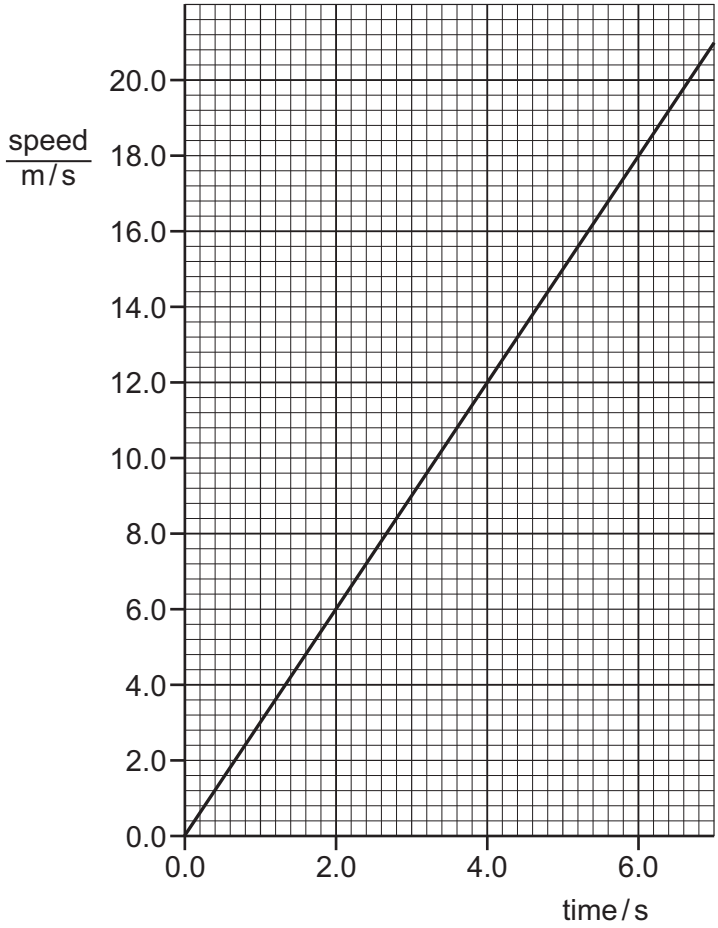
1 The graph is a speed-time graph for a car.



Calculate the distance travelled by this car between time = 2.0 s and time = 6.0 s.

distance travelled = ... m [3]

[Total: 3]

2 A car takes 12.8 s to travel 200 m.

Calculate the average speed of the car for this 200 m.

average speed = ... m / s [3]

[Total: 3]

3 A skydiver jumps from an aeroplane. She falls freely with her parachute closed; then she opens her parachute.

Diagram A shows the skydiver falling freely with her parachute closed.

Diagram B shows the skydiver falling with the parachute open.

