

Mark Scheme (Results)

November 2024

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

## **Edexcel and BTEC Qualifications**

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at <a href="https://www.edexcel.com">www.edexcel.com</a> or <a href="https://www.edexcel.com">www.btec.co.uk</a>. Alternatively, you can get in touch with us using the details on our contact us page at <a href="https://www.edexcel.com/contactus">www.edexcel.com/contactus</a>.

## Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: <a href="https://www.pearson.com/uk">www.pearson.com/uk</a>

November 2024
Question Paper Log Number P75932A
Publications Code 4MA1\_1F\_2411\_MS
All the material in this publication is copyright

© Pearson Education Ltd 2024

## **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

- o M marks: method marks
- A marks: accuracy marks
- B marks: unconditional accuracy marks (independent of M marks)

### Abbreviations

- o cao correct answer only
- ft follow through
- o isw ignore subsequent working
- SC special case
- oe or equivalent (and appropriate)
- o dep dependent

- o indep independent
- o 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.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

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 eq 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 in another.

International G	CSE Maths			
Values in quotati	on marks must come from a correct method prev	viously seen unless clear	rly stated	otherwise.
Q	Working	Answer	Mark	Notes
<b>1</b> (a)		Laerdal	1	B1 allow incorrect spelling
(b)		900	1	B1 allow 9 hundreds
(c)		St Gotthard	1	B1 allow incorrect spelling
(d)		twelve thousand	1	B1 allow incorrect spelling
		nine hundred (and)		
		forty		
(e)		31512	1	B1 cao
				Total 5 marks

<b>2</b> (a)(i)	Isosceles	1	B1 allow incorrect spelling
(ii)	Square	1	B1 allow incorrect spelling
(b)	Correct line	1	B1
(c)	4	1	B1 cao
			Total 4 marks

3	(a)		16	1	B1 cao
	(b)	19 and 10 or –9 or		2	M1 Allow 19 and 10 seen on pictogram
		19 - x or $y - 10$			x and y are incorrect values
		Correct answer scores full marks (unless from	9		A1
		obvious incorrect working)			SC B1 for 3 or 6 with or without seeing
					the figures on the pictogram
	(c)		Three large squares	1	B1 oe eg 13 small squares
			and one small		
			square		
					Total 4 marks
4	(a)		70	1	B1 cao
	(b)		15	1	B1 cao
	(c)		7000	1	B1 allow -40
	·				Total 3 marks

5	(a)		11 <i>d</i>	1	B1
	(b)		10 <i>pm</i>	1	B1 or 10mp
	(c)		-24	1	B1 cao
	(d)		48	1	B1cao
	(e)		$a^4$	1	B1 cao
	(f)	$9 \times 8 \text{ or } 72 \text{ and } \pm 4 \times 12 \text{ or } \pm 48$		2	M1
		Correct answer scores full marks (unless from	24		A1 cao
		obvious incorrect working)			SC B1 for 76
					Total 7 marks

6	2358 × 0.28 (= 660.24)	2358 × 0.28 (= 660.24)	2358 ÷ 12 (= 196.5)	2358 ÷ 12 (= 196.5)	42 ÷ 0.28 (= 150)	42 × 12 (= 504)		4	M1
	42 × 12 (= 504)	660.24 ÷ 12 (= 55.02)	"196.5" × 0.28 (= 55.02)	42 ÷ 0.28 (= 150)	"150" × 12 (= 1800)	"504" ÷ 0.28 (= 1800)			M1
	"660.24" – "50 <sup>2</sup>	1,,,							M1
	or ("55.02" – 42) >								WH
	or ("196.5" – "150") × 12 × 0.28 oe								
	or $(2358 - "1800") \times 0.28$ oe								
	Correct answer scores full marks (unless from obvious incorrect working)					156.24		A1	
								Total 4 marks	

7	180 – 138 (= 42)		4	M1
				NB If angles are on the diagram they
				must be from correct working and
				correctly assigned
	360 – ("42" + 107 + 125)			M1
	Correct answer scores full marks (unless from	86		A1
	obvious incorrect working)			
		one correct reason		B1 dep on M1for one correct reason
				(i) Angles on a straight <u>line</u> add to 180° or
				angles on a straight <u>line</u> add to <u>180°</u>
				(ii) Angles in a quadrilateral sum to 360°
				or angles in a <u>quadrilateral</u> sum to <u>360°</u>
				Total 4 marks

