Pearson Edexcel

Mark Scheme (Standardisation)

January 2021

Pearson Edexcel International GCSE
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
- 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 15c, 17, 25 (where the mark scheme states otherwise) 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		Makalu	1	B1 Accept 8485
	b		Five thousand eight hundred and ninety five	1	B1
	c		800	1	B1 Accept 8 (eight) hundreds, hundreds, 100('s),
	d		2077	1	B1 Accept −2077
					Total 4 marks

2	ai		likely	1	B1
	aii		impossible	1	B1
	b		cross at $\frac{1}{2}$	1	B1
	c		cross at $\frac{1}{6}$	1	B1
					Total 4 marks

3	a		Trapezium	1	B1
	b		42	1	B1 Accept 40 – 44
	c		Correct lines marked	1	B1
	d		2	1	B1
					Total 4 marks

4	8 + 3 × 4.50 (= 21.5)			M1	
	(30 – '21.5') ÷ 1.1 (= 7.72... or 7) or 8.5 ÷ 1.1 (= 7.72... or 7)			M1	method to find the number of packets of seeds – could be repeated addition
	30 – '21.5' – '7' × 1.1 or 8.5 – 7.7			M1	complete method to find the change
		0.8(0)	4	A1	
					Total 4 marks

5	a		(−2, 3)	1	B1	
	b		(×) at (4, −2)	1	B1	condone missing label as long as unambiguous
	c		$y = -3$	1	B1	oe
						Total 3 marks

6	a		6 squares shaded	1	B1	
	b		$\frac{3}{10}$	1	B1	
	c	$\frac{1}{2} = \frac{30}{60} = 0.5$ or 50% $\frac{3}{4} = \frac{45}{60} = 0.75$ or 75% $\frac{4}{5} = \frac{48}{60} = 0.8$ or 80% $\frac{5}{6} = \frac{50}{60} = 0.83...$ or 83...%	$\frac{1}{2}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}$	2	B2	can be given as fraction, decimal or percentage equivalents B1 for 3 fractions in the correct order **or** for 4 in fractions in the correct reverse order **or** for 2 fractions correctly converted to decimals or percentages **or** 2 fractions written with a common denominator that is a multiple of 60
	d	$14 \div 5 \times 9$			M1	
			25.2	2	A1	oe
						Total 6 marks

7	a		3	1	B1	
	b	$\frac{12}{60} \times 360$ or $360 \div 60 \times 12$ or $360 \div (60 \div 12)$ oe or $\left(\frac{12}{60} \times 100\right) \frac{20}{100} \times 360$			M1	M1 Allow two stages e.g. $\left(\frac{12}{60} \times 100\right) \frac{20}{100} \times 360$
			72	2	A1	
	c	$\frac{35}{100} \times 60$ or 0.35×60 oe			M1	
			21	2	A1	
						Total 5 marks

8	a		a^4	1	B1
	b		$20bc$	1	B1
	c		$7d - 3e$	2	B2 (B1 for $7d$ or $-3e$ or $7d + -3e$)
					Total 4 marks

9	E.g. 42 ÷ 3 (= 14) or 68 ÷ 8 (= 8.5) or 42 × 3 (= 126) or $\frac{15}{8} \times 68$ (= 127.5)			M1 for a correct first step
	E.g. 9 × '14' + 15 × '8.5' oe or '126' + '127.5'			M1 for a complete method
		253.5	3	A1
				Total 3 marks

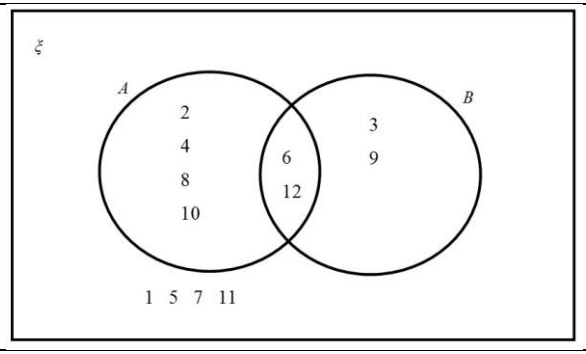
10	(180 – 44) ÷ 2 (= 68)			M1 May be seen on diagram
	180 – '68' **or** 44 + '68'			M1
		112	3	A1
				Total 3 marks

