



# Mark Scheme (Results)

January 2023

Pearson Edexcel International GCSE  
In Mathematics A (4MA1) Paper 1FR

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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
  - 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.

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, mark the method that leads to the answer on the answer line; where no answer is given on the answer line, award the lowest mark from the methods shown.

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.

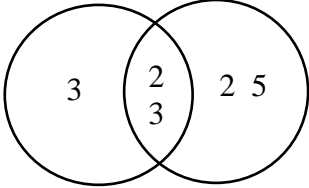
Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.
  - **Parts of questions**

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

<b>International GCSE Maths</b>				
<b>Apart from Question 21, the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method</b>				
<b>Q</b>	<b>Working</b>	<b>Answer</b>	<b>Mark</b>	<b>Notes</b>
<b>1</b> (a)		15	1	B1
(b)		18	1	B1
(c)		16	1	B1
(d)		2	1	B1
(e)		8 and 18	1	B1
				<b>Total 5 marks</b>
<b>2</b> (a)		Unlikely	1	B1 Tick at
(b)		Evens	1	B1 Tick at
(c)		Impossible	1	B1 Tick at
				<b>Total 3 marks</b>
<b>3</b> (a)		Prism	1	B1 Accept pentagon(al) prism
(b) (i)		7	1	B1
(ii)		10	1	B1
(c)	$\pm(70 - 8 \times 5)$ or $- 30$ or $70 - 5 - 5 - 5 - 5 - 5 - 5 - 5 - 5$ oe		2	M1 Could be done in 2 parts
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	30		A1
				<b>Total 5 marks</b>

<b>4</b>	(a)		$9y$	1	B1
	(b)		$12p^2$	1	B1
	(c)		6	1	B1
	(d)		-1	1	B1
	(e)		$6c + 2d$	2	B2 for $6c + 2d$ or $2d + 6c$ (B1 for $6c$ or $2d$ )
					<b>Total 6 marks</b>

<b>5</b>	$15 - 6.90 (= 8.10)$ or $1500 - 690 (= 810)$			3	M1
	“8.10” $\div$ 0.55 (= 14.727...) or “810” $\div$ 55 (= 14.727...) or 15				M1
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	14			A1
					<b>Total 3 marks</b>

6	(a)	1, 2, 5, 10	1	B1 in any order												
	<p>(b) 18, 36, ... <b>and</b> 60, 120, ...</p> <p><b>or</b> 2 3 3 oe</p> <p><b>or</b> 2 2 3 5 oe</p> <p><b>or</b></p>  <p><b>or</b></p> <table border="1" data-bbox="441 775 667 938"> <tr> <td><b>2</b></td> <td>18</td> <td>60</td> </tr> <tr> <td><b>3</b></td> <td>9</td> <td>30</td> </tr> <tr> <td><b>5</b></td> <td><b>3</b></td> <td>10</td> </tr> <tr> <td></td> <td></td> <td><b>2</b></td> </tr> </table> <p><b>or</b></p> <p>2, 2, 3, 3, 5 oe</p>	<b>2</b>	18	60	<b>3</b>	9	30	<b>5</b>	<b>3</b>	10			<b>2</b>		2	<p>M1 for any correct valid method and no errors e.g.</p> <p>for starting to list at least <b>two</b> multiples of each number</p> <p><b>or</b></p> <p>2 3 3 seen</p> <p><b>or</b></p> <p>2 2 3 5 seen</p> <p>(may be in a factor tree or a ladder diagram and ignore 1)</p> <p><b>or</b></p> <p>a fully correct Venn diagram</p> <p><b>or</b></p> <p>other clear method, e.g, table, not be written as a product</p>
<b>2</b>	18	60														
<b>3</b>	9	30														
<b>5</b>	<b>3</b>	10														
		<b>2</b>														
	<i>Working required</i>	180		A1 accept $2^2 \times 3^2 \times 5$ oe												
				<b>Total 3 marks</b>												

<b>7</b>	(a)		0.405, 0.45, 0.5, 0.504, 0.54	1	B1
	(b)		8	1	B1
	(c)		$3\frac{4}{9}$	1	B1
	(d)	$0.28$ or $\frac{22}{25}$ or $\frac{7}{25} + 0.88$ oe		2	M1
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	0.58		A1 oe eg $\frac{29}{50}$
					<b>Total 5 marks</b>

