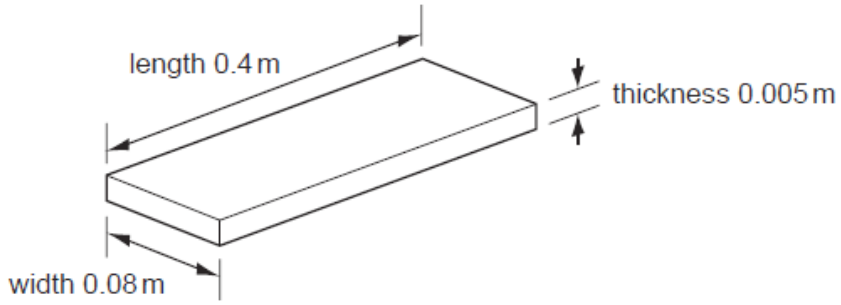
Section A: Multiple Choice Questions

1. A manufacturer measures accurately the dimensions of a wooden floor tile. The approximate dimensions of the tile are shown.



2. Which pair of quantities includes one scalar and one vector?

A mass time
B temperature time
C temperature velocity
D velocity weight

3. A reel of copper wire is labelled ‘length 30 m’ and ‘diameter 2 mm’. A student calculates the volume of the copper wire. Which instruments does he use to measure accurately the length and the diameter of the wire?

	length	diameter
A	rule	calipers
B	rule	micrometer
C	tape	calipers
D	tape	micrometer

4. Which row correctly shows examples of a vector quantity and a scalar quantity?

	vector	scalar
A	area	force
B	mass	density
C	velocity	acceleration
D	weight	volume

5. Vernier calipers read to one tenth of a millimetre. Which reading is given to this precision?

A 3.3 cm **B** 3.31 cm **C** 3.310 cm **D** 3.312 cm

6. Velocity is given by the change in displacement divided by the change in time. How many vector quantities appear in this statement?

A 0 **B** 1 **C** 2 **D** 3

7. The level of water in a measuring cylinder is 75 cm^3. A stone of volume 20 cm^3 is lowered into the water. What is the new reading of the water level?

A 20 cm^3 **B** 55 cm^3 **C** 75 cm^3 **D** 95 cm^3

8. The diagram shows three forces acting on a block. Which additional force will produce a resultant force of 3 N to the left?

A 3 N to the left
B 6 N to the right
C 9 N to the left
D 13 N to the right

9. A plumber measures, as accurately as possible, the length and internal diameter of a straight copper pipe. The length is approximately 80 cm and the internal diameter is approximately 2 cm. What is the best combination of instruments for the plumber to use?

	internal diameter	length
A	rule	rule
B	rule	tape
C	vernier calipers	rule
D	vernier calipers	tape

10. The diameter and the length of a thin wire, approximately 1 m in length, are measured as accurately as possible. What are the best instruments to use?

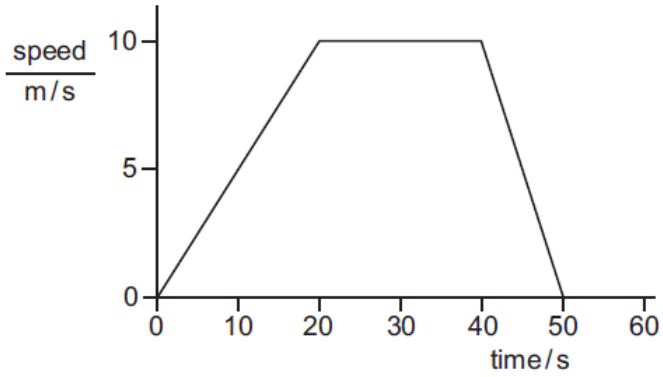
	diameter	length
A	micrometer	rule
B	micrometer	vernier calipers
C	rule	tape
D	vernier calipers	rule

