Pearson Edexcel

Mark Scheme (Results)

January 2023

Pearson Edexcel International GCSE In Mathematics A (4MA1) Paper 2FR

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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

- **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.

International GCSE Maths				
Apart from Questions 13, 14d, 15, 25 the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method				
Q	**Working**	**Answer**	**Mark**	**Notes**
1 (a)		84, 105, 171, 233, 490	1	B1
(b)		5102	1	B1
(c)		3 tens	1	B1 accept 30, tens
(d)		700	1	B1
				Total 4 marks

2 (a)		40	1	B1
(b)		USA	1	B1
(c)		95	1	B1
(d)		Bar drawn height 25	1	B1
				Total 4 marks

3 (a)		Octagon	1	B1
(b)		Acute	1	B1
(c)		Chord drawn	1	B1
(d)		360	1	B1
				Total 4 marks

4	(a)		(1, 0)	1	B1	
	(b)		Cross marked at (3, −2)	1	B1	
	(c)		(−3, −1)	2	B2	for (−3, −1) If not B2 then award B1 for (−3, a) where $a \neq -1$ **or** (b, −1) where $b \neq -3$ **or** (−1, −3)
	(d)		$y = 3$	1	B1	
						Total 5 marks

5	eg 2.5 kg = 2500 g **or** 400 g = 0.4 kg **or** 350 g = 0.35 kg		4	B1	for a correct conversion between g and kg
	eg 400 + 350 (= 750) **or** 0.4 + 0.35 (= 0.75) **or** 400 × 2 (= 800) **or** 0.4 × 2 (= 0.8)			M1	for method to find the weight of parcel **B** or **C** ft incorrect conversion
	eg 2500 **–** (400 + "750" + "800") **or** 2.5 **–** (0.4 + "0.75" + "0.8") (= 0.55)			M1	for a complete method ft incorrect conversion
	Correct answer scores full marks (unless from obvious incorrect working)	550		A1	
					Total 4 marks

6	(a)(i)		34	1	B1	
	(ii)		Added 6	1	B1	accept eg add 6, +6
	(b)		76	1	B1	
	(c)		Correct explanation	1	B1	eg 467 is odd **or** the numbers in the sequence are even **or** $6n - 2$ **or** ..., 466, 472, ...
						Total 4 marks

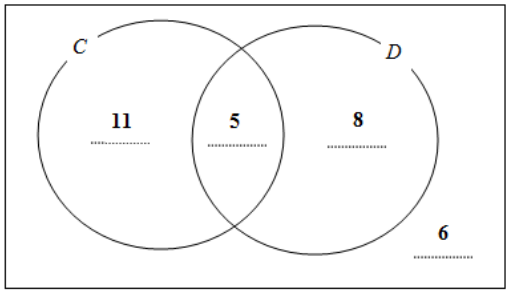
7	(a)	eg 60 : 24		2	M1	for any ratio equivalent to 60 : 24 or for an answer of 2 : 5	
		Correct answer scores full marks (unless from obvious incorrect working)	5 : 2		A1		
	(b)		$\frac{3}{10}$	1	B1		
	(c)	eg $20 \div 4$ (= 5) **or** $20 \div 4 \times 11$ (= 55) **or** $\frac{x}{11} = \frac{20}{4}$ **or** $\frac{x}{20} = \frac{11}{4}$		3	M1	for a correct first step	M2 for $\frac{20}{4} \times 15$
		eg $11 \times$ "5" + 20 **or** (11 + 4) × "5"			M1	for a complete method	
		Correct answer scores full marks (unless from obvious incorrect working)	75		A1		
							Total 6 marks

8		*DL*, *DP*, *DR*, *HL*, *HP*, *HR*, *JL*, *JP*, *JR*, *SL*, *SP*, *SR*	2	B2	for all 12 combinations with no extras or repeats If not B2 then B1 for at least 4 correct combinations (ignoring extras and repeats)
					Total 2 marks

9	(a)		20 30	1	B1	allow eg 20.30 or 20:30
	(b)	eg 10:50am + 45mins = 11:35am **or** 10:50am + 1hr10mins = 12:00pm **or** 2:20pm − 45mins = 1:35pm **or** 2:20pm – 1hr10mins = 1:10pm **or** 45mins + 1hr10mins = 1hr55mins or 115mins **or** 10:50am to 2:20pm = 3hr30mins or 210mins		3	M1	for correctly working with two times condone missing am or pm
		eg 10:50am + 45mins + 1hr10mins = 12:45pm **or** 10:50am + 1hr55mins = 12:45pm **or** 2:20pm − 45mins − 1hr10mins = 12:25pm **or** 2:20pm − 1hr55mins = 12:25pm			M1ft	for getting to a time one step from the answer **or** 1hr35mins **or** a correct ft from a previous error condone missing am or pm
		Correct answer scores full marks (unless from obvious incorrect working)	95		A1	
						Total 4 marks