8	(a)		$\frac{27}{80}$	1	B1 oe 0.33(75) or 33(.75)% truncated or rounded
	(b)	$\frac{80 - (27 + 10) (= 43) \text{ oe or } 80 - 37 (= 43)}{80 - (27 + 10)} \text{ oe or } \frac{80 - 37}{80}$		2	M1
		Correct answer scores full marks (unless from obvious incorrect working)	$\frac{43}{80}$		A1 oe 0.53(75) or 53(.75)% truncated or rounded NB Penalise incorrect notation once
					Total 3 marks

9	$41.25 \div 15$ oe or 2.75 oe or		2	M1
	$\frac{52}{2} \times 41.25$ oe			
	15			
	Correct answer scores full marks (unless from	143		A1
	obvious incorrect working)			
				Total 2 marks

10	$[5.8, 6.2] \times 1.5$	$[5.8, 6.2] \times 18$		3	M1	M2 for
	(=[8.7, 9.3])	(=[104.4, 111.6])				$[5.8, 6.2] \times$
	"[8.7, 9.3]" × 18	"[104.4, 111.6]"× 1.5			M1	27
	(=[156.6, 167.4])	(=[156.6, 167.4])			Do not allow	
	or	or			$18 \times 1.5$ oe on its own	
	their value × 18	their value $\times 1.5$				
	Correct answer scores full marks (unless from obvious incorrect working)		162		A1 allow [156.6, 167.4]	
					Ignore attempts at conversi- minutes to hours/minutes o	
						Total 3 marks

11	c-5=8d  oe or  -8d=-c+5  or		M1
	$\frac{c}{8} = d + \frac{5}{8} \text{ oe or } \frac{c-5}{8} \text{ oe}$		
	Correct answer scores full marks (unless from obvious incorrect working)	$d = \frac{c-5}{8}$	A1 accept $d = \frac{c}{8} - \frac{5}{8}$ oe or $d = \frac{5 - c}{-8}$ oe
			(must see $d = \dots$ on answer line or in
			working)
			Total 2 marks

12	x   -2   -1   0   1   2   3	Correct line between	3	B3 for a correct line between $x = -2$ and
	y -2 -1.5 -1 -0.5 0 0.5	x = -2		x = 3
		and		
		<i>x</i> =3		(B2 for a correct straight line segment
				through at least 3 of $(-2, -2)$ $(-1, -1.5)$
	(-2, -2) (-1, -1.5) (0, -1) (1, -0.5) (2, 0) (3, 0.5)			(0,-1)(1,-0.5)(2,0)(3,0.5)
				or
	1-			for all of $(-2, -2)$ $(-1, -1.5)$ $(0, -1)$ $(1, -1.5)$
	4			[-0.5) (2, 0) (3, 0.5) plotted but not joined)
	-2 -1 0 1 2 3 x			(B1 for at least 2 correct points stated
	*			(may be in a table) <b>or</b> plotted <b>or</b> for a line
	-1.4			drawn with a positive gradient through
				(0, -1) or for a line with a gradient of 0.5)
	X -2-			
				Total 3 marks

13	$3.6 \times 2.1 = 7.56$ or		4	M1
	$0.3 \times 0.3 = 0.09$ or			
	$3.6 \div 0.3 = 12$ or			
	$2.1 \div 0.3 (= 7)$			
	"7.56" ÷ "0.09" (= 84) or			M1
	"12" × "7" (= 84)			
	"84" $\div$ 6 × 17.5(0) oe			M1 for a complete method
	Correct answer scores full marks (unless from	245		A1
	obvious incorrect working)			
				Total 4 marks

<b>14</b> (a)	(3)	(4)	5	6	For all correct	2	B2 for all correct values
	5	6	(7)	8	values		(B1 for 6 or 7 correct values)
	7	8	9	(10)			
(b)						2	M1 for $\frac{m}{12}$ where $m < 12$ or $\frac{11}{n}$ where $n > 11$ or for 11:12
	Correct and obvious inc			unless from	$\frac{11}{12}$		A1 oe 0.91(666) or 91(.666)% truncated or rounded
							Total 4 marks