11. Which quantity X is calculated using this equation?

$$X = \frac{\text{change in velocity}}{\text{time taken}}$$

A acceleration B average velocity C distance travelled D speed

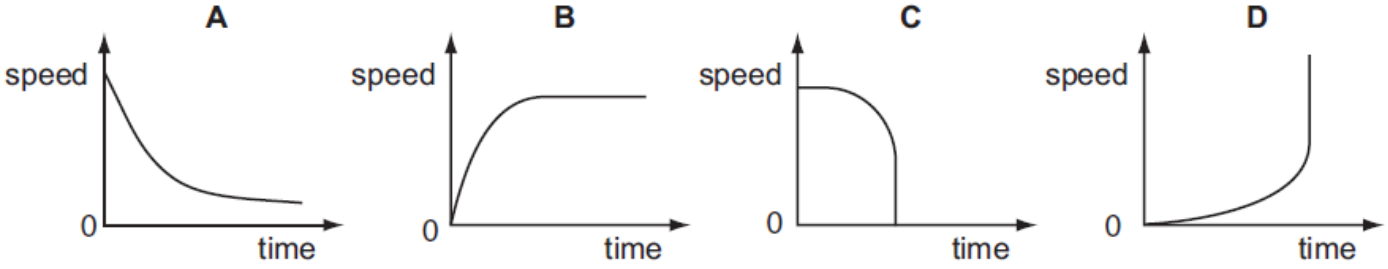
12. The graph shows the movement of a car over a period of 50 s.



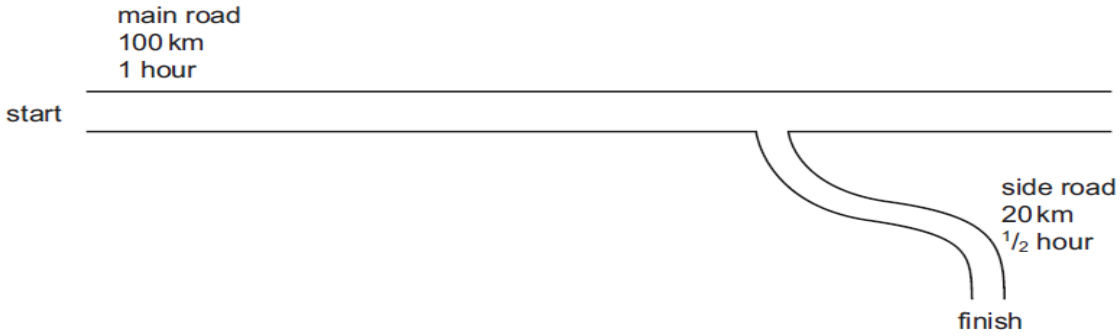
What was the distance travelled by the car while its speed was increasing?

A 10 m **B** 20 m **C** 100 m **D** 200 m

13. Which graph represents the motion of a body falling vertically that reaches a terminal velocity?



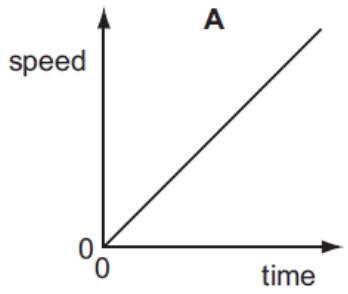
14. A car takes 1 hour to travel 100 km along a main road and then ½ hour to travel 20 km along a side road.

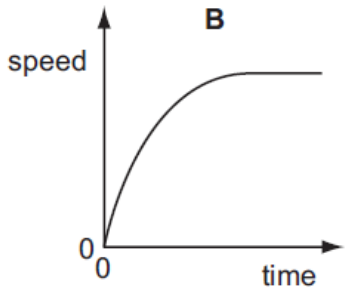


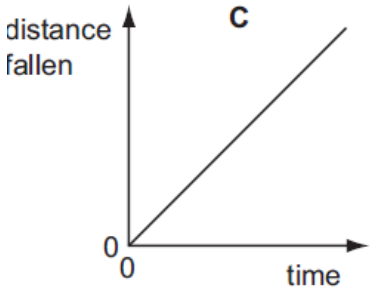
What is the average speed of the car for the whole journey?

