## MARK SCHEME for the October/November 2014 series

## **0606 ADDITIONAL MATHEMATICS**

0606/21

Paper 2, maximum raw mark 80

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 October/November 2014 series for most Cambridge IGCSE<sup>®</sup>, Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.



Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2014	0606	21

1 (a)		B1	
		B1	
(b)	No.in <i>H</i> only = $50 - x$ ; No in <i>F</i> only = $60 - x$ Sum: $50 - x + 60 - x + x + 30 - 2x = 98$ x = 14	B1 M1 A1	Both written or on diagram Add at least 3 terms each with <i>x</i> involved and equate to 98 soi
2	$9x^{2} + 2x - 1 < (x + 1)^{2}$ $8x^{2} < 2 \text{ oe isw}$ $-\frac{1}{2} < x < \frac{1}{2}$	M1 A1 A1	Expand and collect terms
3	$\log_{2}(x+3) = \log_{2} y+2 \rightarrow x+3 = 4y$ $\log_{2}(x+y) = 3 \rightarrow x+y = 8$ x+3 = 4(8-x) $5x = 29 \rightarrow x = 5.8, \text{ oe}$ y = 2.2  oe	B1 B1 M1 A1 A1	Eliminate $y$ or $x$ from two linear three term equations

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2014	0606	21

4 (i)	f(37) = 3 or gf(x) = $\frac{\sqrt{x-1}-3-2}{2(\sqrt{x-1}-3)-3}$	B1	
	$gf(37) = \frac{3-2}{6-3} = \frac{1}{3}$	B1	
(ii)	$y = \sqrt{x-1} - 3 \rightarrow (y+3)^2 = x-1$	<b>M1</b>	Rearrange and square in any order
	$(x+3)^2 + 1 = f^{-1}(x)$ oe isw	A1	Interchange <i>x</i> and <i>y</i> and complete
(iii)	$y = \frac{x-2}{2x-3}$		
	$2xy - 3y = x - 2  \rightarrow  2xy - x = 3y - 2$	M1	Multiply and collect like terms
	$\frac{3x-2}{2x-1} = g^{-1}(x)$ oe	A1	Interchange and complete Mark final answer
5 (i)	<i>B</i> = 900	B1	
(ii)	$B = 500 + 400e^2 = 3455 \text{ or } 3456 \text{ or } 3460$	B1	3455.6 scores <b>B0</b>
(iii)	$\left(\frac{\mathrm{d}B}{\mathrm{d}t}\right) = 80\mathrm{e}^{0.2t}$	B1	
	$t = 10 \rightarrow \frac{\mathrm{d}B}{\mathrm{d}t} = 80\mathrm{e}^2 = 591(/\mathrm{day})$	B1	awrt
(iv)	$10000 = 500 + 400e^{0.2t}  \rightarrow  e^{0.2t} = (23.75)$	M1	$e^{0.2t} = k$
	$0.2t = \ln 23.75$ t = 15.8 (days)	DM1	take logs: $0.2t = \ln k$
	( - 10.0 (udys)	A1	awrt

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2014	0606	21

$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6 (i)	$(x+2)^2 + x^2 = 10$	B1	
