



Pearson
Edexcel

Mark Scheme (Results)

Summer 2023

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

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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. E.g. 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.

- **Parts of question**

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

Brackets and speech marks:

$0.32 \times 200 (= 64)$ the brackets here mean that the calculation is required for the mark and not the answer – however the answer would also secure the mark. If a student gave $0.32 \times 200 = 68$ they would still gain the mark as the method is correct and does not require the calculation to be correct for the award of the mark.

64 alone would also gain the mark.

200 – “146”

This shows that the calculation requires 200 minus the calculation that gave 146; if the calculation was shown but inaccurately worked out then the method mark would still be gained.

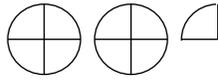
Eg 146 should have come from 0.73×200

If the student had given $0.73 \times 200 = 156$ and then given $200 - 156$ this would have gained the method mark.... the 156 came from a correct calculation even though the arithmetic was incorrect.

international GCSE Maths**Apart from Question 17 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)		7054	1	B1
(b)		78 300	1	B1
(c)		70 000	1	B1 or seventy thousand oe or tens of thousands or 10 000 (the place value of the 7)
(d)		2000	1	B1 2,000 accept 2000 seen elsewhere if box is empty
(e)		10 000	1	B1 10^4
				Total 5 marks

2 (a)		60	1	B1
(b)		9	1	B1
(c)		21	1	B1 Sometimes continental 1 looks like 7...please accept as no 27 on list
(d)		15	1	B1
				Total 4 marks

3	(a)		28	1	B1
	(b)			1	B1 (quarter circle can be any quadrant)
	(c)	<p>“28” + 10 + 14 + 20 + “18” (= 90) oe eg $8 \times 11.25 (= 90)$ or “56” + 20 + 28 + 40 + “36” (= 180) oe</p>		2	<p>M1 ft their (a) and their (b) from diag</p> <p>3 correct figures out of 5 seen (no need to add)</p> <p>allow figures doubled; 3 out of 5 seen</p> <p>(figures may be seen in or by table)</p>
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	180		<p>A1 cao</p> <p>SCB1 if no other marks awarded for 360 or 90</p>
					Total 4 marks

4 (a)			1	B1
(b)		17, 21	1	B1 Ignore any extra numbers if the 2 that are required are there
(c)		41	1	B1
(d)		A correct reason	1	B1 The numbers of sticks are always an odd number (always ends in 1,3,5,7,9) 102 is even, pattern 25 has 101 sticks, The pattern goes ...97, 101, 105... It is $4n + 1$ oe $4 \times 25 + 1 = 101$ (or does not =102) The pattern never ends in a 2
				Total 4 marks

5	(a)		(2, 3)	1	B1
	(b)		For the point (6, 1) marked	1	B1 If not marked <i>D</i> then award marks so long as unambiguous.
	(c)		(3.5, 1)	2	B2 oe for both coordinates correct (B1 for a correct calculation for one coordinate $\frac{2+5}{2}$ or $\frac{3+-1}{2}$ or for one correct coordinate or for (1, 3.5))
	(d)		line drawn	1	B1 horizontal line drawn – any length as long as unambiguous
					Total 5 marks

6	(a)		Octagon	1	B1
	(b)		8.6	1	B1 allow in range 8.4 – 8.8
	(c)		B, D	1	B1 both given
					Total 3 marks

7	(i)		unlikely	1	B1 Award unlikely together with a fraction. Accept incorrect spelling if meaning is clear
	(ii)		evens	1	B1
	(iii)		impossible	1	B1
					Total 3 marks

8	$26 \times 14 (= 364)$ or $26 \times 15 (= 390)$ or $14 \times 15 (= 210)$ or $\frac{3}{4} \times 26 (= 19.5)$ or $\frac{3}{4} \times 14 (= 10.5)$ or $\frac{3}{4} \times 15 (= 11.25)$ oe		3	M1 For multiplying 2 of the 4 numbers 26, 14, 15, $\frac{3}{4}$ oe
	3 of 26, 14, 15, $\frac{3}{4}$ oe seen multiplied together			M1 For multiplying 3 of the 4 numbers (multiplication must be seen) – could be done in separate sums
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	4095		A1
				Total 3 marks