10 (a)	eg 500 × 1.18		2	M1	
	Correct answer scores full marks (unless from obvious incorrect working)	590		A1	
(b)	eg 350 ÷ 1.40		2	M1	
	Correct answer scores full marks (unless from obvious incorrect working)	250		A1	
				Total 4 marks	

11	eg $\frac{1}{4}\times 200\ (=50)$ **or** $\frac{2}{5}\times 200\ (=80)$ **OR** $\frac{43}{200}$		4	M1	for a method to find the beads for Bernadette **or** Claudio **OR** Derek's beads as a fraction
	eg $\frac{1}{4}\times 200\ (=50)$ **and** $\frac{2}{5}\times 200\ (=80)$ **OR** $\frac{43}{200}+\frac{1}{4}+\frac{2}{5}\left(=\frac{173}{200}\right)$			M1	for a method to find the beads for Bernadette **and** Claudio **OR** method to find the fraction of the 200 beads given away
	eg 200 – "50" – "80" – 43 (= 27) **OR** $1-"\frac{173}{200}"$			M1	for a method to find the number of beads Asif has left **OR** 1 − the fraction of the 200 beads given away
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{27}{200}$		A1	cao
				Total 4 marks	

12 (a)		Correct Venn diagram	3	B3	for all sections completed correctly If not B3 then award B2 for 3 correct sections B1 for 1 or 2 correct sections
(b)(i)		$\frac{13}{30}$	1	B1	oe, ft their Venn diagram
(ii)		$\frac{6}{30}$	1	B1	oe, ft their Venn diagram
					Total 5 marks

13	eg 8 × 12 (= 96) **or** 7 × 3 (= 21) **or** 3 × 15 (= 45) **or** 8 × 9 (= 72) **or** 15 × 12 (= 180) **or** 7 × 9 (= 63)		5	M1	for a method to find one relevant area accept 15 – 8 as 7 and 12 – 3 as 9
	eg "96" + "21" (= 117) **or** "45" + "72" (= 117) **or** "180" – "63" (= 117)			M1	for a complete method to find the total area
	eg 117 ÷ 7 (= 16.7... or 17)			M1	(indep) for a method to find the number of tins for their area ft from any value that has come from a calculation that includes at least 2 of the given dimensions
	eg "17" × 23.9			M1	for a method to calculate the cost for their number of tins dependent on previous M1
	Working required	406.3(0)		A1	dep on M1
					Total 5 marks

14	(a)		$10x - x^2$	1	B1	oe eg $-x^2 + 10x$
	(b)		$3(2y + 9)$	1	B1	
	(c)	eg $h - 4 = \frac{m}{2}$ **or** $2h = m + 8$		2	M1	for a correct first step
		Correct answer scores full marks (unless from obvious incorrect working)	$m = 2(h - 4)$		A1	oe eg $m = 2h - 8$ SC award M1 for $m = 2h - 4$ **or** $m = h - 8$
	(d)	eg $7g - 2g + 3 = -5$ **or** $5g + 3 = -5$ **or** $7g = 2g - 5 - 3$ **or** $7g = 2g - 8$		3	M1	for correctly collecting the terms in g on one side or the numbers on one side
		eg $7g - 2g = -5 - 3$ **or** $5g = -8$			M1	for a correct rearrangement with terms in g on one side and numbers on the other. Award of this mark implies the first M1
		Working required	$-\frac{8}{5}$		A1	(dep on M1) oe eg $-1\frac{3}{5}$ or −1.6
						Total 7 marks

