Mark Scheme (Results)

June 2022

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 question 22, 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)		7534	1	B1	
	(b)	eg 3600 − 3574 **or** 3745 − 3600		2	M1	for 3600 – "number" or "number" – 3600 where "number" contains the digits 3,4,5,7. Must have attempted to evaluate this calculation
			26		A1	cao
						Total 3 marks

Q		Working	Answer	Mark	Notes	
2	(a)		Pentagon	1	B1	
	(b)		acute angle clearly indicated with 'A'	1	B1	allow either angle or both acute angles indicated
	(c)		reflex angle clearly indicated with 'R'	1	B1	accept either the interior reflex angle, or any of the exterior reflex angles, if labelled outside of the shape with an arc
						Total 3 marks

Q		Working	Answer	Mark	Notes	
3	(a)		18	1	B1	
	(b)(i)	eg 66 − 15 − 9 − 3 − "18" **or** 66 − (7.5 × "6") **or** 66 − 45		2	M1ft	ft their 18 from part (a)
			21		A1ft	ft their 18 from part (a) eg 66 – 15 – 9 – 3 – their answer to part (a)
	(ii)		$3\frac{1}{2}$ diagrams drawn	1	B1ft	follow through their 21 from (b)(i)
						Total 4 marks

4	(a)		$\dfrac{7}{10}$	1	B1	oe eg $\dfrac{70}{100}$
	(b)		15	1	B1	
	(c)	eg $35 \times 3 \div 5$ **or** 7×3 **or** $\dfrac{3}{5} \times 35$		2	M1	for a complete method
			21		A1	
						Total 4 marks

5	(a)		1	1	B1	or one line (only) on the diagram clearly indicated
	(b)		2	1	B1	
	(c)		126	1	B1	allow ± 2
						Total 3 marks

6	(a) (i)		27	1	B1	
	(ii)		5, 16	1	B1	either or both indicated
	(b)	5 or 23 identified as a prime **or** 5 + 23		2	M1	at least one prime identified
			28		A1	
						Total 4 marks

7	(a)		$(-1, 3)$	1	B1	
	(b)		$(5, 1)$	2	B1 B1	for x = 5 for y = 1
	(c)	$\dfrac{1}{2} \times 6 \times 4$ oe		2	M1	for a correct method
			12		A1	
	(d)		D indicated at $(-1, -1)$	1	B1	label not required if coordinate clearly indicated
						Total 5 marks

8			add 489 to 13 203	2	B2	oe eg accept 489 + 13 203
						(B1 for sight of 489 × 27 = 13 203)
						Total 2 marks

9	(a)		7p − t	2	B2	Fully correct answer (allow −1t)
						(B1 for 7p or −t)
	(b)	eg 8 × 5 − 3 × 4 **or** 40 − 12		2	M1	for a complete method
			28		A1	
						Total 4 marks

10	(a) (i)		35	1	B1	if answer line is blank, check the diagram
	(ii)	<u>vertically</u> <u>opposite</u> angles are equal **or** vertically <u>opposite</u> <u>angles</u> are equal		1	B1	
	(b) (i)	(BEC =) 180 − 90 − 35 (= 55) **or** (BEH =) 35 + 90		2	M1	for a method to find angle BEC **or** BEH
			125		A1	if answer line is blank, check the diagram
	(ii)	eg <u>Angles</u> in a <u>triangle</u> add to 180° (allow angles in a <u>triangle</u> add to <u>180°</u>) Angles in a <u>triangle</u> sum to 180º (allow angles in a <u>triangle</u> sum to <u>180°</u>) Angles on a straight <u>line</u> add to 180° (allow angles on a straight <u>line</u> add to <u>180°</u>) The <u>exterior angle</u> of a triangle is <u>equal</u> to the sum of the <u>interior opposite angles</u>		1	B1	(dep on M1) for one correct reason
						Total 5 marks

11			4	M1	for a method to find the cost of 500g of Cheddar
	$9.2 \times \dfrac{500}{1000}$ **or** $9.2 \div 2$ $(= 4.6)$ oe				
	$6.3 - \text{"}4.6\text{"} (= 1.7)$			M1	for a method to find the cost of 200g of Stilton
	$\text{"}1.7\text{"} \times \dfrac{1000}{200}$ **or** "1.7" $\times 5$ oe			M1	for a complete method to find the cost of 1kg of Stilton
		8.5(0)		A1	
Total 4 marks					

