Pearson

Mark Scheme (Results)

January 2017

International GCSE Mathematics A
4MA0/4HR

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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  If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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: Apart from Questions 8, 18 and 21, 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)	e.g. $\frac{100}{24}\times 30$		2	M1 For $\frac{100}{24}$ (=4.16(66..)) or $\frac{30}{24}$ or 1.25 or $\frac{24}{100}=\frac{30}{x}$ oe
			125		A1
	(b)	e.g. $\frac{850}{300}\times 24$ or $850\div\frac{300}{24}$ oe		2	M1 Complete method to find number made
			68		A1 cao
					Total 4 marks

2	(a)	$0.15 + 0.4$	0.55	1	B1
	(b)	$\frac{1-(0.15+0.4)}{3}$ or $\frac{0.45}{3}(=0.15)$		2	M1
			0.3		A1
	(c)	160×0.4		2	M1
			64		A1
					Total 5 marks

3	$\frac{35}{100} \times 1200$ oe or 420		3	M1		[Award M2 for $1200 \times (1 - 0.35)$]
	1200 – "420"			M1	dep	
		780		A1	SC M1 for 1620	
						Total 3 marks

4	30×20 or 600		4	M1	For area of rectangle
	$\pi \times 8^2$ or 201.(0619298...) or 64π			M1	Indep for area of circle eg $\pi \times 8^2$ or 201.(0619298..) or 64π
	$30 \times 20 - \pi \times 8^2$			M1	
		399		A1	Accept 398 -399.1
					Total 4 marks

5	(a)(i)		{3, 5, 7}	2	B1
	(a)(ii)		{1, 2, 3, 5, 7, 9}		B1
	(b)		6	1	B1
					Total 3 marks

6	$12.8^2 - 9.7^2$ or $163.84 - 94.09$ or 69.75		3	M1	For squaring and subtracting $[a = \cos^{-1}\left(\frac{9.7}{12.8}\right)(= 40.7...)$ **and** $\sin 40.7.. = \frac{x}{12.8} or \tan 40.7.. = \frac{x}{9.7}]$
	$\sqrt{12.8^2 - 9.7^2}$			M1dep	For square root $[x = 12.8 \sin 40.7.. or \quad x = 9.7 \tan 40.7..]$
		8.35		A1	Allow 8.35 - 8.352
					Total 3 marks

7	(a)		$12p + 15$	1	B1	
	(b)		$2(3r + 7)$	1	B1	
	(c)	$(-5)^2 - 3 \times -5$ oe	40	2	M1 A1	or +25 or +15
	(d)	$\frac{w^{13}}{w^4}$ or $w \times w^8$ or $w^5 \times w^4$		2	M1	For $\frac{w^{13}}{w^4}$ or $w \times w^8$ or $w^5 \times w^4$
			w^9		A1	
	(e)			2	M1	For $x \geq 3$ or $x < 9$ or $3 < x \leq 9$
			$3 \leq x < 9$		A1	Accept [3, 9) or $9 > x \geq 3$
						Total 8 marks

8	$160 - 3x + 7x - 20 = 180$ or $2(160 - 3x) + 2(7x - 20) = 360$ oe		3	M1	For a correct equation
	e.g. $4x = 180 - 140$ or $-3x + 7x = 180 + 20 - 160$ or $4x = 40$ or $14x - 6x = 360 - 320 + 40$ oe			M1	For isolating the terms in x in a correct equation
		10		A1	Dep on at least M1
					Total 3 marks

9	(a)	$\cos x = \frac{60}{110}$ or $\cos x = 0.545(4545...)$		3	M1	
		$(x =)\ \cos^{-1}\left(\frac{60}{110}\right)$			M1	
			56.9		A1	56.9 – 57
	(b)	$90 - 56.9(4426885...)$ oe	033	2	M1ft A1ft	for complete method, ft from (a) if "(a)" < 90, 90 – their x accept (0)33 – (0)33.1 or ft
	(c)(i)		105	2	B1	
	(c)(ii)		115		B1	Accept $114.\dot{9}$
						Total 7 marks