11	(−2, 7) (−1, 5) (0, 3) (1, 1) (2, −1) (3, −3)	Correct line between $x = -2$ and $x = 3$	3	B3 for a correct line between $x = -2$ and $x = 3$ (B2 for a correct straight line segment through at least 3 of (−2, 7) (−1, 5) (0, 3) (1, 1) (2, −1) (3, −3) **or** for all of (−2, 7) (−1, 5) (0, 3) (1, 1) (2, −1) (3, −3) plotted but not joined) (B1 for at least 2 correct points stated (may be in a table) **or** plotted **or** for a line drawn with a negative gradient through (0, 3) **or** for a line with a gradient of −2)
				Total 3 marks

12	250 ÷ (2 + 3) (= 50)			M1
	50 × 2 (= 100) **or** 50 × 3 (= 150)			M1
	$\frac{42}{100} \times '150'$ (= 63) or 0.42 × '150' oe (= 63)			M1 (indep) for a method to find 42% of **their** amount for Haydn
	'100' – '63'			M1 (dep on M2) for finding difference between their amounts for Rose and Haydn
		37	5	A1
				Total 5 marks

12 ALT	$\frac{2}{2+3}\times 100$ (= 40)			M1 for method to find the percentage of £250 that Rose gives to charity
	$\frac{3}{2+3}\times 100\times 0.42$ (= 25.2) oe			M1 for method to find the percentage of £250 that Haydn gives to charity
	'40' – '25.2' (= 14.8)			M1 (dep M2) for method to find difference between the two percentages
	$\frac{\text{'14.8'}}{100}\times 250$ or '0.148' × 250 oe			M1
		37	5	A1
				Total 5 marks

13	$\pi \times (18 \div 2)^2$ (= 254.469...)			M1
		254	2	A1 accept 254 – 255
				Total 2 marks

14	a		Fully correct Venn diagram	3	B3 fully correct Venn diagram (B2 for 2 or 3 sections correct B1 for 1 section correct)
	b				M1 ft from (a) $\frac{\text{'4'}}{a}$ where $a \geq 4$ **or** $\frac{b}{12}$ where $b \leq 12$
			$\frac{4}{12}$	2	A1 oe
					Total 5 marks

15	a		$15a + 20$	1	B1
	b		$2(2c - 7)$	1	B1
	c	E.g. $5x - x = 6 + 11$ **or** $4x - 11 = 6$ **or** $5x = x + 17$			M1 for correct rearrangement with x terms on one side and numbers on the other **or** the correct simplification of either x terms or numbers on one side in a correct equation
		$4x = 17$ **or** $-4x = -17$			M1
			4.25	3	A1 oe, dep on at least M1
					Total 5 marks

Question	Working	Answer	Mark	Notes
16	e.g. $\frac{16}{5}$ **and** $\frac{11}{6}$ or $\frac{96}{30}$ **and** $\frac{55}{30}$		3	M1 for two correct improper fractions
	e.g. $\frac{\cancel{16}^{8}}{5}\times\frac{11}{\cancel{6}^{3}}$ **or** $\frac{176}{30}$ **or** $\frac{5280}{900}$ oe			M1 correct cancelling or multiplication of numerators and denominators without cancelling
	e.g. $\frac{16}{5}\times\frac{11}{6}=\frac{176}{30}=\frac{88}{15}=5\frac{13}{15}$ **or** $\frac{16}{5}\times\frac{11}{6}=\frac{176}{30}=5\frac{26}{30}=5\frac{13}{15}$ **or** $\frac{\cancel{16}^{8}}{5}\times\frac{11}{\cancel{6}^{3}}=\frac{88}{15}=5\frac{13}{15}$ **or** $\frac{96}{30}\times\frac{55}{30}=\frac{5280}{900}=\frac{88}{15}=5\frac{13}{15}$ NB: a student can show initially that $5\frac{13}{15}=\frac{88}{15}$ and they need to show that LHS = $\frac{88}{15}$	shown		A1 Dep on M2 for conclusion to $5\frac{13}{15}$ from correct working – either sight of the result of the multiplication e.g. $\frac{176}{30}$ must be seen and equated to $\frac{88}{15}$ or $5\frac{26}{30}$ **or** correct cancelling prior to the multiplication to $\frac{88}{15}$ NB: use of decimals scores no marks
				Total 3 marks