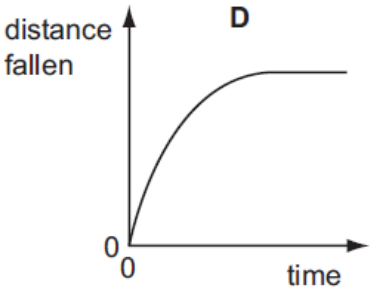
A 60 km / h B 70 km / h C 80 km / h D 100 km / h

15. Which graph shows the motion of a heavy, steel ball falling from a height of 2 m?



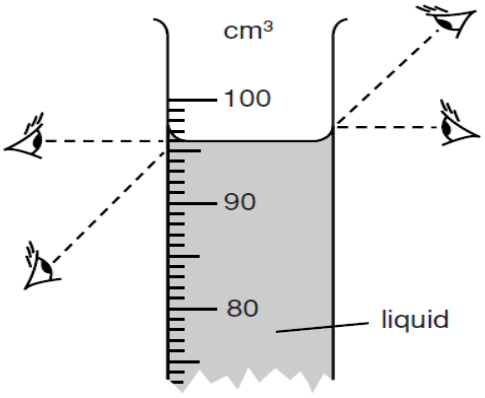






Section B: Structured Questions

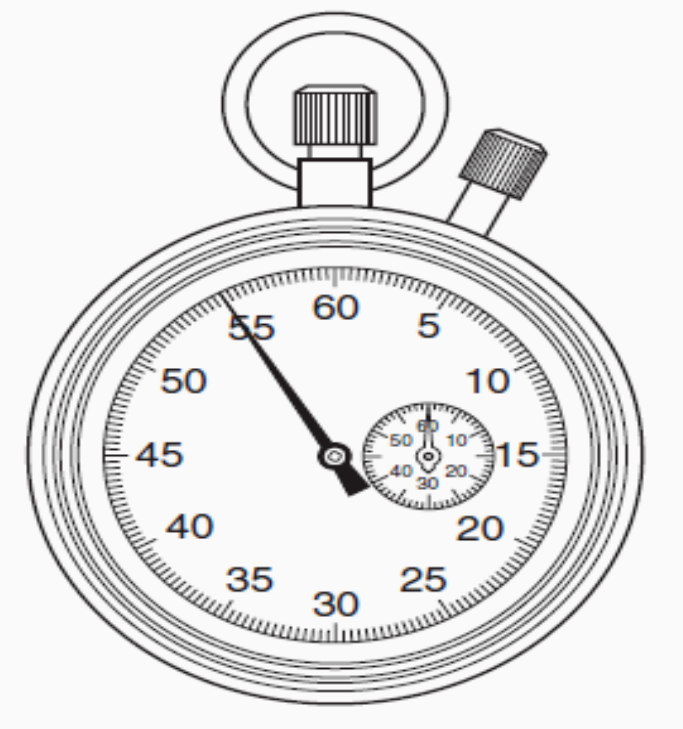
1. The following shows the top part of a measuring cylinder containing some water.



(a) The diagram shows four positions, **A**, **B**, **C** and **D** a person could look when taking the reading from the measuring cylinder. Identify the correct position to take reading. [1]

(b) By taking reading from the measuring cylinder, state the volume of water. [2]

2. A worker on the production line in a factory is making brackets. An inspector times the worker whilst he makes 5 brackets. To start, the stopwatch is set to zero. After 5 brackets have been made, the stopwatch is as shown below.



(a) State the reading on the stopwatch. [1]
(b) Calculate the time taken to make 1 bracket. [2]
(c) The worker has a target of making 300 brackets per hour. Does the worker meet his target? [4]