Points (1, 3), (-3, -1) isw or elimination of x leads to $y^2 - 2y - 3 = 0$ , then as aboveA1 A1both x or a pair both y or second pair(ii) $m^2x^2 + 10mx + 25 + x^2 = 10$ $b^2 - 4ac = (0) \rightarrow 100m^2 - 60(m^2 + 1) = 0$ $b^2 - 4ac = (0) \rightarrow 100m^2 - 60(m^2 + 1) = 0$ $m = \pm \sqrt{\frac{3}{2}}$ oe iswB1 A1attempt to use discriminant on three term quadratic. Allow unsimplified cao $\pm$ is requiredAlternative solution: $\frac{dy}{dx} = \frac{-x}{\sqrt{10-x^2}}$ or $\frac{dy}{dx} = -\frac{x}{y}$ Result: $y^2 = x^2 + 5y$ after inserted in $y = mx + 5$ Attempt to solve with $x^2 + y^2 = 10$ $y = 2, x = \pm \sqrt{6}$ $m = \pm \frac{3}{\sqrt{6}}$ oeB1allow unsimplified7(i) $v = 2 \cosh t + 1$ $1 = 0$ B1mark final answer(ii) $2 \cosh t + 1 = 0$ $1 = \frac{2\pi}{3}$ or $2.09$ B1mark final answer(iii) $t = \frac{2\pi}{3} \rightarrow -x = 2 \sin(\frac{2\pi}{3}) + \frac{2\pi}{3} = 3.83m$ $a = -2 \sin t$ $t = \frac{2\pi}{3} a = -\sqrt{3} = -\frac{1.73}{4} ms^{-2}$ B1awrt8(i) $\frac{dy}{dx} = \frac{(2+x^2)^2 (2x-x^2)^2 x}{(2+x^2)^2} = \frac{4x}{(2+x^2)^2}$ $k = 4$ M1apply quotient or product rule unsimplified	<b>o</b> (1)			3 term quadratic with attempt to solve
(ii) or elimination of x leads to $y^2 - 2y - 3 = 0$ , then as above (ii) $m^2x^2 + 10mx + 25 + x^2 = 10$ $b^2 - 4ac = (0) \rightarrow 100m^2 - 60(m^2 + 1) = 0$ $b^2 - 4ac = (0) \rightarrow 100m^2 - 60(m^2 + 1) = 0$ $m = \pm \sqrt{\frac{3}{2}}$ oe isw A1 $m = \pm \sqrt{\frac{3}{2}}$ oe isw A1 A1 $m = \pm \sqrt{\frac{3}{2}}$ or $\frac{dy}{dx} = \frac{x}{y}$ Result: $y^2 = x^2 + 5y$ after inserted in $y = mx + 5$ Attempt to solve with $x^2 + y^2 = 10$ $y = 2, x = \pm \sqrt{6}$ $m = \pm \frac{3}{\sqrt{6}}$ oe A1 F (ii) $2\cos t + 1 = 0$ $t = \frac{2\pi}{3} \rightarrow x = 2\sin(\frac{2\pi}{3}) + \frac{2\pi}{3} = 3.83m$ $a = -2\sin t$ $t = \frac{2\pi}{3} a = -\sqrt{3} = -\frac{1.73}{4}ms^{-2}$ B1 $m = t = \frac{3}{x} = -\sqrt{3} = -\frac{1.73}{4}ms^{-2}$ B1 $m = t = \frac{1}{x} = \frac{2}{x} = -\sqrt{3} = -\frac{1.73}{4}ms^{-2}$ B1 $m = t = \frac{1}{x} = \frac{2}{x} = -\sqrt{3} = -\frac{1}{x} = \frac{4x}{(2 + x^2)^2}$ A1 $m = t = \frac{1}{x} = $				
(ii) then as above (ii) $m^2x^2 + 10mx + 25 + x^2 = 10$ $b^2 - 4ac = (0) \rightarrow 100m^2 - 60(m^2 + 1) = 0$ $m = \pm \sqrt{\frac{3}{2}}$ or isw A1 attempt to use discriminant on three term quadratic. Allow unsimplified $m = \pm \sqrt{\frac{3}{2}}$ or isw A1 cao $\pm$ is required A1 cao $\pm$ is required A1 allow unsimplified Result: $y^2 = x^2 + 5y$ after inserted in $y = mx + 5$ Attempt to solve with $x^2 + y^2 = 10$ $y = 2, x = \pm \sqrt{6}$ A1 Eliminate x or y both $m = \pm \frac{3}{\sqrt{6}}$ or $2.09$ A1 allow unsimplified $t = \frac{2\pi}{3} \text{ or } 2.09$ A1 angle $t = \frac{2\pi}{3} = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2}$ B1 anwrt B1 mark final