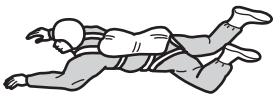


Diagram A

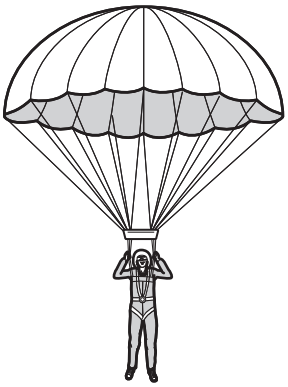
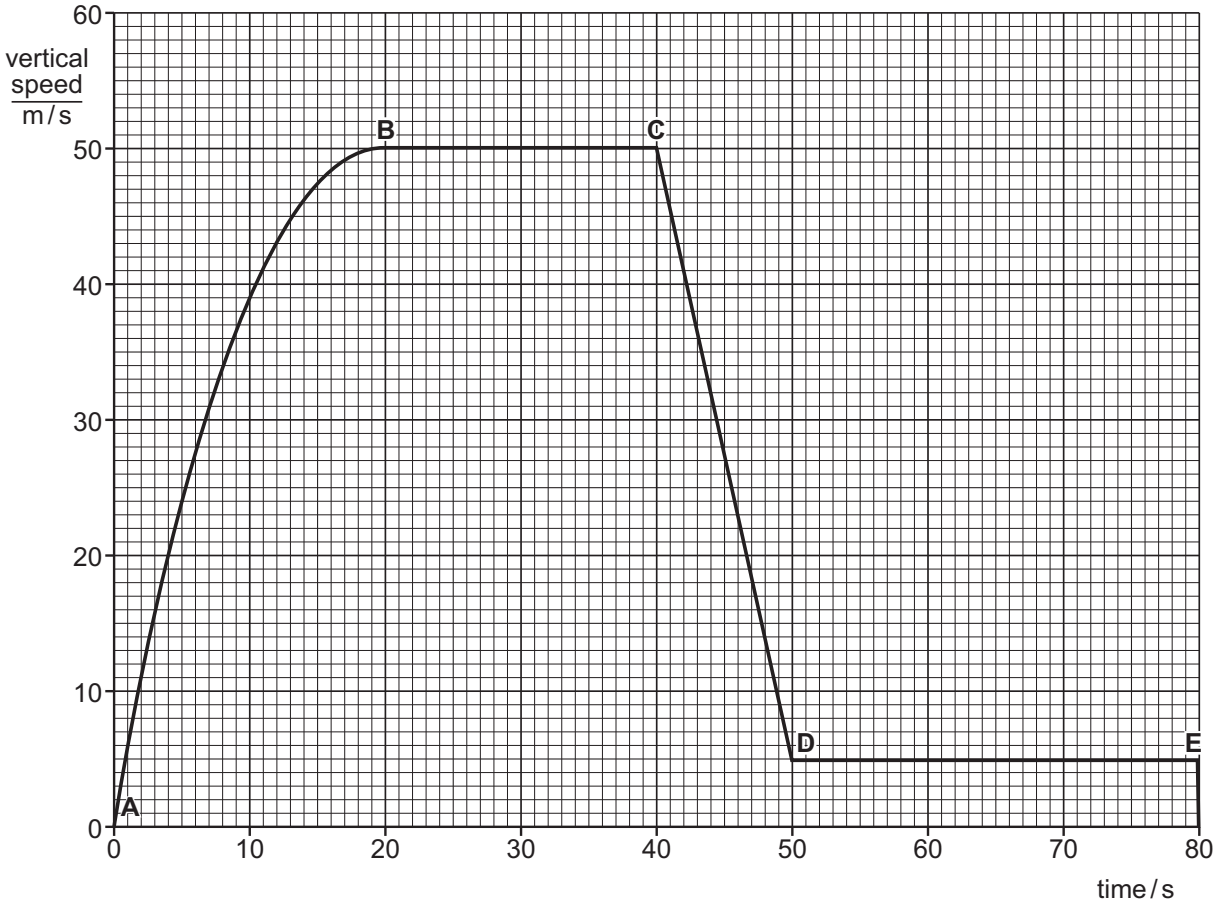


Diagram B

The graph shows the speed-time graph for the skydiver ' s vertical motion, from leaving the aeroplane to landing on the ground.



Using the information from the graph:

(a) Describe the vertical motion of the skydiver between time = 0 and time = 20 s.

..... [1]

(b) Determine the maximum vertical speed of the skydiver.

maximum speed = ... m / s [1]

(c) Determine the point, A, B, C, D or E, at which the skydiver opens her parachute.

