



Mark Scheme (Results)

Summer 2026

Pearson Edexcel International GCSE

In Mathematics B (4MB1) 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
- awrt – answer which rounds to
- eeoo – each error or omission
- cas – Correct answer scores full marks (unless from obvious incorrect working)
- wr – working required

- **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.

If a candidate misreads a number from the question. Eg. Uses 252 instead of 255; method marks may be awarded provided the question has not been simplified. Examiners should send any instance of a suspected misread to review.

If there is a choice of methods shown, then award the lowest mark, unless the subsequent working 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.

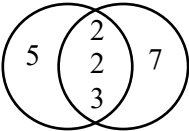
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

- **Parts of questions**

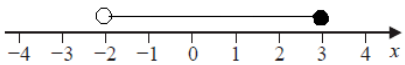
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded to another.

Question		Working	Answer	Mark	Notes
1		$8x < 20$		2	M1 for isolating the terms in x correctly or for $x = 2.5$ or $x > 2.5$ or 2.5 Accept $6x + 2x < 20$ Allow any inequality/equals symbol
			$x < 2.5$		A1 oe eg $2.5 > x$ or $x < \frac{20}{8}$ Only isw incorrect simplification of a correct inequality Do not allow $x \leq 2.5$ or $x = 2.5$ or $x > 2.5$ or 2.5 on answer line
		<i>cas</i>			Total 2 marks

Question		Working	Answer	Mark	Notes
2		$4(2ab - 7a)$ or $a(8b - 28)$ or $2(4ab - 14a)$ or $2a(4b - 14)$ or $4a(2b \pm \dots)$ or $4a(\dots - 7)$ or $\dots(2b - 7)$		2	M1 a correct partial factorisation or a common factor of $4a$ and one correct term in the brackets or $2b - 7$ in the brackets
			$4a(2b - 7)$		A1 Condone a missing final bracket Do not isw – see general marking guidance.
		<i>cas</i>			Total 2 marks

Question	Working	Answer	Mark	Notes																																											
3	$2 \times 2 \times 3 \times 5$ and $2 \times 2 \times 3 \times 7$ oe or Multiples (60) 120, 180, 240, 300, 360, 420, 480, 540 and Multiples (84) 168, 252, 336, 420 or <table><tr><td>2</td><td>60</td><td>84</td></tr><tr><td>2</td><td>30</td><td>42</td></tr><tr><td>3</td><td>15</td><td>21</td></tr><tr><td></td><td>5</td><td>7</td></tr></table> or <table><tr><td>2</td><td>60</td></tr><tr><td>2</td><td>30</td></tr><tr><td>3</td><td>15</td></tr><tr><td></td><td>5</td></tr></table> and <table><tr><td>2</td><td>84</td></tr><tr><td>2</td><td>42</td></tr><tr><td>3</td><td>21</td></tr><tr><td></td><td>7</td></tr></table> <table><tr><td>4</td><td>30</td><td>42</td></tr><tr><td>3</td><td>15</td><td>21</td></tr></table> or <table><tr><td>6</td><td>10</td><td>14</td></tr><tr><td>2</td><td>5</td><td>7</td></tr></table> <table><tr><td>12</td><td>5</td><td>7</td></tr></table>	2	60	84	2	30	42	3	15	21		5	7	2	60	2	30	3	15		5	2	84	2	42	3	21		7	4	30	42	3	15	21	6	10	14	2	5	7	12	5	7		2	M1 Both numbers expressed as a product of primes For $2 \times 2 \times 3 \times 5$ allow $4 \times 3 \times 5$ or $6 \times 2 \times 5$ or 12×5 or $2 \times 2 \times 3 \times 5 \times 1$ For $2 \times 2 \times 3 \times 7$ allow $4 \times 3 \times 7$ or $6 \times 2 \times 7$ or 12×7 or $2 \times 2 \times 3 \times 7 \times 1$ A list of multiples including 420 for both numbers Or a correct table or 2 correct trees Allow equivalent tables and tree eg (2, 3, 2) rather than (2, 2, 3) Or allow as Venn diagram. 
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12	5	7																																													
		420		A1 Allow $2 \times 2 \times 3 \times 5 \times 7$ oe																																											
	cas			Total 2 marks																																											

Question	Working	Answer	Mark	Notes
4	(a)	4	1	B1
	(b)	eg $\sqrt{2}$ or $\sqrt{3}$ or 0.5π	1	<p>B1 for any irrational number within the given range including multiples of π or e eg $\frac{\sqrt{11}}{3}$ or $\frac{3\pi}{5}$ or $e^{0.5}$</p>
				Total 2 marks

