Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

Cambridge IGCSE

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 Paper 4 (Extended) **October/November 2016**

MARK SCHEME

Maximum Mark: 120

Published

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.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Abbreviations

awrt   answers which round to
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

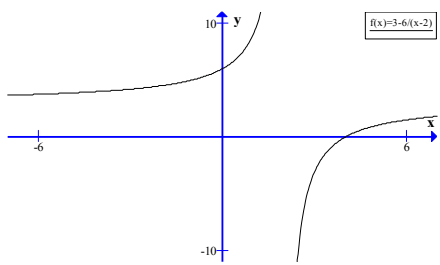| Question			Answer	Mark	Part Marks
1	(a)		171	1	
	(b)		10	1	
	(c)		172	1	
	(d)		4	2	**B1** for 170 or 174 seen
	(e)		172.1	2	**M1** for attempt at $\sum fx$ soi by 24099 or 172 or 172.1...
2	(a)		2.83 or 2.828...	3	**B2** for $\sqrt{8}$ or $2\sqrt{2}$ final answer or **M2** for $2^2 + 2^2$ or **M1** for correct sketch
	(b)		225 cao	2	**B1** for 45 soi by e.g. 135 If 0 scored **SC1** for 224.9 to 225.1
	(c)		8 cao	2	**M1** for $2 \times 3 + 0.5 \times 2 \times 2$ oe
3	(a)		Positive	1	
	(b)	(i)	12.15	1	
		(ii)	66	1	
	(c)	(i)	$y = 37.2 + 2.37x$	2	Range 37.20 to 37.21 and 2.369 to 2.370 **B1** for $37.2 + kx$, or $a + 2.37x$, If 0 scored, **SC1** for $37 + 2.4x$
		(ii)	82 or 82.2...	1	**FT** *their* (i)

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Page 3	**Mark Scheme**	**Syllabus**	**Paper**
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Question	Answer	Mark	Part Marks
4 **(a)**	48	**1**	
(b)	84	**2**	**FT** (180 – 2 × *their* (a)), *their* (a) ≠ 45 **M1** for (180 – 2 × *their* (a)) *their* (a) ≠ 45
(c)	42	**1**	**FT** *their* (b) ÷ 2
(d)	69 cao	**2**	**B1** for angle *OBC* or *OAC* = 21 or angle *ABC* = 69
(e)	55.5	**2**	**FT** *their* (d) **M1** for (180 – *their* (d)) ÷ 2
5 **(a)**	36.7 or 36.68 to 36.69	**2**	**B1** for at least 3 of (7.5, 17.5, 30, 42.5, 70) soi by 4402.5 Accept 37.2 or 37.18 to 37.19 for full marks and 3 of (8, 18, 30.5, 43, 70.5) soi for **B1**
(b)	0.8, 3.6, 2.6, 2.7, 1.47 or 1.466 to 1.467, 0.7	**3**	**B2** for 4 or 5 correct or **B1** for 2 or 3 correct
6 **(a)**	Reflection $y = x$	**2**	**B1** for each
(b)	Rotation, centre (2, 3) 90 [anticlockwise] or 270 clockwise	**2**	**B1** for each
(c)	Translation $\begin{pmatrix} -4 \\ 3 \end{pmatrix}$	**2**	**B1** for each
(d)	Enlargement, centre (0, 0) [SF] $\frac{1}{3}$ oe	**2**	Allow reduction **B1** for each
7	Correctly equating one set of coefficients	**M1**	Equation $x =$ or $y =$ from one equation Note – a correct sketch showing intersection in third quadrant scores **M2** (other sketches may score the **M1** for $y = \dots$ seen)
	Correct method to eliminate one variable	**M1**	Correct substitution into other equation
	$x = -2$ $y = -\frac{1}{2}$	**B2**	**B1** for each If zero scored **SC1** for correct substitution into one of original equations and evaluation to find other variable

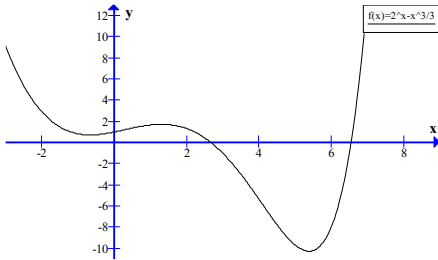| Question	Answer	Mark	Part Marks
8 (a)	$\dfrac{\sqrt{8}}{3}$ or $\dfrac{2\sqrt{2}}{3}$ or $\sqrt{\dfrac{8}{9}}$	3	**M2** for $\dfrac{\sqrt{3^2-1^2}}{3}$ or **M1** for 3^2-1^2 If 0 scored, **SC1** for 0.943 or 0.9428... or $\sqrt{0.889}$
(b) (i)	$[\cos B] = \dfrac{9^2+10^2-11^2}{2\times 9\times 10}$ oe	2	**M1** for $11^2 = 9^2+10^2-2\times 9\times 10\times \cos B$
(ii)	$0.5 \times 9 \times 10 \times$ *their* exact (a)	**M2**	**M1** for $0.5 \times 9 \times 10 \times$ *their* (a) (*their* (a) must be < 1)
	Leading to $30\sqrt{2}$	**A1**	Cancelling seen or $\dfrac{180\sqrt{2}}{6}$ or $\dfrac{90\sqrt{2}}{3}$ or $\dfrac{60\sqrt{2}}{2}$ seen
9 (a)	21.5 or 21.45 to 21.46…	2	**M1** for $100-\pi\times 5^2$ oe
(b) (i)	5.77 or 5.773 to 5.774	2	**M1** for $\tan 60 = \dfrac{10}{x}$ oe
(ii)	21.5 or 21.54 to 21.55	2	**M1** for $10 + 2 \times$ *their* (b)(i) oe or $10 + \dfrac{10}{\sin 60}$ oe
(iii)	100 to 101.0… nfww	4	**M3** for $0.5 \times 10 \times$ *their* (b)(i) $+ 0.5 \times 10 \times$ *their* (b)(i) $+ 0.5 \times 10 \times 10 \sin 60$ oe or **M2** for any 2 of these or **M1** for any 1 of these OR **M3** for $0.5 \times (their(b)(ii))^2 \times \sin 60 - 10^2$ oe or **M2** for $0.5 \times (their(b)(ii))^2 \times \sin 60$ oe or **M1** for *their* attempt at area of triangle $ABC - 100$

