7}{8}$ or $-\frac{14}{16}$ or -0.875	A1	3	3
				Total 3 marks

18.	$2\frac{11}{12}b = 1\frac{1}{3} + 1\frac{1}{2}$	M1		
	$b = (1\frac{1}{3} + 1\frac{1}{2}) \div 2\frac{11}{12}$	M1dep		
	$b = \frac{17}{6} \times \frac{12}{35}$ (o.e.)	M1dep		
	$b = \frac{34}{35}$ (cao)	A1	4	4
				Total 4 marks

19.	(a) $26^2 = 2 AD^2$ OR $\frac{AD}{26} = \sin$ or $\cos 45^\circ$	M1		
	18.4 cm	A1	2	
	(b) Sector $ADCP = \frac{1}{4}\pi \times "18.3847..."^2$	M1		
	Shaded $ABC = "18.3487..."^2 - \frac{1}{4}\pi \times "18.3847..."^2$	M1dep		
	72.4 cm ²	A1	3	5
				Total 5 marks

20.	correct attempt at balancing equations	M1		
	correct decision to add/subtract	M1dep		
	OR			
	correct attempt to make x/y the subject	(M1)		
	Substituting for x (or y)	(M1dep)		
	$x = -19$	A1		
	$y = 14$	A1	4	4
				Total 4 marks

21.	(a) $18 - x, 16 - x$	B1		
	3	B1	2	
	(b) " $(18 - x) + x + (16 - x) + 3 = 32$ " (o.e)	M1		
	$x = 5$	A1	2	4
				Total 4 marks

22.	(a) $\mathbf{c} = 5 \left(\begin{pmatrix} 1 \\ 4 \end{pmatrix} - 4 \begin{pmatrix} 1 \\ 2 \end{pmatrix} \right)$ (subst)	M1		
	$\begin{pmatrix} -15 \\ -20 \end{pmatrix}$ OR $5 \begin{pmatrix} -3 \\ -4 \end{pmatrix}$	A1	2	
	(b) $ c = \sqrt{(\pm 15)^2 + (\pm 20)^2}$	M1		
	$ c = 25$	A1ft	2	4
				Total 4 marks

23.	(a) $\frac{5000}{80} \times 100$	M1		
	£6250	A1	2	
	(b) $\frac{5000 - 4300}{5000} \times 100$	M1		
	14%	A1	2	4
				Total 4 marks

24.	$-7 \leq 3x$ (o.e.)	M1		
	$2x \leq 5$ (o.e.)	M1		
	$-2\frac{1}{3}, x$ OR $x, 2\frac{1}{2}$	A1		
	$-2, -1, 0, 1, 2$	A1	4	4
				Total 4 marks

Notes:

Both Ms must be collected in order to collect final A mark.

Ignore any weak inequalities (provided right way round)

25.	(a) Prob = $\frac{1}{4} + \frac{2}{5}$ (o.e)	M1		
	$\frac{13}{20}$ (0.65, 65%)	A1	2	
	(b) $\frac{25}{100} \times \frac{40}{99}$ or $\frac{40}{100} \times \frac{25}{99}$	M1		
	$\frac{25}{100} \times \frac{40}{99} + \frac{40}{100} \times \frac{25}{99}$ (o.e.)	M1dep		
	$\frac{20}{99}$ (0.202, 20.2%)	A1	3	5
	SC: With replacement $2 \times \left(\frac{25}{100} \times \frac{40}{100}\right)$ M1, M0, A0			
				Total 5 marks

26.	(a) $\frac{117 \times 3 + 108 \times 2 + 118 + 120 + 122 + 123 + 124}{10}$	M1		
	117.4 (cm)	A1	2	
	(b) 117 (cm)	B1	1	
	(c) $\frac{117 + 118}{2}$ or placing data in order	M1		
	117.5 (cm)	A1	2	5
				Total 5 marks

27.	(a) $\angle AOC = 80^\circ$	(oe)	B1	
	$\angle OAC = 50^\circ$		B1	
	Suitable valid reason (only ONE required) eg \angle at centre of circle ($=2 \times \angle$ at circum) or base angle of isos. Δ		B1	3
	(b) $\angle OCD = 90^\circ$	(oe)	B1	
	$\angle ADC = 100^\circ$ (Isos. Δ)		B1	
	Suitable valid reason (only ONE required) eg \angle betw. tangent and radius Or \angle sum of quadrilateral		B1	3
				6
				Total 6 marks

28.	(a) perpendicular bisector construction arcs	M1		
	Locus drawn accurately	A1	2	
	(b) C labelled and $\triangle ABC$ drawn	B1	1	
	(c) Arc, rad. 4cm, centre C drawn at least inside $\triangle ABC$	M1		
	Arc, rad. 6 cm, centre B drawn at least inside $\triangle ABC$	M1		
	Area shaded correctly	A1ft	3	6
				Total 6 marks

29.	(a) $\tan \angle BAC = \frac{15}{20}$ (o.e)	M1		
	$\angle BAC = 36.9^\circ$	A1	2	
	(b) $AB = \sqrt{20^2 + 15^2}$	M1		
	$AB = 25$ cm	A1	2	
	(c) $AD = 20 \times \cos 30$ (= 17.3)	M1		
	$\Delta ABD = \frac{1}{2} \times 17.3 \times 25 \times \sin(30 + 36.9)$	M1dep		
	$\Delta ABD = 199$ cm ²	A1	3	7
				Total 7 marks

TOTAL FOR PAPER : 100 MARKS

END

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