Question	Working	Answer	Mark	Notes
5		Shown	2	B2 for a fully correct diagram. Must be a single line (B1 for an open circle at -2 and a closed circle at 3 or a single line from -2 to 3) Allow (for an open circle and] as a closed circle
	<i>cas</i>			Total 2 marks

Question	Working	Answer	Mark	Notes
6	$50 \times 0.36 [= 18]$ or $50 \times (1 - 0.64) [= 18]$ oe $50 \times 0.64 [= 32]$ or 32		2	M1 correct method to find the expected number of games not won or games won
		18		A1 cao
	<i>cas</i>			Total 2 marks

Question	Working	Answer	Mark	Notes
7	$180 - 105 [= 75]$ or 75		2	M1 a correct method to find the angle. Could be seen on the diagram
		75 and <u>Opposite angles</u> of a <u>cyclic quadrilateral</u> sum to 180°		A1 75 and correct reason – need underlined words Allow $\angle$ for angle
				Total 2 marks

Question		Working	Answer	Mark	Notes
8		$15700 + 10 \times 2000 [= 35700]$		3	M1 Correct method to find total sale price. May be implied by 35700 or $15700 + 20000$
		$\frac{"35700"}{0.84}$ or $"35700" + "35700" \times \frac{16}{84}$ or $x - \frac{16}{100}x = "35700"$ oe			M1 for dividing by 0.84 Allow $\frac{n}{0.84}$ or $\frac{n}{84} \times 100$ where n is positive or a fully correct method to find the original price. Condone $\frac{n}{84\%}$
			42 500		A1 NB multiply by 1.16 gives an answer of 41412 and is M1M0A0 unless the method marks can be awarded in the working.
		<i>cas</i>			Total 3 marks

Question	Working	Answer	Mark	Notes
9	$\frac{2(4x-3)-3(2x+5)}{6}$ oe or $\frac{2(4x-3)}{6} - \frac{3(2x+5)}{6}$ oe or $\frac{8x-6}{6} - \frac{6x+15}{6}$ oe		3	M1 for a correct method to reduce to a single fraction. Allow any common denominator Condone invisible brackets if multiplied out correctly with one error only. May be implied by the second M mark and a correct final expression equivalent to $\frac{2x-21}{6}$
	$\frac{8x-6-6x-15}{6}$ oe			M1 for multiplying out the brackets. Allow one sign error if 4 terms given. If the 1 st M1 has been awarded then this may be implied by a correct answer. ft their expression of the form $m(4x-3)-n(2x+5)$ where m and n are integers NB $\frac{8x-6-6x\pm 15}{6}$ implies M1M1
		$\frac{2x-21}{6}$		A1 allow $\frac{21-2x}{-6}$ Dep on both M marks being awarded. Do NOT isw
	wr			Total 3 marks

Question	Working	Answer	Mark	Notes
10		$[w=]3$	3	B1
	$[w \times h =] \frac{4.5^2}{27} \times 20 [=15]$ oe or $[w \times h =] \frac{3}{4} \times 20 [=15]$ oe or $[Fd =] \frac{27}{3}$ and $\frac{20}{2}$ oe			M1 A correct method to calculate the area of the bar 2,, $t < 4$ or correct method to find both fd May be implied by 15 Accept 9 and 10
		$[h=]5$		A1
	cas			Total 3 marks

Question		Working	Answer	Mark	Notes
11		6:10 and 6:9 oe or $[G:R:B]=6:10:9$ oe		3	M1 for writing the ratios with a common figure for green or for writing a correct 3 part ratio which can be in any order. Allow equivalent ratios eg 3:5 and 3:4.5 or $2:\frac{10}{3}$ and 2:3 or $1:\frac{5}{3}$ and $1:\frac{3}{2}$ or 3:5:4.5 or $[R:G:B]=10:6:9$ Do not need to be labelled as G, R and B
		$\frac{"10"}{"6"+"10"+"9"} \times 200 [= 80]$ or $\frac{"6"}{"6"+"10"+"9"} \times 200 [= 48]$ or $\frac{"9"}{"6"+"10"+"9"} \times 200 [= 72]$ or 48:80:72			M1 correct method to find the number of red pens sold or green pens sold or blue pens sold. ft their ratios incorporating red, green and blue May be implied by 48, 72 or 80
			80		A1
		<i>cas</i>			Total 3 marks

