1. 0625/32/O/N/19/No.1

Fig. 1.1 shows a water tank that is leaking. Drops of water fall from the tank at a constant rate.

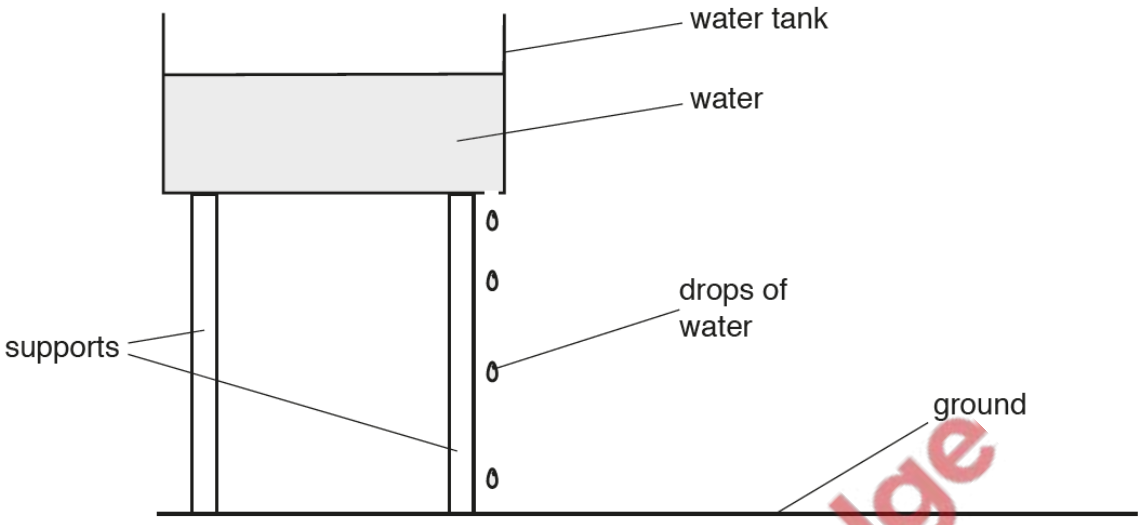

Fig. 1.1 (NOT to scale)

(a) A student uses a stopwatch to determine the time between two drops hitting the ground.

He sets the stopwatch to zero. He starts the stopwatch when the first drop hits the ground.

He stops the stopwatch after a further 30 drops have hit the ground.

The reading on the stopwatch is recorded and shown in Fig. 1.2.

Fig. 1.2

(i) State the time taken for 30 drops to hit the ground.

time = ... s [1]

(ii) Calculate the average time between two drops hitting the ground.

time = ... s [2]

(iii) Explain why the student measures the time for 30 drops to hit the ground instead of measuring the time for one drop to hit the ground.

.....

..... [1]

(b) Fig. 1.1 shows that the drops get further apart as they get close to the ground.

State why the drops get further apart.

.....

..... [1]

(c) In another experiment the student determines the speed of a falling weight at different times. The speed–time graph for his results is shown in Fig. 1.3.

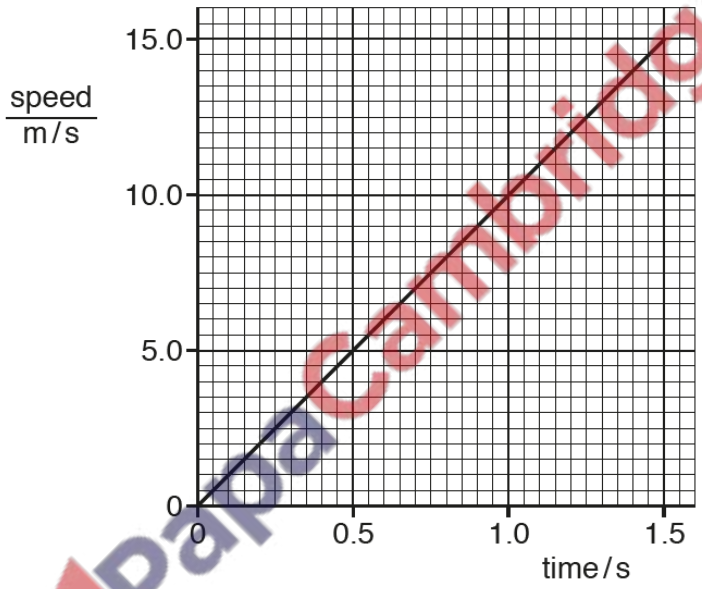

Fig. 1.3

Calculate the distance fallen by the weight in the first 1.5 s.

distance = ... m [3]

[Total: 8]

2. 0625/33/O/N/19/No.2

A student reviews some data about athletes and footballers.

(a) An athlete runs 12 km in 1.5 hours.

Calculate the athlete's average speed in km/h.

average speed = ... km/h [3]

(b) Fig. 2.1 shows the speed-time graph for a footballer for the first 15.0 seconds of a game.

