

9. A research engineer is testing the effectiveness of the braking system of a car when it is driven in wet conditions.

The engineer measures and records the braking distance,  $d$  metres, when the brakes are applied from a speed of  $V \text{ km h}^{-1}$ .

Graphs of  $d$  against  $V$  and  $\log_{10} d$  against  $\log_{10} V$  were plotted.

The results are shown below together with a data point from each graph.

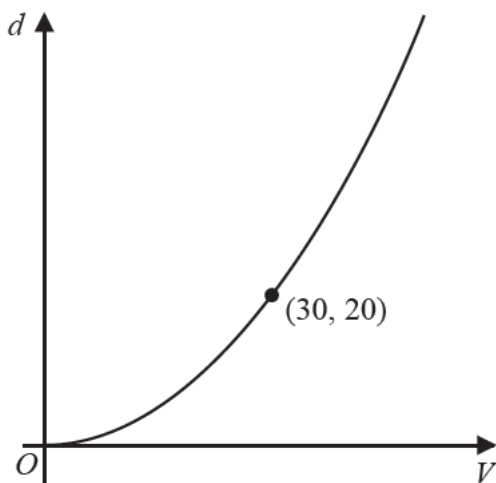


Figure 5

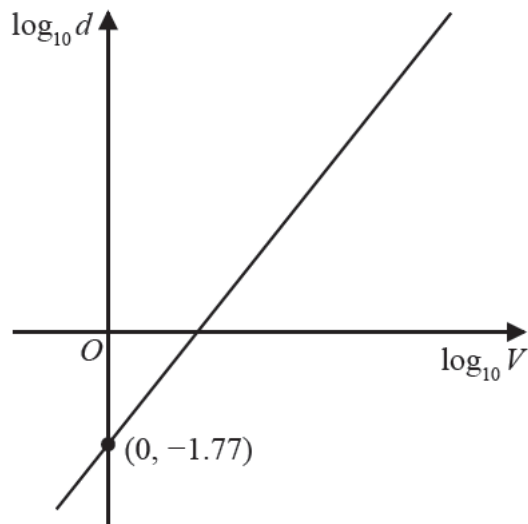


Figure 6

- (a) Explain how Figure 6 would lead the engineer to believe that the braking distance should be modelled by the formula

$$d = kV^n \quad \text{where } k \text{ and } n \text{ are constants}$$

with  $k \approx 0.017$

(3)

Using the information given in Figure 5, with  $k = 0.017$

- (b) find a complete equation for the model giving the value of  $n$  to 3 significant figures.

(3)

Sean is driving this car at  $60 \text{ km h}^{-1}$  in wet conditions when he notices a large puddle in the road 100 m ahead. It takes him 0.8 seconds to react before applying the brakes.

- (c) Use your formula to find out if Sean will be able to stop before reaching the puddle.

(3)