



---

**CAMBRIDGE INTERNATIONAL MATHEMATICS**

**0607/41**

Paper 4 (Extended)

**May/June 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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2016 series for most Cambridge IGCSE<sup>®</sup>, Cambridge International A and AS Level components and some Cambridge O Level components.

<b>Page 2</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge IGCSE – May/June 2016</b>	<b>0607</b>	<b>41</b>

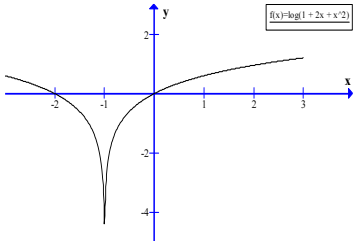
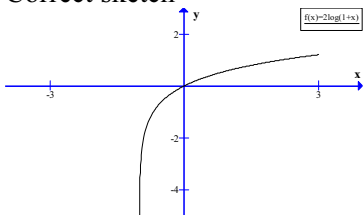
### Abbreviations

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
nfw	not from wrong working
soi	seen or implied

Question	Answer	Mark	Part Marks
<b>1</b>			
<b>(a) (i)</b>	16 000	<b>3</b>	<b>M2</b> for $13600 \div 0.85$ oe or <b>M1</b> for $13600 = 85\%$
<b>(ii)</b>	9590 or 9587 to 9588	<b>3</b>	<b>M2</b> for $13600 \times 0.89^3$ oe or <b>M1</b> for $13600 \times 0.89^k$ , $k > 1$ oe
<b>(b)</b>	9 years nfw	<b>3</b>	<b>M2</b> for $\frac{\log\left(\frac{11500}{23000}\right)}{\log 0.92}$ or $23\,000 \times 0.92^n = 11\,500$ <b>and</b> appropriate sketch or at least 2 valid trials or <b>M1</b> for $23\,000 \times 0.92^n [= 11500]$  If 0 scored <b>SC2</b> for 8 nfw or 8.3(1295..) nfw
<b>2</b>			
<b>(a)</b>	$\frac{300}{L}$ oe	<b>3</b>	<b>M1</b> for $f = \frac{k}{L}$ soi oe <b>M1</b> (Dep on 1 <sup>st</sup> <b>M1</b> ) for substituting $f = 93.7$ and $L = 3.2$ soi by 299.8 or 299.84
<b>(b)</b>	107 or 107.0 to 107.1 ...	<b>1FT</b>	<b>FT</b> $\frac{\text{their } k}{L}$ oe only
<b>(c)</b>	857 or 856.5 to 857.1 ...	<b>2FT</b>	<b>FT</b> $\frac{\text{their } k}{L}$ oe only <b>M1</b> for $0.35 = \frac{\text{their } k}{L}$
<b>3</b>			
<b>(a) (i)</b>	Quadrilateral drawn at $(-1, -1), (-1, -2), (-3, -1), (-3, -3)$	<b>3</b>	<b>M2</b> for 3 pts correct or <b>M1</b> for correct reflection of $A$ in $y$ -axis
<b>(ii)</b>	Reflection $y = -x$ oe	<b>1</b> <b>1</b>	
<b>(b) (i)</b>	Quadrilateral drawn at $(3, 1), (6, 1), (3, 3), (9, 3)$	<b>2</b>	<b>B1</b> for any stretch with $y$ -axis invariant or with stretch factor 3
<b>(ii)</b>	Stretch, $y$ -axis oe invariant (stretch factor) $\frac{1}{3}$	<b>2</b>	<b>B1</b> for any 2 correct