10	(a)		111375	2	M1 For $3^a \times 5^b \times 11$ with $a = 4$ or $b = 3$
					A1 Accept $3^4 \times 5^3 \times 11$ oe
	(b)		2025	2	M1 For $3^4 \times 5^q$ or $3^p \times 5^2$ (and no 11) or $n \times 3^3 \times 5^2$ where $n \neq 11$
					A1 Accept $3^4 \times 5^2$ oe
					Total 4 marks

11		$y = -2x + 1$	2	M1 For $y = -2x + c$ ($c \neq 1$) or $y = mx + 1$ or for a correct method to find the gradient or $m = -2$ and $c = 1$ stated or $-2x + 1$ or $L = -2x + 1$ A1 oe
				Total 2 marks

12	(a)		Correct probabilities	2	B1 B1	For 0.4 on LH branch For 0.3, 0.7 and 0.3 on RH branches
	(b)		0.42	2	M1 A1	For 0.6×0.7 oe
	(c)	$0.6 \times$ "0.3" $\times$ "0.8" + "0.4" $\times 0.7 \times$ "0.8" + "0.4" $\times$ "0.3" $\times 0.2$ (= 0.144 + 0.224 + 0.024) oe		3	M2ft	For a complete method M1ft for $0.6 \times$ "0.3" $\times$ "0.8" or 0.144 $\left(\frac{18}{125}\right)$ or "0.4" $\times 0.7 \times$ "0.8" or 0.224 $\left(\frac{28}{125}\right)$ or "0.4" $\times$ "0.3" $\times 0.2$ or 0.024 $\left(\frac{3}{125}\right)$
			0.392		A1cao	$\frac{49}{125}$ oe
		Alternative method				
		$1 - [(0.6 \times 0.7 \times 0.2) + (0.4 \times 0.3 \times 0.8) + (0.6 \times 0.7 \times 0.8) + (0.6 \times 0.3 \times 0.2) + (0.4 \times 0.7 \times 0.2)]$	0.392		M2ft	For complete method M1ft for 1 – (at least 2 correct products).
					A1cao	$\frac{49}{125}$
						Total 7 marks

13	(a)	$P = \frac{k}{q^2}$	$p = \frac{51.2}{q^2}$	3	M1 Allow $Pq^2 = k$ or $q^2 = \frac{k}{p}$ Do not allow $P = \frac{1}{q^2}$
		$12.8 = \frac{k}{2^2}$ oe or $k = 12.8 \times 2^2$ or $k = 51.2$			M1 For correct substitution in a correct equation. Implies first M1 Award M2 if $k = 51.2$ stated unambiguously
					A1 Award 3 marks if answer is $P = \frac{k}{q^2}$ but k is evaluated in (a) or (b) SCB2 for $Pq^2 = 51.2$ or $q^2 = \frac{51.2}{p}$
	(b)	$\frac{51.2}{8^2}$	0.8	1	B1ft ft equation in the form $P = \frac{k}{q^2}$ oe
					Total 4 marks

14	(a)	e.g. $\frac{8}{5}$ or 1.6 or $\frac{5}{8}$ or 0.625 or e.g. $4 \times \frac{8}{5}$ or $4 \div \frac{5}{8}$ oe or e.g. $\frac{AZ}{4} = \frac{8}{5}$ or $\frac{AZ}{8} = \frac{4}{5}$ oe		2	M1	For correct scale factor or correct expression for AZ or for a correct equation involving AZ oe
			6.4		A1	oe e.g. $\frac{32}{5}$
	(b)	Eg $6 \div \frac{8}{5}$ or $6 \times \frac{5}{8}$ or $\frac{6 \times 4}{"6.4"}$ oe	3.75	2	M1 A1	Correct expression for BC oe
	(c)	$52.48 - \frac{52.48}{1.6^2}$		3	M2	For a fully correct method or M1 for $\frac{52.48}{1.6^2}$ or 20.5
			31.98		A1	Accept 32.0 or 32
						Total 7 marks