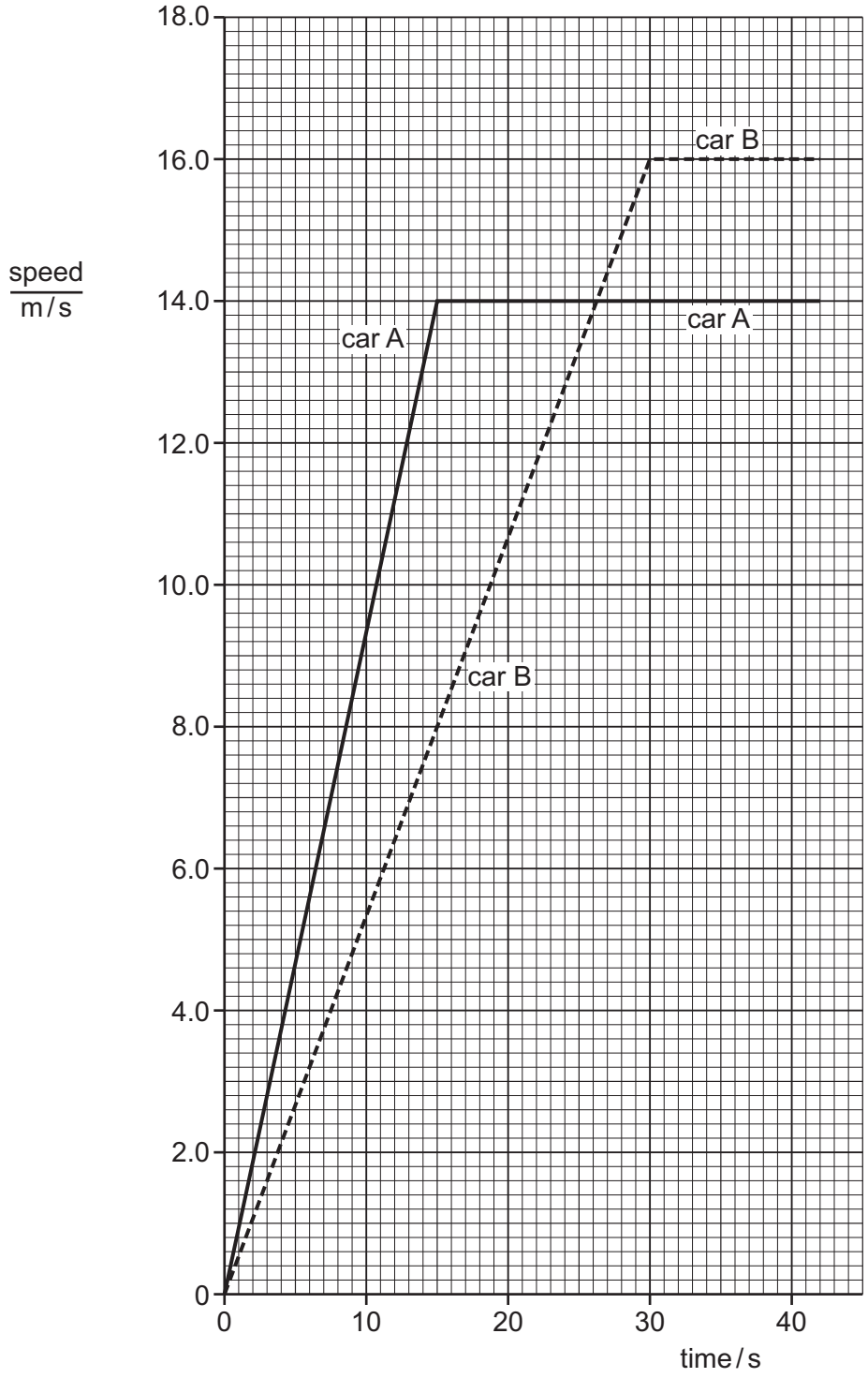
..... [1]

(d) Determine the distance the skydiver falls between time = 50 s and time = 80 s.

distance = ... m [3]

[Total: 6]

4 The diagram shows the speed–time graphs for two cars, A and B.



Describe the motion of car B after 30 s.

.....

..... [2]

[Total: 2]

5 In a race, a child runs 500 m in 4 minutes and 20 seconds.

(a) Determine how many seconds there are in 4 minutes and 20 seconds.