answer B1 awrt B1 awrt B1 awrt B1 ft ft <i>their</i> v (2 <sup>nd</sup> differential) $t \sup \frac{2n}{3} = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2}$ B1 awrt B1 awrt B1 awrt B1 argle awrt A1 argle argle t in correct a awrt A1 argle awrt A1 argle argle t in correct a awrt A1 argle argle argle t in correct a awrt A1 argle argle argle argle t in correct a awrt A1 argle arg			A1	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	(ii)	$m^2 x^2 + 10mx + 25 + x^2 = 10$	B1	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		$(m^2 + 1)x^2 + 10mx + 15 = 0$		
Alternative solution: $\frac{dy}{dx} = \frac{-x}{\sqrt{10-x^2}} \text{ or } \frac{dy}{dx} = -\frac{x}{y}$ Result: $y^2 = x^2 + 5y \text{ after inserted in } y = mx + 5$ Attempt to solve with $x^2 + y^2 = 10$ $y = 2, x = \pm \sqrt{6}$ $m = \pm \frac{3}{\sqrt{6}} \text{ oe}$ Alt Eliminate x or y both $1 = \frac{1}{10}$ $m = \pm \frac{3}{\sqrt{6}} \text{ oe}$ Alt $1 = \frac{1}{10}$ (i) $y = 2 \cos t + 1$ (i) $2 \cos t + 1 = 0$ $t = \frac{2\pi}{3} \text{ or } 2.09$ Alt $1 = \frac{2\pi}{3} a = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2}$ Bit $1 = \frac{1}{10} \text{ mark final answer}$ $1 = \frac{2\pi}{3} a = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2}$ Bit $1 = \frac{4x}{(2+x^2)^2}$ $1 = \frac{4x}{(2+x^2)^2}$ Alt $1 = \frac{4x}{(2+x^2)^2}$ Alt $2 = \frac{4x}{(2+x^2)^2}$ Alt $3 = \frac{4x}{(2+x^2)^2}$ Alt $4 = \frac{4}{(2+x^2)^2}$ Alt $4 = \frac{4}{(2+x^2$		$b^2 - 4ac = (0) \rightarrow 100m^2 - 60(m^2 + 1) = 0$		-
$\frac{dy}{dx} = \frac{-x}{\sqrt{10 - x^2}} \text{ or } \frac{dy}{dx} = -\frac{x}{y}$ Result: $y^2 = x^2 + 5y$ after inserted in $y = mx + 5$ Attempt to solve with $x^2 + y^2 = 10$ $y = 2, x = \pm \sqrt{6}$ $m = \pm \frac{3}{\sqrt{6}}$ oe 7 (i) $v = 2 \cosh t + 1 = 0$ (ii) $2 \cosh t + 1 = 0$ $t = \frac{2\pi}{3}$ or $2.09$ (iii) $t = \frac{2\pi}{3} \rightarrow x = 2 \sin\left(\frac{2\pi}{3}\right) + \frac{2\pi}{3} = 3.83 \text{ m}$ $a = -2 \sin t$ $t = \frac{2\pi}{3} a = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2}$ 8 (i) $\frac{dy}{dx} = \frac{(2 + x^2) \times 2x - x^2 \times 2x}{(2 + x^2)^2} = \frac{4x}{(2 + x^2)^2}$ k = 4 $x = \frac{1}{2} = x^2$ $x = \frac{1}{2} = \frac{1}{2}$		$m = \pm \sqrt{\frac{3}{2}}$ oe isw	A1	$cao \pm is required$