3. Fig. 3.1 shows a measuring cylinder containing some water.

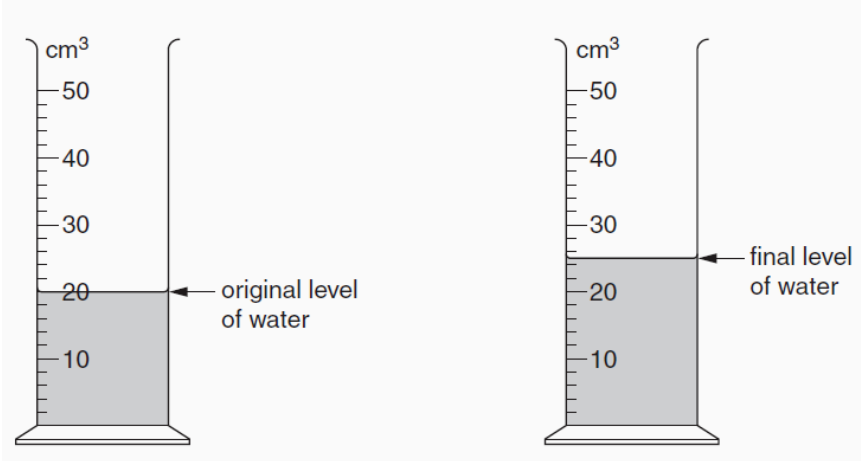


Fig. 3.1 Fig. 3.2

A student allows 200 drops of water to fall into the water in the measuring cylinder. Fig. 3.2 shows the measuring cylinder after the addition of the drops.

(a) State
(i) the original volume of water in the cylinder. [1]
(ii) the final volume of water in the cylinder. [1]
(b) Calculate the volume of water added. [1]
(c) Calculate the average volume of one of the drops of water. [2]

4. A parachutist jumps from an aircraft. Some time later, the parachute opens.
Fig. 4.1 is a graph of the vertical speed of the parachutist plotted against time t.

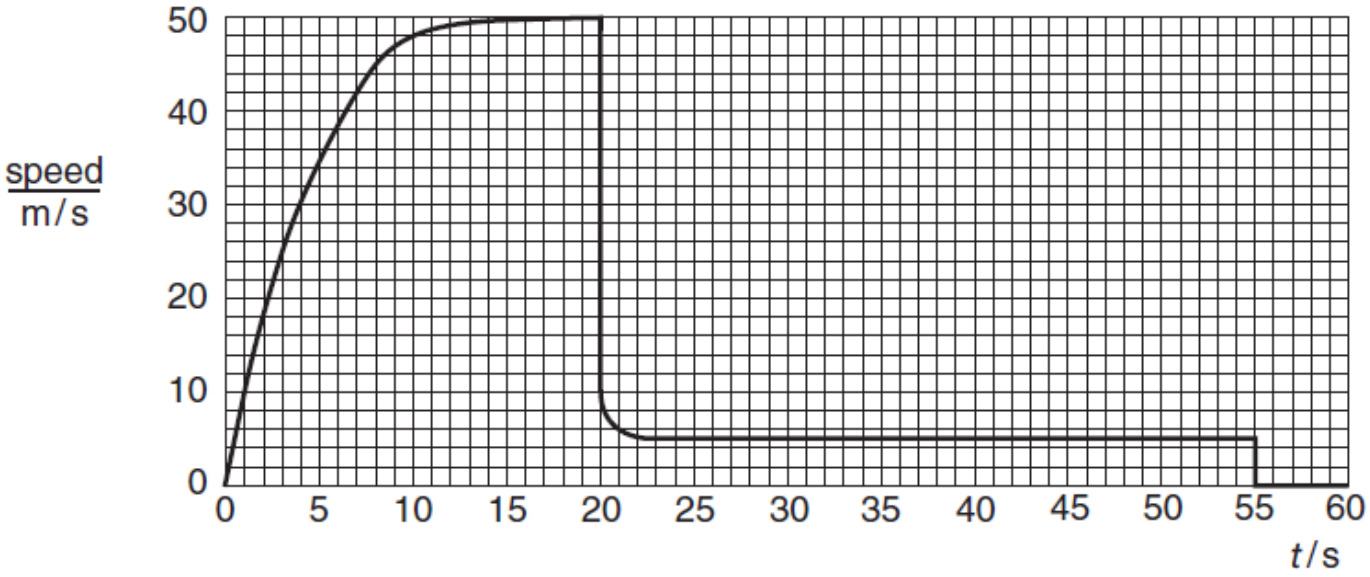
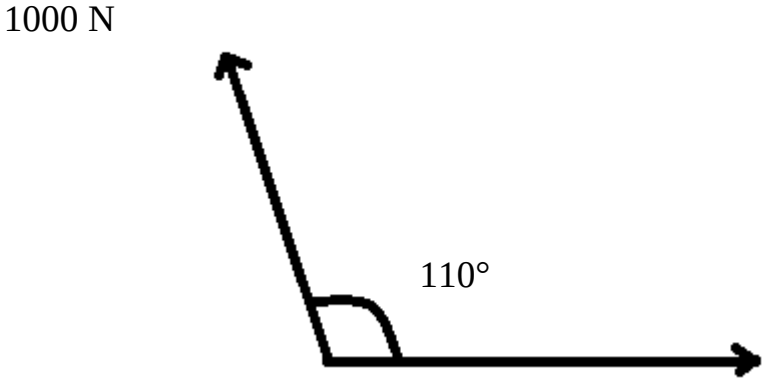


