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Mark Scheme (Results)

January 2017

Pearson Edexcel International GCSE Mathematics B (4MB0) Paper 01R

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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

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- **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.
- **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.

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International GCSE Mathematics B Mark Scheme				
Q	**Working**	**Answer**	**Mark**	**Notes**
1	$360-(152+122)$ OR $(180-152)+(180-122)$		2	M1
		86°		A1
				Total 2 marks

NB. Allow $62+32+x=180$ (M1)
Allow the 'completion' of a pentagon with the result that $90+90+152+122+x=540$ for (M1)
Accept $x+152+122=360$ for (M1)

2	$\frac{275}{5500}$ OR $\frac{0.275}{5.5}$		2	M1
		$\frac{1}{20}$		A1
				Total 2 marks

Notes: 1. Fraction with both numerator/denominator in grams or kilograms for (M1)

2. Do not accept 0.05 or 5% for (A1) unless you also see $\frac{1}{20}$ as well.

3. Ignore any units given (e.g. g or kg) in the final answer.

3.	$15.\frac{2}{3}x-15.\frac{8}{15}x=15.\frac{16}{5}$ (o.e.) (correct attempt to remove denominators)		2	M1 (no slips)
		$x = 24$		A1
				Total 2 marks

Note: Accept $\frac{10}{15}x-\frac{8}{15}x=\frac{16}{5}$ (o.e.) for (M1)

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Q	Working	Answer	Mark	Notes
4	$\frac{12.5}{100}\times 0.95\times 32000$ (o.e.)		2	M1
		(£) 3800		A1
				Total 2 marks

5	$(5-3\times 7)-(5-3\times 12)$ (o.e.)		2	M1
		15		A1 (accept -15)
				Total 2 marks

Notes: 1. Accept $5\times\pm 3$ for (M1)
2. Accept 15 or -15 for (A1)

6	$w(x-y)+z(x-y)$ or $x(w+z)-y(w+z)$		2	M1
		$(w+z)(x-y)$		A1
				Total 2 marks

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Q	Working	Answer	Mark	Notes
7	$6x^5$ or $+\frac{18}{x^4}$ (one term correctly differentiated)		2	M1
		$6x^5+\frac{18}{x^4}$		A1 (accept $6x^5+18x^{-4}$)
				Total 2 marks

Notes: 1. Accept $6x^5+18x^{-4}$ or $6\left(x^5+3x^{-4}\right)$ or $6\left(x^5+\frac{3}{x^4}\right)$

2. Using the quotient rule: $\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{x^9-6}{x^3}\right)=\frac{x^3.9x^8-(x^9-6).3x^2}{x^6}$ earns (M1)

8	$\frac{1}{2}\times12\times15\times\sin A=35$		2	M1
		$\frac{7}{18}$ ($\frac{35}{90}$, 0.389...)		A1 (o.e.) (do not ISW if candidate finds the angle) **NB: Â = 0.399 radians**
				Total 2 marks

Note: An incorrectly cancelled fraction, from a previously correct fraction does not lose the A mark.

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Q	Working	Answer	Mark	Notes
9	$\dfrac{\frac{1}{9}+125}{\frac{1}{9}}$ or $1+\dfrac{125}{1/9}$		2	M1
		1126		A1
				Total 2 marks

Notes: 1. Accept $\left(\frac{1}{9}+125\right)\times 9$ or $1+5\times 15^2$ for (M1)

2. Where decimals are used for 1/9, **must** see 0.11 (or better) written down for (M1).

10	a	$\dfrac{2\cos 30-1}{\sqrt{12288}-64}$		2	M1
			0.015625		A1 (Do not accept 1/64)
	b		0.01563	1	A1ft (Accept 0.01562)
					Total 3 marks

Notes: 1. Accept a correct standard form format in either part.

2. For the follow through in (b), we must see more than 4 significant figures in part (a).
(Of course, the correct answer seen in part (b) earns the (A1) irrespective of what is seen in part (a).)

