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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2011 question paper for the guidance of teachers

0581 MATHEMATICS

0581/11

Paper 1 (Core), maximum raw mark 56

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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Abbreviations

cao correct answer only cso correct solution only

dep dependent

ft follow through after error isw ignore subsequent working

oe or equivalent SC Special Case

www without wrong working

Qu.	Answers	Mark	Part Marks
1	$\begin{pmatrix} -3\\4 \end{pmatrix}$	1	
2	24 or 24 out of 30	2	M1 for $\frac{4}{5} \times 30$
3	1.8	2	M1 for 1.4 ÷ 7 or SC1 for answer 180
4	16	2	B1 for 1cm to 0.5km oe or 800 000 (cm) or figs 16
5	(a) 25	1	
	(b) Green cao	1	
6	7.5(0) cao	2	M1 for $\frac{258.75}{4.6}$
7	(a) 120	1	
	(b) $\frac{9}{25}$ cao	2	B1 for $\frac{36}{100}$ or $\frac{18}{50}$
8	(a) 7853 to 7855 or 7850 or 7860 www	2	M1 for $\pi \times 50^2$
	(b) 0.7853 to 0.7855 or 0.785 or 0.786	1ft	Their (a) ÷ 10 000 evaluated
9	(a) 15	1	
	(b) 2 (pm), 6 (pm)	1	
	(c) 15	1	Allow –15
10	(a) Rectangle or rhombus	1	Either one or both given
	(b) Isosceles (triangle)	1	
	(c) 5 cao	1	