17	$a = 7$		4	B1
	$\frac{b + \text{their } a}{2} = 8.5$ oe **or** $b = 10$			M1 ft their value of a **or** for setting up an equation for b **or** $b = 10$
	$\frac{\text{their } a + \text{their } a + \text{their } b + c}{4} = 9$ oe or (c =) $9 \times 4 - (2 \times \text{their } a + \text{their } b)$ oe			M1 for a calculation involving c using their values **or** for a calculation leading to c using their values
		7, 10, 12		A1
				Total 4 marks

18	a		Correct number line	2	B2 for a fully correct number line e.g. shaded circle at −2, unshaded circle at 1 and a line drawn between them B1 for a shaded circle at −2 **or** an unshaded circle at 1 **or** circles at −2 and 1 with line in between but shading incorrect
	b		−3, −2, −1, 0, 1, 2	2	B2 fully correct values with no extras B1 for 5 correct values and none incorrect **or** all 6 correct values with no more than one additional incorrect value
					Total 4 marks

19	3.4 or $\frac{17}{5}$ or $3\frac{2}{5}$ or $3\frac{24}{60}$ or 204 oe		3	B1	
	433.5 ÷ 3.4 or 433.5 ÷ $\frac{17}{5}$ or 433.5 ÷ $3\frac{2}{5}$ or $\frac{433.5}{'204'} \times 60$ oe			M1	for use of speed = distance ÷ time Allow 433.5 ÷ 3.24 (= 133.796…) for this mark only
		127.5		A1	oe allow 128
					Total 3 marks

20	a	(x =) 270 ÷ (12 × 5) (= 4.5) oe		3	M1	
		π × '4.5'^{2} × 2 × '4.5' (= 182.25π oe)			M1	ft dep on M1
			573		A1	accept 572 − 573
	b		1 000 000	1	B1	or (1 ×) 10^6 or (one or 1) million oe
						Total 4 marks

21	a	e.g. $A + 5z = \frac{c}{y}$ oe **or** $Ay = c - 5yz$ oe		2	M1	for a correct first step e.g. add 5z to both sides **or** multiply all terms by y
			$c = y(A + 5z)$		A1	oe
	b		1	1	B1	
	c	$(x \pm 3)(x \pm 8)$		2	M1	or for $(x \pm a)(x \pm b)$ where $ab = 24$ or $a + b = -11$
			$(x - 3)(x - 8)$		A1	
						Total 5 marks

22	0.024 × 50 000 (= 1200) oe or 1.024 × 50 000 (= 51 200) oe or 1.024^2 × 50 000 (= 52 428.8) oe or 0.024 × 50 000 × 3 (= 3600) oe 0.024 × 50 000 × 3 + 50 000 (= 53 600) oe		3	M1	M2 for $50\,000 \times 1.024^3$
	0.024 × (50 000 + '1200') (= 1228.8) oe **and** 0.024 × (50 000 + '1200' + '1228.8') (= 1258.2912) **or** '1200' + '1228.8' + '1258.2912' (= 3687.(0912)) **or** 1.024 × '52 428.8'			M1 for completing method to find total amount in the account	
		53 687		A1 accept 53 687 – 53 688	
				accept (1 + 0.024) or $\left(1+\frac{2.4}{100}\right)$ as equivalent to 1.024 throughout	
					Total 3 marks