11	a		2, 4, 6, 8, 10	1	B1
	b		1, 2, 3, 4, 6, 8, 9	1	B1
	c		2, 4, 6, 8	1	B1ft provided that this set is non-empty
					Total 3 marks

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Q	Working	Answer	Mark	Notes
12 a		(11)	1	B1 Do not penalise missing brackets here
b		$\begin{pmatrix} 3 & -2 \\ -12 & 8 \end{pmatrix}$	2	B2 (-1eeoo)
				Total 3 marks

13	Correctly identifying a factor in the numerator **or** denominator which leads to the required solution.		3	M1
	Correctly identifying **both** factors in the numerator and denominator ($(x-2y)$ and 2)			M1 dep
		$3x^2/2y$		A1 (accept $\frac{3}{2}x^2y^{-1}$)
				Total 3 marks

Notes: 1. For the first (M1), accept for the numerator $6x^2(x-2y)$ or $3x^2(2x-4y)$. Do not accept $6x(x^2-2xy)$ or $3x(2x^2-4xy)$.

For the denominator accept $4y(x-2y)$ or $2y(2x-4y)$

2. $\frac{6x^2}{4y}$ earns (M1)(M0)(A0)

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Q		Working		Answer	Mark	Notes
14	a	arranging items into numerical order	$\frac{6+8}{2}$		2	M1
				7		A1
	b			8	1	A1
						Total 3 marks

15	$4x-5y-3\times5=wy$		3	M1
	$4x-15=y(w+5)$			M1 dep
		$y=\frac{4x-15}{w+5}$ (o.e.)		A1
				Total 3 marks

Notes: 1. $4x=wy+5y+15$ (M1)

2. 2nd (M1) is for collecting terms in y and factorising.

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Q	Working	Answer	Mark	Notes
16 a		Any positive number less than 1	1	B1
b	$100x = 40x^2$ Accept $\frac{10}{\sqrt{40}} = \sqrt{x}$ or $x = \left(\frac{10}{\sqrt{40}}\right)^2$ for method		2	M1
		$x = 2.5$ (o.e.)		A1
				Total 3 marks

Notes: 1. (a) Answer can be embedded e.g. $\sqrt{1/4}$

2. (b) Do not penalise $x = 0$ as an extra answer.

17	balancing two equations	Making x/y the subject of one equation		4	M1
	Correctly deciding to add/subtract	Correctly substituting into the second equation			M1 dep
			$x = 3,\ y = -1$		A1, A1
					Total 4 marks

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Q	Working	Answer	Mark	Notes
18	$a : b = 30 : 48$ or $b : c = 48 : 200$		3	M1 Accept equivalent ratios for method
		$a : b : c = 30 : 48 : 200$ $a : b : c = 15 : 24 : 100$		A1 A1
				Total 3 marks

Notes: 1. $\frac{a}{b} = \frac{5 \times 3}{8 \times 3}$ or $\frac{b}{c} = \frac{6 \times 4}{25 \times 4}$ (M1)

$\frac{a}{b} = \frac{15}{24}$ and $\frac{b}{c} = \frac{24}{100}$ (A1)

2. $\frac{6}{25} = \frac{8}{x}$ or $\frac{x}{6} = \frac{5}{8}$ (M1)

$5 : 8 : \frac{100}{3}$ or $\frac{30}{8} : 6 : 25$ (A1)

3. $a = \frac{5}{8}b$ or $c = \frac{25}{6}b$ (M1)

$\frac{5}{8} : 1 : \frac{25}{6}$ (o.e.) (A1)

4. $\frac{6}{8} \times 5$ (3.75) (M1)

3.75 : 6 : 25 (A1)

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Q	Working	Answer	Mark	Notes
19 a	Penalise incorrect rounding/accuracy once only in the question (the first time it occurs) $\frac{BC}{12} = \sin 45^0$ (o.e.)		2	 M1
		8.49 cm		A1
b	$(AB =)$ "8.49" + $5\cos 20^0$		2	M1
		13.2 cm		A1
				Total 4 marks

Note: (a) For the (o.e.), accept $\frac{BC}{12} = \cos 45^0$ or $2x^2 = 12^2$.

