Question Number	Scheme	Marks
1(a)	$\mathrm{f}(x)$,, 9	B1
		(1)
(b)	$\mathrm{fg}(1.5)=\mathrm{f}\left(\frac{3}{2\times1.5+1}\right)=9-\left(\frac{3}{2\times1.5+1}\right)^2$	M1
	$=\frac{135}{16}$	A1
		(2)
(c)	$\mathrm{g}(x)=\frac{3}{2x+1}\Rightarrow \mathrm{g}^{-1}(x)=\frac{3-x}{2x}$	M1 A1
	$0<x$,, 3	B1
		(3)
		Total 6

(a)

B1: Correct range. Allow equivalent notation e.g. y ,, 9, f ,, $9, y\in(-\infty, 9]$ but not x ,, 9.

Condone just ",, 9" and "less than or equal to 9"

(b)

M1: Full attempt at method to find fg (1.5) condoning slips. Implied by a correct answer or 8.44
e.g. For a correct order of operations so requires an attempt to apply g (1.5) first and then f to their g (1.5)

Also allow for an attempt to substitute x = 1.5 into $9-\left(\frac{3}{2x+1}\right)^2$ condoning slips such as substituting

x = 1.5 into $9-\frac{3}{(2x+1)^2}$

(c)

M1: Changes the subject of $y=\frac{3}{2x+1}$ and obtains $x=\frac{3\pm y}{2y}$ or $x=\frac{3}{2y}\pm\frac{1}{2}$ or equivalent.

Alternatively changes the subject of $x=\frac{3}{2y+1}$ and obtains $y=\frac{3\pm x}{2x}$ or $y=\frac{3}{2x}\pm\frac{1}{2}$ or equivalent.

A1: $\mathrm{g}^{-1}(x)=\frac{3-x}{2x}$, $\mathrm{g}^{-1}(x)=\frac{1}{2}\left(\frac{3-x}{x}\right)$, $\mathrm{g}^{-1}(x)=\frac{3}{2x}-\frac{1}{2}$, $\mathrm{g}^{-1}: x\mapsto\frac{3-x}{2x}$ or $\mathrm{g}^{-1}: x\mapsto\frac{3}{2x}-\frac{1}{2}$

Condone $y=\frac{3-x}{2x}$ o.e and even $\mathrm{g}^{-1}=\frac{3-x}{2x}$ but NOT $\mathrm{f}^{-1}=\frac{3-x}{2x}$ o.e. ISW after a correct answer.

Don't for this mark allow fractions/fractions that may be misinterpreted such as $\mathrm{g}^{-1}(x)=\frac{\frac{3-x}{x}}{2}$ but answers such as $\mathrm{g}^{-1}(x)=\frac{\frac{3}{x}-1}{2}$ and $y=\frac{\left(\frac{3-x}{x}\right)}{2}$ are clear and unambiguous and can score both marks.

B1: Correct domain. Allow equivalent notation e.g. $x\in(0, 3]$ but not just $(0, 3]$

Question Number	Scheme	Marks
2(a)	$R = \sqrt{5}$	B1
	$\tan\alpha = \frac{2}{1} \Rightarrow \alpha = ...$	M1
	$\alpha = 1.107$	A1
		(3)
(b)(i)	$\text{Max} = 3 + 7\sqrt{5}$	B1ft
(b)(ii)	$(2x - "1.107") = \pi \Rightarrow x = ...$	M1
	$\Rightarrow x = \frac{\pi + "1.107"}{2} = 2.12$	A1
		(3)
		Total 6

(a)

B1: Correct exact value (Condone $R = \pm\sqrt{5}$).

isw after a correct answer. e.g. $R = \sqrt{5} = 2.24$

M1: Allow for: $\tan\alpha = \pm\frac{2}{1}$, $\tan\alpha = \pm\frac{1}{2}$, $\cos\alpha = \pm\frac{1}{"R"}$, $\sin\alpha = \pm\frac{2}{"R"}$ leading to a value for α

If no method is shown imply by the sight of awrt 1.1 rads or awrt $63°$

A1: awrt 1.107

(b)(i)

B1ft: Award for 3 + 7×their R where $R > 0$.

Also follow through on decimal answers from (a) e.g.

Condone solutions such as $3 - 7 \times -\sqrt{5} = 18.65..$.

(b)(ii)

M1: For an attempt to solve $(2x \pm "1.107") = \pi$ or $(2x \pm "1.107") = -\pi$. May be implied by awrt 2.12

Condone a bracketing slip $\cos(2(x \pm "1.107")) = -1 \Rightarrow 2(x \pm "1.107") = \pi \Rightarrow x = ...$ (condone $-\pi$ as above)

Also condone an attempt to solve $(2x \pm "63°") = 180°$ but not mixed units, e.g. $(2x \pm "1.107") = 180°$

A1: For awrt 2.12. This cannot be given in a list, the 2.12 must be selected.