23	(5 – 2) × 180 ÷ 5 (= 108) **or** 360 ÷ 5 (= 72)		5	M1	for method to find an interior or exterior angle of a pentagon
	(6 – 2) × 180 ÷ 6 (= 120) **or** 360 ÷ 6 (= 60)			M1	for method to find an interior or exterior angle of a hexagon
	360 – 108 – 120 (= 132) **or** 60 + 72 (= 132) **or** (180 – '120') + (180 – '108')			M1	dep on M2 for a correct method to find angle *EDI* using correct figures
	360 – '72' – '60' – '132' (= 96)			M1	for a complete method to find angle *x*
		96		A1	dep on correct working
				Note:	Angles may be seen on diagram throughout
					Total 5 marks

24	a		$2^6 \times 3 \times 11^4$	2	B2	oe, accept 2 811 072
					B1	for $2^a \times 3^b \times 11^c$ oe where two of *a*, *b* and *c* are correct
	b		$2^9 \times 3^5 \times 11^8$	2	B2	cao
					B1	for $2^a \times 3^b \times 11^c$ oe where two of *a*, *b* and *c* are correct **or** $2.666... \times 10^{13}$ **or** an equivalent expression for e.g. $2^2 \times 2^7 \times 3^5 \times 11^3 \times 11^5$
						Total 4 marks

25	$7^2-(10\div 2)^2\,(=24)$ or $\dfrac{\sin\left(\frac{1}{2}x\right)}{5}=\dfrac{\sin 90}{7}$ oe or $\cos x=\dfrac{7^2+7^2-10^2}{2\times 7\times 7}$ oe or $\sin\left(\frac{1}{2}x\right)=\dfrac{5}{7}$ oe or $\cos y=\dfrac{5}{7}$ oe		5	M1	or use of sine rule or cosine rule to find angle (x) of the apex or angle y $\left(=90-\frac{1}{2}x\right)$
	$\sqrt{7^2-(10\div 2)^2}$ $(=\sqrt{24}=2\sqrt{6}=4.898...)$ or $(x=)\,2\times\sin^{-1}\left(\dfrac{5\times\sin 90}{7}\right)(=91.169\ldots)$ oe or $(x=)\,2\times\sin^{-1}\left(\dfrac{5}{7}\right)(=91.169\ldots)$ oe or $(x=)\cos^{-1}\left(\dfrac{7^2+7^2-10^2}{2\times 7\times 7}\right)(=91.169\ldots)$ oe or $(x=)\,2\left(90-\cos^{-1}\left(\frac{5}{7}\right)\right)\left(=2(90-44.415)...=91.169...\right)$ Allow 5 from correct working			M1	for complete method to find height of triangle or the angle (x) of the apex $\cos^{-1}\left(\frac{5}{7}\right)(=44.415...)$ **and** $5\times\tan' 44.415...'\,(=4.898...)$ or $7\times\sin' 44.415...'\,(=4.898...)$ **or** $\sin^{-1}\left(\frac{5}{7}\right)(=45.584...)$ **and** $\dfrac{5}{\tan' 45.584...'}\,(=4.898...)$ or $7\times\cos' 45.584...'\,(=4.898...)$
	E.g. $6\times 10+\dfrac{(10\div 2)\times'\sqrt{24}'}{2}\times 2$ $(=60+10\sqrt{6}=84.494...)$ **or** $5\times\left(6+6+'\sqrt{24}'\right)(=60+10\sqrt{6}=84.494...)$ **or** $\left(\frac{1}{2}\times 7\times 7\times\sin' 91.169...'+10\times 6\right)(=60+10\sqrt{6}=84.494...)$			M1	for method to find the total area of the pentagon allow answers in the range 84.49 – 85
	E.g. '84.494' ÷ 16 (= 5.28...) or $\left(60+10\sqrt{6}\right)\div 16\,(=5.28...)$			M1	for method to find the number of tins required using their area
		6		A1	dep on at least M2
					Total 5 marks