Ferris wheel

1. The height, h metres, of a seat on a Ferris wheel after t minutes is given by

$$h(t) = -15 \cos 1.2t + 17, \text{ for } t \geq 0.$$

(a) Find the height of the seat when t = 0.

(b) The seat first reaches a height of 20 m after k minutes. Find k.

(c) Calculate the time needed for the seat to complete a full rotation, giving your answer correct to one decimal place.

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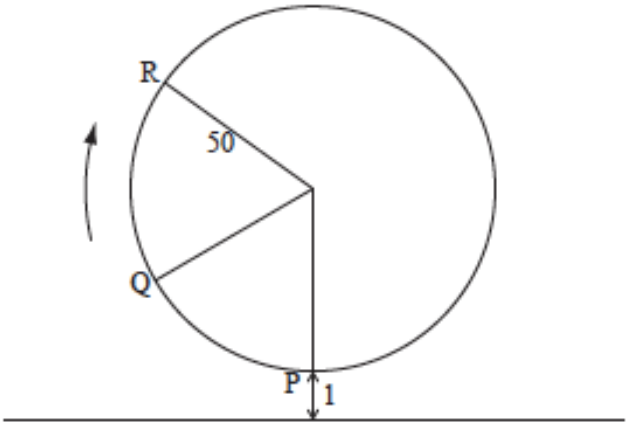
2. The following diagram represents a large Ferris wheel at an amusement park. The points P, Q and R represent different positions of a seat on the wheel.



The wheel has a radius of 50 metres and rotates clockwise at a rate of one revolution every 30 minutes.

A seat starts at the lowest point P, when its height is one metre above the ground.

(a) Find the height of a seat above ground after 15 minutes.

(b) After six minutes, the seat is at point Q. Find its height above the ground at Q.

The height of the seat above ground after t minutes can be modelled by the function $h(t) = 50 \sin (b(t - c)) + 51$.

(c) Find the value of b and of c.

(d) Hence find the value of t when the seat is 96 m above the ground.

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