20	a		0.15	1	B1
	b	any two of the following combined probabilities added together $0.3\times0.3,\quad 0.1\times0.15,\quad 0.1\times0.15$ $0.3\times0.3+0.1\times0.15+0.1\times0.15$		3	 M1 M1(DEP)
			$0.12\left(\frac{3}{25}, 12\%\right)$		A1
					Total 4 marks

Notes (a) Accept $\frac{3}{20}$

(b) Accept correct fractions in compound probabilities

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Q	Working	Answer	Mark	Notes
21 a		3^6	1	B1
b	$3^{2x+5} = "3^6"^{5-x}$		3	M1
	$2x+5 = "6".(5-x)$			M1 dep
		$x = 3\frac{1}{8}(\frac{25}{8}, 3.125)$		A1
				Total 4 marks

Notes: 1. (a) $9^3 = 729$ earns (B0)

2. (b) For the 2nd (M1), ft from their $"6"$ from their $3^{"6"}$

22 a		16, 12	2	B1, B1ft
b			2	
		Heights: 6, 4.5		B1, B1ft
				Total 4 marks

Notes: (a) ft $"12" = 60 - 32 - "16"$

(b) $"4.5"$ from their $"12"$. If *x* is the incorrect final table entry, then height of last bar should be $\frac{x \times 4.5}{12}$.

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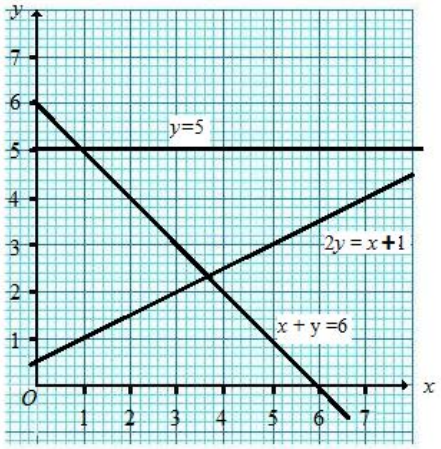
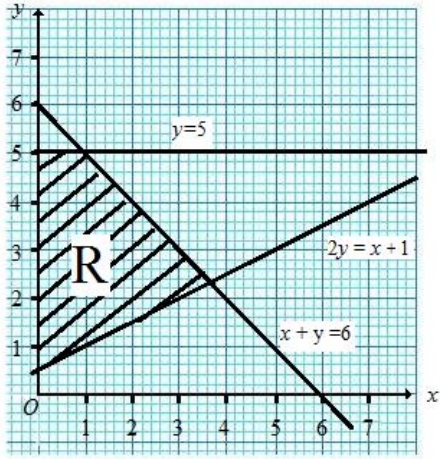
Q	Working	Answer	Mark	Notes
23 a			3	B1, B1, B1
b			1	B1 ft (Allow inverted shading)
				Total 4 marks

Notes: 1 (a) Penalise missing/incorrect labels once only (first time it occurs)

2. (a) $2y = x + 1$ must pass through (1, 1) and (5, 3) and $x + y = 6$ must pass through (0, 6) and (6, 0).

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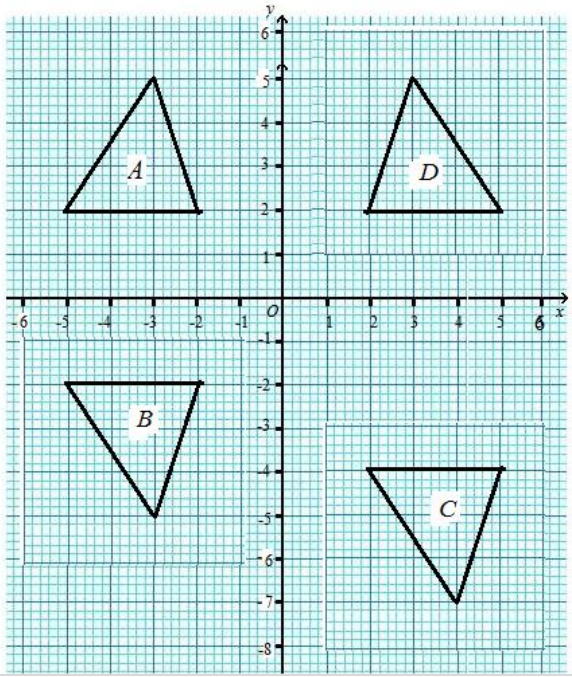
Q	Working	Answer	Mark	Notes
24				
a	Triangle B		1	B1
b	Triangle C		1	B1ft Penalise missing/incorrect
c	Triangle D		1	B1ft labels once only
d		$\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$	2	B1, B1 (-1ee)
				Total 5 marks

Notes. 1. Must see a triangle *D* to award any marks in part (d).