12	eg $3x - 24 + 102 - x = 180$ oe **or** $90 + 90 + 3x - 24 + 102 - x = 360$ oe		3	M1	for setting up a correct equation
	eg $2x = 180 - 78$ oe **or** $2x = 360 - 258$ oe **or** eg $(180 + 24 - 102) \div 2$ **or** $360 - (90 + 90 - 24 + 102) \div 2$			M1	for simplifying and isolating the x term **or** for a complete calculation to find the value of x
		51		A1	
Total 3 marks					

13	(a)	$150 \div (90 \div 18)$ oe eg $150 \div 5$		2	M1	for a complete method to find the number of people for running
			30		A1	if answer line is blank, check the table for answer
	(b)	eg $360 - (90 + 150 + 15 \times \text{"}5\text{"}) (= 45)$ oe	eg $360 \div \text{"}5\text{"} (= 72)$		3	M1	for working out the angle for swimming **or** the total number of people check the table for answers ft their "5" from $90 \div 18$
		"45" $\div$ "5"	"72" $- (18 + 15 + \text{"}30\text{"})$			M1	for a complete method to work out the number of people for swimming ft their "5" from $90 \div 18$ ft their "30" from (a)
				9		A1	if answer line is blank, check the table for answer
Total 5 marks						

14	(a)	$2.6 \times 40 + 30$ oe		2	M1	
			134		A1	allow 2 h 14 mins
	(b)	$2 \times 60 + 40 \ (= 160)$ oe		3	M1	convert 2 hours 40 minutes to minutes
		("160" − 30) ÷ 40 **or** "130" ÷ 40			M1	for a complete method
			3.25		A1	oe eg $3\frac{1}{4}$ or $\frac{13}{4}$ (Note: may see use of their part (a))
						Total 5 marks

15		eg $10.5 \div (5 - 2) \ (= 3.5(0))$ **or** $\frac{5}{7} - \frac{2}{7} \left(= \frac{3}{7}\right)$ **or** $10.5 \times \frac{5}{5-2} (= 17.5)$ **or** $10.5 \times \frac{2}{5-2} (= 7)$		3	M1	for finding the value of one share **or** the difference as a fraction **or** Bella's share **or** Millie's share
		eg "3.5"×7 **or** $10.5 \div "\frac{3}{7}"$ or "17.5" + "7"			M1	for a complete method
			24.5(0)		A1	oe eg $\frac{49}{2}$
						SCB1 for an answer of 3 and/or 7.5 oe
						Total 3 marks

16		$\dfrac{62.3...}{6.07...}$		2	M1	for 62.3(2) **or** 6.07(646…) **or** 10.2 **or** 10.3 **or** 10.25 **or** 10.26 **or** 10.255 **or** 10.256
			10.2559(6871)		A1	
						Total 2 marks

17	(a)		0.45	1	B1	oe eg $\frac{9}{20}, \frac{45}{100}, 45\%$
	(b)	eg 1 − (0.25 + 0.2 + 0.2) (= 0.35) **or** 1 − ("0.45" + 0.2) (= 0.35) **or** $300 \times (0.25 + 0.2 + 0.2)(=195)$		3	M1	allow use of their "0.45" from part (a), check the table
		eg 300 × "0.35" **or** 300 − "195"			M1	for a complete method
			105		A1	cao (award $\frac{105}{300}$ M2 only)
						Total 4 marks

18	(a)	eg 6 × 2.4 + 5 × 3.5		2	M1	
			31.9		A1	oe
	(b)	(W =) 5.9n **or** (W =) 5.9(n − 1) + 2.4 **or** (W =) 2.4n + 3.5(n − 1)		2	M1	for 2.4n + 3.5n or 5.9n seen
			5.9n − 3.5		A1	oe but must be in simplest form eg −3.5 + 5.9n
						Total 4 marks

19		$5 \times 12 (= 60)$ **or** $\frac{15 + 7 - 2 + 23 + x}{5} = 12$ oe **or** $\frac{x + "43"}{5} = 12$		3	M1	for a method to find the total of the 5 numbers **or** setting up an equation in x "43" comes from 15 + 7 − 2 + 23
		x + 15 + 7 − 2 + 23 = "60" **or** x + "43" = "60" **or** "60" − (15 + 7 − 2 + 23)			M1	for forming an equation with their 60 **or** for a complete calculation to find the value of x "43" comes from 15 + 7 − 2 + 23
			17		A1	
						Total 3 marks