15	$0.35 \times 140 \ (= 49) \ \text{oe} \ \text{or}$		4	M1
	14 + 14 + 14 + 7 (= 49) oe or			
	$\frac{1}{4}$ , 140(= 35) oe or 140 ÷ 4 (= 35) or			
	$0.4 \times 140 \ (= 56) \ \text{oe}$			
	"49" × 6 (= 294) oe or			M1 for 1 correct
	" $35$ " × 8 (= 280) oe or			
	$(140 - 49" - 35") \times 10 (= 560)$ or			
	"56" $\times$ 10 (= 560)			
	"49" × 6 (= 294) oe <b>and</b>			M1 for all correct
	" $35$ " × 8 (= 280) oe and			
	$(140 - 49" - 35") \times 10 (= 560)$ or			
	"56" × 10 (= 560)			
	Correct answer scores full marks (unless from	1134		A1 cao
	obvious incorrect working)			
				Total 4 marks

16	30 or 50		2	M1
	Working required	1500		A1 cao dep on M1
				1500 must come from correct figures of 30 and 50
				Total 2 marks

17	P -2 -3 -4 -5 -5 -4 -5 -5 -4 -5 -5 -4 -5 -4 -5 -5 -4 -3 -2 -1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2 3 4 5 6 x	Triangle with vertices (3, -1) (5, -1) (3, -4)	2	B2 for a correct reflection  (B1 for a correct reflection in a vertical line or for 2 points of the correct triangle or for a correct reflection in <i>y</i> = 1)  Overlay is available
					Total 2 marks

			1	1 .	<u></u>
18	(a)		$10$	1	B1 allow $10 \Box p \Box 15$ or $10  or$
					$10 \Box p < 15 \text{ or } 10 - 15$
	(b)	$12.5 \times 18 + 17.5 \times 16 + 22.5 \times 14 + 27.5 \times 8 + 32.5 \times 4$		4	M2 for at least 4 correct products added
	` /	(= 1170)			(need not be evaluated) <b>or</b>
					(
		or			If not M2 then award:
		225 + 280 + 315 + 220 + 130 (= 1170)			M1 for consistent use of value within
		` ,			interval (including end points) for at least
		[lower bound products are: 180, 240, 280, 200, 120]			4 products which must be added
		[upper bound products are: 270, 320, 350, 240, 140]			r
		[ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [			or
		Sum of lower bound products = 1020			
		Sum of upper bound products = 1320			correct midpoints used for at least 4
		Sum of apper bound products – 1320			products and not added
		Sum of products using 11, 16, 21, 26 and 31 = 1080			products and not added
		Sum of products using 12, 17, 22, 27 and $32 = 1140$			
		Sum of products using 12, 17, 22, 27 and $32 = 1140$ Sum of products using 13, 18, 23, 28 and $33 = 1200$			
		Sum of products using 14, 19, 24, 29 and 34 = 1260			
		"1170" ÷ 60			M1 dep on at least M1
		11/0 . 00			wir dep on at least wir
					Allow division by their $\Sigma f$ provided
					addition or total under column seen
		Connect annual scores full marks (unless from their	10.5		
		Correct answer scores full marks (unless from obvious	19.5		A1 oe
		incorrect working)			m 4 3 5
1					Total 5 marks

19	angl	lly correct gle bisector all relevant arcs	B2 for a fully correct angle bisector with all arcs shown (the line and the arcs can intersect on or within the overlay guidelines)
			(B1 for all arcs and no angle bisector drawn or for a correct angle bisector within or on guidelines but no arcs or insufficient arcs)
			NB Overlay is available
			Total 2 marks

20	(a)		$p^{15}$	1	B1 cao
	(b)	$8n^2 + 6n + n^2 - 4n$		2	M1 for expanding with at least 3 correct terms (must see for example, $8n^2$ and not just $2n \times 4n$ )(can assume that no sign in front of a number is $a + if$ terms written in a list or table)
			$9n^2 + 2n$		A1 oe $2n+9n^2$ or $n(9n+2)$ or $n(2+9n)$
	(c)	e.g. 2x+5=12-3x or $\frac{2}{3}x+\frac{5}{3}=4-x$ oe		3	M1 for removal of fraction and multiplying out RHS correctly by 3 or separating fraction (LHS) in an equation
		e.g. 2x+3x=12-5  or  5x=7  or 5-12=-3x-2x  or  -7=-5x  or $\frac{2}{3}x+x=4-\frac{5}{3} \text{ oe or } \frac{5}{3}x=\frac{7}{3} \text{ oe}$			M1 ft (dep on 4 terms) correctly rearranging their 4 term equation for terms in <i>x</i> on one side of equation and number terms on the other
		Working required	$\frac{7}{5}$		A1 oe eg 1.4 or $1\frac{2}{5}$ dep on M2
					Total 6 marks