<b>8</b>	(a)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>apple pie</th> <th>fruit</th> <th>ice cream</th> <th>Total</th> </tr> </thead> <tbody> <tr> <th>Year 5</th> <td></td> <td></td> <td>8</td> <td>36</td> </tr> <tr> <th>Year 6</th> <td>34</td> <td>8</td> <td></td> <td></td> </tr> <tr> <th>Total</th> <td></td> <td>14</td> <td>10</td> <td></td> </tr> </tbody> </table>					apple pie	fruit	ice cream	Total	Year 5			8	36	Year 6	34	8			Total		14	10		3	B3 Fully correct table If not B3, then B2 for 4 or 5 correct B1 for 2 or 3 correct
			apple pie	fruit	ice cream	Total																					
		Year 5			8	36																					
Year 6	34	8																									
Total		14	10																								
(b)	$\frac{22}{80}$			2	M1																						
			$\frac{11}{40}$		A1																						
					<b>Total 5 marks</b>																						



<b>9</b>	$(ABD \Rightarrow) 360 - 52 - 112 - 90 (= 106)$		4	M1 may be marked in correct place on diagram
	$(CBD \Rightarrow) 180 - "106" (=74)$			M1 may be marked in correct place on diagram
		32		A1
		Reasons given		<p>B1 dep on M1</p> <p>At least two appropriate reasons given.  “<u>angles</u> in a <u>quadrilateral</u> add to <math>360^\circ</math>”  accept 4-sided shape.</p> <p>“<u>angles</u> on a straight <u>line</u> add to <math>180^\circ</math>” <b>or</b>  angles on a straight <u>line</u> add to <math>180^\circ</math></p> <p>“angles in a <u>triangle</u> add to <math>180^\circ</math>” <b>or</b>  <u>angles</u> in a <u>triangle</u> sum to <math>180^\circ</math></p> <p>“base angles in an <u>isosceles</u> triangle (are equal)”</p>
				<b>Total 4 marks</b>

<b>10</b>			240	1	B1 Accept 235 - 245
			58	1	B1 Accept 58 -59
	e.g.  $950 \div 6$ or $950 \div \frac{240}{40}$ oe or $50 \times 3 + 8$	e.g.  $170 \times 6$ or $170 \times \frac{240}{40}$ oe or $300 \times 2 + 420$		2	M1 for a correct method that gives the exchange for  950 Danish krone to dollars or 170 dollars to Danish krone
	(1 dollar = 6 krone)				
	<i>Working required</i>		All figures accurate eg 950 Danish krone = 150 - 165 dollars (or clearly showing 170 is enough)  or  170 dollars = 1000 - 1040 Danish krone (or clearly showing that 950 is less than 170 dollars) oe		A1
					<b>Total 4 marks</b>

<b>11</b>	(a)	$0.48031(4\dots) + 0.45555(5\dots)$ <b>or</b> $\frac{61}{127} + \frac{41}{90}$		2	M1 Evaluate either fraction correctly as a decimal to at least 5 sf (rounded or truncated) or as a simplified fraction or an answer of 0.935, 0.936, 0.9358 or 0.9359
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	0.93587(05162)		A1 Correct to at least 5 sf (rounded or truncated)
	(b)		0.936	1	B1 ft if at least 4 sf given in (a)
					<b>Total 3 marks</b>

<b>12</b>	(a)	$(T=) 2.5 \times 12 (+) 1.5 \times 5$		2	M1
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	37.5		A1 Accept 38 with working shown
	(b)	$55 = 2.5d + 1.5 \times 8$ <b>or</b> $55 - 1.5 \times 8 (= 43)$ <b>or</b> $55 - 12 (= 43)$		3	M1 Form a correct equation <b>or</b> subtract time taken for bus stops from 55
		$2.5d = 55 - 1.5 \times 8$ oe <b>or</b> $2.5d = 43$ oe <b>or</b> "43" $\div 2.5$ oe			M1 Isolate term in $d$ in a correct equation <b>or</b> a correct calculation for journey length
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	17.2		A1
					<b>Total 5 marks</b>

<b>13</b>	2.4 ÷ 0.4 (= 6) or 240 ÷ 40 (= 6) or 10 ÷ 0.4 (= 25) or 1000 ÷ 40 (= 25) or 40 × 40 × 40 (= 64 000) or 0.4 × 0.4 × 0.4 (= 0.064) or 1000 × 240 × 240 (= 57 600 000) or 10 × 2.4 × 2.4 (= 57.6) oe		3	M1 could show the number of boxes along the edge of a container – award marks if this is unambiguous.
	“6” × “6” × “25” oe or “57 600 000” ÷ “64 000” or “57.6” ÷ “0.064” oe			M1 fully correct method to find greatest number of boxes
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	900		A1
<b>Total 3 marks</b>				

