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Mark Scheme (Results)

June 2016

Pearson Edexcel International GCSE
Mathematics A (4MA0)
Paper 2F

Pearson Edexcel Level 1/Level 2 Certificate
Mathematics A (KMA0)
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
    - 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 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.

International GCSE Maths June 2016 – Paper 2F Mark scheme				
Apart from Questions 9(b), 13(b), and 19 (where the mark scheme states otherwise), 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)(i)		21	1	B1
(ii)		10 or 30	1	B1
(iii)		13	1	B1
(iv)		16 or 36	1	B1
(v)		27	1	B1
(b)		16 & 21	1	B1 Both needed for mark
(c)		13 & 33	1	B1 Both needed for mark
				Total 7 marks

2 (a)		8	1	B1
(b)		Norway	1	B1
(c)		Bar drawn to 5	1	B1
(d)		5	1	B1
(e)		5:2	2	M1 10 : 4 oe or 2 : 5 or 1 : 2.5 or 0.4 : 1 A1 Accept 2.5 : 1 or 1 : 0.4
				Total 6 marks

3	(a)		Cone	1	B1	Accept circular based pyramid
	(b)(i)		Prism	1	B1	Accept hexagonal prism
	(b)(ii)		12	1	B1	
	(b)(iii)		18	1	B1	
	(c)	Eg 20 × 2 or 2×2×4 + 2×2×4 + 2×2×2 or 6×2×4 − 2×2×2 or 8 × 5	40	2	M1 A1	For a complete method to find the volume or 6×2×4 or 48 oe or (2×2×4)+(2×2) or 20 oe
						Total 6 marks

4	(a)		−12,−5,−2,0,1	1	B1	
	(b)		1	1	B1	
	(c)		−6	1	B1	
	(d)		Oberstdorf	1	B1	Accept 9 or −9
						Total 4 marks

5	(a)(i)		(3, 1)	1	B1	
	(ii)		(−2, 3)	1	B1	
	(b)		$y = 1$	1	B1	
	(c)		8	1	B1	
						Total 4 marks

6		5.79	3	M2 For 19.52 – (2.95 + 4.99) or 19.52 – 2.95 – 4.99 19.52 – 7.94 or 11.58 If not M2 then M1 for 2.95 + 4.99 or 7.94 A1 5.79
				Total 3 marks

7	(a)		96	1	B1
	(b)		10	1	B1
					Total 2 marks

8	(a)		16 10	1	B1		Allow any separator or a space between hours and minutes.
	(b)		17 05 or 5 05 (pm)	1	B1ft	Ft from (a) Allow 5 05 or Five past 5	
	(c)	Eg 1835 → 1935 → 2015 Eg 1835 → 1900 → 2000 → 2015	100	2	M1 A1	For an attempt to work out the difference between 18 35 and 20 15 Or for 25 + 60 + 15 oe Or for 1.66(66...) (hours) or 1 hour 40 mins ScB1 for 2 hours 40 mins or 160 mins	
							Total 4 marks

9	(a)	Eg 135 × 4 or (135 ÷ 90) × (140 + 70 + 60 + 90) or 1.5 × 360 or 210 + 105 + 90 + 135	540	2	M1 A1	A correct method to find the total number of students at the college
	(b)	Measure 140° ± 2° Eg "140" × $\frac{"540"}{360}$ or "140" × 1.5 or $\frac{135}{90}$ × "140" oe	210	3	B1 M1ft A1ft	Measuring angle (140° ± 2°) maybe on diagram. For a complete method Accept 207 – 213 (Integer value only) unless from incorrect working. **Note:** 138° = 207 students 139° = 208.5 (208 or 209 students) 140° = 210 students 141° = 211.5 (211 or 212 students) 142° = 213 students
						Total 5 marks

10	(a)	**2** **3** **4** **6** **3** **4** **5** **7** **5** **6** **7** **9**	**2,3**,4,6 3,4,**5**,7 5,6,7,**9**	2	B2	For all eight entries correct If not B2 then B1 for five, six, or seven entries correct.
	(b) (i)		$\frac{2}{12}$	1	B1ft	$\frac{2}{12}$ oe ft from a complete table Accept 0.16(666...) rounded or truncated to at least 2 dp
	(b) (ii)		$\frac{5}{12}$	1	B1ft	$\frac{5}{12}$ ft from a complete table Accept 0.41(666...) rounded or truncated to at least 2 dp
						Total 4 marks