Result: $y^2 = x^2 + 5y$ after inserted in $y = mx + 5$ Attempt to solve with $x^2 + y^2 = 10$ $y = 2, x = \pm \sqrt{6}$ $m = \pm \frac{3}{\sqrt{6}}$ oe 7 (i) $v = 2 \cos t + 1$ (ii) $2 \cos t + 1 = 0$ $t = \frac{2\pi}{3}$ or $2.09$ (iii) $t = \frac{2\pi}{3} \rightarrow x = 2 \sin\left(\frac{2\pi}{3}\right) + \frac{2\pi}{3} = 3.83 \text{ m}$ $a = -2 \sin t$ $t = \frac{2\pi}{3} a = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2}$ 8 (i) $\frac{dy}{dx} = \frac{(2 + x^2) \times 2x - x^2 \times 2x}{(2 + x^2)^2} = \frac{4x}{(2 + x^2)^2}$ k = 4 MI Eliminate x or y both MI Eliminate x or y both MI equate heir v to zero (must be a differential) and attempt to solve to find an <b>angle</b> awrt B1 awrt B1 awrt B1 awrt B1 ft ft <i>their</i> v (2 <sup>nd</sup> differential) ft using <i>their</i> <b>angle</b> t in correct a awrt A1 apply quotient or product rule unsimplified A1 k=4 does not need to be specifically identified		Alternative solution:		
Result: $y^2 = x^2 + 5y$ after inserted in $y = mx + 5$ Attempt to solve with $x^2 + y^2 = 10$ $y = 2, x = \pm \sqrt{6}$ $m = \pm \frac{3}{\sqrt{6}}$ oe 7 (i) $v = 2 \cos t + 1$ (ii) $2 \cos t + 1 = 0$ $t = \frac{2\pi}{3}$ or $2.09$ (iii) $t = \frac{2\pi}{3} \rightarrow x = 2 \sin\left(\frac{2\pi}{3}\right) + \frac{2\pi}{3} = 3.83 \text{ m}$ $a = -2 \sin t$ $t = \frac{2\pi}{3} a = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2}$ 8 (i) $\frac{dy}{dx} = \frac{(2 + x^2) \times 2x - x^2 \times 2x}{(2 + x^2)^2} = \frac{4x}{(2 + x^2)^2}$ k = 4 MI Eliminate x or y both MI Eliminate x or y both MI equate heir v to zero (must be a differential) and attempt to solve to find an <b>angle</b> awrt B1 awrt B1 awrt B1 awrt B1 ft ft <i>their</i> v (2 <sup>nd</sup> differential) ft using <i>their</i> <b>angle</b> t in correct a awrt A1 apply quotient or product rule unsimplified A1 k=4 does not need to be specifically identified		$\frac{dy}{dt} = \frac{-x}{\sqrt{1-x}}$ or $\frac{dy}{dt} = -\frac{x}{\sqrt{1-x}}$	B1	allow unsimplified
$\begin{vmatrix} y^2 = x^2 + 5y \text{ after inserted in } y = mx + 5\\ \text{Attempt to solve with } x^2 + y^2 = 10\\ y = 2, x = \pm \sqrt{6}\\ m = \pm \frac{3}{\sqrt{6}} \text{ oe} \end{vmatrix}$ $I = \frac{3}{\sqrt{6}} \text{ oe}$ $I = 3$				
Attempt to solve with $x^2 + y^2 = 10$ $y = 2, x = \pm \sqrt{6}$ $m = \pm \frac{3}{\sqrt{6}}$ oe 7 (i) $v = 2\cos t + 1$ (ii) $2\cos t + 1 = 0$ $t = \frac{2\pi}{3}$ or 2.09 (iii) $t = \frac{2\pi}{3} \rightarrow x = 2\sin\left(\frac{2\pi}{3}\right) + \frac{2\pi}{3} = 3.83 \text{ m}$ $a = -2\sin t$ $t = \frac{2\pi}{3} a = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2}$ 8 (i) $\frac{dy}{dx} = \frac{(2+x^2) \times 2x - x^2 \times 2x}{(2+x^2)^2} = \frac{4x}{(2+x^2)^2}$ k = 4 MI Eliminate x or y both MI equate their x to y both MI equate their v to zero (must be a differential) and attempt to solve to find an <b>angle</b> awrt B1 awrt B1 ft ft their v (2 <sup>nd</sup> differential) DB1 ft ft using their <b>angle</b> t in correct a awrt A1 apply quotient or product rule unsimplified A1 $k=4$ does not need to be specifically identified				
$\begin{vmatrix} y = 2, x = \pm \sqrt{6} \\ m = \pm \frac{3}{\sqrt{6}} \text{ oe} \end{vmatrix} \qquad A1 \\ A1 \qquad both$ $T  (i) \qquad v = 2\cos t + 1 \\ (ii) \qquad 2\cos t + 1 = 0 \\ t = \frac{2\pi}{3} \text{ or } 2.09 \\ (iii) \qquad t = \frac{2\pi}{3} \text{ or } 2.09 \\ (iii) \qquad t = \frac{2\pi}{3} \rightarrow x = 2\sin\left(\frac{2\pi}{3}\right) + \frac{2\pi}{3} = 3.83 \text{ m}$ $a = -2\sin t \\ t = \frac{2\pi}{3} a = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2} \end{aligned} \qquad B1 \qquad \text{awrt}$ $B1 \qquad \text{awrt} \\ B1 \qquad \text{ft} \qquad t = \frac{2\pi}{3} a = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2} \\ B1 \qquad \text{ft} \qquad t = \sin t + \frac{2\pi}{3} a = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2} \end{aligned}$			M1	Eliminate x or y
7 (i) $v = 2\cos t + 1$ (ii) $2\cos t + 1 = 0$ $t = \frac{2\pi}{3} \text{ or } 2.09$ (iii) $t = \frac{2\pi}{3} \rightarrow x = 2\sin\left(\frac{2\pi}{3}\right) + \frac{2\pi}{3} = 3.83\text{ m}$ $a = -2\sin t$ $t = \frac{2\pi}{3} a = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2}$ 8 (i) $\frac{dy}{dx} = \frac{(2+x^2) \times 2x - x^2 \times 2x}{(2+x^2)^2} = \frac{4x}{(2+x^2)^2}$ k = 4 M1 equate their v to zero (must be a differential) and attempt to solve to find an <b>angle</b> awrt B1 awrt B1 awrt B1 ft ft their v (2 <sup>nd</sup> differential) ft using <i>their</i> <b>angle</b> t in correct a awrt M1 apply quotient or product rule unsimplified A1 $k=4$ does not need to be specifically identified		$y = 2, x = \pm \sqrt{6}$		
(ii) $2\cos t + 1 = 0$ $t = \frac{2\pi}{3} \text{ or } 2.09$ (iii) $t = \frac{2\pi}{3} \rightarrow x = 2\sin\left(\frac{2\pi}{3}\right) + \frac{2\pi}{3} = 3.83 \text{ m}$ $a = -2\sin t$ $t = \frac{2\pi}{3} a = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2}$ 8 (i) $\frac{dy}{dx} = \frac{(2+x^2) \times 2x - x^2 \times 2x}{(2+x^2)^2} = \frac{4x}{(2+x^2)^2}$ k = 4 M1 equate their v to zero (must be a differential) and attempt to solve to find an <b>angle</b> awrt B1 awrt B1 ft ft <i>their</i> v (2 <sup>nd</sup> differential) ft using <i>their</i> <b>angle</b> t in correct a awrt A1 apply quotient or product rule unsimplified A1 $k=4$ does not need to be specifically identified		$m = \pm \frac{3}{\sqrt{6}}$ oe	A1	