<b>21</b> (a)	2 3 5 7	1	B1 All numbers must be present with no repeats and no other numbers.  Numbers can be in any order Allow commas, colons, etc, between the numbers
(b)	3 7	1	B1 Both numbers must be present with no repeats and no other numbers.  Numbers can be in any order  Allow commas, colons, etc, between the numbers
(c)	2 4 5 6 8	1	B1 All numbers must be present with no repeats and no other numbers.  Numbers can be in any order Allow commas, colons, etc, between the numbers
1			Total 3 marks

22	$\pi \times 70^2 \times 18$ oe or $\pi \times 0.7^2 \times 0.18$ oe		4	M1 for use of $\pi r^2 h$
	$88200\pi$ or $277\ 088(.472)$ ) or $0.0882\pi$ or $\frac{441}{5000}\pi$ or $0.277(088472)$			A1 Allow 276 948 – 277 200 or Allow 0.276 948 – 0.277 200
	"277 $088(.472)$ " ÷ $1000 (= 277.088)$ or $88200\pi \div 1000 (= 88.2\pi \text{ or } \frac{441}{5}\pi)$ "0.277 $(088472)$ " × $1000 (= 277.088)$ or $88200\pi \div 1000 (= 88.2\pi \text{ or } \frac{441}{5}\pi)$			Allow a value for their volume which contains $\pi$ , 70 and 18 to be divided by 1000  Allow a value for their volume which contains $\pi$ , 0.7 and 0.18 to be multiplied by 1000
	Correct answer scores full marks (unless from obvious incorrect working)	277		A1 awrt 277
				Total 4 marks

B1 for $2^2 \times 5^2$ oe or $2 \times 2 \times 5 \times 5$ oe or $2^2 \times 7$ oe or $2 \times 2 \times 7$ oe or $5^2 \times 7$ oe or $5 \times 5 \times 7$ oe or $5^2 \times 7$ oe or $5 \times 5 \times 7$ oe or $5^2 \times 7$	$2^2 \times 5^2 \times 7$	2	B2 Allow $2 \times 2 \times 5 \times 5 \times 7$ Answers must be a product of prime factors  Can be in any order (allow $2^2 \cdot 5^2 \cdot 7$ )  Do not allow 1 in the final answer $2 \times 2 \times 5 \times 5 \times 7$ in working space and 700 on answer line award B2 $2^2 \times 5^2 \times 7$ in working space and 700 on answer line award B2  (B1 for $2^p \times 5^q \times 7^r$ where two of $p$ or $q$ or $r$ are correct  or  one mistake in their product (see working on the left for examples)  or  for 700)
			Total 2 marks

24	$475 \times 0.16 = 76$ oe <b>or</b> $475 \times (1 - 0.16) = 399$ oe		4 M1 (working for shop A)
	$     \begin{array}{r}             1 - 0.15 & (= 0.85) \text{ or } x - 0.15x = 408 \text{ or} \\             100(\%) - 15(\%) & (= 85(\%)) \text{ or} \\             \frac{408}{85} & (= 4.8) \text{ oe}     \end{array} $		M1 (working for shop B)
	85 408 ÷ "0.85" (= 480) or 408 ÷ "85" × 100 (= 480) or 408 × 100 ÷ "85" (= 480) oe or		M1 (working for shop B)
	"4.8" × 100 (= 480) or $\frac{408}{85} \times 15 (= 72)$		
	Working required	<b>A and</b> 72 and 76 seen	A1 dep on M2 for <b>A</b> with correct working (72 and 76 seen)
			Total 4 marks