9		Correct triangle	2	B2 Correct triangle within tolerance If not B2, then B1 for <i>CB</i> of length 6.5 cm or angle $ACB = 38^\circ$ Allow <i>CB</i> length 6.3 cm to 6.7 cm and angle $ACB = 36^\circ$ to 40°
				Total 2 marks

10	(a)	$6 \times 2.2(0) (= 13.2(0))$ oe	2	M1 May be continued addition
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>		6.8(0)
	(b)	$50 \div 0.85 (= 58.82\dots)$ or $58 \times 0.85 (= 49.3(0))$	2	M1 Allow continued addition if clearly adding at least 58 lots of 0.85 (allow one arithmetic error)
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>		58
				Total 4 marks

11	(a)	$\frac{55}{90} \times 360$ oe		2	M1	Allow $0.61... \times 360$
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	220		A1	Accept 219.6 - 220
	(b)	$\frac{195}{39} (= 5)$ or 5 : 1 or $\frac{39}{195} (= \frac{1}{5} = 0.2)$ or 1 : 5 or $\frac{75}{195} (= \frac{5}{13} = 0.38...)$ or 5 : 13 or $\frac{195}{75} (= \frac{13}{5} = 2.6)$ or 13 : 5		2	M1	starting to work with 195° and 39 people or starting to work with 195° and 75°
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	15		A1	
					Total 4 marks	

12	$2 \times \pi \times 8.5$ oe		2	M1
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	53.4		A1 allow answers in range 53.3 – 53.43
				Total 2 marks

13	(a)	$3x - x^2$	1	B1
	(b)	$6(2a - 3b)$	2	B2 If not B2, then B1 for $3(4a - 6b)$ or $2(6a - 9b)$ or 6(expression with one error)
	(c)	$T = 8h + 20j$	3	B3 for $T = 8h + 20j$ oe eg $T = 4(2h + 5j)$ oe [accept $T = 8 \times h + 20 \times j$] (B2 for $8h + 20j$ or $T = 8h + aj$ or $T = bh + 20j$ or $T = 20h + 8j$ or a correct equation with letters such as S and L eg $T = 8S + 20L$) (B1 for $8h + aj$ or $bh + 20j$ or $20h + 8j$ or for $T =$ an incorrect expression in h and j)
				Total 6 marks

14	(a)		612	1	B1
	(b)	$2580 \div 6.45 (= 400)$ or $2580 \times 0.85 (= 2193)$ or $\frac{0.85}{6.45} (= 0.13(17\dots))$ or $\frac{6.45}{0.85} (= 7.5(88\dots))$		2	M1
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	340		A1 cao
					Total 3 marks

15	(a)		Valid Reason	1	B1 eg Finn added 5 and 3, but he should have squared the 3 first.
	(b)		$2 \times 6 - (4^2 - 14)$	1	B1 Brackets in correct location. Condone correct but unnecessary brackets. [must not be around the minus sign between the 6 and the 4 ²]
	(c)	9+..... or+ 10 or $(-3)^2 + 5 \times 2$ or $-3 \times -3 + 5 \times 2$		2	M1 For either 9 or 10 in the correct place or the correct substitutions (brackets around -3 squared, unless recovered)
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	19		A1
					Total 4 marks

16	(a)		104	1	B1 accept 102 – 106
	(b)	eg “9.4” × 50 (= 470) [460 – 480] or eg “9.4” ÷ 2 (= 4.7) [4.6 – 4.8]		3	M1 Their measurement × 50 or ÷2 Working may be shown by diagram
		“9.4” × 50 ÷ 2			M1 Their measurement × 50 and ÷2 Working may be shown by diagram
		<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	235		A1 accept 230 – 240
					Total 4 marks