Fig 4.1

(a) State what happens at t = 20 s and t = 55 s. [1]
(b) Describe the motion of the parachutist between t = 0 and t = 20 s. [2]
(c) Explain, in terms of the forces acting, why the speed of the parachutist is constant between t = 25 s and t = 55 s. [5]
(d) Calculate the distance travelled by the parachutist between t = 25 s and t = 55 s. [2]

5. Determine the resultant of the following two forces using a scale diagram.



[5]

6. Two athletes, A and B, run a 100 m race. At time $t = 0$, a gun is fired to start the race. Fig. 6.1 shows the distance-time graph for the two athletes.

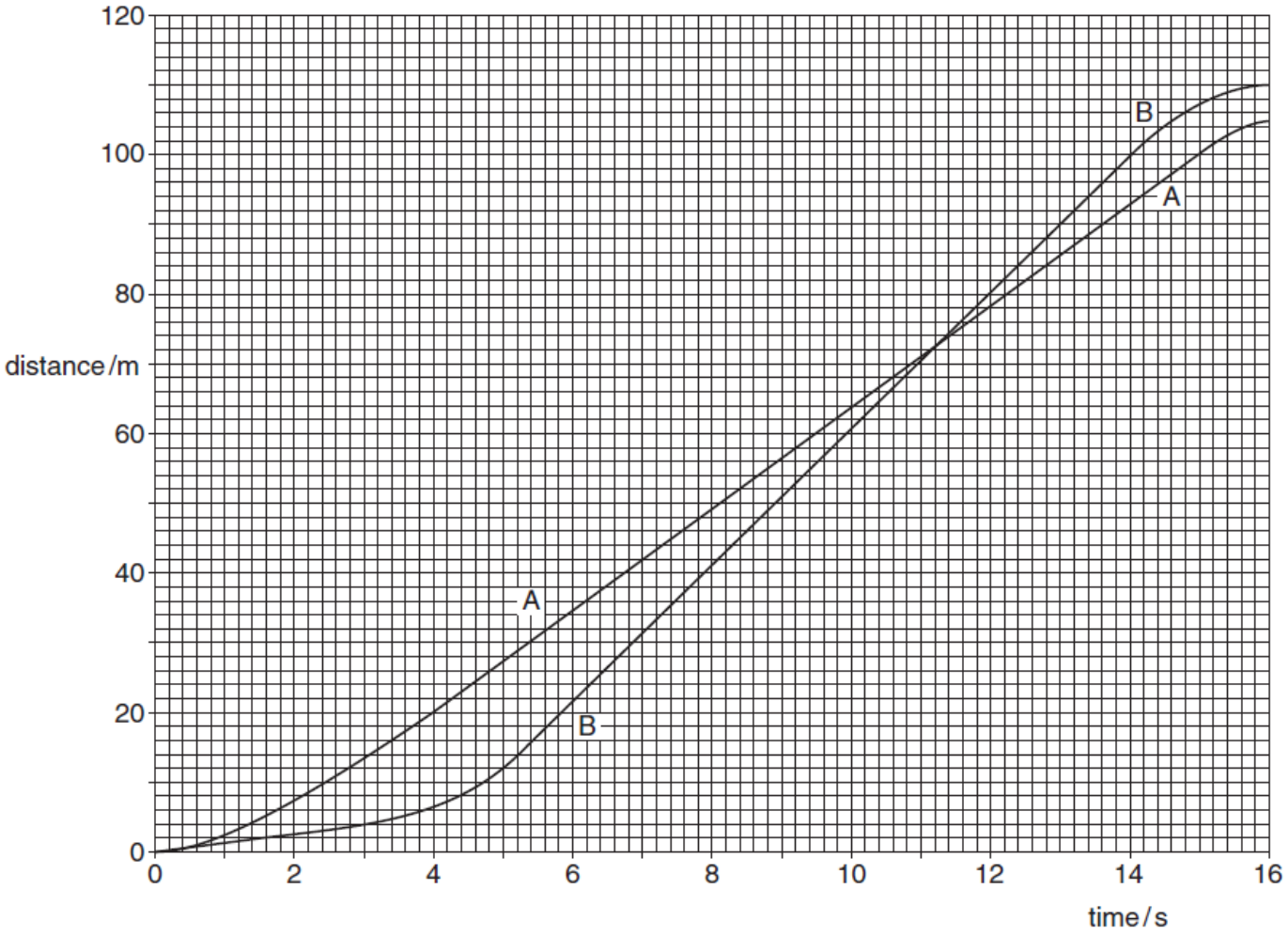


Fig 6.1

(a) Describe the motion of athlete A during the first 8 s of the race. [2]

(b) State the distance between the two athletes as the winner passes the 100 m mark. [1]

(c) Calculate the speed of athlete A between $t = 4$ s and $t = 15$ s. [2]

7. A piece of paper falls from 4.0 m above the ground. Fig.7.1 shows how the height *h* above the ground varies with the time *t*.

