Pearson Edexcel

Mark Scheme (Standardisation)

January 2020

Pearson Edexcel International GCSE
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. 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 19 and 24 the correct answer, unless clearly obtained by an incorrect method, should be taken to imply a correct method				
Q	**Working**	**Answer**	**Mark**	**Notes**
1 (i)		13 or 23	1	B1
(ii)		36	1	B1
(iii)		14	1	B1
				Total 3 marks

2 (a)		0.5, 0.501, 0.51, 0.55	1	B1
(b)		$\frac{3}{10}$	1	B1 for $\frac{3}{10}$ oe eg $\frac{30}{100}$
(c)		0.47	1	B1
				Total 3 marks

3	20 ÷ 4 (= 5) **or** width = 15 **or** length = 20		3	M1 Could be clearly shown on diagram
	(4 × '5') × (3 × '5') **or** 20 × 15 **or** ('5' × '5') × 12 **or** 25 × 12			M1 dep on M1
		300		A1 for 300 SCB1 for 60 × 80 (=4800)
				Total 3 marks

4	(a)		12	1	B1	
	(b)	'12' × 2.5	30	1	B1ft	Ft their 12
	(c)	One and a quarter rectangles	One and a quarter rectangles drawn oe	1	B1	ft their 12
	(d)	36 × 5000 (= 180 000) or 200 000 ÷ 5000 (=40)		2	M1	
			No and 180 000		A1	for no oe **and** 180 000 **or** no oe **and** 40 **or** no oe **and** 20 000 short or 20 000 **and** short/off
						Total 5 marks

5	(a)		10*ab*	1	B1	
	(b)		4	1	B1	
						Total 2 marks

6	(a)		cuboid	1	B1	Accept rectangular cuboid or rectangular prism. Do not accept cube
	(b)		6.5	1	B1	Accept 6.4 – 6.6
	(c)		A and F	1	B1	May be stated or could be circled in list
						Total 3 marks

7	(a)		60	1	B1	for 60
	(b)	3 × 6 (=18)		2	M1	for 3 × 6 (=18)
			20		A1	for 20
	(c)		+3	1	B1	or $\times\frac{8}{5}$
						Total 4 marks

8	(a)		−4, (−1), 2, (5), 8, 11, (14), 17	2	B2	for −4, 2, 8, 11, 17
					(B1	for 3 or 4 correct values)
	(b)			2	M1	(may ft from (a) if B1 awarded) for at least 5 points correctly plotted – if no plots, use points at which graph crosses squares or M1
			Graph drawn		A1	for correct graph drawn from $x = -1$ to $x = 6$
						Total 4 marks

9	(a)(i)		$\frac{10}{25}$	1	B1	for 0.4 oe
	(ii)		$\frac{8}{25}$	1	B1	for 0.32 oe (penalise incorrect notation once only in (a))
	(b)		2	1	B1	for 2
	(c)	(1×14) + (2×17) + (3×15) + (4×12) + (5×9) (= 14 + 34 + 45 + 48 + 45)		2	M1	For correct products seen – condone one incorrect product or one missing product
			186		A1	for 186
						Total 5 marks

10	5.25 ÷ 3 (= 1.75)		4	M1	
	[9.75 – (2 × '1.75')] ÷ 5 (= 1.25)			M1	
	(5 × '1.75') + (3 × '1.25') (= 8.75 + 3.75)			M1	
		12.5(0)		A1	
					Total 4 marks

