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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

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2. $6(3)-p(2)=4$ (subst.) M1

$p=7$ A1 2 **2**

Total 2 marks

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3. $6=2\times3,\quad 15=3\times5,\quad 27=3\times3\times3$

At least two correct decompositions M1

270 A1 2 **2**

Total 2 marks

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4. (a) 3 B1 1

(b) 3 B1 1 **2**

Total 2 marks

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5. $\sqrt{3},\ \sqrt{2.5},\ \pi$ B1, B1 **2**

Total 2 marks

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6. $360-112$ OR $180+68$ (o.e) M1

248^{o} or S68^{o}W A1 2 **2**

Total 2 marks

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7. A correct decomposition of 500 into 2 or more numbers leading to 10 and "*n*" M1

$10\sqrt{5}$ A1 2 **2**

Total 2 marks

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8. 30 B1

150 B1 2 **2**

Total 2 marks

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9. (a) 30, 42 B1,B1 2

(b) Accept…

differences increase by 2 B1 1 **3**
differences 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

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10. Sight of -12 (but not for $x^2 - 12$) M1

Accept $f(0) = -12$

f … -12 or $[-12, \infty)$ or $x^2 - 12 \geq -12$ A1 2 **2**

Total 2 marks

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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

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12. circumference = $2\pi \times 6378000$m M1

$= \frac{2\pi \times 6378000}{1000}$ km (converting metres to km) M1

$12\,756\pi$ OR $12\,800\pi$ (cao) A1 3 **3**

Total 3 marks

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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

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14. (a) f, g B1 1

(b) a, b, c, f, g, h B1 1

(c) h B1 1 **3**

Total 3 marks

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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

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16. (a) 42 (cm^2) B1 1

(b) perp dist × 8 = "42" M1

or perp dist = $7 \times \sin$ "$\angle ABC$" (M1)

perp dist = 5.25 cm (awrt) A1 2 **3**

Total 3 marks

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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

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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

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19. (a) $26^2 = 2\,AD^2$ **OR** $\frac{AD}{26}=\sin$ or $\cos 45°$ 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

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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

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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

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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) $|\mathbf{c}| = \sqrt{"(\pm15)"^2+"(\pm20)"^2}$ — M1

$|\mathbf{c}| = 25$ — A1ft 2 **4**

Total 4 marks

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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

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24. $-7 \le 3x$ (o.e.) M1

$2x \le 5$ (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)

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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 $2\times(\frac{25}{100}\times\frac{40}{100})$ M1, M0, A0

Total 5 marks

26.	(a) $\frac{117\times3+108\times2+118+120+122+123+124}{10}$		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) $\angle AOC = 80^o$	(oe)	B1		
	$\angle OAC = 50^o$		B1		
	Suitable valid reason (only **ONE** required) eg $\angle$ at centre of circle (=2 × $\angle$ at circum) or base angle of isos. Δ		B1	3	
	(b) $\angle OCD = 90^o$	(oe)	B1		
	$\angle ADC = 100^o$ (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** ΔABC drawn	B1	1	
	(c) Arc, rad. 4cm, centre C drawn at least inside ΔABC	M1		
	Arc, rad. 6 cm, centre B drawn at least inside ΔABC	M1		
	Area shaded correctly	A1ft	3	**6**
			Total 6 marks	

29.	(a) $\tan \angle BAC = \frac{15}{20}$ (o.e)	M1		
	$\angle BAC = 36.9^o$	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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