

- 1 A long tube contains oil. A small ball is held at rest at the surface of the oil. At time $t = 0$, the ball is released and begins to fall vertically through the oil.

Fig. 1.1 shows the ball falling through the oil.

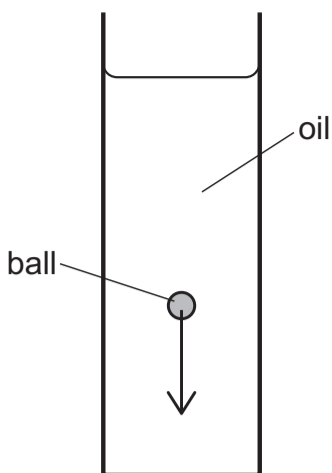


Fig. 1.1

As the ball begins to fall through the oil, it accelerates.

- (a) Define acceleration.

.....
 [1]

- (b) The mass of the ball is 0.0075 kg.

Calculate the resultant force acting on the ball when it is accelerating downwards at 2.8 m/s^2 .

resultant force = [2]

- (c) As the ball falls, its speed v is recorded. Fig. 1.2 is the speed–time graph for the falling ball.

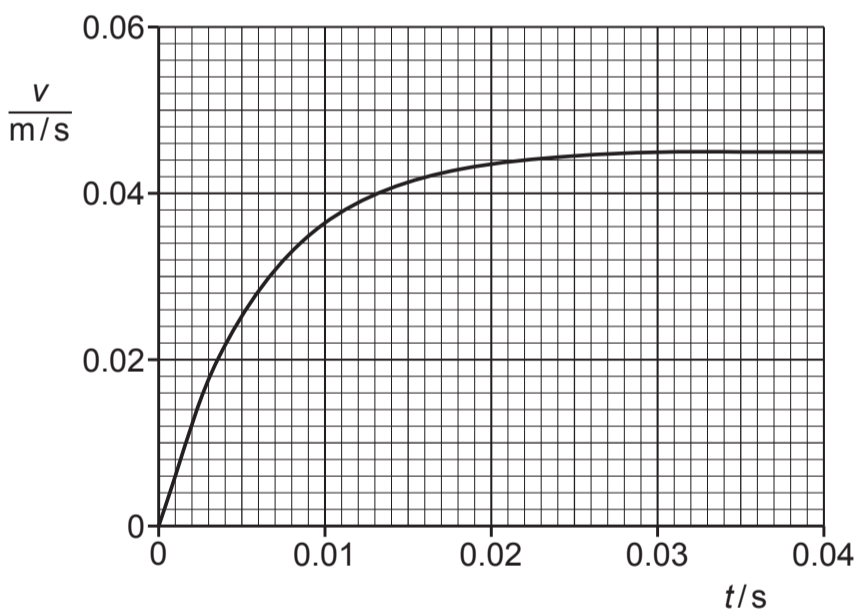


Fig. 1.2

- (i) Describe what happens to the acceleration between $t = 0$ and $t = 0.040 \text{ s}$.

Explain why this happens.

.....

 [4]

- (ii) By drawing a tangent on Fig. 1.2, determine a value for the acceleration of the ball at $t = 0.010 \text{ s}$.

acceleration = [3]