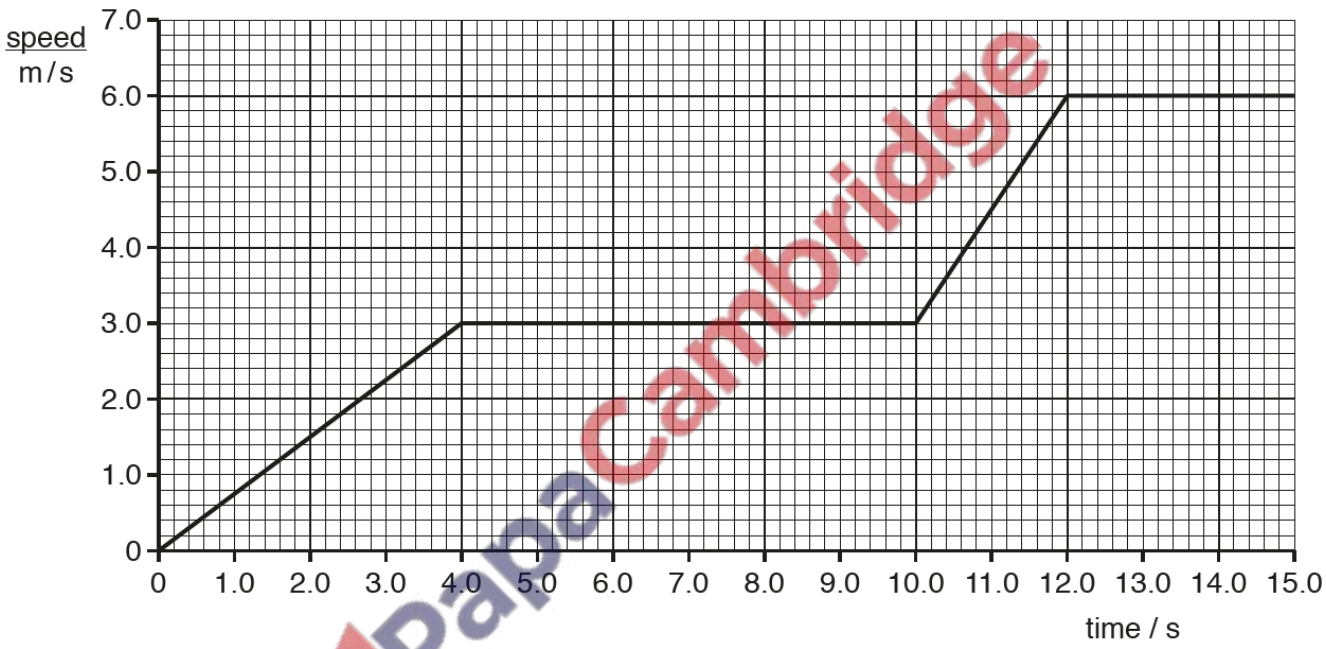

Fig. 2.1

(i) Use the graph in Fig. 2.1 to calculate the distance travelled by the footballer during the first 4.0 seconds.

distance = ... m [3]

(ii) Use the graph in Fig. 2.1 to determine when the footballer is moving with greatest acceleration.

Between ..... s and ..... s

Give a reason for your answer.

.....

.....

[2]

(c) Another footballer has a mass of 72 kg.

Calculate the weight of this footballer.

weight = ... N [3]

[Total: 11]

3. 0625/41/O/N/19/No.1

A car accelerates from rest at time $t = 0$ to its maximum speed.

Fig. 1.1 is the speed-time graph for the first 25 s of its motion.

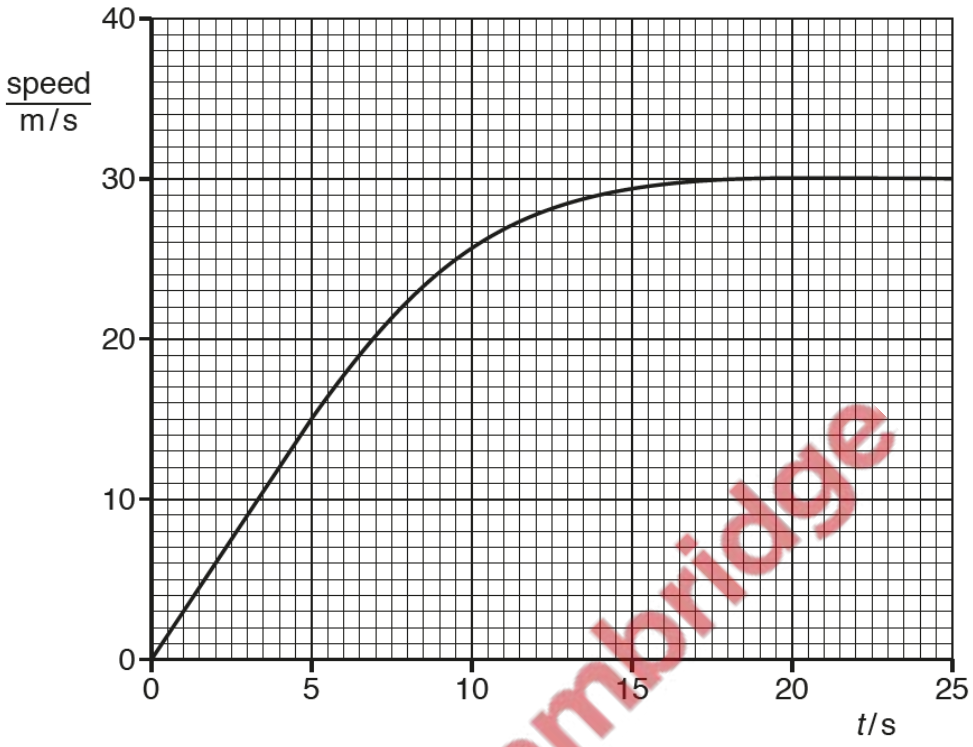

Fig. 1.1

(a) The mass of the car is 2300 kg.

For the time between $t = 0$ and $t = 5.0$ s, determine:

(i) the acceleration of the car

acceleration = ... [2]

(ii) the resultant force acting on the car.

resultant force = ... [2]

(b) Describe the motion of the car between $t = 10\,s$ and $t = 15\,s$. Explain how Fig. 1.1 shows this.

.....

.....

.....

..... [3]

(c) Between $t = 10\,s$ and $t = 15\,s$, the force exerted on the car due to the engine remains constant.

Suggest and explain why the car moves in the way shown by Fig. 1.1.

.....

.....

..... [2]

[Total: 9]