(iii) $t = \frac{2\pi}{3} \text{ or } 2.09$ (iii) $t = \frac{2\pi}{3} \rightarrow x = 2\sin\left(\frac{2\pi}{3}\right) + \frac{2\pi}{3} = 3.83 \text{ m}$ $a = -2\sin t$ $t = \frac{2\pi}{3}a = -\sqrt{3} = -\frac{1.73}{4}\text{ ms}^{-2}$ <b>8</b> (i) $\frac{dy}{dx} = \frac{(2+x^2) \times 2x - x^2 \times 2x}{(2+x^2)^2} = \frac{4x}{(2+x^2)^2}$ k = 4 <b>M1</b> apply quotient or product rule unsimplified <b>A1</b> $k=4$ does not need to be specifically identified	7 (i)	$v = 2\cos t + 1$	B1	mark final answer
(iii) $t = \frac{2\pi}{3} \text{ or } 2.09$ (iii) $t = \frac{2\pi}{3} \rightarrow x = 2\sin\left(\frac{2\pi}{3}\right) + \frac{2\pi}{3} = 3.83 \text{ m}$ $a = -2\sin t$ $t = \frac{2\pi}{3}a = -\sqrt{3} = -\frac{1.73}{4} \text{ ms}^{-2}$ B (i) $\frac{dy}{dx} = \frac{\left(2 + x^2\right) \times 2x - x^2 \times 2x}{\left(2 + x^2\right)^2} = \frac{4x}{\left(2 + x^2\right)^2}$ $k = 4$ M1 apply quotient or product rule unsimplified A1 is provided in the equation of the equat	(ii)	$2\cos t + 1 = 0$	M1	•
$\begin{vmatrix} a = -2\sin t \\ t = \frac{2\pi}{3}a = -\sqrt{3} = -\frac{1.73}{4}\text{ms}^{-2} \end{vmatrix} \qquad $		$t = \frac{2\pi}{3} \text{ or } 2.09$	A1	an <b>angle</b>
$\begin{vmatrix} a = -2\sin t \\ t = \frac{2\pi}{3}a = -\sqrt{3} = -\frac{1.73}{4}\text{ms}^{-2} \end{vmatrix} \qquad $	(iii)	$t = \frac{2\pi}{3} \rightarrow x = 2\sin\left(\frac{2\pi}{3}\right) + \frac{2\pi}{3} = 3.83 \mathrm{m}$	B1	awrt
8 (i) $\frac{dy}{dx} = \frac{(2+x^2) \times 2x - x^2 \times 2x}{(2+x^2)^2} = \frac{4x}{(2+x^2)^2}$ A1 apply quotient or product rule unsimplified k = 4 k = 4		$a = -2\sin t$	B1ft	ft <i>their</i> v (2 <sup>nd</sup> differential)
$\frac{dy}{dx} = \frac{(2+x^2)^{\times 2x - x \times 2x}}{(2+x^2)^2} = \frac{4x}{(2+x^2)^2}$ A1 unsimplified k = 4 A1 k = 4 does not need to be specifically identified		$t = \frac{2\pi}{3}a = -\sqrt{3} = -\frac{1.73}{4}\mathrm{ms}^{-2}$	DB1ft	ft using <i>their</i> <b>angle</b> <i>t</i> in correct <i>a</i> awrt
identified identified	8 (i)	$\frac{dy}{dx} = \frac{(2+x^2) \times 2x - x^2 \times 2x}{(2+x^2)^2} = \frac{4x}{(2+x^2)^2}$		
r r r r r r r r r r r r r r r r r r r		k = 4	A1	1 · · ·
$\int (2+x^2)^2 dt + 2+x^2 + (0) dt + BI = \frac{BI}{their k} \times \text{ original function}$	(ii)	$\int \frac{x}{(2+x^2)^2} dx = \frac{1}{4} \times \frac{x^2}{2+x^2} + (c) \text{ isw}$	B1 B1	$\frac{1}{their k} \times$ original function