Question		Working	Answer	Mark	Notes
12	(a)	12.8×10^{-41} or 1.28×10^n or $m \times 10^{-40}$		2	M1 allow a correct answer in any form or $12.8 \times 10^{-105+64}$ or 1.28×10^n or $m \times 10^{-40}$ where $1 \leq m < 10$
			1.28×10^{-40}		A1 cao
	(b)	0.8×10^{169} or 8×10^p or $q \times 10^{168}$		2	M1 allow a correct answer in any form or $0.8 \times 10^{64-(-105)}$ or 8×10^p or $q \times 10^{168}$ where $1 \leq q < 10$
			8×10^{168}		A1 cao
		cas			Total 4 marks

Question	Working	Answer	Mark	Notes
13	$x = k\sqrt{w}$ oe		4	M1 For a correct relationship for x in terms of w . Allow any letter for k but not x . w or y
	$y = \frac{c}{w}$ or $w = \frac{c}{y}$			M1 For a correct relationship for y in terms of w . Allow any letter for c (may be the same letter used for M1 but not x . w or y)
	$\left[x^2 = k^2w \Rightarrow\right] y = \frac{m}{x^2}$ and $16 = \frac{m}{2^2}$			M1 dep on both the previous M marks being awarded. For eliminating w to gain a relationship between x and y and substituting $x = 2$ and $y = 16$
		$y = \frac{64}{x^2}$		A1 oe NB y must be the subject of the equation
	<i>cas</i>			Total 4 marks

Question	Working	Answer	Mark	Notes
14	$\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$		4	M1 for a correct matrix for reflection in y-axis (may be seen written as an inverse matrix) or reflection in the y-axis of the point (1, 0) and (0, 1) May be seen on a diagram. Allow $\begin{pmatrix} x \\ y \end{pmatrix} \rightarrow \begin{pmatrix} -x \\ y \end{pmatrix}$ for all their points
	$\begin{pmatrix} 4 & 0 \\ 0 & 4 \end{pmatrix}$ or $\begin{pmatrix} \frac{1}{4} & 0 \\ 0 & \frac{1}{4} \end{pmatrix}$			M1 for a correct matrix for enlargement/inverse matrix SF4 or correct enlargement of points in a diagram May be implied by $4 \times \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ or $\frac{1}{4} \times \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ where a, b, c and d are either numbers or letters. Allow $\begin{pmatrix} x \\ y \end{pmatrix} \rightarrow \begin{pmatrix} 4x \\ 4y \end{pmatrix}$ for all their points
	$\begin{pmatrix} 4 & 0 \\ 0 & 4 \end{pmatrix} \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$ or $4 \times \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$ $\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} 4 & 0 \\ 0 & 4 \end{pmatrix}$ or $\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} \frac{1}{4} & 0 \\ 0 & \frac{1}{4} \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$			M1 Dependent on the first method mark being awarded Allow the multiplication of the two matrices in either order. If using the points of a quadrilateral (May be seen on a diagram) then this mark is awarded for 2 pairs of correct simultaneous equations found that could be used to find N (see note below)
		$\begin{pmatrix} -4 & 0 \\ 0 & 4 \end{pmatrix}$		A1 dependent on correct working- could be from a diagram
	<i>wr</i>			Total 4 marks

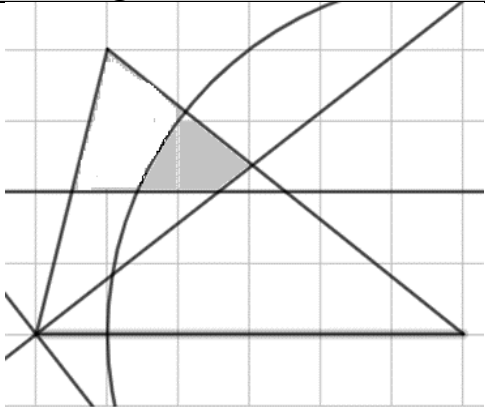
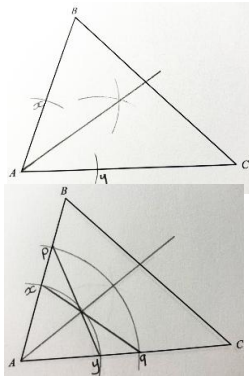
	<i>Note for 3rd M1 using coordinates</i>
	<p>Matrix $\mathbf{N} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ can be found by substitution of the coordinates of A, B, C, D into $(ax + by, cx + dy)$ and set equal to the coordinates of A'', B'', C'', D'' to form simultaneous equations which can then be solved to find a, b, c and d</p> <p>e.g. Quadrilateral A, B, C, D with coordinates $(x_1, y_1), (x_2, y_2), (x_3, y_3), (x_4, y_4)$ will go to Quadrilateral $A'', B'', C'', D'' (x_1'', y_1''), (x_2'', y_2''), (x_3'', y_3''), (x_4'', y_4'')$</p> <p>Matrix $\mathbf{N} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ can be found using $\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} x_1 & x_2 & x_3 & x_4 \\ y_1 & y_2 & y_3 & y_4 \end{pmatrix} = \begin{pmatrix} x_1'' & x_2'' & x_3'' & x_4'' \\ y_1'' & y_2'' & y_3'' & y_4'' \end{pmatrix}$ (order of multiplication must be correct)</p> <p>Leading to</p> <p>2 from $ax_1 + by_1 = x_1'' \quad ax_2 + by_2 = x_2'' \quad ax_3 + by_3 = x_3'' \quad ax_4 + by_4 = x_4''$</p> <p>and</p> <p>2 from $cx_1 + dy_1 = y_1'' \quad cx_2 + dy_2 = y_2'' \quad cx_3 + dy_3 = y_3'' \quad cx_4 + dy_4 = y_4''$</p>