11	0.66(..), 0.6, 0.7, 0.625 $\frac{80}{120}$ $\frac{72}{120}$ $\frac{84}{120}$ $\frac{75}{120}$ 66.(666...) %, 60%, 70%, 62.5%	$\frac{3}{5}, \frac{5}{8}, \frac{2}{3}, \frac{7}{10}$	2	M1 A1 	For 2 fractions converted to decimals (terminating or to at least 2 dp rounded or truncated) or For 2 fractions converted to percentages (at least 2 sf rounded or truncated)) or For 2 fractions expressed as equivalent fractions with a denominator of 120 or a multiple of 120 or For 3 fractions in correct order. Correct order- can be decimal or percentage or fraction equivalents in correct order. SCB1 for fractions reversed
					Total 2 marks

12	(a)		22	1	B1	
	(b)		Added 3	1	B1	Accept +3, 3 more, jumped forward by 3, difference = 3 oe or $3n + 4$ oe
	(c)		37	1	B1	
	(d)		Correct reasoning	1	B1	For a correct reason. For example: $3n + 4 = 60$ does not have an integer solution or 60 is a multiple of 3 or 60 is in the 3 times table or 58 are 61 are in the sequence or 58 is in the sequence and 58 + 3 does not equal 60
						Total 4 marks

13 (a)	$4p = 12 - 7$ or $4p = 5$ or $(12 - 7) \div 4$	1.25 oe	2	M1 A1	For $4p = 12 - 7$ oe or For $(12 - 7) \div 4$ oe. Eg $\frac{5}{4}$ Award M1A0 for 1.25 embedded.
(b)	$(8y - 18 =)\ 3y + 9$ $8y - 3y = 9 + 18$ or $5y = 27$ oe	5.4 oe	3	M1 M1 A1	For correct expansion of bracket For collecting terms in y on one side and constant terms on the other (as part of a correct equation). Eg $\frac{27}{5}$ or $5\frac{2}{5}$ Dep on at least M1 ScB1 for $8y - 18 = 3y + 3$ **AND** $8y - 3y = 3 + 18$ or $8y - 18 = 3y + 3$ **AND** $5y = 21$
	Alternative Method $\frac{8y - 18}{3} = y + 3$ or $\frac{8y}{3} - \frac{18}{3} = y + 3$ oe $\frac{8y}{3} - y = 3 + \frac{18}{3}$ or $5y = 27$ oe	5.4 oe	3	M1 M1 A1	For dividing both sides of the equation by 3 as part of a correct equation For collecting terms in y on one side and constant terms on the other (as part of a correct equation) Eg $\frac{27}{5}$ or $5\frac{2}{5}$ Dep on at least M1
					Total 5 marks

14	(a)	0.8 × 485 or 485 – 0.2 × 485 or 485 – "97" oe	388	3	M2 A1	For a complete method If not M2 then: M1 for 0.2 × 485 or 97 oe cao
	(b)	$\frac{79}{0.2}$ or $\frac{79}{20}$ × 100 or 3.95 × 100 or 79 × 5 oe	395	3	M2 A1	For a complete method If not M2 then: M1 For 20% = 79 or 0.2x = 79 or $\frac{79}{20}$ or 3.95 or $\frac{x}{79} = \frac{100}{20}$ oe cao ScB2 for 316
						Total 6 marks

15	(a) (i)		12.18019444	2	M1 A1	For 37.9(35) or 3.11(448.....) or For 12.1(180…) rounded or truncated to at least 3 significant figures. For 12.180(19444 ...) rounded or truncated to at least 5 significant figures.
	(a) (ii)		12.2	1	B1ft	ft from value with at least 4 sf
	(b)		21	1	B1	
	(c)		2	2	M1 A1	For 64 + 36 or 100 or 10^2
						Total 6 marks