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11			1	
M1 $\frac{1 \times \text{their I 1}}{2 \times \text{their I 12}}$ Method 2 (Multiplication first) B1 $\frac{2}{6} + \frac{1}{8} \text{ or } \frac{1}{3} + \frac{1}{8} \text{ oe}$ M1 $\frac{ad + bc}{bd}$ for their $\frac{a}{b} + \frac{c}{d}$ A1 If M0, SC1 if $\frac{11}{12}$ is only followed by $\frac{11}{24}$ or if zero, SC1 if work is entirely in decimals with answer of 0.458 3 to 0.45835 12 (a) Correct ruled line 1	11	— final answer www		Method 1 (Addition first)
M1 $2 \times \text{their } 12$ Method 2 (Multiplication first)			B1	$\frac{8}{12} + \frac{3}{12}$ or $\frac{8+3}{12}$ oe
Method 2 (Multiplication first) B1 $\frac{2}{6} + \frac{1}{8} \text{ or } \frac{1}{3} + \frac{1}{8} \text{ oe}$ M1 $\frac{ad+bc}{bd}$ for their $\frac{a}{b} + \frac{c}{d}$ A1 If M0, SC1 if $\frac{11}{12}$ is only followed by $\frac{11}{24}$ or if zero, SC1 if work is entirely in decimals with answer of 0.4583 to 0.45835 12 (a) Correct ruled line (b) -2.7, 0.7 1, 1ft B2ft their ruled line through (0, 3) for two intersections given to 1 decimal place or B1 for -2.70 to -2.75 and 0.70 to 0.75 or B1ft their ruled line through (0, 3) for two intersections not given to 1 decimal place 13 135 cao 3 M1 for 720 or $(6-2) \times 180$ oe seen in working and M1 for equation $180 + 4x = \text{their } 720$ or M1 for $(360 - 180) \div 4 (= 45)$ oe seen in working and M1 dep for $180 - \text{their } 45$ 14 (a) $9x - 10$ final answer 2 B1 for $6x - 4$ or $3x - 6$ or for answer of $9x + j$, or $4x - 10$ (b) $2x^3 - 3x$ final answer 2 B1 for answer in form $2x^3 + m$ or $n - 3x$ 15 (a) Negative 1 Ignore embellishments 1 Ignore embellishments 1 [gnore embellishments 1 Follow through their (c)(i) 2 B1 for angle $ABD = 70^\circ$ stated or seen on the diagram			M1	
Method 2 (Multiplication first) B1 $\frac{2}{6} + \frac{1}{8} \text{ or } \frac{1}{3} + \frac{1}{8} \text{ oe}$ M1 $\frac{ad+bc}{bd}$ for their $\frac{a}{b} + \frac{c}{d}$ A1 If M0, SC1 if $\frac{11}{12}$ is only followed by $\frac{11}{24}$ or if zero, SC1 if work is entirely in decimals with answer of 0.4583 to 0.45835 12 (a) Correct ruled line (b) -2.7 , 0.7 1, 1, 1ft B2ft their ruled line through (0, 3) for two intersections given to 1 decimal place or B1 for -2.70 to -2.75 and 0.70 to 0.75 or B1ft their ruled line through (0, 3) for two intersections not given to 1 decimal place or B1 for -2.70 to -2.75 and 0.70 to 0.75 or B1ft their ruled line through (0, 3) for two intersections not given to 1 decimal place or B1 for -2.70 to -2.75 and 0.70 to 0.75 or M1 for (360 -180) $\div 4$ ($=45$) oe seen in working and M1 for equation $180 + 4x = \text{their } 720$ or M1 for (360 -180) $\div 4$ ($=45$) oe seen in working and M1 dep for $180 - \text{their } 45$ 14 (a) $9x - 10$ final answer 2 B1 for $6x - 4$ or $3x - 6$ or for answer of $9x + j$, or $4x - 10$ or for answer of $4x + j$ or $4x - 10$ lgnore embellishments 15 (a) Negative 1 Ignore embellishments 16 (b) Correct point 17 (c) (i) Accurate ruled line 18 (ii) English mark 19 Follow through their (e)(i) 2 B1 for angle $ABD = 70^{\circ}$ stated or seen on the diagram			Δ1	
M1 $\frac{ad+bc}{bd}$ for their $\frac{a}{b} + \frac{c}{d}$ A1 If M0, SC1 if $\frac{11}{12}$ is only followed by $\frac{11}{24}$ or if zero, SC1 if work is entirely in decimals with answer of 0.458 $\frac{1}{3}$ to 0.45835 12 (a) Correct ruled line (b) -2.7 , 0.7 1, 1ft (b) -2.7 , 0.7 1, 1ft (c) -2.7 , 0.7 1, 1ft (c) -2.7 , 0.7 1, 1ft (d) -2.7 , 0.7 1, 1ft (e) -2.7 , 0.7 1, 1ft (e) -2.7 , 1ft (f) -2.7 , 1ft (f) -2.7 , 1ft (e) -2.7 , 1ft (e) -2.7 , 1ft (f) -2.7 , 1ft			AI	Method 2 (Multiplication first)