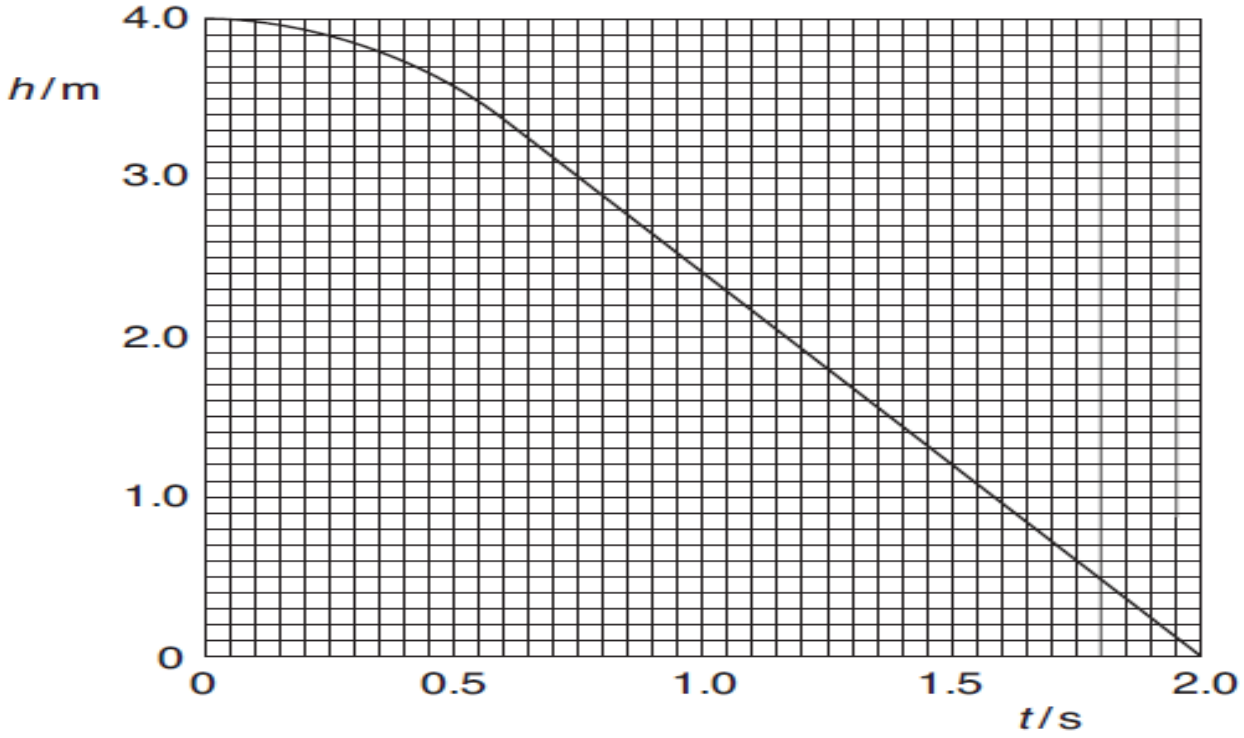


Fig 7.1

(a) State what happens to the speed of the paper as it falls. [2]

(b) Calculate the speed of the paper at time $t = 1.5$ s. [2]

(c) As the paper falls, energy changes from one form to another.

8. Fig. 8.1 shows the speed-time graph for the first 125 s of the journey of a lorry.