Question		Working	Answer	Mark	Notes
15		$2(x+4) - 2x = \frac{8x(x+4)}{y}$ or $\frac{2(x+4) - 2x}{x(x+4)} = \frac{8}{y}$		4	M1 for starting to eliminate the fraction by multiplying through by $x(x+4)$ or by making the LHS a single fraction
		$8y = 8x(x+4)$ or $y = x(x+4)$ or $x^2 + 4x - y = 0$ oe			M1 dep on 1st M1 being awarded. For eliminating the fraction and obtaining a correct 3-term equation (may be unsimplified). Allow one sign error
		$y = (x+2)^2 - 4$ or $x = \frac{-4 \pm \sqrt{16+4y}}{2}$			M1 dep on 2nd M1 being awarded. For attempting to complete the square eg $y = (x+2)^2 \pm n$ where n is any value or use the quadratic formula with 1 numerical error
			$x = -2 + \sqrt{y+4}$		A1 (dep on all 3 M marks awarded) Allow $x = \sqrt{y+4} - 2$ Do not condone $x = -2 - \sqrt{y+4}$ or $x = -2 \pm \sqrt{y+4}$
		<i>wr</i>			Total 4 marks

Question	Working	Answer	Mark	Notes
16	Bounds for x are 8.35 or 8.45 A are 45 or 55		4	B1 one correct bound
	$A = x^2 \sin C$ or $[\sin C =] \frac{A}{x^2}$ or $A = x \times h$ and $\sin C = \frac{h}{x}$			M1 using 8.35 ,, x ,, 8.45 and 45 ,, A ,, 55 to find $\sin C$ in a correct equation or a correct expression where h is any letter representing the perpendicular height of the rhombus
	$55 = 8.35^2 \times \sin C$ or $\frac{55}{8.35^2}$			M1 Dependent on M1 being awarded. Allow 8.35 ,, $x < 8.4$ $50 < A$,, 55
		$\frac{55}{8.35^2}$ and 52.077...		A1 dependent on all previous marks being awarded. The correct expression for $\sin C$ with the correct values substituted must be seen followed by awrt 52.1
	<i>wr</i>			Total 4 marks

Question	Working	Answer	Mark	Notes
17	$10^2 - 4^2 [= 84]$ oe $\cos \angle ABF = \frac{4}{10} [\angle ABF = 66.421\dots]$ $\sin \angle AFB = \frac{4}{10} [\angle AFB = 23.578\dots]$		4	M1 correct use of Pythagoras theorem to find AF^2 eg $10^2 = AF^2 + 4^2$ or correct use of trig to find an angle
	$[AF =] \sqrt{10^2 - 4^2} [= \sqrt{84} = 9.165\dots]$ $[AF =] 4 \times \tan("66.421\dots")$ or $[AF =] 10 \times \sin("66.421\dots")$ $[AF =] \frac{4}{\tan("23.578\dots")}$ or $[AF =] 10 \times \cos("23.578\dots")$ $[AF =] \frac{4 \times \sin("66.421\dots")}{\sin("23.578\dots")}$ or $[AF =] \sqrt{10^2 + 4^2 - 2 \times 4 \times 10 \cos("66.421\dots")}$			M1 Fully correct method to find AF fit their $\angle ABF$ or $\angle AFB$ if it comes from correct working or is clearly labelled May be seen as part of an expression for the area eg $\frac{1}{2} \times 4 \times 10 \times \sin("66.421\dots")$
	$\frac{1}{2} \times 4 \times \sqrt{84} \times 13$ or $\frac{1}{2} \times 4 \times 9.165\dots \times 13$ or $\frac{1}{2} \times 4 \times 10 \times \sin("66.421\dots") \times 13$ or $\frac{1}{2} \times \sqrt{84} \times 10 \times \sin("23.578\dots") \times 13$			M1 a correct method to find the volume. fit their AF , $\angle ABF$ or $\angle AFB$ if they come from correct working or are clearly labelled
		238		A1 allow any value between 238 and 239 inclusive
	<i>cas</i>			Total 4 marks

