Mark Scheme (Results)

January 2014

Pearson Edexcel International GCSE Mathematics A (4MA0/4H) Paper 4H

Pearson Edexcel Certificate Mathematics A (KMA0/4H) Paper 4H

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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.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

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

- **Abbreviations**
  - o   cao – correct answer only
  - o   ft – follow through
  - o   isw – ignore subsequent working
  - o   SC - special case
  - o   oe – or equivalent (and appropriate)
  - o   dep – dependent
  - o   indep – independent
  - o   eeoo – each error or omission
  - o   awrt – anything which rounds to

- **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 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 in another.

Question	Working	Answer	Mark	Notes
Apart from questions 3, 15(a), 18(a) and 20, (where the mark scheme states otherwise) the correct answer, unless clearly obtained from an incorrect method, should be taken to imply a correct method.				
1. (a)	840 : 40 oe or 840 ÷ 40 oe or 1 : 21	21	2	M1 A1 Accept 21 : 1
(b)	(105 ÷ 3) x 2	70	2	M1 M1 for 105 ÷ 3 (=35) A1
(c)	(105 ÷ {4+3}) x 3	45	2	M1 M1 for 105 ÷ (4+3) (=15) A1
				Total 6 marks

2. (a)	0.5 x (11 + 7) x 10	90	2	M1 M1 for (0.5 x 2 x 10) + (7 x 10) + (0.5 x 2 x 10) A1
(b)	"90" x 12	1080	2	M1 ft Their area in (a) x 12 A1 ft
				Total 4 marks

3.	$18y + 30 = 39$ or $3y + 5 = 6.5$ $18y = 39 - 30$ or $3y = 6.5 - 5$	0.5 oe	3	M1 M1 for correct expansion {$18y + 30$} M1 A1 Dependent on at least one M1
				Total 3 marks

4.	(0x2) + 1x10 + 2x7 + 3x6 + 4x3 + 5x2 "64" ÷ 30	2.13 rec oe	3	M1 M1 for 5 correct products stated or evaluated M1 Dependent on first M1 A1 Accept 2.1 or better with no working. Accept 2 if M2 awarded.
				Total 3 marks

5.		rotation 90° clockwise or − 90° {centre} (0,0) or *O* or origin	3	B1 B1 accept 270° or 270° anticlockwise. B1 Award no marks if multiple transformations. condone lack of brackets around 0,0
				Total 3 marks

6.	(a)		k^5	1	B1	
	(b)		$14t - 6$	1	B1	Mark response on answer line or final statement in body of script, do not isw.
	(c) (i)		$8y + 24 - 6y + 21$		M1	M1 for 3 terms with correct signs or 4 terms without signs
			$2y + 45$	2	A1	Mark response on answer line or final statement in body of script, do not isw.
	(c) (ii)		$x^2 - 6x - 4x + 24$		M1	M1 for 3 terms with correct signs or 4 terms without signs
			$x^2 - 10x + 24$	2	A1	Mark response on answer line or final statement in body of script, do not isw.
	(d)				M1	or v^7 / v or $v^4 \times v^2$ or v^{11} / v^5
			v^6	2	A1	
						Total 8 marks

7.	3.2 x 3.2 (= 10.24)			M1	Area of square.
	$\pi \times 5^2$ (= 78.5....) { π = 3.14 or better}			M1	Area of circle, accept awrt 78.5 →78.6 incl.
	$\pi \times 5^2 - 3.2 \times 3.2$			M1	Intention to subtract areas from correct methods.
		68.3	4	A1	Accept awrt 68.3 or 68.4
					Total 4 marks

8.	Fully correct factor tree or repeated division to reach prime factors (condone inclusion of 1's) or 3, 5, 5, 11 or 3 x 5 x 5 x 11 x 1			M2	Factors must multiply to 825
					If not M2 then M1 for correct but incomplete factor tree/ division ladder which includes 2 different primes. (e.g. 25 x 3 x 11)
		3 x 5 x 5 x 11	3	A1 cao	Accept 3 x 5^2 x 11 and dots in place of multiplication signs.
					Total 3 marks

9.	(a) (i)			6, 12	1	B1	
	(a) (ii)			2, 3, 5, 6, 7, 9, 11, 12	1	B1	Withhold mark for repeat elements.
	(b)		No Universal set has only numbers less than 13		1	B1	Dependent on "No" box indicated. (idea that 14 does not belong to $\mathcal{E}$)
							Total 3 marks

10.		4 x 2.6 (= 10.4) (4 x 2.6 – 5) ÷ 3				M1	or 5.4 seen.
						M1	Correct full calculation which would lead to correct answer.
				1.8	3	A1 cao	
		Alternative solution: Any 4 numbers (including 5) that have a total 10.4 or any 3 numbers that have a total of 5.4				M1	
		(Sum of their 3 numbers) ÷ 3				M1	Correct full calculation which would lead to correct answer.
				1.8	3	A1	
							Total 3 marks

