

7. (a) Express $3 \sin \theta - 4 \cos \theta$ in the form $R \sin(\theta - \alpha)$, where $R > 0$ and $0 < \alpha < 90^\circ$
State the value of R and give the value of α to 2 decimal places.

(3)

The temperature in a greenhouse, $G^\circ\text{C}$, is modelled by the equation

$$G = 17 + 3 \sin(15t)^\circ - 4 \cos(15t)^\circ \quad 0 \leq t \leq 17$$

where t is the time in hours after 5 a.m.

(b) Find, according to this model,

(i) the maximum temperature in the greenhouse,

(1)

(ii) the time, after midday, when the temperature in the greenhouse is 20°C .

Give your answer to the nearest minute.

(Solutions based entirely on graphical or numerical methods are not acceptable.)

(4)