Question		Working		Answer	Mark	Notes
18	(a)	$(10 + 6 \times 3)$ or $(10 + 6 \times 7)$			2	M1 A correct expression for either term. Allow for 28 or 52 (need not be added)
				80		A1 cao
	(b)			$4n + 3$	2	B2 for fully correct formula oe eg $7 + 4(n - 1)$ (B1 for $4n + c$ where $c \neq 3$ or $xn + 3$ where $x \neq 4$)
	(c)		Sequence (a) is even and Sequence (b) is odd		1	B1 for realising that (a) is always an even number and (b) always an odd number
		cas				Total 5 marks

Question		Working	Answer	Mark	Notes
19	(a)		Arc, centre C radius 7cm	1	B1 for a correct arc (within guidelines) NB The arc does not have to touch/cross AC and BC but must stay within the guidelines if extended.
	(b)		a line parallel to AC drawn 3 cm from AC	1	B1 for a correct line (within guidelines) NB the line does not have to touch/cross AB and BC but it must stay within the guidelines if it was extended.
	(c)		Correct bisector with construction arc/lines shown	2	B2 bisector drawn within guidelines with relevant construction lines where arcs/lines intersect within the guidelines (if extended) <u>Method 1</u> Intersecting arcs drawn from a point x on AB and a point y on AC such that $Ax=Ay$ <u>Method 2</u> Concentric arcs drawn centre A , at point x on AB and at point y on AC such that $Ax=Ay$ and at point p on AB and a point q on AC such that $Ap=Aq$, then intersecting lines drawn between xq and yp  (B1 bisector drawn within guidelines or relevant construction lines where arcs/lines intersect within the guidelines (if extended)) NB the bisector does not need to touch/cross BC but must remain in tolerance if it was extended to BC
	(d)		Correct region shaded	1	B1 Allow any clear indication of the correct region eg labelled R NB The region must be fully bounded so the arc must cross/touch BC , the line must cross/touch the arc and the bisector, the bisector must cross/touch BC
					Total 5 marks

