16.

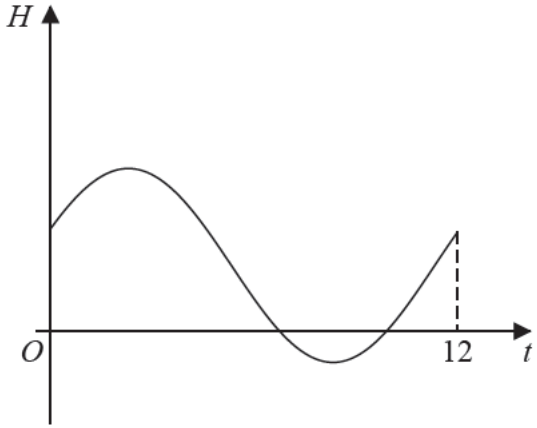

Figure 5

A horizontal path connects an island to the mainland.

On a particular morning, the height of the sea relative to the path, H m, is modelled by the equation

$$H = 0.8 + k\cos(30t - 70)°$$

where k is a constant and t is number of hours after midnight.

Figure 5 shows a sketch of the graph of H against t.

Use the equation of the model to answer parts (a), (b) and (c).

(a) Find the time of day at which the height of the sea is at its maximum.

(2)

Given that the maximum height of the sea relative to the path is 2 m,

(b) (i) find a complete equation for the model,

(ii) state the minimum height of the sea relative to the path.

(3)

It is safe to use the path when the sea is 10 centimetres or more **below** the path.

(c) Find the times between which it is safe to use the path.

(*Solutions relying entirely on calculator technology are not acceptable.*)

(5)