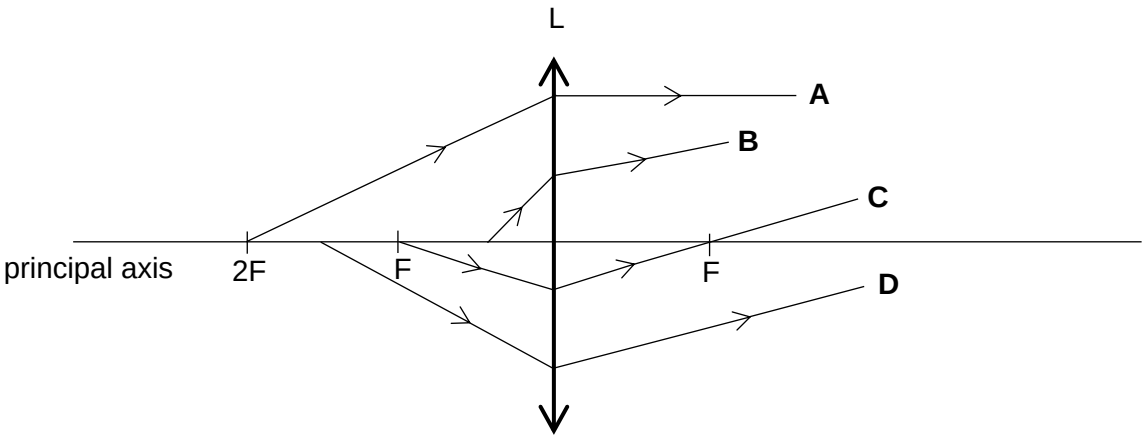
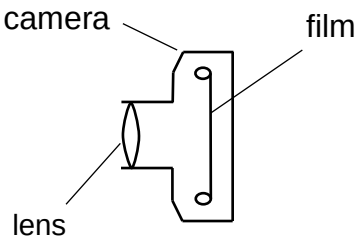
1 L is a converging lens with its principal focus at F.

Which of the following correctly represents a ray of light passing through L?



2 A camera has a single converging lens of focal length *f*.



The distance between the lens and the film is adjustable.

What is the distance between the lens and the film for a sharp image of the dancer to be formed on the film?

A less than *f*

B between *f* and *2f*

C at *2f*

D greater than *2f*

3 A converging lens is used to produce a real image four times the size of the object. Given that the object distance is 20 cm, what is the focal length of the lens?

A 4.0 cm

B 16 cm

C 25 cm

D 100 cm

4 A man travels 15 m to the North in 40 s, stops for 10 s, and then travels 20 m to the East in 50 s.

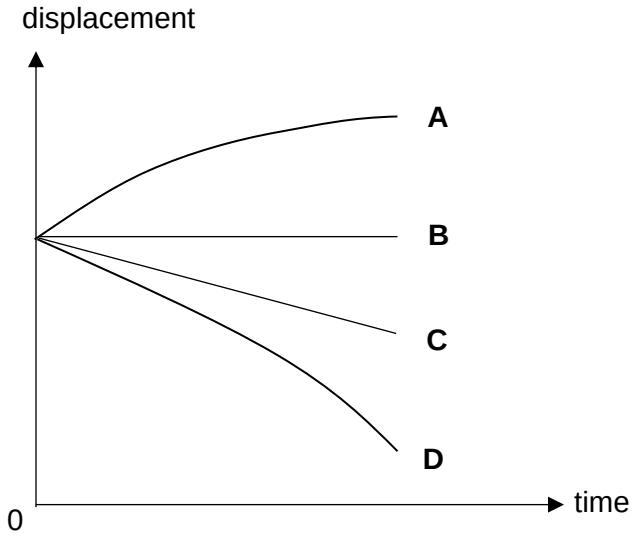
What is the magnitude of his average velocity?

A 0.25 m s^{-1} **B** 0.28 m s^{-1}

C 0.35 m s^{-1} **D** 0.39 m s^{-1}

5 The diagram below shows the displacement-time graph of four objects, **A**, **B**, **C**, and **D**.

Which object is moving with decreasing speed?



6 A ball is thrown vertically upward with an initial velocity of 16 m s^{-1}. It hits the ground 3.3 s later. The effect of air resistance on the ball is negligible.

What is the initial height of the ball from the ground?