25 (a)(i)	$(x\pm 8)(x\pm 3)$ or		2	M1 for $(x\pm 8)(x\pm 3)$ or
	x(x-3)+8(x-3) or			(x+a)(x+b) where $ab = -24$ or
	x(x+8)-3(x+8)			a + b = 5 and, a and b are integers
	Correct answer scores full marks (unless from obvious incorrect working)	(x+8)(x-3)		A1 for $(x+8)(x-3)$ Allow any letter for $x$
				Must be in the form $(x+a)(x+b)$ where $a$ and $b$ are integers
(ii)		-8 and 3	1	B1 must ft from their answer in (a)(i) ft from their incorrect factors in the form $(x + a)(x + b)$ Award B0 for $-8$ and 3 if no marks scored in (a)(i)
(b)	3y-7y > -10-5 or $5+10 > 7y-3y$		3	M1 allow use of = or condone incorrect inequality sign
	$-4y > -15 \text{ or } 15 > 4y \text{ or } y = \frac{15}{4} \text{ oe or}$			M1 allow use of = or condone incorrect inequality sign
	Working required	$y < \frac{15}{4}$		A1 dep on M1 oe eg $y < 3.75$ or $\frac{15}{4} > y$ or $3.75 > y$ Must have correct sign on answer line
				NB Sight of correct answer in working space and just $(y =) \frac{15}{4}$ oe on answer line gains M2 only  Total 6 marks

26	(a)		0.000 084	1	B1 cao
	(b)	$52 \times 10^{145}$ or $5.2 \times 10^n$ or		2	M1
		$p \times 10^{146}$ where $1 \le p < 10$			
		Correct answer scores full marks (unless from	$5.2 \times 10^{146}$		A1
		obvious incorrect working)			
					Total 3 marks

27	eg $51^2 = (DE)^2 + 24^2$ oe <b>or</b> $2601 = (DE)^2 + 576$ oe <b>or</b> $(DE^2 = )51^2 - 24^2 (= 2025)$ oe <b>or</b> $(DE^2 = )2601 - 576 (= 2025)$ oe <b>or</b>	5	M1 for applying Pythagoras theorem correctly
	$\cos(DFE) = \frac{24}{51} \text{ or } \sin(DEF) = \frac{24}{51}$		
	$(DE =)\sqrt{51^2 - 24^2} = \sqrt{2025} = 45$ or $(DE =)\sqrt{2601 - 576} = \sqrt{2025} = 45$		M1 for square rooting
	or $(DFE =)\cos^{-1}\left(\frac{24}{51}\right) (=61.9)$ or $(DEF =)\sin^{-1}\left(\frac{24}{51}\right) (=28.0)$		
	$\frac{their  DE}{7.5} (=6) \text{ oe } \mathbf{or}  \frac{7.5}{their  DE} (=\frac{1}{6}) \mathbf{or}  \frac{x}{24} = \frac{7.5}{their  DE} \text{ oe}$ $\mathbf{or}  \tan"their  61.9" = \frac{7.5}{(x)} \mathbf{or}  \tan"their  28.0" = \frac{(x)}{7.5} \mathbf{or}$ $\frac{(x)}{\sin(their  28.0)} = \frac{7.5}{\sin(their  61.9)}$ NB Their $ED$ or their $61.9$ or their $28.0$ must be clearly identified Their $61.9$ or their $28.0$ cannot be used as lengths of the triangle		M1 for a correct method to find the scale factor Allow correct use of sine rule/cosine rule/Pythagoras theorem Allow 0.17 or better for $\frac{1}{6}$ Special case Allow $(DE =)\sqrt{51^2 + 24^2}$ $(=\sqrt{3177} = 3\sqrt{353} = 56.3)$ for "45" for this mark
	Their 45 cannot be used as an angle of the triangle  24 ÷ "6" oe or $24 \times \frac{1}{6}$ " or $24 \times 1.67$ " or $(x =) \frac{7.5}{their ED} \times 24$ or $(x =) \frac{7.5}{tan"their 61.9}$ oe or $(x =) 7.5 \times tan"their 28.0$ " oe  or $(x =) \frac{7.5}{\sin(their 61.9)} \times \sin(their 28.0)$ oe  or $51 \times \frac{1}{6}$ " (= 8.5) and $(x =) \sqrt{8.5^2 - 7.5^2}$ (= $\sqrt{16}$ )		M1 dep on previous M1 for a correct method to find $x$ or for finding $BC$ and using Pythagoras theorem to find $x$ Allow $24 \times "\frac{7.5}{56(.3)}"$ or $24 \div "\frac{56(.3)}{7.5}"$ for scale factor for this mark
	Working required	4	A1 dep on M2 The value of 4 must come from correct figures
			Total 5 marks