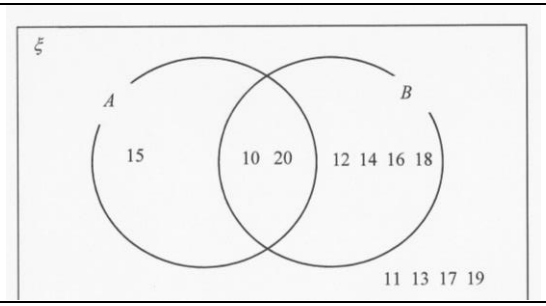
11	(a)(i)		<	1	B1	for <
	(ii)		>	1	B1	for >
	(b)		Neon	1	B1	for neon
	(c)		Mercury	1	B1	for mercury
	(d)	(−35 − − 101) ÷ 10 (=±6.6) **or** ±66 ÷ 10 (= ±6.6) **or** (−35 − − 101) ÷ 5 **or** ±66 ÷ 5 **or** clearly showing counting down from −35 to −95 in 10's or 5's and indicating times by the side **or** from 35 to 95 in 10's or 5's and indicating times by the side with at most one error **or** −95 = 12 mins **or** −100 = 13 mins **or** −105 = 14 mins **or** a correct method to get 66 **and** one of 60 = 12 mins **or** 65 = 13 mins **or** 70 = 14 mins **or** a correct method to get 66 **and** clearly showing counting up or down in 10's or 5's **or** an answer of 13 **or** 14 **or** 13.12		2	M1	
			13.2		A1	for 13.2 or 13 minutes 12 seconds
						Total 6 marks

12	$\frac{7.5}{100}\times 120$ (= 9) or 1.075 ×120 (=129) or 120 × 12 × 0.075 (108)		3	M1
	(120 + '9') × 12 or "129" × 12 120 × 12 × 0.075 + 120 × 12 oe eg 108 + 1440			M1
		1548		A1
				Total 3 marks

13	(a)		$5x - x^2$	1	B1
	(b)		$3(y - 7)$	1	B1
	(c)	$f + d = 3p$ **or** $\frac{f}{3} = p - \frac{d}{3}$		2	M1 A correct first stage in a correct formula
			$p = \frac{f+d}{3}$		A1 for $p = \frac{f+d}{3}$ (must see p =… at some stage) (SCB1 for $p = \frac{f-d}{3}$)
	(d)		$T = 10m + 6n$	3	B3 for $T = 10m + 6n$ oe
					(B2 for $10m + 6n$ or $T = 10m + an$ or $T = bm + 6n$ or $T = 6m + 10n$)
					(B1 for $10m + an$ or $bm + 6n$ or $6m + 10n$) or for T = an incorrect expression in m and n
					Total 7 marks

14		Rotation 180° and (0, 0)	2	B1	Rotation (with none of reflection, translation, enlargement, mirrored, flipped or moved stated)
				B1	180° centre (0, 0) or *O* (award if no vector or equation of line or SF mentioned) (B2 for enlargement SF −1 centre *O*)
					Total 2 marks

15	180 – 140 (= 40) **or** 180(n – 2) = 140n oe		3	M1	Correct method to find exterior angle or correct substitution into formula
	360 ÷ '40' **or** 40n = 360 oe			M1	
		9		A1	
					Total 3 marks

16			3	B3	B3 for all 4 correct regions B2 or 2 or 3 correct regions B1 for 1 correct regions
					Total 3 marks

17	(a)		x^7	1	B1	
	(b)	eg $7^8 \times 7^4 = 7^{12}$ or $7^8 \div 7^3 = 7^5$ or $7^5 \times 7^4$ or $7^4 \div 7^3 = 7$ or $7^8 \times 7$ or $7^{'12'} \div 7^3 = 7^{'12'-3}$		2	M1	for one correct step – must be written as a power of 7
			7^9		A1	for 7^9
						Total 3 marks

18	32.4×100^3		2	M1	for 32.4×100^3 oe
		32 400 000		A1	for 32 400 000 accept 3.24×10^7
					Total 2 marks