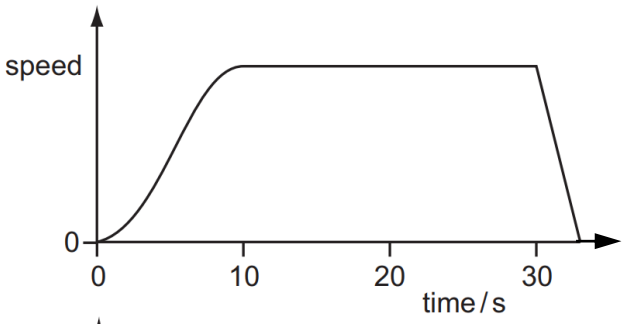
A 1.7 m **B** 36 m

C 56 m **D** 110 m

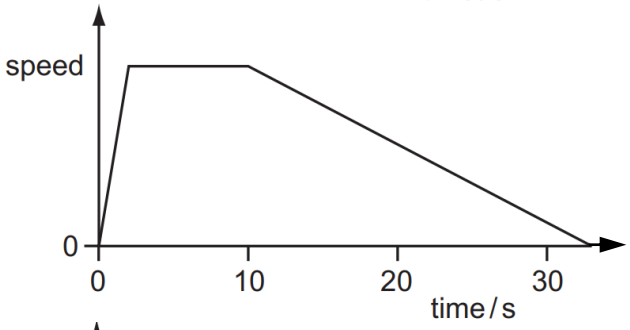
7 A car accelerates from rest for 10 s along a straight road. It stays at a steady speed for 20 s and then brakes to a stop in 3.0 s.

Which graph shows the journey?

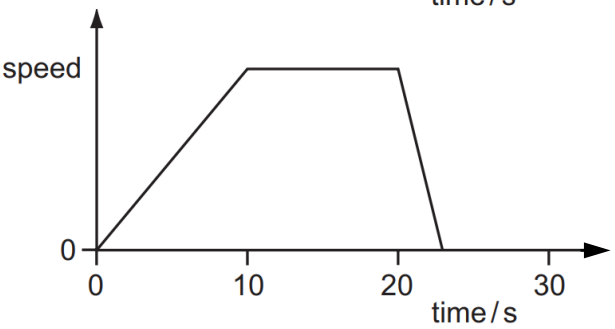
A



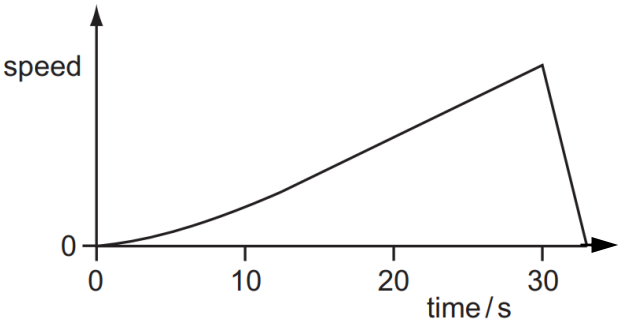
B



C



D



8 Fig. 11.1 shows a converging lens and the real image I of an object placed in front of the lens. 1.0 cm represents 4.0 cm on the grid.

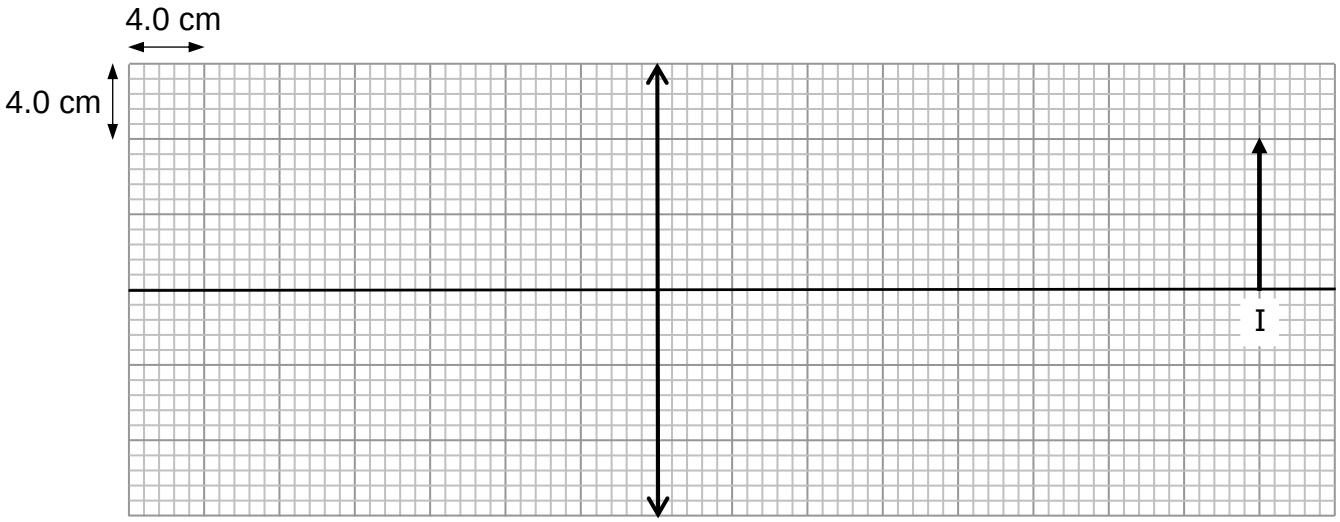


Fig. 11.1

The image is twice the size of the object.

(a) Locate and draw the object. Label the object as O. [1]

(b) Draw two light rays to show how the image is formed from the object. [2]

(c) Determine the focal length of the lens.

focal length = ……..…… [2]

(d) The image in Fig. 11.1 is real. State two other properties of the image.