17	eg $\frac{14}{3}$ and $\frac{6}{5}$		3	M1 both fractions expressed as improper fractions, no need for \div or \times may be equivalent to those given eg $\frac{70}{15}$ or $\frac{18}{15}$ etc. A student could invert $\frac{6}{5}$ and go straight to the 2nd M1, this mark is then implied.
	$\frac{14}{3} \times \frac{5}{6}$ oe or $\frac{70}{15} \div \frac{18}{15}$			M1 For inverting 2 nd fraction and showing intention to multiply or for both fractions expressed as correct equivalent fractions with the same denominator with intention to divide eg $\frac{70}{15} \div \frac{18}{15}$
	<p>eg $\frac{14}{3} \times \frac{5}{6} = \frac{70}{18} = \frac{35}{9} = 3\frac{8}{9}$</p> <p>or $\frac{14}{3} \times \frac{5}{6} = \frac{70}{18} = 3\frac{16}{18} = 3\frac{8}{9}$</p> <p>or $\frac{14^7}{3} \times \frac{5}{6^3} = \frac{35}{9} = 3\frac{8}{9}$</p> <p>or $\frac{14}{3} \div \frac{6}{5} = \frac{70}{15} \div \frac{18}{15} = \frac{70}{18} = \frac{35}{9} = 3\frac{8}{9}$</p> <p>or correct working to $\frac{35}{9}$ and writing $3\frac{8}{9} = \frac{35}{9}$ (may be earlier in working)</p> <p><i>working required</i></p>	Shown		<p>A1 Dep on M2 for conclusion to $3\frac{8}{9}$ from correct working – either sight of the result of the multiplication or division e.g. $\frac{70}{18}$ must be seen or correct cancelling prior to the multiplication to $\frac{35}{9}$</p> <p>OR</p> <p>writing $3\frac{8}{9} = \frac{35}{9}$ (maybe on first line of working) and correct working as far as LHS = $\frac{35}{9}$</p> <p>NB: marks are awarded for use of fractions not decimals (but allow a decimal check of answer)</p>
				Total 3 marks

18	$1 - (0.32 + 0.13 + 0.28)$ oe eg $1 - 0.73 (= 0.27)$ or $0.32 \times 200 (= 64)$ or $0.13 \times 200 (= 26)$ or $0.28 \times 200 (= 56)$ or $0.73 \times 200 (= 146)$		3	M1 (0.27 may be seen in table) [could work with percentages eg $100 - 32 - 13 - 28 (=27)$]
	$[1 - "0.73"] \times 200$ oe eg " 0.27 " $\times 200$ or $200 - "64" - "26" - "56"$ or $200 - "146"$			M1 for a complete method or for an answer of $\frac{54}{200}$
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	54		A1
				Total 3 marks

19	$(4x - 27) + (3x + 46) = 180$ oe or “expression for C” + $(3x + 10) = 180$ or $7x + 19 = 180$ or $3x + 46 + 4x - 27 + 3x + 10 + [“180 - (3x + 10)”] = 360$		4	M1 Sum angles A and B to 180, or find an expression for BCD and sum all angles to 360. [condone missing brackets and condone use of any letter for angle C (even x or BCD)]
				A1 $x = 23$
	eg $3 \times “23” + 46 (= 115)$ or eg $180 - (3 \times “23” + 10) (= 101)$			M1ft dep on M1 using their x to calculate a value for angle B or C (cannot be a negative value and cannot just be x)
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	115		A1 Allow $3x + 46$ or ABC if 115 is clearly seen in working or on diagram
				Total 4 marks

20 (a)	x	-3	-2	-1	0	1	2	3	2	B2 for all correct values, otherwise B1 for 3 or 4 correct values
	y	8	2	-2	-4	-4	-2	2		
(b)									2	M1 dep on B1 scored in (a) for at least 5 points plotted correctly (ft their table)
					correct curve					A1 for a fully correct curve (all coordinates correct and correctly plotted and joined with a curve and curved between (0, -4) and (1, -4))
										Total 4 marks