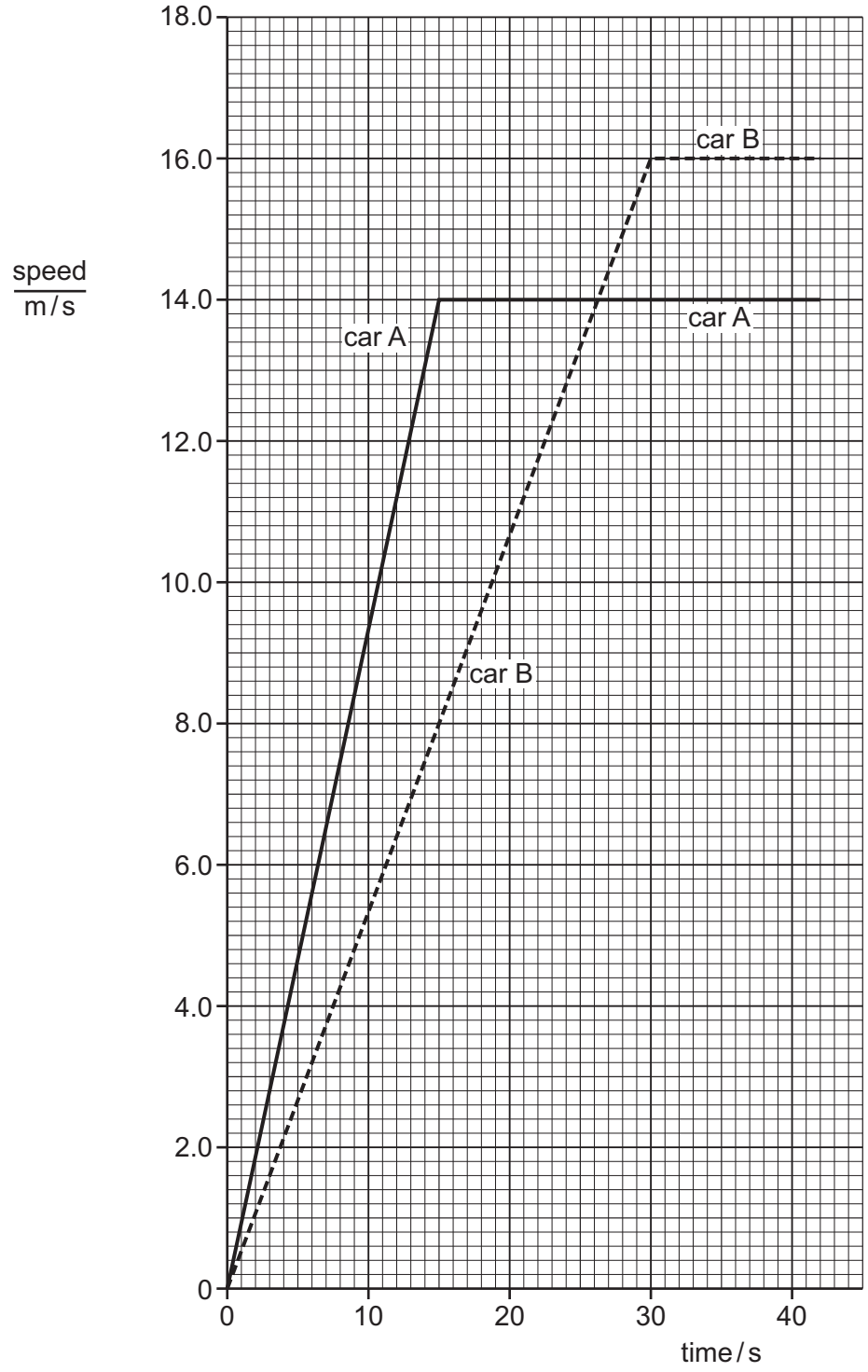
time = ... s [1]

(b) Calculate the average speed of the child.

average speed = ... m / s [3]

[Total: 4]

6 The diagram shows the speed–time graphs for two cars, A and B.



Calculate the distance moved by car B from time = 0 to time = 30.0s.

distance = m [3]

[Total: 3]

7 A student investigates the motion of a trolley as it travels down a slope.

The student makes **two** measurements to determine the average speed of the trolley as it travels down the slope.