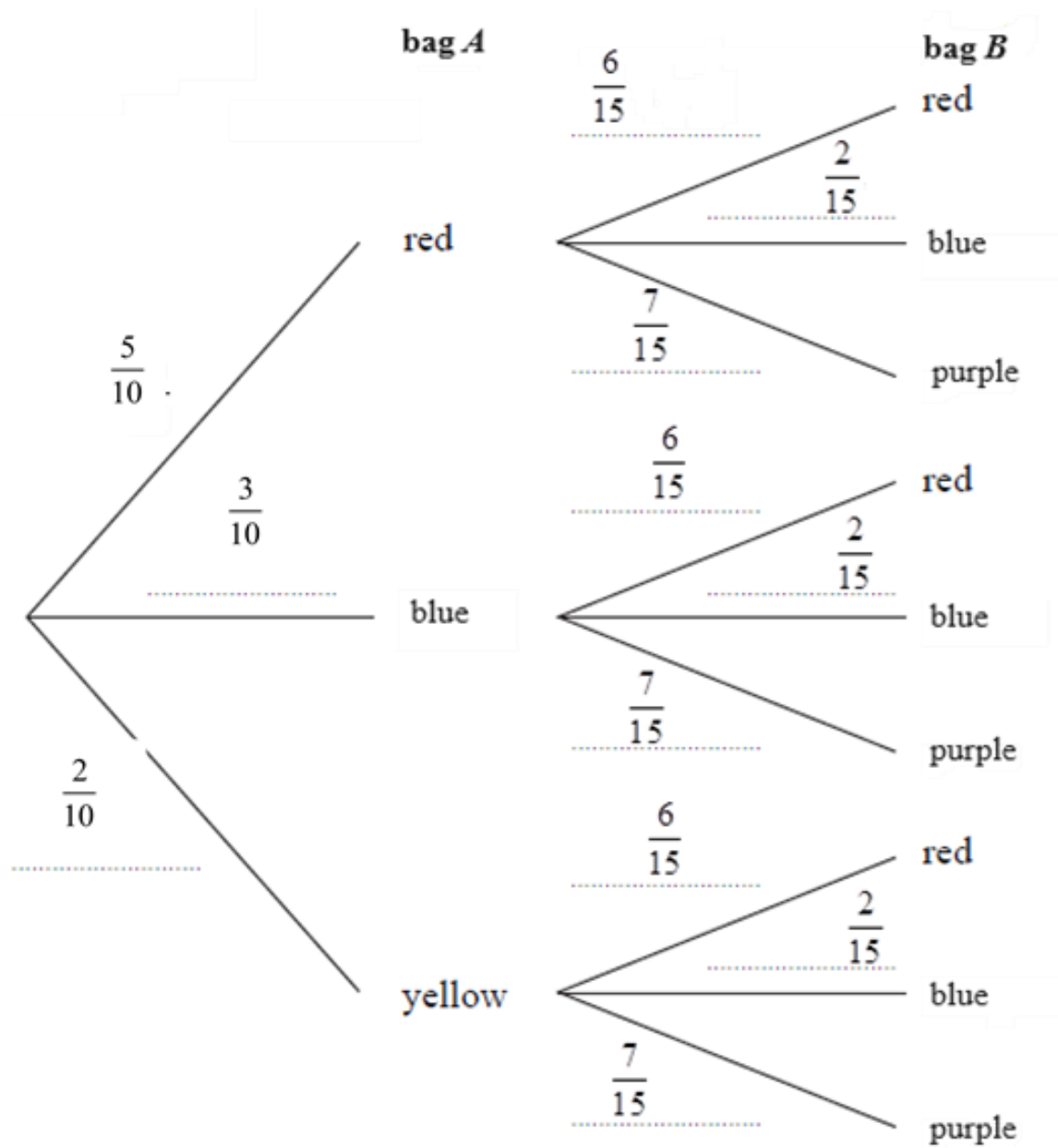
Question		Working	Answer	Mark	Notes
20	(a)	$10\sqrt{7} - 7\sqrt{7}$		2	M1 we must see $10\sqrt{7} - 7\sqrt{7}$. Do not allow $3\sqrt{7}$ on its own.
			$\sqrt{63}$		A1 dep on M1. Allow $a = 63$
	(b)	$\frac{\sqrt{3}-\sqrt{5}}{\sqrt{3}+\sqrt{5}} \times \frac{\sqrt{3}-\sqrt{5}}{\sqrt{3}-\sqrt{5}}$		3	M1 for multiplying the numerator and denominator by $\sqrt{3}-\sqrt{5}$
		$\frac{8-2\sqrt{15}}{-2}$			M1 dep on previous method mark being awarded. For an attempt to expand top and bottom, condone a maximum of one numerical or sign error. Allow an un-simplified version if it would result in at least 2 of these 3 elements being correct. eg $\frac{3-\sqrt{15}-\sqrt{15}+5}{3+5}$ which gives 2 correct terms when simplified
			$-4+\sqrt{15}$		A1 cao dependent on both the previous M marks being awarded
		<i>wr</i>			Total 5 marks

Question	Working	Answer	Mark	Notes
21	$\sqrt[3]{\frac{324000}{12000}}$ or $\sqrt[3]{27}$ or 3 or $\sqrt[3]{\frac{12000}{324000}}$ or $\sqrt[3]{\frac{1}{27}}$ or $\frac{1}{3}$ or $9^x \times k^2 = 3^{x+6}$ and $12000 \times k^3 = 3240000$		5	M1 for a correct SF for height/length or a correct equation. The scale factor may be implicit within an area scale factor or an equation for example $\left(\sqrt[3]{\frac{324000}{12000}}\right)^2$ or $\left(\frac{324000}{12000}\right)^2 = \left(\frac{3^{x+6}}{9^x}\right)^3$
	$9^x \times ("3")^2 = 3^{x+6}$ oe or $9^x = 3^{x+6} \times \left(" \frac{1}{3} " \right)^2$ oe or $\left(\frac{324000}{12000}\right)^2 = \left(\frac{3^{x+6}}{9^x}\right)^3$ oe			M1 apply the area scale factor to form an equation linking the areas allow $9^x \times (m)^2 = 3^{x+6}$ where $m > 1$ or $9^x = 3^{x+6} \times (n)^2$ where $0 < n < 1$ May be implied by award of the 3 rd M1
	$3^{2x} \times (3)^2 = 3^{x+6}$ or $(3)^6 = \frac{3^{3x+18}}{3^{6x}}$ or $9^x \times 9 = 9^{\frac{1}{2}(x+6)}$ or $9^x = 9^{\frac{x}{2}+3} \times \frac{1}{9}$ or $x = 4$ or $2x + 2 = x + 6$ oe eg $6 = -3x + 18$ or $x + 1 = \frac{x}{2} + 3$			M1 dep on at least one of the previous M marks being awarded. Changing all terms to base of 3 or 9 to gain a correct equation or value for x
	$5^{''4''} \times 3$ or $5^{''4''} \div \frac{1}{3}$			M1 dep on the previous M mark being awarded. If working shown ft their value of x if labelled or comes from correct working.
		1875		A1
	<i>cas</i>			Total 5 marks