15	eg $\frac{14}{3}$ **and** $\frac{11}{6}$		3	M1	for both mixed numbers expressed as improper fractions
	eg $\frac{14}{3}\times\frac{6}{11}$ **or** $\frac{28}{6}\div\frac{11}{6}$ **or** $\frac{28n}{6n}\div\frac{11n}{6n}$			M1	seeing this stage gains M2
	eg $\frac{14}{3}\times\frac{6}{11}=\frac{84}{33}=\frac{28}{11}=2\frac{6}{11}$ **or** $\frac{14}{3}\times\frac{6}{11}=\frac{84}{33}=2\frac{18}{33}=2\frac{6}{11}$ **or** $\frac{14}{\cancel{3}^{1}}\times\frac{\cancel{6}^{2}}{11}=\frac{28}{11}=2\frac{6}{11}$ **or** $\frac{14}{3}\div\frac{11}{6}=\frac{28}{6}\div\frac{11}{6}=\frac{28}{11}=2\frac{6}{11}$ **or** correct working to $\frac{28}{11}$ **and** writing $2\frac{6}{11}=\frac{28}{11}$ *Working required*	Shown		A1	dep on M2 for conclusion to $2\frac{6}{11}$ from correct working – either sight of result of multiplication eg $\frac{84}{33}$ must be seen or correct cancelling to $\frac{28}{11}$ or complete method using division and common denominators
					Total 3 marks

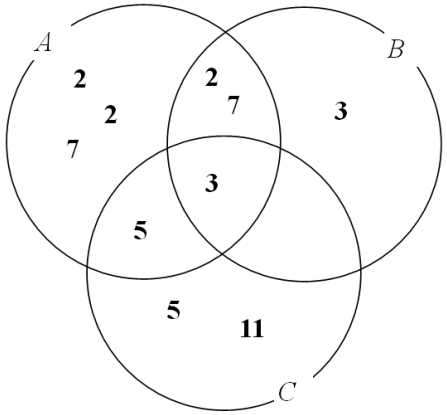
16	(a)		Triangle drawn at (−1, −3) (−1, −4) (−3, −3)	2	B2	for a correct triangle with correct orientation and position If not B2 then award B1 for a correct triangle drawn with correct orientation in wrong position or triangle drawn with 2 out of 3 correct vertices
	(b)		Triangle drawn at (−4, 4) (−4, 5) (−2, 4)	1	B1	cao
						Total 3 marks

17	(a)		−3, −2, −1, 0, 1	2	B2	for −3, −2, −1, 0, 1 If not B2 then award B1 for 4 correct values and no incorrect values (eg −3, −2, −1, 0) **or** for 6 values with no more than one incorrect value (eg −4, −3, −2, −1, 0, 1)
	(b)		$x > -1$	1	B1	accept $-1 < x$
						Total 3 marks

18		Fully correct angle bisector with all relevant arcs shown	2	B2	for a fully correct angle bisector with all relevant arcs shown If not B2 then B1 for all arcs and no angle bisector drawn or for a correct angle bisector within the guidelines but no correct arcs or insufficient correct arcs
					Total 2 marks

19	<table><tr><td>*x*</td><td>−2</td><td>−1</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>*y*</td><td>10</td><td>7.5</td><td>5</td><td>2.5</td><td>0</td><td>−2.5</td><td>−5</td></tr></table>	Correct line	3	B3	for a correct line between $x = -2$ and $x = 4$ If not B3 then award B2 for a line segment through at least 3 of (−2, 10), (−1, 7.5), (0, 5), (1, 2.5), (2, 0), (3, −2.5), (4, −5) **or** all points plotted correctly If not B2 then award B1 for at least 2 correct points plotted or stated (may be seen in a table) **or** for a line drawn with a negative gradient through (0, 5) **or** for a line with a gradient of −2.5
					Total 3 marks

20	eg $\frac{x+7}{80}=\frac{1}{4}$ **or** $4(x+7)=80$ **or** $x+7=20$		4	M1	for setting up a correct equation in terms of x only
	eg $x=80\times\frac{1}{4}-7\ (=13)$ **or** $4x+28=80$ **and** $x=\frac{80-28}{4}\ (=13)$ **or** $x = 13$			M1	for a complete method to find the value of x **or** $x = 13$. Award of this mark implies M2.
	eg $80-("13"+7+"13"-11+3\times"13")(=19)$ **or** $\frac{"13"+7+"13"-11+3\times"13"}{80}\left(=\frac{61}{80}\right)$			M1	for a method to find the number of yellow counters **or** P(R or B or G)
	Correct answer scores full marks (unless from obvious incorrect working)	$\frac{19}{80}$		A1	oe eg accept 0.2375 or 23.75% or 0.237 or 23.7% or 0.238 or 23.8% or 0.24 or 24%
					Total 4 marks