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Q		Working	Answer	Mark	Notes
25	a	$9 = k\left(\frac{1}{2}\right)^3$		3	M1
			$k = 72$ $y = 72x^3$		A1 A1
	b	$x^3 = \frac{125}{3\times"72"}$		2	M1
			$x = \frac{5}{6}$ $(\frac{125}{216}, 0.833)$		A1
					Total 5 marks

NB. (a) Accept $y = kx^3$ on answer line for final (A1) provided k = 72 seen in working space

(b) Answer however must be a correct fraction or decimal which rounds to 0.833

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Q	Working		Answer	Mark	Notes
26 a	96° (opp angles of a cyclic quadrilateral)			2	B1, B1
b	58° (alternate segment)			2	B1, B1
c	$(\angle GAB =)\ 52^0$ (vertically opposite)	$(\angle DAC =)\ 26^0$ (angle sum of triangle) and $(\angle BAC =)\ 44^0$ (angles on st. line)		2	
	$(\angle ACB =)\ 52^0$ (alt segment)	$(\angle ACB =)\ 52^0$ (angle sum of triangle)			B1
	TWO **different** reasons				B1
					Total 6 marks

Notes. Reasons must be consistent with the candidate's argument. Accept angles marked on the diagram.

(a) 'cyclic quadrilateral' sufficient reason

(b) First B1 for answer, second B1 for **two** reasons.

Alternative method: $\angle DAB = 70^\circ$ ((sum of angles on a) straight line)

$\angle DCB = 110^\circ$ ((opposite angles of a) cyclic quadrilateral)

$\angle ACB = 52^\circ$ (B1)(B1)

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Q	Working	Answer	Mark	Notes
27	$x(x-2)+1=\frac{9}{2}(x-2)$ (o.e.) (correctly removing the algebraic fraction)		5	M1
	$2x^2-13x+20\ (=0)$			A1
	Attempt to factorise/solve a quadratic equation			M1
		2.5, 4		A1, A1
				Total 5 marks

NB. 1. Usual rule for factorising a **trinomial** quadratic. If the formula is used, it must be a correct substitution of their coefficients into a correctly quoted formula for (M1)

2. Award (M1)(A1) for $x^2-\frac{13}{2}x+10\quad(=0)$

3. Usual rule for (M1) attempt to factorise. If formula used, correct substitution into a correctly quoted formula.

4. If the answers given are correct from incorrect working, then (A0)(A0)

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Q		Working	Answer	Mark	Notes
28	a	arc, radius 6 cm, centre *P* (must be complete inside the triangle [ignore outside the triangle])		1	B1
	b	perpendicular bisector of *QR* **(must be completely inside the triangle [can extend beyond] for the 'A' mark)**		2	M1, A1
	c	angle bisector of *PQ* and *QR* **(must intersect PR for the 'A' mark)**		2	M1, A1
	d	region T shaded and labelled. (**dependent on 3 attempted constructions)**		1	B1 ft
					Total 6 marks

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Q	Working	Answer	Mark	Notes
29 a	$(PQ^2 =)\ 10^2 - 6^2$		2	M1
		8 (cm)		A1
b	$3 \times PD = 6 \times 6$		3	M1
		PD = 12		A1
		radius = 7.5 (cm)		A1
c	$(3+"8") \times (2 \times "7.5" - (3+"8")) = 10 \times QE$		2	M1
		$(QE =)$ = 4.4 cm		A1
				Total 7 marks

Notes: 1. (a) Alternative method: $\angle PQB = 36.9^\circ$ (or better). Leading to $(PQ =) \dfrac{6}{\tan 36.9^0}$ (M1)

By this method (or any other equivalent trig. method), accept an answer of 7.99 (or better).

(b) Accept $3 \times x = 6 \times 6$ for (M1)

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