……..……... [1]

9 Fig. 12.1 shows how the velocity of a lorry and a police car vary with time *t*.

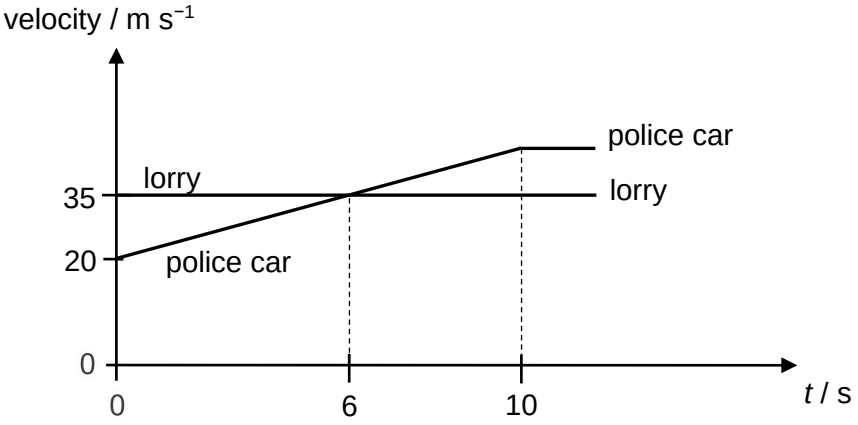


Fig. 12.1

The lorry speeds pass the police car at time $t = 0$ s and travels at a uniform velocity of 35 m s^{-1}.

The police car immediately gives chase with a uniform acceleration until $t = 10$ s, then it continues its journey at a uniform velocity.

(a) Explain what is meant by *uniform velocity*.

……..……...

……..…….... [1]

(b) Determine the velocity of the police car at $t = 10$ s.

velocity = ……..…… [2]

(c) State the time *t* when the lorry is farthest ahead of the police car.

t = ……..…… [1]

(d) Determine the time t when the police car just catches up with the lorry.

t = ……..…… [3]

(e) Upon being overtaken by the police car, the lorry driver immediately steps on the brake to bring the lorry to rest.

Given that the lorry travels a braking distance of 30 m, determine the average acceleration of the lorry.

average acceleration = ……..…… [2]

10 Fig. 11.1 shows the velocity-time graph of two moving cars, P and Q, initially next to each other and at rest.

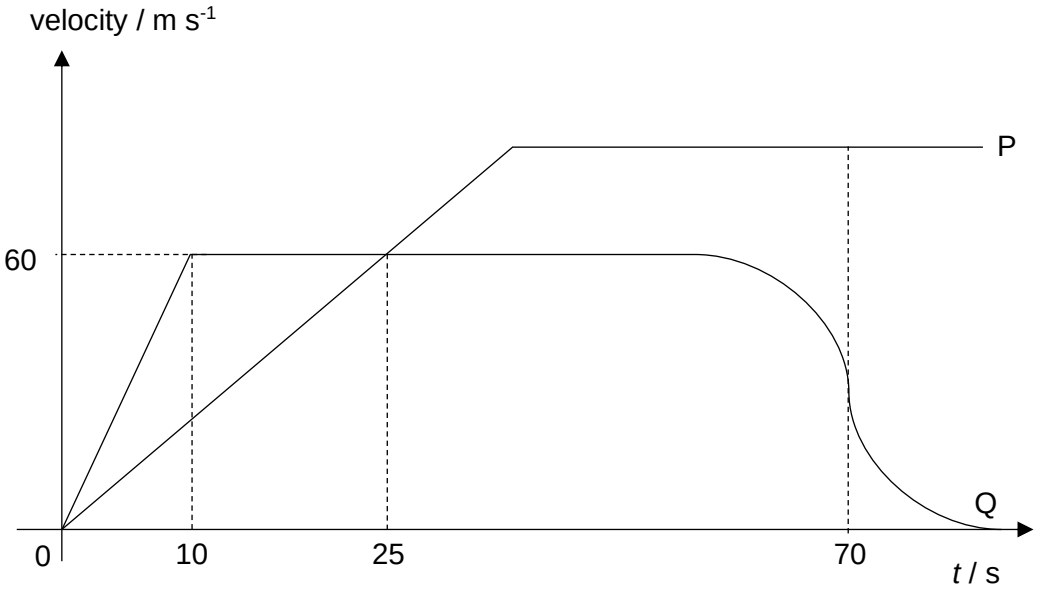


Fig. 11.1

(a) Determine the acceleration of P at t = 10 s.

acceleration of P = ……..…… [2]

(b) Determine the distance between P and Q at t = 25 s.

distance between P and Q = ……..…… [2]

(c) P accelerated uniformly from rest until it overtakes Q at time t_1. After which, P continues to travel at constant velocity.
Determine t_1.

t_1 = …….…… [3]

(d) Sketch and label the acceleration-time graph of P for t = 0 s to t = 70 s.

[2]

(e) Describe the velocity of Q after t = 70 s.

……..……

……..……..…….. [1]