<table>
<tr><td>21 (a)</td><td>$2\times2\times2\times5\times5$ or 2, 2, 2, 5, 5 or $2\times2\times3\times5\times7$ or 2, 2, 3, 5, 7 or eg
<table>
<tr><td>2</td><td>200</td><td>420</td></tr>
<tr><td>2</td><td>100</td><td>210</td></tr>
<tr><td>5</td><td>50</td><td>105</td></tr>
<tr><td></td><td>10</td><td>21</td></tr>
</table></td><td></td><td>2</td><td>M1</td><td>for one number written as a product of prime factors or prime factors listed – numbers may be at end of factor trees or on ‘ladder diagrams’ or in a table or in a Venn diagram
or
at least two factors for each (excluding 1, 200, 420)</td></tr>
<tr><td></td><td>Correct answer scores full marks (unless from obvious incorrect working)</td><td>20</td><td></td><td>A1</td><td>or $2^2\times5$ oe</td></tr>
<tr><td>(b)</td><td> 
</td><td></td><td>2</td><td>M1</td><td>for $2^m\times3^n\times5^p\times7^q\times11^r$ with at least three of $m = 3$, $n = 2$, $p = 2$, $q = 2$, $r = 1$ (all 5 terms should be seen) or omission of one term with others fully correct
OR prime factors seen in a Venn diagram – if so must be fully correct</td></tr>
<tr><td></td><td>Correct answer scores full marks (unless from obvious incorrect working)</td><td>$2^3\times3^2\times5^2\times7^2\times11$</td><td></td><td>A1</td><td>allow 970 200 oe</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Total 4 marks</td></tr>
</table>

22	55 × 32 (= 1760) **or** 52 × 28 (= 1456) **or** 55 × 32 + 52 × 28 (= 3216)		3	M1	for one correct product or method to find the total mark for both classes
	eg $\frac{"1760"+"1456"}{32+28}$ **or** $\frac{3216}{60}$			M1	for a complete method
	Correct answer scores full marks (unless from obvious incorrect working)	53.6		A1	
					Total 3 marks

23	(a)	for 0.04×2000 oe (= 80) **or** 1.04×2000 oe (= 2080)	**OR**		3	M1	for finding 4% **or** 104% of 2000	**OR** M2 for 2000×1.04^3 oe **or** 2000×1.04^4 oe (= 2339.72)
		$1.04 \times$ "2080" oe (= 2163.2) $1.04 \times$ "2163.2" oe	2000×1.04^3 oe			M1	for completing method to find total amount in the account at the end of 3 years	
		Correct answer scores full marks (unless from obvious incorrect working)		2250		A1	accept 2249 – 2250	
							SC: if no other marks gained award M1 for 0.12×2000 oe **or** 240 **or** 1.12×2000 oe **or** 2240 accept (1 + 0.04) as equivalent to 1.04 throughout	
	(b)	eg $1365 \div (1 - 0.09)$ **or** $1365 \div 0.91$			3	M2	for a complete method	
						(M1)	for $1365 \div (100 - 9)$ (= 15) **or** $(100 - 9)\% = 1365$ **or** $91\% = 1365$ **or** eg $(1 - 0.09)T = 1365$ **or** eg $T - 0.09T = 1365$	
		Correct answer scores full marks (unless from obvious incorrect working)		1500		A1		
								Total 6 marks

24	eg $\pi \times 3^2 \times 7$ $(= 63\pi$ or $197.9\ldots)$		3	M1	for method to find the volume of Solid **A**
	eg $\frac{2000}{[\text{vol A}]}$ **or** $\frac{3375}{450} (= 7.5$ oe) **or** $\frac{2000+3375}{[\text{vol A}]+450}$			M1	(indep) for method to find the density of Solid **A**, **B** or **C,** allow use of their volume for Solids **A** and **C**
	Correct answer scores full marks (unless from obvious incorrect working)	8.3		A1	accept 8.29 – 8.31
					Total 3 marks

25	*SCD* = 128° **or** *BCS* = 32° **or** *TSC* = 180 – 128 (= 52)		4	M1	angles need to be identified or may be seen marked on the diagram	M2 for (*BCD* =) 128 + 32 (= 160) **or (***DCV* =) 52 – 32 (= 20) (may be seen marked on the diagram). To award these marks 160 or 20 must be clearly used or identified as the interior or exterior angle.
	eg $(\text{int}\angle =) 128+32 (=160)$ **or** $(\text{ext}\angle =) 180-(128+32) (=20)$ **or** $(\text{ext}\angle =) "52"-32 (=20)$			M1	(dep on previous M1) for method to find the size of one interior or exterior angle, may be seen marked on the diagram.	
	eg $180(n-2) = "160" n$ **or** 360 ÷ "20"			M1	for setting up an equation for the sum of interior angles **or** 360 ÷ "20"	
	Working required	18		A1	dep on M2	
						Total 4 marks

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