19	$\frac{14}{3}(+)\frac{19}{5}$ or $(4)\frac{10}{15}(+)(3)\frac{12}{15}$ or $(4)\frac{10a}{15a}(+)(3)\frac{12a}{15a}$		3	M1	for correct improper fractions or fractional part of numbers written correctly over a common denominator
	eg $\frac{14\times5+19\times3}{3\times5}$ or $\frac{70}{15}+\frac{57}{15}$ or $\frac{70a}{15a}+\frac{57a}{15a}$ or $4\frac{10}{15}+3\frac{12}{15}=7\frac{22}{15}$ oe			M1	for correct fractions with a common denominator of 15 or a multiple of 15
	$\frac{70}{15}+\frac{57}{15}=\frac{127}{15}=8\frac{7}{15}$ or $7\frac{22}{15}=8\frac{7}{15}$ or if shows $8\frac{7}{15}=\frac{127}{15}$ at the beginning then show that the addition comes to $\frac{127}{15}$	Shown		A1	dep on M2 for a correct answer from fully correct working **or** shows that RHS = $\frac{127}{15}$ **and** fully correct working shows LHS = $\frac{127}{15}$
					Total 3 marks

20	$30 + 4x + 10 + x + 20$ (= $5x + 60$) **or** $180 - 30$ (=150)		4	M1	Allow $5x + 60 = n$ where $n \neq 180$ or for subtracting 30 from 180	M2 for $5x + 30 = 150$ oe
	e.g. $30 + 4x + 10 + x + 20 = 180$ **or** $5x + 60 = 180$ oe **or** $180 - 30 - 10 - 20$ (=120) oe eg $180 - 60$			M1	for setting up the equation or for subtracting all numerical values of angles from 180	
	$5x = 120$ **or** "120" ÷ 5			M1	dep on M2 for correctly simplifying to $ax = b$ or for dividing "120" by 5	
		24		A1	for 24	
						Total 4 marks

21		Fully correct angle bisector with all relevant arcs shown	2	B2	Fully correct angle bisector with all arcs shown. B1 for all arcs and no angle bisector drawn or for a correct angle bisector within guidelines but not arcs or insufficient arcs
					Total 2 marks

22	1 – (0.24 + 0.31) (= 0.45) or (0.24 + 0.31) × 180 (= 99)		4	M1	or for a correct equation for missing values eg $x + 0.24 + 2x + 0.31 = 1$ oe (can be implied by 2 probabilities that total 0.45 in table if not contradicted in working space)
	'0.45' ÷ 3 (= 0.15) or '0.45' × 180 (= 81) or 180 − 99 (= 81)			M1	(or 0.15 correctly placed in table if not contradicted)
	'0.15' × 180 or '81' ÷ 3			M1	Or an answer of $\frac{27}{180}$
		27		A1	
					Total 4 marks

23 (a)	$2x > 4 - 7$ **or** $x + 3.5 > 2$			2	M1	For a correct first step allow $2x = 4 - 7$ or $x + 3.5 = 2$ or an answer of $x = -1.5$ or $x < -1.5$ or -1.5
			$x > -1.5$		A1	for $x > -1.5$ oe
(b)	$(x \pm 8)(x \pm 5)$	$\frac{-(-3) \pm \sqrt{(-3)^2 - 4 \times 1 \times (-40)}}{2 \times 1}$ **or** $\frac{3 \pm \sqrt{9 + 160}}{2}$			M1	**or** $(x + a)(x + b)$ where $ab = -40$ **or** $a + b = -5$ **OR** correct substitution into quadratic formula (condone one sign error in a, b or c and missing brackets) (if + rather than ± shown then award M1 only unless recovered with answers)
	$(x - 8)(x + 5)$	$\frac{3 \pm \sqrt{169}}{2}$ **or** $\frac{3 \pm 13}{2}$			M1	$\frac{3 \pm \sqrt{169}}{2}$ **or** $\frac{3 \pm 13}{2}$
			8, −5	3	A1	dep on at least M1 for correct values
						Total 5 marks