Question	Answer	Mark	Part Marks
10 (a)	Fully correct curve 	3	**B2** for both branches but with serious 'curl back' and/or overlap. or **B1** for 1 branch
(b)	$x = 2$ $y = 3$	2	**B1** for each
(c)	$[x =] -4$ $[x =] 3$	2	**B1** for each
(d)	$x < -4$ $2 < x < 3$	1 2	**FT** *their* –4 from (c) **FT** *their* 2 from (b) and *their* 3 from (c) **B1** for each
(e) (i)	Translation $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$	2	**B1** for each
(ii)	Translation $\begin{pmatrix} 0 \\ 3 \end{pmatrix}$	2	**B1** for each
11 (a)	216 n^3 oe	1 1	
(b)	43 $n^2 + n + 1$ oe	1 3	**M2** for $pn^2 + qn + c$ $p, q, c \neq 0$ or **M1** for second differences = 2 or $pn^2 + c$ or $pn^2 + qn$
(c)	173 $n^3 - n^2 - n - 1$ oe	1 3	**FT** *their* (a) – *their* (b) **FT** *their* (a) – *their* (b) **M2** for $pn^3 + qn^2 + rn + c$ $p, q, r, c \neq 0$ or $n^3 -$ *their* (b) or **M1** for third differences = 6 or for $pn^3 + qn^2 + c$ or $pn^3 + qn^2 + rn$ or $pn^3 + rn + c$

Question	Answer	Mark	Part Marks
12 (a) (i)	144π	2	**M1** for $\dfrac{2}{3} \times \pi \times 6^3$
(ii)	108π	2	**M1** for $2\pi \times 6^2 + \pi \times 6^2$ If 0 scored **SC1** for 72π
(b) (i)	12 or 11.99 to 12.01 nfww	3	**M2** for $\dfrac{their\,(a)(i) \times 16}{\frac{4}{3}\pi}$ oe or **M1** for $\dfrac{4}{3} \times \pi \times r^3 = their(a)(i) \times 16$
(ii)	1 : 3 or $\dfrac{1}{3}$:1 cao nfww	3	**M2** for $4 \times \pi \times (their(b)(i))^2 : 16 \times their(a)(ii)$ oe or **M1** for $4 \times \pi \times (their(b)(i))^2$ or $16 \times their(a)(ii)$
13 (a)	$\dfrac{p^3 q^2}{6}$ final answer	3	**M1** for correct use of $a\log b$ **M1** for correct use of $\log a \pm \log b$
(b) (i)	1.29 or 1.292…	3	**M2** for $\dfrac{\log 6}{\log 4}$ or $\log_4 6$ or sketch of $y = 4^x$ and $y = 6$ oe or **M1** for $x\log 4 = \log 6$ or sketch of $y = 4^x$
(ii)	$6x^2 - 5x - 7 = 0$	B2	or **B1** for 3 terms correct in expansion $6x^2 - 9x + 4x - 6$
	$x = \dfrac{-(-5) \pm \sqrt{(-5)^2 - 4 \times 6 \times (-7)}}{2 \times 6}$	M1	**FT** *their* three term quadratic or for sketch of parabola with minimum point **Alternative** If sketch of parabola with minimum point and $y = 1$ and no three term quadratic seen, allow **B3**
	$x = 1.57$ or 1.574... $x = -0.741[01...]$	B2	**B1** for each

Question	Answer	Mark	Part Marks
14 (a)	Fully correct curve	4	**B1** for correct graph for $x < 0$, minimum point seen above x-axis **B1** for correct graph for $0 < x < 2$, maximum point seen higher than minimum point **B1** for minimum point seen below x-axis, $2 < x < 8$ If 0 or 1 scored, **SC2** <u>instead</u> for 'correct curve' except stationary point of inflexion instead of LH minimum and maximum
(b)	0.729 or 0.7287... –10.3 or –10.26...	2	**B1** for each
(c)	(1.31 or 1.311 to 1.312, 1.73[0])	2	**B1** for each co-ordinate
(d)	–2.82, 0.364, 4.23, 5.76 or –2.824 to –2.823 0.3643 to 0.3644 4.228 to 4.229 5.758…	4	**B1** for each If 0 scored **SC2** for −2.8, 0.36, 4.2, 5.8 or **SC1** for three of these.