

10 (a) Express
$$2 \sin x + 5 \cos x$$

in the form

$$R \sin (x + \alpha)$$

where $R > 0$ and $0^\circ \leq \alpha \leq 90^\circ$

[3 marks]

10 (b) In 2010, the water temperature at a beach could be modelled by the formula

$$T = 14.2 - (2 \sin d^\circ + 5 \cos d^\circ)$$

where:

- T is the temperature of the water in $^\circ\text{C}$
- d is the number of days after 1 January 2010

10 (b) (i) Find the value of d when the temperature of the water reached its lowest value in 2010
[1 mark]

10 (b) (ii) Find the maximum temperature of the water predicted by the model in 2010
Give your answer to one decimal place.

[1 mark]

10 (b) (iii) Find the number of **weeks** in 2010 for which the temperature of the water was higher than 15°C

Give your answer to the nearest whole number.

[5 marks]