

10. The height above ground,  $H$  metres, of a passenger on a roller coaster can be modelled by the differential equation

$$\frac{dH}{dt} = \frac{H \cos(0.25t)}{40}$$

where  $t$  is the time, in seconds, from the start of the ride.

Given that the passenger is 5 m above the ground at the start of the ride,

(a) show that  $H = 5e^{0.1 \sin(0.25t)}$  (5)

(b) State the maximum height of the passenger above the ground. (1)

The passenger reaches the maximum height, for the second time,  $T$  seconds after the start of the ride.

(c) Find the value of  $T$ . (2)