2015 P2 Q9

9. The blades of a wind turbine are turning at a steady rate.

The height, h metres, of the tip of one of the blades above the ground at time, t seconds, is given by the formula

$$h = 36\sin(1{\cdot}5t) - 15\cos(1{\cdot}5t) + 65.$$

Express $36\sin(1{\cdot}5t) - 15\cos(1{\cdot}5t)$ in the form

$k\sin(1{\cdot}5t - a)$, where $k > 0$ and $0 < a < \frac{\pi}{2}$,

and hence find the **two** values of t for which the tip of this blade is at a height of 100 metres above the ground during the first turn.

Answers

$h = 39\sin(1.5t - 0.395) + 65$

$t = 1.006 \quad and \quad 1.615$