20	eg $0.45 \times 180 \ (= 81)$ oe		4	M1	for a method to find the number of students studying German
	OR $\dfrac{15}{180}\left(=\dfrac{1}{12} \text{ or } 0.0833...\right)$				**OR** the number of students studying French as a fraction or decimal of the total students
	OR $\dfrac{15}{180}\times100\left(=8.3(33...)\%\right)$				**OR** a method to find the percentage of students studying French
					81 may be seen as part of an equation
	eg $180 - 15 - \text{“81”} \ (= 84)$ **or** $\text{“81”} + 15 \ (= 96)$			M1	for a method to find the number of students studying Italian/Spanish **or** French/German
	OR $1-\left(\dfrac{1}{12}+\dfrac{45}{100}\right)=\left(\dfrac{7}{15} \text{ or } 0.466...\right)$				**OR** a method to find the fraction or decimal of students studying Italian/Spanish **or** French/German
	or $\dfrac{1}{12}+\dfrac{45}{100}=\left(\dfrac{8}{15} \text{ or } 0.533...\right)$				**OR** a method to find the percentage of students studying Italian/Spanish **or** French/German
	OR $100 - (\text{“8.3”} + 45) \ (= 46.6(66…) \text{ or } 46.7\%)$ **or** $\text{“8.3”} + 45 \ (= 53.3(33…) \text{ or } 53.3\%)$				84 or 96 may be seen as part of an equation
	eg $\dfrac{\text{"84"}}{180-\text{"84"}}(\times100)\left(=\dfrac{7}{8} \text{ or } 0.875\right)$ **or** $\dfrac{\text{"84"}}{\text{"96"}}(\times100)\left(=\dfrac{7}{8} \text{ or } 0.875\right)$ **or** $\text{"}\dfrac{7}{15}\text{"}\div\text{"}\dfrac{8}{15}\text{"}\left(=\dfrac{7}{8} \text{ or } 0.875\right)$ **or** $\dfrac{\text{"46.6"}}{\text{"53.3"}}(\times100)(=0.872...)$			M1	for a complete method to find the fraction or decimal or percentage of Italian/Spanish to French/German
		87.5		A1	accept 87.2 – 87.7
					Total 4 marks

21	(a)		$3c^4 + 12c^3$	2	B2	for $3c^4 + 12c^3$ (B1 for $3c^4$ or $12c^3$)
	(b)(i)			2	M1	for $(x \pm 9)(x \pm 1)$ **or** for $(x + a)(x + b)$ with $ab = -9$ or $a + b = 8$
			$(x+9)(x-1)$		A1	for correct factors
	(ii)		$-9, 1$	1	B1	ft dep on factorising in the form $(x + p)(x + q)$
						Total 5 marks

22		$\dfrac{8}{3}(+)\dfrac{15}{4}$ **or** $(2)\dfrac{8}{12}(+)(3)\dfrac{9}{12}$ **or** $(2)\dfrac{8a}{12a}(+)(3)\dfrac{9a}{12a}$		3	M1	for correct improper fractions **or** fractional part of numbers written correctly over a common denominator
		eg $\dfrac{8\times 4 + 15\times 3}{3\times 4}$ **or** $\dfrac{32}{12}+\dfrac{45}{12}$ **or** $\dfrac{32a}{12a}+\dfrac{45a}{12a}$ **or** $2\dfrac{8}{12}+3\dfrac{9}{12}=5\dfrac{17}{12}$ oe			M1	for correct fractions with a common denominator of 12 or a multiple of 12
		$\dfrac{32}{12}+\dfrac{45}{12}=\dfrac{77}{12}=6\dfrac{5}{12}$ **or** $5\dfrac{17}{12}=6\dfrac{5}{12}$ **or** if shows $6\dfrac{5}{12}=\dfrac{77}{12}$ at the beginning then show that the addition comes to $\dfrac{77}{12}$	Shown		A1	dep on M2 for a correct answer from fully correct working **or** shows that RHS $=\dfrac{77}{12}$ **and** fully correct working shows LHS $=\dfrac{77}{12}$
						Total 3 marks

23	eg (V=) $\pi \times \left(\dfrac{18}{2}\right)^2 \times 3.5$ (= 890.(64...) or $\dfrac{567}{2}\pi$)		3	M1	correct method to calculate volume
	eg $(7.04 \times 1000) \div$ "890.64"			M1	correct method to calculate density (if volume is incorrect, their value can be used if clearly labelled) accept use of 7.04 or an incorrect conversion from kg to g for mass
		7.9		A1	accept 7.9 − 7.92
					Total 3 marks