<b>14</b>	(a)		121	1	B1 Accept 119 – 123
	(b)	Stating 6.5cm <b>or</b> an arc with centre <i>T</i> , radius 6.5 cm		3	B1
		Line drawn or × from <i>S</i> , with a bearing of 084°			B1
			<i>B</i> correctly indicated		B1 See overlay
<b>Total 4 marks</b>					

<b>15</b>	(a)		$48 < S \leq 54$	1	B1 Allow 48 – 54 oe
	(b)	$(33 \times 4) + (39 \times 14) + (45 \times 18) + (51 \times 19) + (57 \times 5)$ or $132 + 546 + 810 + 969 + 285 (= 2742)$  [lower bound products are: 120, 504, 756, 912, 270] [upper bound products are: 144, 588, 864, 1026, 300]		4	M2 M2 for at least <b>4</b> correct products added (need not be evaluated) <b>or</b>  If not M2 then award:  M1 for consistent use of value within interval (including end points) for at least <b>4</b> products which must be added  or  correct midpoints used for at least <b>4</b> products and not added
		$\frac{"2742"}{60}$			M1 dep on M1 Allow division by their $\Sigma f$ provided addition or total under column seen
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	45.7		A1oe $45\frac{7}{10}$ or $\frac{457}{10}$ (accept 46 from correct working)
					<b>Total 5 marks</b>

<b>16</b>			3	M1 For area of 2 different faces (ie not 2 triangles)
	$0.5 \times 4.8 \times 3.6 (= 8.64)$ oe or $4.8 \times 3.6$ if clear intention for this to be 2 triangles $7 \times 3.6 (= 25.2)$ $7 \times 4.8 (= 33.6)$ $7 \times 6 (= 42)$ <b>(all measurements with intention to add)</b>			M1 For adding together 5 areas , at least 4 of which are correct  NB: $(3.6 + 4.8 + 6) \times 7 (= 100.8)$ is 3 faces
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	118		A1 118.1 or 118.08
				<b>Total 3 marks</b>

<b>17</b>		$(x =) 3$	3	B1
		$(y =) 6$		B1
		$(z =) 10$		B1
				<b>Total 3 marks</b>

<b>18</b>	(a)		$w^9$	1	B1
	(b)		$10m^7 p^3$	2	B2 (B1 for 2 terms correct as part of a product)
					<b>Total 3 marks</b>

<b>19</b>	$1600 \times 0.16 (= 256)$ oe or $1 - 0.16 (= 0.84)$ oe		4	M1
	$1600 - "256"$ or $1600 \times "0.84"$ (= 1344)			M1
	$\frac{"1344"}{1400} (= 0.96)$ or $\frac{1400 - "1344"}{1400} (= 0.04)$ or $\frac{"1344"}{1400} \times 100 (= 96)$ or $\frac{1400 - "1344"}{1400} \times 100$			M1
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	4		A1 SCB1 for 1856 seen if no other marks awarded
<b>Total 4 marks</b>				

<p><b>20</b></p>	<p><math>390 \div (8 - 2) (= 65)</math> or  <math>\frac{8}{15} - \frac{2}{15} = 390</math> or <math>\frac{8}{15}x - \frac{2}{15}x = 390</math> or  <math>\frac{6}{15} = 390</math> or <math>\frac{6}{15}x = 390</math> oe</p>		<p>3</p>	<p>M1</p>	<p>M2 for  <math>\frac{390 \times 15}{6}</math> oe</p>
	<p>“65” <math>\times (2 + 5 + 8)</math> oe or  <math>\frac{1}{15} = 65</math> or <math>\frac{1}{15}x = 65</math> or <math>\frac{1}{5} = 195</math> or <math>\frac{1}{5}x = 195</math></p>			<p>M1 or for 975 seen with further work and a different answer</p>	
	<p><i>Correct answer scores full marks (unless from obvious incorrect working)</i></p>	<p>975</p>		<p>A1 SCB1 for 52, 130, 208 or 390, 975, 1560 (or 2925) or 97.5, 243.75, 390 (or 731.25)</p>	
				<p><b>Total 3 marks</b></p>	