If M0, SC1 if $\frac{11}{12}$ is only followed by $\frac{11}{24}$ or if zero, SC1 if work is entirely in decimals with answer of 0.458 3 to 0.45835 12 (a) Correct ruled line (b) -2.7, 0.7 1, Ift B2ft their ruled line through (0, 3) for two intersections given to 1 decimal place or B1 for -2.70 to -2.75 and 0.70 to 0.75 or B1ft their ruled line through (0, 3) for two intersections not given to 1 decimal place 13 135 cao 3 M1 for 720 or $(6-2) \times 180$ oe seen in working and M1 for equation $180 + 4x =$ their 720 or M1 for $(360 - 180) \div 4$ (= 45) oe seen in working and M1 dep for $180 -$ their 45 14 (a) $9x - 10$ final answer 2 B1 for $6x - 4$ or $3x - 6$ or for answer of $9x + j$, or $kx - 10$ (b) $2x^3 - 3x$ final answer 2 B1 for answer in form $2x^3 + m$ or $n - 3x$ 15 (a) Negative 1 Ignore embellishments (b) Correct point 1 (c) (i) Accurate ruled line (ii) English mark 16 Follow through their (c)(i) 17 B1 for angle $ABD = 70^\circ$ stated or seen on the diagram			B1	$\frac{2}{6} + \frac{1}{8} \text{ or } \frac{1}{3} + \frac{1}{8} \text{ oe}$
If M0, SC1 if $\frac{11}{12}$ is only followed by $\frac{11}{24}$ or if zero, SC1 if work is entirely in decimals with answer of 0.458 3 to 0.45835 12 (a) Correct ruled line (b) -2.7, 0.7 1, 1ft B2ft their ruled line through (0, 3) for two intersections given to 1 decimal place or B1 for -2.70 to -2.75 and 0.70 to 0.75 or B1ft their ruled line through (0, 3) for two intersections not given to 1 decimal place or B1 for -2.70 to -2.75 and 0.70 to 0.75 or B1ft their ruled line through (0, 3) for two intersections not given to 1 decimal place 13 135 cao 3 M1 for 720 or (6 - 2) × 180 oe seen in working and M1 for equation 180 + 4x = their 720 or M1 for (360 - 180) \div 4 (= 45) oe seen in working and M1 dep for 180 - their 45 14 (a) $9x - 10$ final answer 2 B1 for $6x - 4$ or $6x - $			M1	$\frac{ad+bc}{bd}$ for their $\frac{a}{b} + \frac{c}{d}$
or if zero, SC1 if work is entirely in decimals with answer of 0.4583 to 0.45835 12 (a) Correct ruled line (b) -2.7 , 0.7 1, 1ft B2ft their ruled line through $(0, 3)$ for two intersections given to 1 decimal place or B1 for -2.70 to -2.75 and 0.70 to 0.75 or B1ft their ruled line through $(0, 3)$ for two intersections not given to 1 decimal place 13 135 cao 3 M1 for 720 or $(6-2) \times 180$ oe seen in working and M1 for equation $180 + 4x =$ their 720 or M1 for $(360 - 180) \div 4$ (= 45) oe seen in working and M1 dep for $180 -$ their 45 14 (a) $9x - 10$ final answer 2 B1 for $6x - 4$ or $3x - 6$ or for answer of $9x + j$, or $kx - 10$ (b) $2x^3 - 3x$ final answer 2 B1 for answer in form $2x^3 + m$ or $n - 3x$ 15 (a) Negative 1 Ignore embellishments (b) Correct point 1 (c) (i) Accurate ruled line (ii) English mark 1ft Follow through their (c)(i) 16 (a) 70 2 B1 for angle $ABD = 70^\circ$ stated or seen on the diagram			A1	
with answer of 0.4583 to 0.45835 12 (a) Correct ruled line (b) -2.7 , 0.7 1, 1ft B2ft their ruled line through $(0, 3)$ for two intersections given to 1 decimal place or B1 for -2.70 to -2.75 and 0.70 to 0.75 or B1ft their ruled line through $(0, 3)$ for two intersections not given to 1 decimal place 13 135 cao 3 M1 for 720 or $(6-2) \times 180$ oe seen in working and M1 for equation $180 + 4x =$ their 720 or M1 for $(360 - 180) \div 4$ (= 45) oe seen in working and M1 dep for $180 -$ their 45 14 (a) $9x - 10$ final answer 2 B1 for $6x - 4$ or $3x - 6$ or for answer of $9x + j$, or $kx - 10$ (b) $2x^3 - 3x$ final answer 2 B1 for answer in form $2x^3 + m$ or $n - 3x$ 15 (a) Negative 1 Ignore embellishments (b) Correct point 1 (c) (i) Accurate ruled line (ii) English mark 16 Follow through their (c)(i) 16 (a) 70 B1 for angle $ABD = 70^\circ$ stated or seen on the diagram				If M0 , SC1 if $\frac{11}{12}$ is only followed by $\frac{11}{24}$