21	2 and 15 seen or $1 \times 2 (+) 3 \times 5 (= 17)$	$2x + 15x (= 85)$ or $\frac{2}{3}y + 5y (= 85)$ or $0.25t \times 2 + 0.75t \times 5 (= 85)$		4	M1 For 2 and 15 oe seen or 17 or a correct equation in one unknown for number of 2p coins (x) or number of 5p coins (y) or total number of coins (t)
	$85 \div (2 + 15) (= 5)$ or at least two pairs of multiples of the values of 2 and 15 (eg 4, 30; 6, 45.....) or 10(p) (and) 75(p) or 10 : 75 or 5×2 and 15×5 $2 \times 5 + 5 \times 3 \times 5$ or 20 coins	$17x = 85$ ($x = 5$) or $\frac{17}{3}y = 85$ ($y = 15$) or $4.25t = 85$ ($t = 20$)			M1 assumes previous M1 for number of 2p coins or number of 5p coins or total number of coins or value of 2p coins and value of 5p coins may be clearly listed eg 2 555 2 555 2 555 2 555 with no ambiguity
	5 (2p coins) and 15 (5p coins) or 5 : 15 (if clearly identified (or used) as the key ratio eg not just part of a list) or $(3 - 1) \times 5$	eg 15 – 5 oe			M1 Correct number of 2p coins and 5p coins or a sum to find the difference in number of coins
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	10		A1 SCB1 if no other marks awarded for 21.25 in working or on answer line	
					Total 4 marks

22	(a)		7.6×10^7	1	B1
	(b)		0.000 54	1	B1
					Total 2 marks

23	$DCO = 90$ (or right (angle)) or $DAO = 90$ (or right (angle)) Could also be awarded for $CAO + CAD = 90$ or $DAC + CAO = 90$		3	M1 may be marked on diagram – also allow right angle 'square' symbol on diagram	M2 implied by $360 - 90 - 90 - 48$ or $360 - 228$
	Obtuse $AOC = 360 - 90 - 90 - 48 (= 132)$ oe or Obtuse $AOC = 2(180 - (0.5 \times 48) - 90) (= 132)$ or Obtuse $AOC = 180 - "24" - "24" = 132$ or $180 - 48$ (if working with $\triangle DAC$ and $\triangle OAC$) or Reflex $AOC = 90 + 90 + 48$			M1 dep on M1 being awarded may be marked on diagram	
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	228		A1 SC if no other marks awarded 132 gains B1	
					Total 3 marks

24	for 0.04×680 oe (= 27.2) or 1.04×680 oe (= 707.2)		3	M1 For finding 4% or 104% of the value	or M2 for 680×1.04^3 or 680×1.04^4 or 795.5(0.....)
	1.04 × “707.2” (= 735.488) oe and 1.04 × “735.488” (= 764.90752) oe or $0.04 \times (680 + “27.2”) = 0.04 \times “707.2” = 28.288$ and $0.04 \times (“707.2 + 28.288”) = 0.04 \times “735.488” = 29.41952$ and “735.488” + “29.41952” (= 764.90752.....)			M1 for completing the method	
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	765		A1 or 764 – 765 (if a correct answer is seen in working and then rounded incorrectly, award full marks) SC: if no other marks gained award M1 for 1.12×680 oe or 761.6(0) (or 762) or 0.12×680 oe or 81.6(0) (or 82) or $0.96^3 \times 680$ oe or 601.62... (or 602) (accept $(1 + 0.04)$ as equivalent to 1.04 throughout but not $(1 + 4\%)$)	
				Total 3 marks	

25	For $27 \times 1000 (= 27\ 000)$ or $\frac{27}{60 \times 60} (= 0.0075 \text{ or } \frac{3}{400})$ or $\frac{1000}{60 \times 60} (\frac{5}{18} = 0.27(7\dots))$ or sight of 450		3	M1 For one of $\times 1000$ (eg sight of 27 000) or $(\div 60 \div 60)$ or $\div 3600$ oe ie correct conversion of distance units or of time units or $\frac{1000}{60 \times 60}$	M2 for $27 \div 3.6$ or $27 \times \frac{5}{18}$
	$\frac{27 \times 1000}{60 \times 60}$ oe $(0.45 \times 1000) \div 60$ or $0.27\dots \times 27$			M1 For a fully correct method with correct use of brackets eg $27\ 000 \div 60 \times 60$ is M1 only if not recovered	
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	7.5		A1 $\frac{15}{2}$ or $7\frac{1}{2}$ oe	
				Total 3 marks	