Page	Mark Scheme		Syllabus	Paper	
	Cambridge IGCSE – October/November 2014				21
9	$(a+3\sqrt{5})^2 = a^2 + 3\sqrt{5}a + 3\sqrt{5}a + 45$ oe	<b>B</b> 1	anywhere		
	Equate: $a^2 + a + 45 = 51$ and $6a - b = 0$	B1 B1			
		DI			
	(a+3)(a-2)=0	M1	Attempt to solve three term quadratic with integer coefficients obtained by equating coeffs Both <i>a</i> s correct or one correct pair Both <i>b</i> s correct		
	a = -3, 2	A1			
	b = -18, 12	A1 A1			
10 (i)	$\sec x \csc x = \frac{1}{\cos x \sin x}$	B1	anywhere		
	$\cot x = \frac{\cos x}{\sin x}$	<b>B1</b>	anywhere		
	LHS = $\frac{1 - \cos^2 x}{\cos x \sin x}$ oe	B1ft	correct addition of <i>their</i> terms use of identity and cancel		
	$=\frac{\sin^2 x}{\cos x \sin x} = \tan x \qquad \text{AG}$	B1			
(ii)	$3 \cot x - \cot x = \tan x \rightarrow 2 \cot x = \tan x$	M1	equate and collect like terms, allow sign errors		
	$\tan^2 x = 2$ oe	A1 A1	2 values		
	<i>x</i> = 54.7, 125.3, 234.7, 305.3	A1 A1	only 2 more val	ues. awrt	
11 (i)	Area of sector = $\frac{1}{2} \times x^2 \times 0.8 \left(= 0.4x^2 \text{ cm}^2\right)$	B1	anywhere		
	$SR = 5\sin 0.8 (= 3.59)$ or	<b>B</b> 1	SR may be seen	in stated $\frac{1}{2}a$	b sin C
	$OR = 5\cos 0.8 (= 3.48)$			2	
	Area of triangle =				
	$\frac{1}{2}5\cos 0.8 \times 5\sin 0.8 = 6.247\mathrm{cm}^2$	M1 A1	insert correct te formulae	rms into corr	ect area
	$0.08x^2 = 6.247$		lornitulae		
	$x = 8.837 \mathrm{cm}$ AG	A1			
(ii)	$SQ = 8.84 - 5 (= 3.84 \mathrm{cm})$				
	$PR = 8.84 - 5\cos 0.8 (= 5.35 \text{ or } 5.36 \text{ cm})$	<b>B</b> 1	two lengths from	n <i>SQ, PR, P</i> Ç	2 awrt
	$PQ = 8.84 \times 0.8 (= 7.07 \mathrm{cm})$	B1	third length awrt		
	Perimeter = 19.84 to 19.86 cm or rounded to 19.8 or 19.9	B1	sum		
(iii)	Area $PQSR = 4 \times 6.247$	M1			
	$=25\mathrm{cm}^2$	A1	24.95 to 25		

Page 6	Mark Scheme			Syllabus	Paper
	Cambridge IGCSE – October/November 2014			0606	21
12 (i)	$f(2) = 3(2^{3}) - 14(2^{2}) + 32 = 0$ Or complete long division	B1			
(ii)	$f(x) = (x-2)(3x^2 - 8x - 16)$	M1 A1 M1	$3x^2$ and 16 8x and correct signs Factorise three term quadratic first 2 terms third term correct unsimplified		
(iii)	f(x) = (x-2)(x-4)(3x+4) x = 2, 4	A1 B1			
(iv)	$\int 3x - 14 + \frac{32}{x^2} dx = 1.5x^2 - 14x - \frac{32}{x} (+ c)$ Area = $\left[ 1.5x^2 - 14x - \frac{32}{x} \right]_{0}^{4}$	B1 B1			
	$ \begin{array}{c} 1 & 1 & 1 \\ 1 & 1 & 1 \\ \end{array} \\ = (-) 2 \end{array} $	M1 A1	Limits of 2 and	4 and subtrac	t