21	eg $4x + 8y = 60$ or $3x + 6y = 45$ $-\frac{4x - 6y = 4}{(14y = 56)}$ $+\frac{4x - 6y = 4}{(7x = 49)}$		3	M1 Correct method to eliminate $x$ or $y$ : coefficients of $x$ or $y$ the same <b>and</b> correct operator to eliminate selected variable (condone any one arithmetic error in multiplication) <b>or</b> correctly writing $x$ or $y$ in terms of the other variable and correctly substituting.
	eg $4x - 6\left(\frac{15-x}{2}\right) = 4$ or $4(15-2y) - 6y = 4$ oe			M1 dep correct method to find second variable using their value from a correct method to find first variable or for repeating above method to find second variable.
	eg $x + 2 \times 4 = 15$ or $7 + 2 \times y = 15$			A1 dep on M1
	<i>Working required</i>	$x = 7, y = 4$		<b>Total 3 marks</b>

22	(a)		0.000 0932	1	B1
	(b)		$2.4 \times 10^5$	2	B2 If not B2, then B1 for $240\ 000$ or $24 \times 10^4$ oe or $2.4 \times 10^a$ $a \neq 5$
	(c)		$1.8 \times 10^{121}$	2	B2 If not B2, then B1 for $18 \times 10^{120}$ or $1.8 \times 10^b$ $b \neq 121$
					<b>Total 5 marks</b>

23 (a)		$3c^2(6cd^2 - 7)$	2	<p>B2 fully correct <b>or</b>                      B1 for a correct partial factorisation with at least two terms outside the bracket ie <math>3c(6c^2d^2 - 7c)</math> or <math>c^2(18cd^2 - 21)</math>  <b>or</b> the fully correct factor outside the bracket with two terms inside the bracket and at most one mistake <math>3c^2(\dots\dots\dots)</math></p>
(b) (i)	eg $(y \pm 6)(y \pm 3)$ or $y(y + 3) - 6(y + 3)$ or $y(y - 6) + 3(y - 6)$		2	<p>M1 or <math>(y + a)(y + b)</math> where <math>ab = -18</math> <b>or</b> <math>a + b = -3</math>  <b>or</b>                      factorisation which expands to give 2 out of 3 correct terms</p>
	[allow use of $x$ rather than $y$ ]	$(y - 6)(y + 3)$		A1
(ii)		6, -3	1	B1 ft must come from their factors in (b)(i)
				<b>Total 5 marks</b>

24	$\frac{1}{2} \times 7 \times h = 42$ oe or $(h =) \frac{42 \times 2}{7}$ (= 12) oe or $3.5^2 + h^2 = y^2$ or $h = \sqrt{y^2 - 3.5^2}$ oe		4	M1 A correct equation involving the height or a correct expression for height – could be in terms of y
	$y^2 = \left(\frac{7}{2}\right)^2 + ("12")^2$ oe or $\frac{1}{2} \times 7 \times "\sqrt{y^2 - 3.5^2}" = 42$ oe			M1 (indep) use of <i>their</i> height (any found value that they have called ‘height’)
	$y = \sqrt{\left(\frac{7}{2}\right)^2 + ("12")^2}$ oe			M1 <b>all values must come from a correct method</b>
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	12.5		A1 oe eg $\frac{25}{2}$
				<b>Total 4 marks</b>

<p>25</p>	$\sin 52 = \frac{12 \div 2}{r} \text{ oe or } \frac{r}{\sin 90} = \frac{6}{\sin 52} \text{ oe}$ $\text{or } \cos(90 - 52) = \frac{12 \div 2}{r} \text{ oe}$ $\text{or } (r^2 =)(12 \div 2)^2 + \left(\frac{12 \div 2}{\tan 52}\right)^2 \text{ oe } [r^2 = 6^2 + 4.687...^2]$ $\text{or } \frac{r}{\sin 38} = \frac{12}{\sin 104} \text{ oe}$		<p>4</p>	<p>M1 A correct trig statement for the radius use of tan must also include a correct Pythagoras statement.</p>
	$r = \frac{6}{\sin 52} (=7.614) \text{ oe}$ $\text{or } r = \frac{6}{\cos 38} \text{ oe}$ $\text{or } (r =)\sqrt{(12 \div 2)^2 + \left(\frac{12 \div 2}{\tan 52}\right)^2} [r = \sqrt{6^2 + 4.687...^2}] \text{ oe}$ $\text{or } \frac{12 \sin 38}{\sin 104} \text{ oe}$			<p>M1 A correct method to find the radius of the circle  use of tan must also use Pythagoras to find an expression for <math>r</math></p>
	<p>(Area =) <math>\pi \times ("7.61...")^2</math></p>			<p>M1 the radius must come from a completely correct method</p>
	<p>Correct answer scores full marks (unless from obvious incorrect working)</p>	<p>182</p>		<p>A1 Accept 181 - 183</p>
				<p><b>Total 4 marks</b></p>