(b) -2.7, 0.7 1, 1ft on the intersection of the intersections given to 1 decimal place or B1 for answer intersection of the intersection of				•
intersections given to 1 decimal place or B1 for -2.70 to -2.75 and 0.70 to 0.75 or B1ft their ruled line through $(0, 3)$ for two intersections not given to 1 decimal place 13	12	(a) Correct ruled line	1	
and M1 for equation $180 + 4x = \text{their } 720$ or M1 for $(360 - 180) \div 4$ (= 45) oe seen in working and M1 dep for $180 - \text{their } 45$ 14 (a) $9x - 10$ final answer 2 B1 for $6x - 4$ or $3x - 6$ or for answer of $9x + j$, or $kx - 10$ (b) $2x^3 - 3x$ final answer 2 B1 for answer in form $2x^3 + m$ or $n - 3x$ 15 (a) Negative 1 Ignore embellishments (b) Correct point 1 (c) (i) Accurate ruled line (ii) English mark 1ft Follow through their (c)(i) 16 (a) 70 B1 for angle $ABD = 70^\circ$ stated or seen on the diagram		(b) -2.7, 0.7	1, 1ft	intersections given to 1 decimal place or B1 for -2.70 to -2.75 and 0.70 to 0.75 or B1ft their ruled line through (0, 3) for two
or for answer of $9x + j$, or $kx - 10$ (b) $2x^3 - 3x$ final answer 2 B1 for answer in form $2x^3 + m$ or $n - 3x$ 15 (a) Negative (b) Correct point 1 (c) (i) Accurate ruled line (ii) English mark 16 (a) 70 1 B1 for answer in form $2x^3 + m$ or $n - 3x$ 1 Ignore embellishments 1 B1 Follow through their (c)(i)	13	135 cao	3	and M1 for equation $180 + 4x = \text{their } 720$ or M1 for $(360 - 180) \div 4 (= 45)$ oe seen in working
1 Ignore embellishments (b) Correct point (c) (i) Accurate ruled line (ii) English mark 1 Follow through their (c)(i) 2 B1 for angle ABD = 70° stated or seen on the diagram	14	(a) $9x - 10$ final answer	2	
(b) Correct point (c) (i) Accurate ruled line (ii) English mark 1 1 Follow through their (c)(i) 2 B1 for angle ABD = 70° stated or seen on the diagram		(b) $2x^3 - 3x$ final answer	2	B1 for answer in form $2x^3 + m$ or $n - 3x$
(c) (i) Accurate ruled line (ii) English mark 1 Follow through their (c)(i) 1 B1 for angle ABD = 70° stated or seen on the diagram	15	(a) Negative	1	Ignore embellishments
(ii) English mark 1ft Follow through their (c)(i) 16 (a) 70 2 B1 for angle ABD = 70° stated or seen on the diagram		(b) Correct point	1	
16 (a) 70 2 B1 for angle $ABD = 70^{\circ}$ stated or seen on the diagram		(c) (i) Accurate ruled line	1	
diagram	L	(ii) English mark	1ft	Follow through their (c)(i)
(b) (i) $(y =) 80$	16	(a) 70	2	
		(b) (i) (y =) 80	1	
(ii) $(z =) 40$		(ii) $(z =) 40$	1	
(iii) $(t=) 10$ Ift Follow through 90 – their y or 50 – their z				·

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17	(a) 7.42 or 7.416 cao	3	M2 for $\sqrt{(8^2-3^2)}$ or complete alternate method
			or M1 for $x^2 + 3^2 = 8^2$ or better
	(b) 67.97 to 68(.0) cao	2	M1 for cos $(y) = \frac{3}{8}$ oe
18	(a) 75	2	M1 for $\frac{500 \times 5 \times 3}{100}$ oe
	(b) 3.81(25)	4	or SC1 for answer of 575 M2 for $500 \times 1.05 \times 1.05 \times 1.05$ or M1 for $500 \times 1.05 \times 1.05$ A1 for $578.81(25)$ or $78.81(25)$ seen and A1ft for value of $500(1.05)^3 - 500$ – their (a)