16	(a)		63	1	B1	
	(b)		50	1	B1	
	(c)	Eg $(6 - 2) \times 180$ or 4×180 or 720 oe Eg $3x + x + 164 + 139 + 97 + 156 = 720$ or $4x + 556 = 720$ oe or $\frac{"720" - (164 + 139 + 97 + 156)}{4}$ or $\frac{"720" - 556}{4}$ or $\frac{164}{4}$ oe	41	3	M1 M1 A1	For complete method to find the total of interior angles or 720 Dep For a correct equation using their 720 or For a complete numerical method
		Alternative Method Eg $180 - 156 + 180 - 139 + 180 - 164 + 180 - 97 + 180 - x + 180 - 3x = 360$ or $24 + 41 + 16 + 83 + 180 - x + 180 - 3x = 360$ or $1080 - 556 - 4x = 360$	41	3	M2 A1	For an equation coming from the correct method relating to the sum of exterior angles.

17	(a)		$14de$	1	B1	
	(b)		m^7	1	B1	
	(c)		c^8	1	B1	
	(d)		a^{15}	1	B1	
	(e)	$8x + 12 + 2x + 10$	$10x + 22$	2	M1 A1	Any three terms correct out of four. Allow $2(5x + 11)$ Do not ISW
						Total 6 marks

18	(a)		Enlargement
			Scale factor 2
			Centre (1, 0)
				3	B1
					B1
					B1
						For Enlargement
						For (Scale factor =) 2
						For (Centre) (1, 0)
						NB if more than one transformation mentioned then no marks.

	(b)		Correct triangle at (10, −2), (7,−2), (7,−1)	1	B1	Correct triangle in correct place
	(c)		Correct triangle at (1, 0),(2, 0),(2, 3)	2	M1 A1	Triangle congruent to **D** and with correct orientation ScB1 for triangle with vertices at (4, 2), (5, 2) and (4, −1)
						Total 6 marks

19	Eg 2, 2, 140 or 2, 2, 2, 70 or 2, 2, 2, 2, 35 or 2, 2, 2, 7, 10 or 2, 2, 7, 20 or 2, 7, 40 or 2, 5, 56	$2^4 \times 5 \times 7$	3	M1 A1 A1	For factors that multiply to 560 and include at least 2 prime factors (can be implied from factor tree or repeated division. Dep on M1 2, 2, 2, 2, 5, 7 (condone inclusion of 1). This can be implied in a factor tree or by repeated division. Dep on M1 NB: Candidates showing no working score M0A0
					Total 3 marks

20	Eg (3×4) + (9×6) + (15×8) + (21×9) + (27×3) or 12 + 54 + 120 + 189 + 81	456	3	M1 M1 A1	$f \times x$ for 4 products with x used consistently within interval (including end points) & intention to add. (dep) for use of all correct half-way values Do not ISW ScB2 for 15.2
					Total 3 marks

21	(a)		7, (2), −1, (−2), (−1), 2, 7	2	B2	B1 for at least 2 correct
	(b)	(−1, 7), (0, 2), (1, −1), (2, −2), (3, −1), (4, 2), (5, 7)	Correct curve	2	B2	For the correct smooth curve through all 7 points ($\pm\frac{1}{2}$ sq) B1 ft for at least 6 points from their table plotted correctly ($\pm\frac{1}{2}$ sq) provided at least B1 scored in (a)
						Total 4 marks

22 (a)	$13.5^2 + 60^2$ or 182.25 + 3600 or 3782.25 $\sqrt{"3782.25"}$ or awrt 61.5 13.5 + 60 + $\sqrt{"3782.25"}$ or 13.5 + 60 + 61.5	135	4	M1 M1 M1 A1	For squaring and adding (Dep) for square root Dep Cao NB: A0 if 61.5 is rounded from an inexact value (eg 61.505…)
	Alternative method – using Trigonometry Eg A = 77.3(196…) **and** sin"77.3" = $\frac{60}{AC}$ (AC =) $\frac{60}{\sin"77.3"}$ or awrt 61.5 13.5 + 60 + $\frac{60}{\sin"77.3"}$ or 13.5 + 60 + 61.5	135	4	M1 M1 M1 A1	For finding a correct angle **AND** a correct trig statement (Dep) For an expression for AC Dep cao NB: A0 if 61.5 is rounded from an inexact value (eg 61.505…)
(b)		13.45	1	B1	
					Total 5 marks

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