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2016	0607	41

Question	Answer	Mark	Part Marks
4 (a)	66 000 or 65 970 to 65 982	4	M1 for $\frac{4}{3} \times \pi \times 15^3$ M1 for $\pi \times 15^2 \times 40$ M1 for $\pi \times 25^2 \times 12$
(b) (i)	16.4	1	
(ii)	120	3	M2 for $15000 \div 5^3$ oe or M1 for $5^3$ or $(\frac{1}{5})^3$ seen
5 (a)	4 points plotted correctly	2	B1 for 2 or 3 correct
(b)	Positive	1	Ignore comments on strength
(c) (i)	75	1	
(ii)	16.6	1	
(d) (i)	$0.168t + 3.96$	2	or $m = 0.1684$ to $0.1685$ , $c = 3.963$ to $3.964$ B1 for $n = mt + c$ with either $m$ or $c$ correct or SC1 for $0.17t + 4[.0]$
(ii)	18	1FT	FT from <i>their</i> equation with $t = 85$ , answer rounded or truncated to nearest whole number
6 (a)	$3n + 2$ oe final answer	2	B1 for $3n + k$ or $kn + 2$ oe
(b)	-3, 4, 15, 30	2	B1 for 2 or 3 correct in correct place or -6, -3, 4, 15
(c)	$2n - 3$ oe final answer	3	M2 for $(2n - 3)(n + 2)$ or SC1 for $(2n + a)(n + b)$ where $ab = -6$ or $a + 2b = 1$  OR B1 for -1, 1, 3, 5 B1 for answer $2n + k$ or $kn - 3$
(d)	No <b>and</b> e.g. 502 not a multiple of 5 oe nfw	2	Dep on $5n - 1$ M1dep for <i>their</i> $(3n + 2) + \text{their } (2n - 3) = 501$ oe Dependent on (a) and (c) linear
7 (a)	19.9 or 19.89 to 19.90	3	M2 for $36^2 - 30^2$ soi by 396 or M1 for $AD^2 + 30^2 = 36^2$ oe
(b)	$30 \div \tan 68$ oe  12.12...	M2  A1	M1 for $\tan 68 = \frac{30}{AC}$ oe
(c)	301 or 301.3 to 301.4 or 239 or 238.6 to 238.7	3	B2 for 31.3 or 31.30 to 31.35 or M1 for $\tan = 12.1 \div \text{their (a)}$ oe

Question	Answer	Mark	Part Marks
8 (a) (i)	Correct sketch 	2	<b>B1</b> RH branch through (0, 0), with asymptote $x = a$ (-ve $a$ ) <b>B1</b> for LH branch symmetrical, with asymptote $x = a$ (-ve $a$ )
(ii)	-2 0	1 1	
(iii)	$x = -1$	1	
(b) (i)	Correct sketch 	2	<b>B1</b> for correct shape
(ii)	Same right hand branch	1	
(iii)	e.g. $\log(1 + 2x + x^2) = 2 \log(1 + x)$ No log of a negative number	1 1	Independent
9 (a)	1 hour 20 minutes cao	3	<b>M1</b> for $65 \div 48.75$ <b>M1</b> for correctly converting <i>their</i> time in hours to hours and mins
(b)	140 or 140.4 to 140.5	5	<b>M1</b> for $632 + 65$ [km] soi by 697 <b>M1</b> for <i>their</i> $697 \div 119.5$ soi by 5.83... <b>M1</b> for subtracting <i>their</i> 1.33...(from (a)) <b>M1</b> for $632 \div$ ( <i>their</i> 4.4993)
(c)	27.9	3	<b>M2</b> for $\frac{800 + 130}{120 \times \frac{1000}{60 \times 60}}$ oe or <b>M1</b> for distance $\div$ speed