24	18000×0.15 (= 2700) oe **or** 18000×0.85 (= 15 300) oe		3	M1	for finding 15% or 85% of 18 000	M2 for 18000×0.85^4 oe **or** $18000 \times 0.85^5 (= 7986.(69...))$ oe
	eg 18000×0.85^4 oe **or** "15300" $\times 0.85 \times 0.85 \times 0.85$ oe **or** "15300" $\times 0.85 (= 13005)$ oe **and** "13005" $\times 0.85 (= 11054.25)$ oe **and** "11054.25" $\times 0.85$ oe			M1	(dep) for a complete method	
		9396		A1	awrt 9396	
					If no marks awarded, award SCB1 for **or** $18000 \times 0.85^2 (= 13\ 005)$ oe **or** $18000 \times 0.85^3 (= 11\ 054.(25))$ oe **or** $18\ 000 \times 0.4 (= 7200)$ oe **or** $18\ 000 \times 1.15 (= 20700)$ oe **or** $18\ 000 \times 1.15^4 (= 31482.(1125))$ oe	
						Total 3 marks

25	$-4x \le 11-3$ **or** $-4x \le 8$ **or** $-x \le 2$ **or** $3-11 \le 4x$ **or** $-8 \le 4x$		2	M1	allow equals sign or condone incorrect inequality sign for M1 only
		$x \ge -2$		A1	allow $-2 \le x$ SCB1 for x and -2 with an incorrect sign between them or -2 as an answer
					Total 2 marks

26	$3 \div 2 \ (=1.5$ or $\frac{3}{2}$) **or** eg $\frac{5--1}{4(-0)}$ **or** $c = -1$		3	M1	for correct method to find gradient or the correct value of c for gradient, may see a correct calculation **or** $\frac{3}{2}$ oe **or** $1.5x \ (+ c)$ oe for value of c, allow $c = -1$, $y = -1$, $(L =)$ mx $- 1$ oe
	$y = $ "1.5"x $(+ c)$ **or** $y = mx -1$ **or** eg $y - 5 = m(x - 4)$			M1	for use of $y = mx + c$ with either m or c correct (NB: $m \ne 0$) **or** for $(L =)$ $1.5x - 1$ oe
		$y = \frac{3}{2}x - 1$		A1	oe eg $y = 1.5x - 1$
					Total 3 marks

27	$(AB^2 =)\ 7.5^2 - 6^2\ (= 20.25)$ **or** eg $(BAC =)\sin^{-1}\left(\dfrac{6}{7.5}\right)(= 53.1...)$ **or** $\cos(BCA) = \dfrac{6}{7.5}(= 0.8)$		6	M1	for a correct first step to find AB **or** a complete method to find angle BAC **or** a correct first step to find angle BCA
	$(AB =)\ \sqrt{7.5^2 - 6^2}\ (= 4.5)$ **or** $(AB =)\dfrac{6}{\tan"53.1"}(= 4.5...)$ **or** $(AB =)7.5\cos"53.1"(= 4.5...)$ **or** $(BCA =)\cos^{-1}\left(\dfrac{6}{7.5}\right)(= 36.8...)$			M1	for a complete method to find AB **or** angle BCA
	$(\text{Area ABC} =)\ \dfrac{1}{2}\times 6\times"4.5"\ (= 13.5)$ **or** $(\text{Area ABC} =)\dfrac{1}{2}\times 6\times 7.5\times\sin("36.8")(= 13.47...\ \text{or}\ 13.5)$			M1	ft [their labelled AB] or [their labelled BCA] eg for $\dfrac{1}{2}\times 6\times$[their labelled AB] **or** $\dfrac{1}{2}\times 6\times 7.5\times\sin$[their labelled BCA]
	$(\text{Area DAC} =)\ 31.5 - "13.5"\ (= 18)$ **or** "13.5" + 0.5 × 7.5 × AD = 31.5 oe			M1	ft (dep on previous M1) allow 31.5 – [their area]
	$(AD =)\ ("18" \div 7.5) \div 0.5$ oe			M1	for a complete method to find AD, dependent on correct working
		4.8		A1	accept 4.78 – 4.81
					Total 6 marks