



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

MATHEMATICS

0580/21

Paper 2 (Extended)

October/November 2016

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
nfw	not from wrong working
soi	seen or implied

Question	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 $\frac{5}{12}$ cao	M1 A1	Correct fractions with common denominator
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	$\frac{x^2 + 2y^2}{xy}$ or $\frac{x}{y} + \frac{2y}{x}$ final answer	2	B1 for $xy(x^2 + 2y^2)$ 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	[x =] 55 [y =] 125	1 1FT	correct or FT (180 – their x)

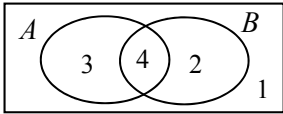
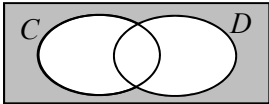
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Question	Answer	Mark	Part marks
10	$6x^8$ final answer	2	B1 for $6x^k$, $6 \times x^8$ or kx^8 ($k \neq 0$) as final answer
11	Correctly eliminating one variable [$x =$] -1 and [$y =$] 5	M1 A1 A1	If zero scored, SC1 for 2 values that satisfy one of the original 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 $18.1\dot{8}-0.1\dot{8}$ oe or B1 for $\frac{2k}{11k}$ (k 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 M2 for $\frac{y}{2} = \frac{\sqrt{98+2}}{\sqrt{7+2}}$
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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Question	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	B1 for accurate line from <i>B</i> to at least <i>AC</i> or M1 for correct arcs
(b)	Accurate bisector through angle <i>B</i> with 2 pairs of correct arcs and reaching to at least <i>AC</i>	2	
(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 <i>y</i>, <i>q</i> and <i>r</i>
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	$y \geq 0$ and $x \geq 1$ oe and $x + y \leq 4$ oe	4	SC3 for $y > 0, x > 1$ and $x + y < 4$ oe or B1 for $y \geq 0$ B1 for $x \geq 1$ oe and B2 for $x + y \leq 4$ 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)		2	B1 for $n(A \cap B) = 4$
(ii)	$\frac{2}{10}$ oe	1FT	allow correct answer or FT $\frac{\text{their } 2}{10}$
(b)		1	
23	$\sqrt{(3)^2 - 4(2)(-3)}$ oe or better $\frac{-3 + \sqrt{k}}{2(2)}$ or $\frac{-3 - \sqrt{k}}{2(2)}$ oe -2.19, 0.69	B1 B1 B1B1	If completing the square, B1 for $\left(x + \frac{3}{4}\right)^2$ oe 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 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
(b)	35.1 to 35.5[4...]	2	M1 for $\sin = \frac{8}{\text{their (a)}}$ or $\cos = \frac{\sqrt{8^2 + 8^2}}{\text{their (a)}}$ or $\tan = \frac{8}{\sqrt{8^2 + 8^2}}$ oe