1 During a wet weather, a stationary rain droplet falls from great height and eventually reaches a terminal velocity of 9.00 m s^{-1}.

(a) Explain how the droplet achieved terminal velocity.

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.....

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.....

.....

[3]

(b) The droplet eventually hits the side window of a moving train. The relative velocity, v of the droplet makes an angle of θ with the vertical, as shown in Fig. 1.1.

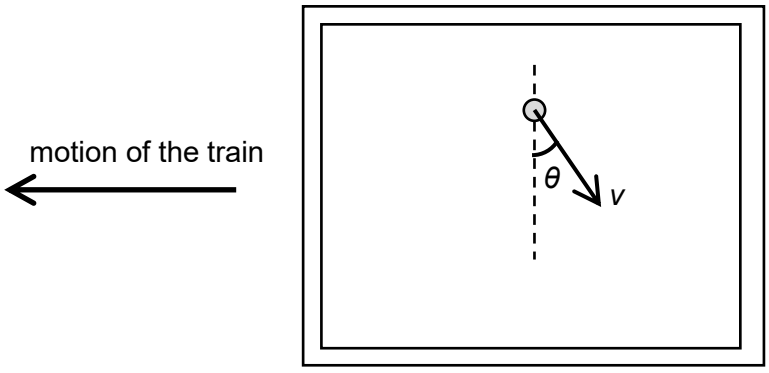
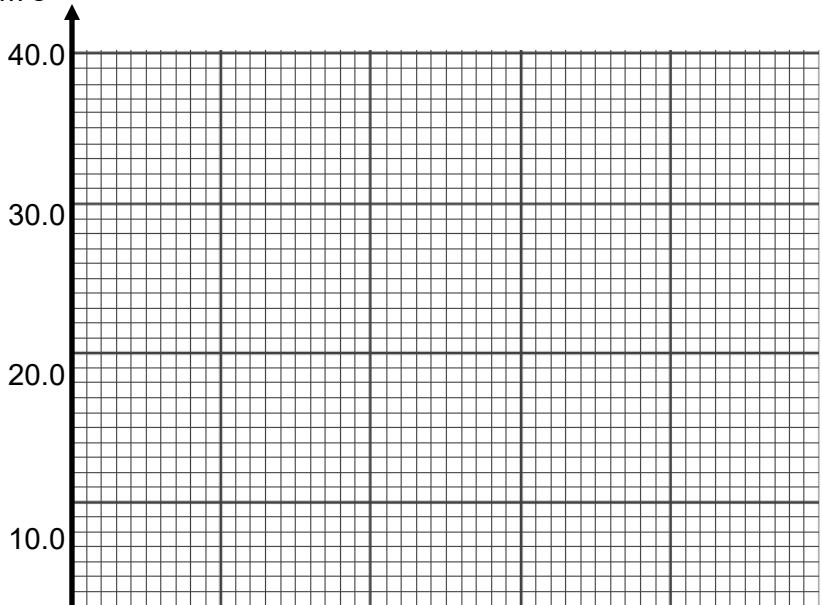


Fig. 1.1

Sketch a graph of the train speed against θ using the grid in Fig. 1.2. [3]



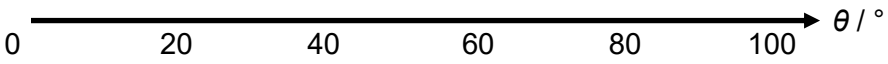


Fig. 1.2

(c) The train is travelling at a speed of 125 km h^{-1}. On reaching the station, the brake is applied such that the train decelerates uniformly. During the deceleration, the train travels another 850 m before coming to a rest.

Determine the time taken for the train to stop.

time taken = ... s [2]

[Total: 8]