

11. (i) Solve, for $-90^\circ \leq \theta < 270^\circ$, the equation,

$$\sin(2\theta + 10^\circ) = -0.6,$$

giving your answers to one decimal place.

(5)

(ii) (a) A student's attempt at the question

“Solve, for $-90^\circ < x < 90^\circ$, the equation $7 \tan x = 8 \sin x$ ”

is set out below.

$$\begin{aligned}7 \tan x &= 8 \sin x \\7 \times \frac{\sin x}{\cos x} &= 8 \sin x \\7 \sin x &= 8 \sin x \cos x \\7 &= 8 \cos x \\\cos x &= \frac{7}{8} \\x &= 29.0^\circ \text{ (to 3 sf)}\end{aligned}$$

Identify two mistakes made by this student, giving a brief explanation of each mistake.

(2)

(b) Find the smallest positive solution to the equation

$$7 \tan(4\alpha + 199^\circ) = 8 \sin(4\alpha + 199^\circ).$$

(2)

(Total for Question 11 is 9 marks)