Question	Working	Answer	Mark	Notes
22	$\angle DOC = 60^\circ$		5	M1 for correct angle. May be seen on diagram or used when finding area of the sector.
	$[DC =] \frac{8}{\tan 30} [= 8\sqrt{3} = 13.856...] \text{ or }$ $[DC =] 8 \tan 60 [= 8\sqrt{3} = 13.856...] \text{ or }$ $[OD =] \frac{8}{\sin 30} [= 16] \text{ or }$ $[DC =] \frac{8 \times \sin 60}{\sin 30} [= 8\sqrt{3} = 13.856...]$			M1 a correct method to find either <i>OD</i> or <i>CD</i>
	$[\text{Area } OBC =] \frac{60}{360} \times \pi \times 8^2 \left[= \frac{32}{3} \pi = 33.510... \right]$			M1 for a correct method for finding the area of the sector ft their 60 if clearly labelled or marked on diagram
	$[\text{Area } OCD =] 0.5 \times 8\sqrt{3} \times 8 [= 32\sqrt{3} = 55.425...]$ or $0.5 \times 8\sqrt{3} \times 16 \times \sin(30)$ or $0.5 \times 16 \times 8 \times \sin(60)$			M1 for a correct method for finding the area of the triangle allow $0.5 \times \sqrt{16^2 - 8^2} \times 8 [= 32\sqrt{3} = 55.425...]$ ft their 16 if from correct working or clearly labelled
		21.9		A1 awrt 22
	<i>cas</i>			Total 5 marks

Question		Working	Answer	Mark	Notes
23	(a)		w^{-2}	1	B1 accept $\frac{1}{w^2}$
	(b)		5	1	B1
	(c)	mab^3 or $2a^pb^3$ or $2ab^q$		2	M1 For an expression in the correct form ma^pb^q with 2 of m, p and q correct
			$2ab^3$		A1 fully correct
	(d)	$6c^2d$ or $2c^yd^z$ or xc^yd^{-2} or xc^7d^z		3	M1 for correctly simplifying the numerator or for a final expression in the form xc^yd^z with 1 of x, y and z correct
		$2c^7d^z$ or $2c^yd^{-2}$ or xc^7d^{-2}			M1 For a final expression in the form xc^yd^z with 2 of x, y and z correct
			$2c^7d^{-2}$		A1 oe eg $\frac{2c^7}{d^2}$
		<i>cas</i>			Total 7 marks

Question	Working	Answer	Mark	Notes
24	(a) Diagram on next page	$\frac{3}{10}, \frac{2}{10}$ $\frac{6}{15} \left[\text{or } \frac{2}{5} \right], \frac{2}{15}, \frac{7}{15}$	3	B3 fully correct B2 the first set of branches and at least one of the 2 nd set of branches correct B1 at least one set of 3 branches correct
	(b) Not both red $\left(\frac{5}{10} \times \frac{2}{15} \right) + \left(\frac{5}{10} \times \frac{7}{15} \right)$ or $\left(\frac{5}{10} \times \frac{9}{15} \right)$ or Not both blue $\left(\frac{3}{10} \times \frac{6}{15} \right) + \left(\frac{3}{10} \times \frac{7}{15} \right)$ or $\left(\frac{3}{10} \times \frac{13}{15} \right)$ or Not both yellow $\left(\frac{2}{10} \times \frac{6}{15} \right) + \left(\frac{2}{10} \times \frac{2}{15} \right) + \left(\frac{2}{10} \times \frac{7}{15} \right)$ or $\left(\frac{2}{10} \times 1 \right)$ Or Both the same colour $\left(\frac{5}{10} \times \frac{6}{15} \right) + \left(\frac{3}{10} \times \frac{2}{15} \right)$		3	M1 ft their tree diagram if working shown. For a start to finding the probability one of these 4 rows Do not award if just see the equivalent single values of $\frac{3}{10}, \frac{13}{50}, \frac{2}{10}$ or $\frac{6}{25}$ May be implied by the 2 nd M1
	$\left(\frac{5}{10} \times \frac{9}{15} \right) + \left(\frac{3}{10} \times \frac{13}{15} \right) + \left(\frac{2}{10} \right)$ or $\left(\frac{45}{150} \right) + \left(\frac{39}{150} \right) + \left(\frac{2}{10} \right)$ oe $1 - \left(\frac{5}{10} \times \frac{6}{15} \right) - \left(\frac{3}{10} \times \frac{2}{15} \right)$			M1 for a correct method for probability they are not the same colour. Ft tree diagram if working shown. $\frac{3}{10} + \frac{39}{150} + \frac{2}{10}$ or $1 - \frac{1}{5} - \frac{1}{25}$
		$\frac{19}{25}$		A1 0.76
	<i>cas</i>			Total 6 marks



