

Cambridge International Examinations Cambridge International General Certificate of Secondary Education

MATHEMATICS

0580/21 October/November 2016

Paper 2 (Extended) MARK SCHEME Maximum Mark: 70

Published

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Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working

soi seen or implied

Q	uestion	Answer	Mark	Part marks
1		-7	1	
2	(a)	[0].0402	1	
	(b)	[0].040	1	
3		[0].67	2	M1 for 14 × 0.905 [–12] or 12.67
				If zero scored, SC1 for answer [0].74[0]
4		$\frac{8}{12}$ and $\frac{3}{12}$ oe	M1	Correct fractions with common denominator
		$\frac{5}{12}$ cao	A1	
5	(a)	$\frac{1}{125}$	1	
	(b)	4.56×10^{-3}	1	
6		42	2	M1 for $Q = 90$ or $WPQ = 90 - 42$ or $WPQ = 48$
7		$\frac{x^2 + 2y^2}{xy} \text{ or } \frac{x}{y} + \frac{2y}{x}$	2	B1 for $xy(x^2 + 2y^2)$
		final answer		or M1 for $\frac{x^2y + 2y^3}{xy^2}$ or $\frac{x^3 + 2xy^2}{x^2y}$
8		$\frac{pt - 2t - 3p}{pt}$ final answer	2	B1 for $pt - 2t - 3p$ or $1 - \frac{2t + 3p}{pt}$
9		[<i>x</i> =] 55	1	
		[<i>y</i> =] 125	1FT	correct or FT (180 – their x)

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Quest	tion	Answer	Mark	Part marks
10		$6x^8$ final answer	2	B1 for $6x^k$, $6 \times x^8$ or $kx^8 (k \neq 0)$ as final answer
11		Correctly eliminating one variable	M1	
		[x =] -1 and	A1	If zero scored,
		[<i>y</i> =] 5	A1	equations
				or SC1 if no working shown, but 2 correct answers given
12 (a))	$\frac{1}{8}$ cao	1	
(b))	$\frac{2}{11}$	2	M1 for 18.18–0.18 oe
		11		or B1 for $\frac{2k}{11k}$ (<i>k</i> not 0 or 1)
13 (a))	(2p-3)(2p+3) final answer	1	
(b))	(a-2b)(2x-y) oe final answer	2	B1 for $2x(a-2b) - y(a-2b)$ or $a(2x-y) - 2b(2x-y)$
14		$6\frac{2}{3}$ oe	3	M1 for $y = k\sqrt{x+2}$ oe or better
				e.g. $2 = k\sqrt{7+2}$
				M1 for $[y =]$ their $k \times \sqrt{98 + 2}$
				or $\sqrt{98+2}$
				M2 for $\frac{5}{2} = \frac{\sqrt{53 + 2}}{\sqrt{7 + 2}}$
15 (a))	$\begin{pmatrix} 5\\8 \end{pmatrix}$	1	
(b))	(8) final answer	2	B1 for final answer 8 without brackets

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Q	uestion	Answer	Mark	Part marks
16		6.35 or 6.349 to 6.350	3	M2 for $\frac{8}{h} = \sqrt[3]{\frac{0.5}{0.25}}$ oe
				or M1 for $\left(\frac{8}{h}\right)^3 = \frac{0.5}{0.25}$ oe
				or for $\sqrt[3]{\frac{0.5}{0.25}}$ or $\sqrt[3]{\frac{0.25}{0.5}}$ oe
17	(a)	Accurate arc, centre <i>B</i> , radius 5 cm meeting both <i>BA</i> and <i>BC</i>	1	
	(b)	Accurate bisector through angle <i>B</i> with 2 pairs of correct arcs and reaching to at least <i>AC</i>	2	B1 for accurate line from <i>B</i> to at least <i>AC</i> or M1 for correct arcs
	(c)	Correct region identified	1	
18	(a)	4	2	B1 for 25 or –21
	(b)	$\sqrt{y-qr}$ oe final answer	2	M1 for $y - qr = p^2$ or M1 for correctly square rooting <i>their</i> function of y, q and r
19	(a)	6n + 1 oe final answer	2	B1 for $6n + c$ or for $kn + 1$ ($k \neq 0$)
	(b)	$(n+2)^2$ final answer	2	M1 for any quadratic expression or reaching second difference of 2
20	(a)	$\frac{3mx}{50}$ or 0.06mx	2	M1 for $m \times x \times 60 \div 1000$ oe
	(b)	35	2	M1 for $5 \times x \times 60 \div 1000 = 10.5$ oe or for substituting $m = 5$ in <i>their</i> (a) and equating to 10.5 oe

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Question		Answer	Mark	Part marks	
21		$y \ge 0$ and $x \ge 1$ oe and $x + y \le 4$ oe	4	SC3 for $y > 0$, $x > 1$ and $x + y < 4$ oe or B1 for $y \ge 0$ B1 for $x \ge 1$ oe and B2 for $x + y \le 4$ oe or M1 for grad = -1 soi If B0 scored for first two B marks, SC1 for y = 0 and $x = 1$ or with incorrect inequality sign	
22	(a) (i)	$\begin{bmatrix} A \\ 3 \\ 4 \\ 2 \end{bmatrix}_{1}^{B}$	2	B1 for $n(A \cap B) = 4$	
	(ii)	$\frac{2}{10}$ oe	1FT	allow correct answer or FT $\frac{their 2}{10}$	
	(b)		1		
23		$\sqrt{(3)^2 - 4(2)(-3)}$ oe or better	B1	If completing the square, B1 for $\left(x + \frac{3}{4}\right)^2$ oe	
		$\frac{-3+\sqrt{k}}{2(2)}$ or $\frac{-3-\sqrt{k}}{2(2)}$ oe	B1	B1 for $-\frac{3}{4} + \sqrt{\frac{3}{2} + \left(\frac{3}{4}\right)^2}$ or $-\frac{3}{4} - \sqrt{\frac{3}{2} + \left(\frac{3}{4}\right)^2}$ oe	
		-2.19, 0.69	B1B1	SC1 for -2.2 or -2.186 and 0.7 or 0.686 or -2.19 and 0.69 seen but not final answer or 2.19 and -0.69 Maximum score without working is 2	
24	(a)	13.9 or 13.85 to 13.86	3	M2 for $\sqrt{8^2 + 8^2 + 8^2}$ oe	
				or M1 for $8^2 + 8^2$ or better for one face $\sqrt{8}$ $\sqrt{8^2 + 8^2}$	
	(b)	35.1 to 35.5[4]	2	M1 for sin = $\frac{3}{their(\mathbf{a})}$ or cos = $\frac{\sqrt{3} + 3}{their(\mathbf{a})}$ or tan = $\frac{8}{\sqrt{8^2 + 8^2}}$ oe	