| Question | Answer | Marks | Partial marks |
|---|---|---|---|
| 8 | $\left(2-\sqrt{10}\right)\left(2+\sqrt{10}\right)=-6$ | **B1** | |
| | $x=\dfrac{-1\pm\sqrt{1^{[2]}-4(2-\sqrt{10})(2+\sqrt{10})}}{2\left(2-\sqrt{10}\right)}$ | **M1** | |
| | $x=\dfrac{-1\pm\sqrt{1-4(-6)}}{2\left(2-\sqrt{10}\right)}$ | **A1** | |
| | $\dfrac{-6}{2\left(2-\sqrt{10}\right)}$ oe , $\dfrac{4}{2\left(2-\sqrt{10}\right)}$ oe | **A1** | |
| | $\dfrac{-6}{2\left(2-\sqrt{10}\right)}\times\dfrac{\left(2+\sqrt{10}\right)}{\left(2+\sqrt{10}\right)}$ or $\dfrac{4}{2\left(2-\sqrt{10}\right)}\times\dfrac{\left(2+\sqrt{10}\right)}{\left(2+\sqrt{10}\right)}$ | **M1** | **FT** $\dfrac{k}{2\left(2-\sqrt{10}\right)}$ where $k$ is a non-zero constant |
| | $\dfrac{-6(2+\sqrt{10})}{2(-6)}$ oe = $1+\dfrac{1}{2}\sqrt{10}$ | **A1** | Must have sufficient detail shown |
| | $\dfrac{4(2+\sqrt{10})}{2(-6)}$ oe = $-\dfrac{2}{3}-\dfrac{1}{3}\sqrt{10}$ | **A1** | Must have sufficient detail shown |
| 9(a) | $2(e^x + 1)^2 - 1$ [= 8] | **M1** | |
| | $e^x = -1+\sqrt{\dfrac{9}{2}}$ oe | **A1** | |
| | $x=\ln\left(\dfrac{3}{\sqrt{2}}-1\right)$ isw or 0.115 or 0.1145[06…] rot to 4 or more dp | **A1** | |
| 9(b) | f is not one-one, hence $f^{-1}$ does not exist oe | **B1** | |
| | $g^{-1}(x) = \ln(x - 1)$ | **2** | **M1** for $x = \ln(y - 1)$ and a swop of variables at some point<br>or $y = \ln(x + 1)$<br>or $e^x = y - 1$ and $y = \ln x - 1$ |
| | $x > 1$ | **B1** | |

| Question | Answer | Marks | Partial marks |
|---|---|---|---|
| 10(a) | $OA = \sqrt{6^2 + 8^2}$ oe or 10 | **B1** | |
| | [Angle $AOB$ = ]<br>0.9272[95…] rot to 4 or more dp<br>or<br>[Angle $OAB$ = ]<br>0.6435[01…] rot to 4 or more dp | **M1** | |
| | [Angle $COB$ =] 2.214[297…] rot to 3 or more dp | **A1** | |
| | [Arc $CB$ =] 6(*their* 2.214) | **M1** | **FT** *their COB* |
| | [Perimeter =] 8 + (*their* 10 + 6) + 6(*their* 2.214) | **M1** | **FT** *their* arc $CB$ and $OA$ |
| | 37.3 or 37.28[578…] rot to 2 or more dp | **A1** | |
| 10(b) | $\frac{1}{2} \times 8 \times 6 + \frac{1}{2} \times 6^2 \times 2.214$ oe, soi | **M2** | **FT** *their* 2.21<br>**M1** for $\frac{1}{2} \times 6^2 \times 2.214$ soi |
| | 63.9 or 63.85[735…] rot to 2 or more dp | **A1** | |
| 11(a) | $\dfrac{1}{\frac{1}{\cos x} - \frac{1}{\sin x}} + \dfrac{1}{\frac{1}{\cos x} + \frac{1}{\sin x}}$ | **M1** | |
| | Simplifies denominator<br>$\dfrac{1}{\frac{\sin x - \cos x}{\sin x \cos x}} + \dfrac{1}{\frac{\sin x + \cos x}{\sin x \cos x}}$ | **A1** | |
| | Writes as two simple algebraic fractions:<br>$\dfrac{\sin x \cos x}{\sin x - \cos x} + \dfrac{\sin x \cos x}{\sin x + \cos x}$ | **A1** | OR writes as a single simple algebraic fraction:<br>$\dfrac{\sin x \cos x(\sin x + \cos x) + \sin x \cos x(\sin x - \cos x)}{(\sin x - \cos x)(\sin x + \cos x)}$ |
| | Combines and simplifies:<br>$\dfrac{2\sin^2 x \cos x}{\sin^2 x - \cos^2 x}$ | **A1** | |
| | Correct simplification to given answer e.g.<br>$\dfrac{2\cancel{\sin^2 x}\cos x}{\cancel{\sin^2 x} - \frac{\cos^2 x}{\sin^2 x}} = \dfrac{2\cos x}{1 - \cot^2 x}$<br>or $\dfrac{\cancel{\sin^2 x}(2\cos x)}{\cancel{\sin^2 x}(1 - \cot^2 x)} \quad \left[= \dfrac{2\cos x}{1 - \cot^2 x}\right]$ | **A1** | All steps correct nd fully justified |