15	(a)		$(y - 8)(y + 6)$	2	M1 For $(y \pm 8)(y \pm 6)$ A1 cao
	(b)	$4 = 5(e - 3)$ or $4 = 5e - 15$ or $\frac{4}{5} = e - 3$			M1
			$\frac{19}{5}$	2	A1 $3\frac{4}{5}$ or 3.8
	(c)	$\frac{3(x-1)-2(x+1)}{(x+1)(x-1)}$ or $\frac{3(x-1)}{(x+1)(x-1)} - \frac{2(x+1)}{(x+1)(x-1)}$		3	M1 oe e.g. $\frac{3(x-1)-2(x+1)}{x^2-1}$
		$\frac{3x-3-2x-2}{(x+1)(x-1)}$ oe			M1
			$\frac{x-5}{(x+1)(x-1)}$		A1 oe e.g. $\frac{x-5}{x^2-1}$
					Total 7 marks

16	(a)	$\frac{10}{2.72-2.47}$ or 40		2	M1 Or bar of height 40 wrong width
			Correct bar		A1
	(b)		5	1	B1
					Total 3 marks

17	(a)	$0.5 \times (360 - 260)$ or 0.5×100	50	2	M1 A1	For a complete method
	(b)	e.g. 360 – (“50” + 260 + 30) (= 20), 90 – "20" or $\frac{180-100}{2}+30$		2	M1ft	For a complete method.
			70		A1	
						Total 4 marks

18	(a)		–3.4	2	M1 A1	Line $y = -5$ drawn or clear attempt to take reading at y = –5 Accept –3.35 to –3.45 inclusive
	(b)			3	M2	$y = -5x$ drawn. M1 for $x^3 - 0.2x^2 - 9x + 7 = -5x$ or $y = -5x$ oe
			–2.5		A1	dep on at least M1 (−2.45 - −2.55)
						Total 5 marks

19	$(\pi \times 5^2) + \pi \times 5 \times l$ $(25\pi) + 5\pi l$		5	M1	For a correct expression for total surface area
	$(l =)$ 13			A1	For the correct slant height
	$(h =)\ \sqrt{13^2 - 5^2}$ *or* $\sqrt{144}$ *or* 12			M1	For the correct method to find h ft if first M1 scored
	$(V =)\frac{1}{3} \times \pi \times 5^2 \times 12\ (= 314 - 314.3)$			M1	For the correct method to find V ft if first M1 scored
		100π		A1	
					Total 5 marks

20 (a)	$6\sqrt{c} - 9 + 2c\ - 3\sqrt{c}$ or $3\sqrt{c} - 9 + 2c$		3	M1	Accept $\sqrt{c}\sqrt{c}$ or $(\sqrt{c})^2$ instead of c
		$c = 5$ $k = 3$		A1 B1	
(b)	$\frac{1}{p \times p^{\frac{2}{3}}}$ or $p^{m+1+\frac{2}{3}} = 1$		3	M1	
	$\frac{1}{p^{\frac{5}{3}}}$ *or* $p^{\frac{-5}{3}}$ *or* $m + 1 + \frac{2}{3} = 0$			M1	
		$-\frac{5}{3}$		A1	$p^{\frac{-5}{3}}$ gains M2 only
					Total 6 marks

21	(a)		$3x - 13 - 50$	1	B1	or $3x - 13 - 25 - 25$
	(b)	$x - 52$		5	B1	or $x - 2 - 25 \times 2$
		$25(3x - 63)(x - 52)$ (= 81900)			M1	For a correct expression for volume of box
		eg $3x^2 - 156x - 63x + 3276$ (= 3276) or $75x^2 - 3900x - 1575x + 81900$ (= 81900)			M1	For brackets correctly expanded
		eg $3x^2 - 219x = 0$ or $3x(x - 73) = 0$ or $75x^2 - 5475x = 0$			M1	For correctly reducing to 2 term quadratic equation
		$(x = 0)$ or $x = 73$	73		A1	For $x = 73$ NB: A1 dependent on at least 2 method marks
						Total 6 marks

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