11.	(a)			Algeria	1	B1	Accept 2.38 x 10^6
	(b)	1.13 x 10^6 + 2.38 x 10^6 + 9.24 x 10^5 + 5.83 x 10^5 or digits 5017				M1	Intention to add 4 correct values.
				5.017 x 10^6	2	A1	accept 5 x 10^6 or better
	(c)	7.91 x 10^7 ÷ 1.13 x 10^6				M1	
				70 oe	2	A1	
							Total 5 marks

12.	$(DBC =) 60 - x$ (Angles in an) <u>equilateral</u> triangle (= 60 degrees) $BDC = 60 - x$ or $BCD = 60 + 2x$ oe <u>Base/bottom</u> <u>angles</u> in an <u>isosceles</u> triangle (are equal) $(BCD =) 60 + 2x$			B1	Can be marked on diagram. {Reason 1} B1 Can be marked on diagram. B1 {Reason 2} both reasons 1 and 2 needed for B1
		$2x$	4		Can be marked on diagram. B1 Answer only = B3. Numerical methods leading to a numerical answer can only score B1 (for giving both reasons adequately).
	Alternative: {Call ACD "*y*"} $(BDC$ and $DBC =) 60 - "y"/2$ <u>Base/bottom</u> <u>angles</u> in an <u>isosceles</u> triangle (are equal) $x + (60 - "y"/2) = 60$ oe (Angles in an) <u>equilateral</u> triangle (= 60 degrees)			B2	B2 for both $(BDC$ and $DBC =) 60 - y/2$ B1 for either $(BDC$ or $DBC =) 60 - y/2$ Can be marked on diagram. {Reason 1} i.e. Angle *ABC* is 60
		$2x$	4	B1 B1	{Reason 2} both reasons needed for B1 Answer only = B3. Numerical methods leading to a numerical answer can only score B1 (for giving both reasons adequately).
					Total 4 marks

13.	$(x - 5)\{4(x - 5) + 3\}$			M1	Accept $(x - 5)\{4x - 20 + 3\}$ or reaching $4x^2 - 37x + 85$
		$(x - 5)(4x - 17)$	2	A1	
					Total 2 marks

14. (a)		0.3 in first fail branch 0.8, 0.2 in second attempt pass, fail branches		2	B1 B1	Branches must be labelled. Ignore extra branches leading from "pass".
(b)	"0.3" x 0.8		0.24 oe	2	M1ft A1	
(c)	("0.3" x "0.2"x 0.8) + ("0.3"x "0.2"x "0.2"x 0.8) oe		0.0576 oe	3	M2ft A1	M1ft for "0.3" x "0.2" x 0.8 (=0.048) or "0.3" x "0.2" x "0.2" x 0.8 (=0.0096) Accept 36/625
						Total 7 marks

15. (a) (i)	$3x + 2y = 120$ $2y = 120 - 3x$ or $1.5x + y = 60$	$y = 0.5 (120 - 3x)$ *	2	B1 B1 dependent on first B1 * Answer given on question paper.
(ii)	$A = x \times y$ $A = x \times (60 - 1.5x)$	$A = 60x - 1.5x^2$ *	1	B1 * Answer given on question paper.
(b)		$(dA/dx =) 60 - 3x$	2	B2 If not B2 then B1 for 60 or $-3x$
(c)	"60 - 3x" = 0 $x = 20$: $(y = 30)$ $A = 20 \times 30$ or $60 \times 20 - 1.5 \times 20^2$	600	3	M1ft A1 A1 cao Answer only = M1A2 (full marks)
				Total 8 marks

16.	(8x4)+(5x4)+(3x4) or 0.16({5x40}+{10x12.5}+{30x2.5})	64	3	M1	Correct fd calculated (or marked on vertical axis with no contradictions). or 28 ÷ 2 or 14 or 32, 20, 12 frequencies assigned to correct blocks. or 1 cm^2 = 4 customers oe or 1 small square = 0.16 customers oe M1 Correct calculations to give 3 correct frequencies with the intention to add (32 + 20 + 12) A1 cao
					Total 3 marks

17.	$5 \times (360 \div 12) (= 150)$ $(AB^2 =) 10^2 + 7^2 - 2 \times 10 \times 7 \times \cos (\text{"150"})$ $(AB^2 =) 149 - 140 \cos (\text{"150"})$ $(AB^2 =) 270.24...$				M1	Angle *AOB*.
					M1	Accept the use of the cosine rule with any angle but sides (10 and 7) must be in correct places.
		16.4	4	A1 A1	awrt 270 awrt 16.4
						Total 4 marks