Question	Working	Answer	Mark	Notes
25	$\angle YAX = 320 - 270 [= 50]$		6	M1 Correct method to find $\angle YAX$. May be seen on diagram or used
	$AY = \frac{45}{\tan 10} [= 255.207...]$			M1 Correct method to find AY Allow awrt 255 May be seen on diagram or used
	$XY^2 = "255.207..."^2 + 2000^2 - 2 \times "255.207..." \times 2000 \cos "50"$ oe or $XY^2 = 3408953.61...$ or $XY = 1846.33...$ or $XY^2 = ("255.207..." \sin(50))^2 + (2000 - "255.207..." \cos(50))^2$			M1 For a fully correct method to find XY^2 or XY [= 1846.33...] ft their AY and $\angle YAX$ if clearly labelled or from correct working. Allow awrt 3410000 or awrt 1850
	$\frac{\sin \angle YXA}{"255.207..."} = \frac{\sin "50"}{\sqrt{"3409381.6..."}}$ oe or $\sin \angle YXA = 0.106$ or $("255.207...")^2 = ("1846.33...")^2 + 2000^2 - 2 \times 2000 \times "1846.33..." \cos(\angle YXA)$ or $\angle XYA = \cos^{-1} \left(\frac{("1846.33...")^2 + ("255.207...")^2 - 2000^2}{2 \times "1846.33..." \times "255.207..." } \right)$ $\frac{\sin \angle XYA}{2000} = \frac{\sin "50"}{\sqrt{"3409381.6..."}}$ oe or $\sin \angle XYA = 0.82974...$ $2000^2 = ("1846.33...")^2 + ("255.207...")^2 - 2 \times "255.207..." \times "1846.33..." \cos(\angle XYA)$ or $\angle YXA = \cos^{-1} \left(\frac{("1846.33...")^2 + 2000^2 - ("255.207...")^2}{2 \times "1846.33..." \times 2000} \right)$			M1 for a correct method to find either $\angle YXA$ or $\angle XYA$ ft their AY , XY and $\angle YAX$ if clearly labelled or from correct working. Correct method implied by $\angle XYA = 123.927...$ or $\angle YXA = 6.0777...$
	$140 + "123.927"$ or $180 + (90 - "6.0777")$ or $(90 + "50") + (180 - "56.0728...")$			M1 fully correct method to find the bearing. ft their angle(s) if clearly labelled or comes from correct working
		264		A1 dep on at least 2 method marks awarded. awrt 264
	<i>wr</i>			Total 6 marks

Question	Working		Answer	Mark	Notes
26		$x^2 = 2 - \left(\frac{4+x}{3}\right)^2$	$(3y-4)^2 = 2 - y^2$	6	M1 for substituting a correct expression for x or y into the quadratic equation
		$\left[x^2 = 2 - \right] \frac{16+8x+x^2}{9}$	$9y^2 - 24y + 16 [= 2 - y^2]$		M1 for a correct method to multiply out the squared brackets
		$10x^2 + 8x - 2 = 0$	$10y^2 - 24y + 14 = 0$		M1 for a correct 3-term quadratic equation equal to zero. Allow unsimplified equations involving x^2/y^2 and x/y and constant. May be implied by the 4 th M1
		$(5x-1)(x+1)$	$(5y-7)(y-1)$		M1 for using a correct method to solve the/their simplified 3-term quadratic. If the quadratic is correct then the method is implied by $x = 0.2$ and $x = -1$ or $y = 1.4$ and $y = 1$ (condone incorrect labelling) Working must be shown if their quadratic is incorrect to gain this method mark. If factorising must multiply out to give 2 correct terms. Allow use of formula with one sign error. Allow completing the square with one sign error only
		$x = 0.2$ and $x = -1$ oe	$y = 1.4$ and $y = 1$ oe		A1 for both x values correct or both y values correct or allow for 1 correct pair
			$x = 0.2,$ $y = 1.4$ and $x = -1,$ $y = 1$		A1oe dependent on 3 rd M1 being awarded Must be correctly paired isw if correct values are paired correctly in the working
	<i>wr</i>				Total 6 marks