26	$17 \times 11 (= 187)$ or $18.5 \times 12 (=222)$ or $18 \times 9 (=162)$ or $18.5 \times 10 (= 185)$		4	M1 Expression for total of A or B either including or excluding last round	M2 for $1.5 \times 11 + 18.5 (= 35)$ or $9 \times 0.5 + 18.5 (= 23)$
	$18.5 \times 12 - 17 \times 11$ (“222” – “187”)(= 35) or $18.5 \times 10 - 18 \times 9$ (“185” – “162”)(= 23) or $\frac{"187"+x}{12} = 18.5$ ($x = 35$) or $\frac{"162"+y}{10} = 18.5$ ($y = 23$) or Diff between A and B in first rounds “187” – “162” (= 25) or Diff between A and B after further round “222” – “185” (= 37) [or $2 \times 18.5 (= 37)$ where 2 must come from correct working]			M1 expression for number of points gained by A or B in the last round or for an equation that could lead to the number of points gained by A or B in the last round	OR $1.5 \times 11 (= 16.5)$ or $0.5 \times 9 (= 4.5)$
	“35” – “23” or “37” – “25” or “16.5” – “4.5”			M1 calculation for difference between number of points scored in last round	
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	12		A1	
				Total 4 marks	

The 2 is 2 further rounds of 18.5 ie 37 comes from $18.5 \times 12 - 18.5 \times 10$ so the 2×18.5 is $(12 - 10) \times 18.5$

27	<p>eg ($DEK =$) $\frac{360}{9}$ or 40</p> <p>or (interior angle $=$) $\frac{(9 - 2) \times 180}{9}$ or 140</p> <p>or $OFK = 140 \div 2 (= 70)$</p> <p>or $FOK = \frac{2}{9} \times 360 (= 80)$</p> <p>or $EDK = 180 - 0.5 \times 140 (= 110)$</p> <p>Angles marked correctly (any exterior or interior angle) gains this mark</p>		3	<p>M1 method to find interior or exterior angle or correct interior or exterior angle stated or shown correctly on diagram or for using 70° for OFK or 80° for FOK or 110 for EDK</p> <p>If a student has only found an interior or exterior angle and has clearly mixed up interior and exterior angles this mark cannot be awarded but can still be awarded for any of the other angles stated</p>
	<p>$EDK = 110$ and $DEK = 40$</p> <p>or</p> <p>$FOK = 80$ and $OFK = 70$</p> <p>or</p> <p>$ODE = 70$ and $DEK = 40$</p> <p>or</p> <p>$FED = 140$ and $EDK = 110$ oe</p>			<p>M1 For two correct angles that can lead directly to the answer in a single step (eg $180 -$ both angles or one angle minus the other)</p>
	<p><i>Correct answer scores full marks (unless from obvious incorrect working)</i></p>	30		A1
				Total 3 marks

28	$\cos BAD = \frac{8}{14}$ or $\sin ABD = \frac{8}{14}$ or $\sin ABD = \frac{8 \sin 90}{14}$ or $(BD =) \sqrt{14^2 - 8^2} (= \sqrt{132} = 2\sqrt{33} = 11.489\dots)$		4	M1
	$BAD = \cos^{-1}\left(\frac{8}{14}\right) (= 55.1(5\dots))$ or $\cos^{-1}\left(\frac{14^2 + 8^2 - "11.489"^2}{2 \times 14 \times 8}\right)$ $BAD = \sin^{-1}\left(\frac{"11.489\dots"}{14}\right) (= 55.1(5\dots))$ or $BAD = \tan^{-1}\left(\frac{"11.489\dots"}{8}\right) (= 55.1(5\dots))$ or $BAD = 180 - 90 - \sin^{-1}\left(\frac{8}{14}\right) (= 180 - 90 - 34.8\dots = 55.1(5\dots))$ or $CAD = 180 - 38 - \sin^{-1}\left(\frac{8}{14}\right) - 90 (= 180 - 38 - 34.8 - 90 = 17.2)$			M1 (accept 55.1 or 55.2 without working)
	$\tan("55.15\dots" - 38) = \frac{CD}{8}$ oe eg $\tan 17.2 = \frac{CD}{8}$ oe or $\frac{CD}{\sin(55.1\dots - 38)} = \frac{8}{\sin(90 - (55.1\dots - 38))}$ oe			M1 A correct equation with CD being the only unknown value
	<i>Correct answer scores full marks (unless from obvious incorrect working)</i>	2.47		A1 2.44 – 2.48
				Total 4 marks