18. (a)	$(3x + 2)(2x + 1) = 100$		2	M1	or $(2x \times 3x) + 2(2x + 1) + 3x = 100$ oe or $(2x \times 3x) + (2 \times 2x \, (x1)) + 1) + 3x + 1 + 1 = 100$ oe other partitions are acceptable but partitioning must go on to form a correct equation.
	$6x^2 + 4x + 3x + 2 = 100$	$6x^2 + 7x - 98 = 0$ *		A1	Accept $6x^2 + 7x + 2 = 100$ if M1 awarded * Answer given
(b)	$(3x + 14)(2x - 7) (= 0)$ $x = 3.5$ $(\text{Area} =) 6 \times \text{"3.5"}^2$ or $(3 \times \text{"3.5"}) \times (2 \times \text{"3.5"})$	73.5	5	M2	or $(x =) \dfrac{-7 \pm \sqrt{49} + 2352}{12}$ or $(x =) \dfrac{-7 \pm \sqrt{2401}}{12}$ If not M2 then M1 for $(3x \pm 14)(2x \pm 7)$ or $(x =) \dfrac{-7 \pm \sqrt{7^2 - 4 \times 6 \times -98}}{2 \times 6}$ condone + in place of $\pm$ and 1 sign error.
				A1 M1ft A1 cao	Dependent on at least M1 Ignore negative root. Dependent on at least M1 and $x > 0$ Dependent on first M1
					Total 7 marks

19.	$180 \div (1 + 7) (= 22.5)$ $360 \div \text{"22.5"}$	16	3	M1 M1ft dep M2 for $\dfrac{180(n - 2)}{n} = \dfrac{7 \times 180}{8}$ or $\dfrac{7 \times 360}{n}$ or M2 for $360 \div \dfrac{180}{(1 + 7)}$ A1 cao
				Total 3 marks

20.	$(x =)$ 0.01515.. and $(100x =)$ 1.515... $99x = 1.5$ 15/990 oe		1/ 66 *	2	M1 or $10x = 0.1515..$ and $1000x = 15.1515..$ selected A1 but not 1/66 Numerator and denominator have to be integers. * Answer given
					Total 2 marks
21.	$165 \div 1250$ or 164.9 rec $\div 1250$		0.132	3	M2 M1 for 165 or 164.9 rec or 1250 selected. A1 cao
					Total 3 marks

22.	$y = 2x - 7$ $x^2 + 4x^2 - 14x - 14x + 49 = 34$ $5x^2 - 28x + 15 (= 0)$ $(5x - 3)(x - 5) (=0)$ $x = 0.6 \ \ x = 5$	$x = 0.6 \ \& \ y = -5.8$ $x = 5 \ \ \& \ y = 3$	7	M1 M2 M1 for $4x^2 - 14x - 14x + 49$ or better A1 correct 3 part quadratic M1 or $\dfrac{--28 \pm \sqrt{(-28)^2 - 4 \times 5 \times 15}}{2 \times 5}$ or better or $5x(x - 5) - 3(x - 5)$ condone no brackets around negative numbers. A1 Dependent on previous M1 (both x values correct). A1 Dependent on previous M1 (both complete solutions correct).
	Alt: $x = (y + 7)/2$ $0.25 \times (y^2 + 14y + 49) + y^2 = 34$ $5y^2 + 14y - 87 = 0$ $(y - 3)(5y + 29) (=0)$ $y = 3 \ \ y = -5.8$	$x = 0.6 \ \& \ y = -5.8$ $x = 5 \ \ \& \ y = 3$		M1 M2 M1 for $0.25 \times (y^2 + 14y + 49)$ A1 correct 3 part quadratic M1 or $\dfrac{-14 \pm \sqrt{14^2 - 4 \times 5 \times -87}}{2 \times 5}$ or better or $y(5y + 29) - 3(5y + 29)$ A1 Dependent on previous M1 (both y values correct) A1 Dependent on previous M1 (both complete solutions correct)
				Total 7 marks

23.	$(AC^2 =) 230^2 + 230^2 (= 105800)$ $(MC =) \frac{1}{2} \sqrt{(\text{“}105800\text{”})} (=162.6..)$ $(MT^2 =) 218^2 - \text{“}162.6\text{”}^2 (=21074)$ $(MT=) \sqrt{\text{”}21074\text{”}}$			M1 M1 M1 M1 A1	M1 for $(MC^2) = 115^2 + 115^2 (=26450)$ M1 for $\sqrt{(\text{“}26450\text{”})} (=162.6..)$ or M1 for correct trig working leading to one correct acute angle in MCT {either 41.8 or 48.2} or M1 for correct trigonometry working leading to correct answer Accept awrt 145
		145	5		
					Total 5 marks

| | | | | | **TOTAL FOR PAPER: 100 MARKS** |