24 (a)	545 – 500 (= 45) **or** 592 – 545 (= 47)		4	M1	may be seen as part of a calculation	
	$\frac{45}{500}\times100(=9)$ **or** $\frac{47}{545}\times100(=8.6)$			M1	for one correct expression (allow 8 or 8.7 from a correct expression for 8.6 throughout)	
	$\frac{45}{500}\times100(=9)$ **and** $\frac{47}{545}\times100(=8.6)$			M1	for both correct expressions **or** having found "9%" finds 109% of 545: 1.09 × 545(=594.05) or 9% of 545 (49.05) or having found "8.6%" finds 108.6% of 500: 1.086 × 500(=543) or 8.6% of 500 (43)	
		No, 9(%) and 8.6(%)		A1	for no oe, 9% and 8.6% seen or no oe and 9% and 594.05 or 8.6% and 543 or No, 49.05 > 45 or No 594.05 > 592 oe	
Alternative mark scheme for 8(a)						
	$\frac{545}{500}\times100(=109)$ or $\frac{545}{500}(=1.09)$ **or** $\frac{592}{545}\times100(=108.6)$ or $\frac{592}{545}\left(=1.086\right)$		4	M3	for both correct expressions which should lead to 109 **or** 1.09 **and** 108.6 **or**1.086 (allow 108 or 108.7 from correct working for 108.6 or 1.08 or 1.087 from correct working for 1.086 throughout) (if not M3 then award M2 for one of these expressions)	
	$\frac{545}{500}\times100(=109)$ or $\frac{545}{500}(=1.09)$ **and** $\frac{592}{545}\times100(=108.6)$ or $\frac{592}{545}\left(=1.086\right)$					
		No, 109(%) and 108.6(%)		A1	oe eg no and 1.09 and 1.086	
(b)	952 ÷ 85 × 100 oe (=1120)		3	M1	for a method to find price before discount	M2 for $\frac{952}{85}\times15$
	0.15 × "1120" or "1120" – 952 oe			M1	for a correct method to find discount	
		168		A1		
						Total 7 marks

25	19.3×150		2	M1
		2895		A1
				Total 2 marks

26	50×60 (= 3000) or $50 \div 1000$ (= 0.05 or $\frac{1}{20}$) or $50 \times 60 \times 60$ (= 180 000) or or $\frac{60 \times 60}{1000} (= 3.6)$ or $1000 \div 60 \div 60$ (= 0.27777…. or $\frac{5}{18}$)		3	M1	for 50 with at least one of ÷ 1000 or × 60 or $\frac{60 \times 60}{1000} (= 3.6)$ or $1000 \div 60 \div 60$
	$50 \times \frac{60 \times 60}{1000}$ oe eg $50 \div \frac{5}{18}$			M1	(dep) for a complete method
		180		A1	for 180 (SCB1 for both conversion factors correct but applying them wrongly eg $\frac{50 \times 1000}{60 \times 60}$)
					Total 3 marks

27	$(AC^2 =)\ 17^2 - 15^2$		5	M1
	$(AC =)\ \sqrt{17^2 - 15^2}\ (= \sqrt{64} = 8)$			M1
	$\frac{\pi \times '8'}{2} (= 4\pi = 12.566...)$			M1 dep on M2 for $\frac{\pi \times '8'}{2}$ oe or 4π 12.5663…
	'12.566…'+ 15 + 17			M1 for '12.566' + 15 + 17 and no additional values
		44.6		A1 for awrt 44.6
				Total 5 marks
Alternative mark scheme for 11				
	$\cos^{-1}\left(\frac{15}{17}\right) (= 28.0724)$ or $\sin^{-1}\left(\frac{15}{17}\right)\ (= 61.9275)$		5	M1 for a correct method to find one of the angles
	15 × tan ('28.0724')(= 8) or 15 ÷ tan ('61.9275')(= 8)			M1
	$\frac{\pi \times '8'}{2}$ (= 4π = 12.566…)			M1 dep on M2 for $\frac{\pi \times '8'}{2}$ or 12.5663… or 4π
	"12.566" + 15 + 17			M1 for "12.566" + 15 + 17 and no additional values
		44.6		A1 for awrt 44.6
				Total 5 marks

Appendix 1