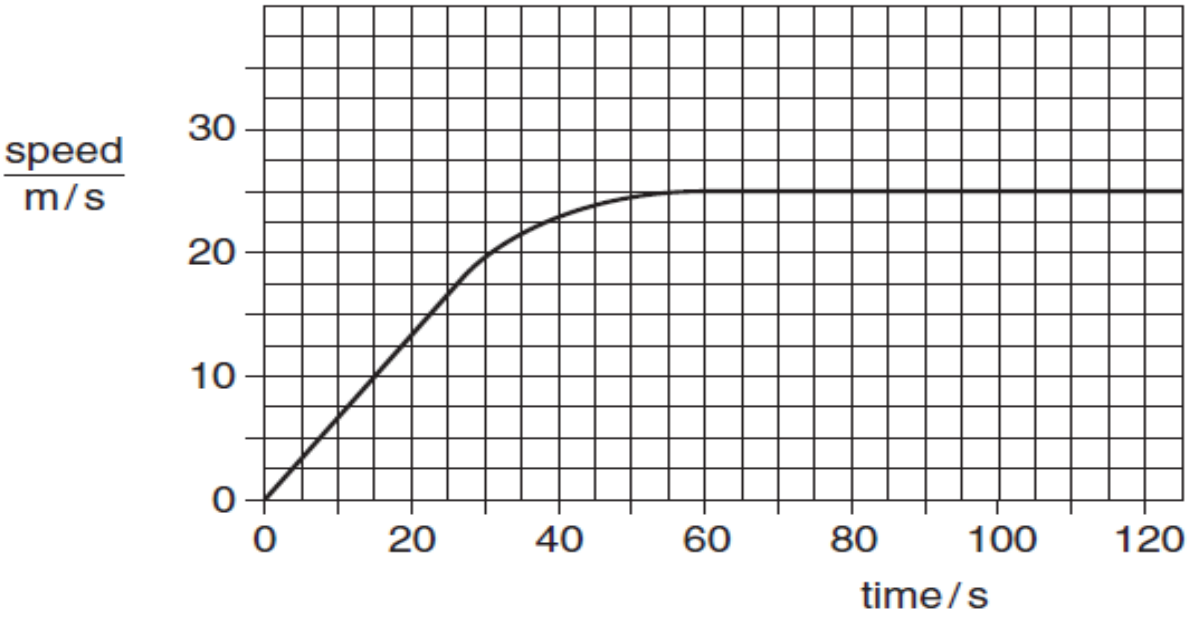


Fig 8.1

(a) During the motion shown, describe what happens to
(i) the speed of the lorry,
(ii) the acceleration of the lorry. [4]
(b) Determine the maximum speed of the lorry in m/s and in km/h. [2]
(c) Calculate the acceleration between t = 0 s and t = 30 s [3]