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2016	0607	41

Question	Answer	Mark	Part Marks
<b>10 (a)</b>	8.94 or 8.944... or $4\sqrt{5}$	<b>3</b>	<b>M2</b> for $8^2 + 4^2$ <b>M1</b> for 8 and 4 seen
<b>(b)</b>	Gradient of $AB = \frac{1}{2}$ oe Gradient of perpendicular = $-2$ oe $y = (\text{their}-2)x + c$ midpoint (2, 1) Substitute (2, 1) to reach $c = 5$  OR  $(x + 2)^2 + (y + 1)^2$ oe $(x - 6)^2 + (y - 3)^2$ oe equating above two expressions 3 correct expansions correct completion with no errors or omissions	<b>1</b> <b>1FT</b> <b>M1</b> <b>B1</b> <b>A1</b>  <b>B1</b> <b>B1</b> <b>M1</b> <b>B1</b> <b>A1</b>	May be on diagram
<b>(c)</b>	$\left(\frac{5}{3}, \frac{5}{3}\right)$ oe	<b>2</b>	<b>M1</b> for $x + 2x = 5$ oe
<b>11 (a)</b>	$9^2 = (3x - 1)^2 + (2x)^2$ $-2(2x)(3x - 1) \cos 60$ oe $81 = 9x^2 - 6x + 1 + 4x^2 - 6x^2 + 2x$ oe  $7x^2 - 4x - 80 = 0$	<b>M1</b> <b>A2</b> <b>A1</b>	or <b>B1</b> for $9x^2 - 3x - 3x + 1$  Completion with no errors or omissions
<b>(b) (i)</b>	$\frac{-(-4) \pm \sqrt{(-4)^2 - 4 \times 7 \times (-80)}}{2 \times 7}$ oe  $x = 3.68$ or $3.678...$ or $-3.11$ or $-3.107$ to $-3.106$	<b>M1</b>  <b>B2</b>	or sketch of quadratic graph (any relevant one) with 1 positive root and 1 negative root  <b>B1</b> for either
<b>(ii)</b>	[ $AB =$ ] 7.36 or 7.356 to 7.357 [ $BC =$ ] 10[.0] or 10.03 to 10.04	<b>1FT</b> <b>1FT</b>	<b>FT</b> 2 $\times$ a positive root <b>FT</b> 3 $\times$ a positive root $- 1$
<b>(c)</b>	31.9 or 32[.0] or 31.85 to 32[.00]	<b>2FT</b>	<b>M1</b> for $\frac{1}{2} \times \text{their } AB \times \text{their } BC \sin 60$ oe

Question	Answer	Mark	Part Marks		
12	(a)	63.6	2	<b>M1</b> for midpoints (47.5, 52.5, 57.5, 62.5, 67.5, 72.5, 77.5) soi	
	(b)	Correct Curve	5	<b>B4</b> for 5 points correct and joined or for 6 points correct or <b>B3</b> for at least 3 correct points or <b>B2</b> for all correct cfs 5, 24, 58, 116, 162, 191, 200 seen or <b>B1</b> for at least 3 correct cfs or for increasing curve with 6 points plotted at upper bounds  If 0 or 1 or 2 scored, <b>SC3</b> for <b>all</b> points correct but consistently translated to mid-interval or lower bound.	
	(c)	(i)	63 to 64	1	Dependent on increasing curve
	(ii)	8.5 to 10.5	2	<b>B1</b> for [l.qtile. =] 58.5 to 59.5 or [u.qtile. =] 68 to 69 Dependent on increasing curve	
	(d)	(i)	$\frac{12 \text{ to } 16}{200}$ oe	1FT	<b>FT</b> ( <i>their</i> 'read off' at 53)/200 dep on increasing cfs
	(ii)	$\frac{72}{39800}$ oe	2	<b>M1</b> for $\frac{k}{200} \times \frac{k-1}{199}$ where $k = 8, 9$ or $10$	
13	(a)	(i)	2.25 oe	2	<b>M1</b> for $1 = 2(5 - 2x)$ or $5 - 2x = \frac{1}{2}$ oe
	(ii)	$-5 + 4x$ final answer	2	<b>B1</b> for $5 - 2(5 - 2x)$	
	(iii)	$\frac{5-x}{2}$ oe final answer	2	<b>M1</b> for $2x = 5 - y$ or $x = 5 - 2y$ or $\frac{y}{2} = \frac{5}{2} - x$	
		$\frac{2}{3}$	1		