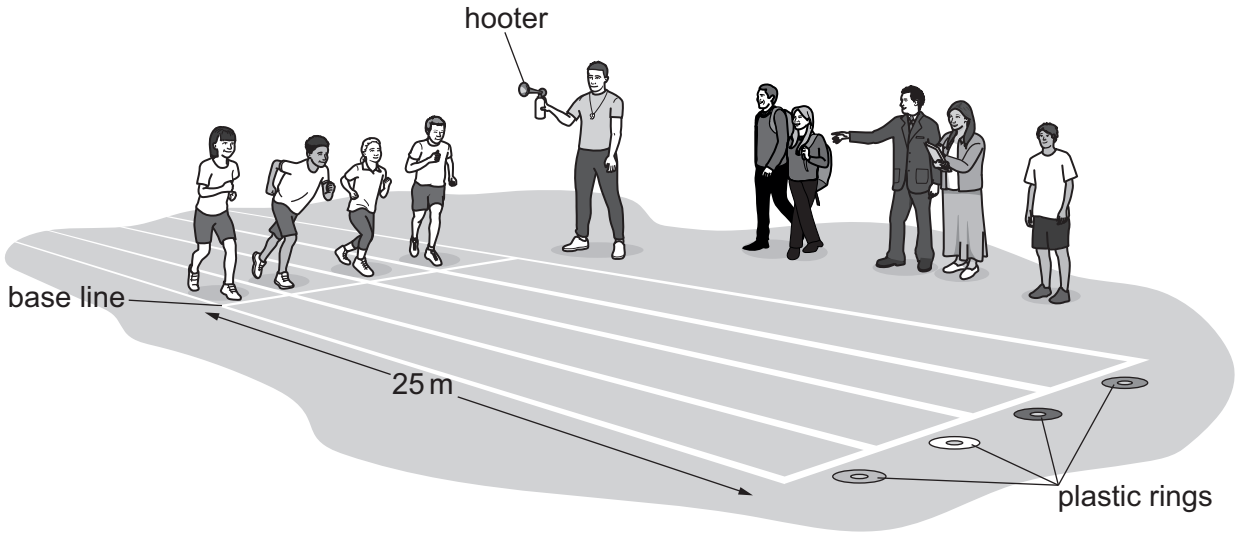
State the **two** measurements.
For each measurement, suggest the instrument used for making the measurement.

1. measurement ..... instrument used .....

2. measurement ..... instrument used ..... [2]

[Total: 2]

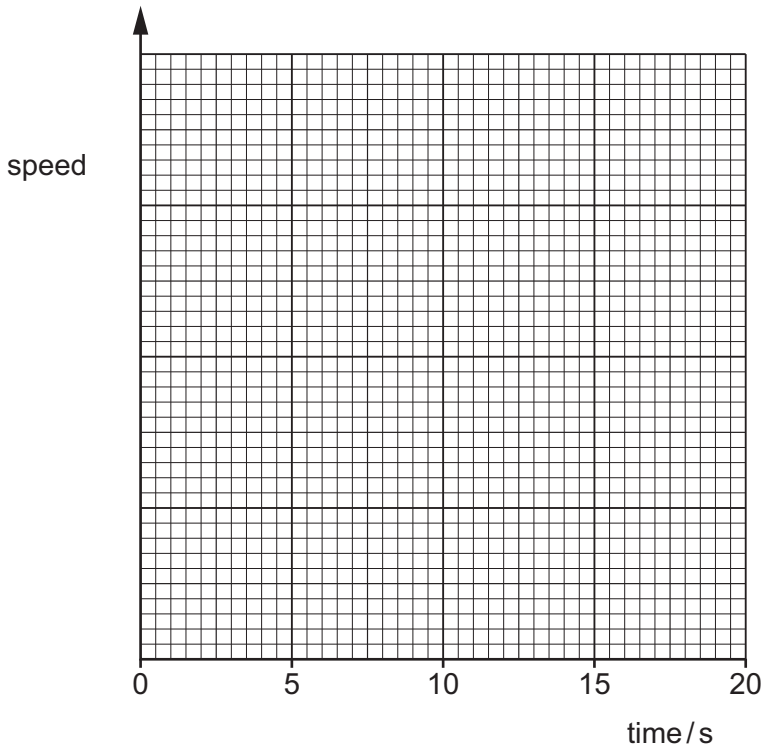
8 The diagram shows children about to run a race. They have to run 25 m, pick up a small plastic ring and run back to cross the base line.



The teacher records the following information for **one** of the children.

The child starts to run at time = 0.
The child picks up the ring at time = 9.0 s.
The child finishes the race at time = 17.0 s.
The highest speed occurs as the child finishes the race.

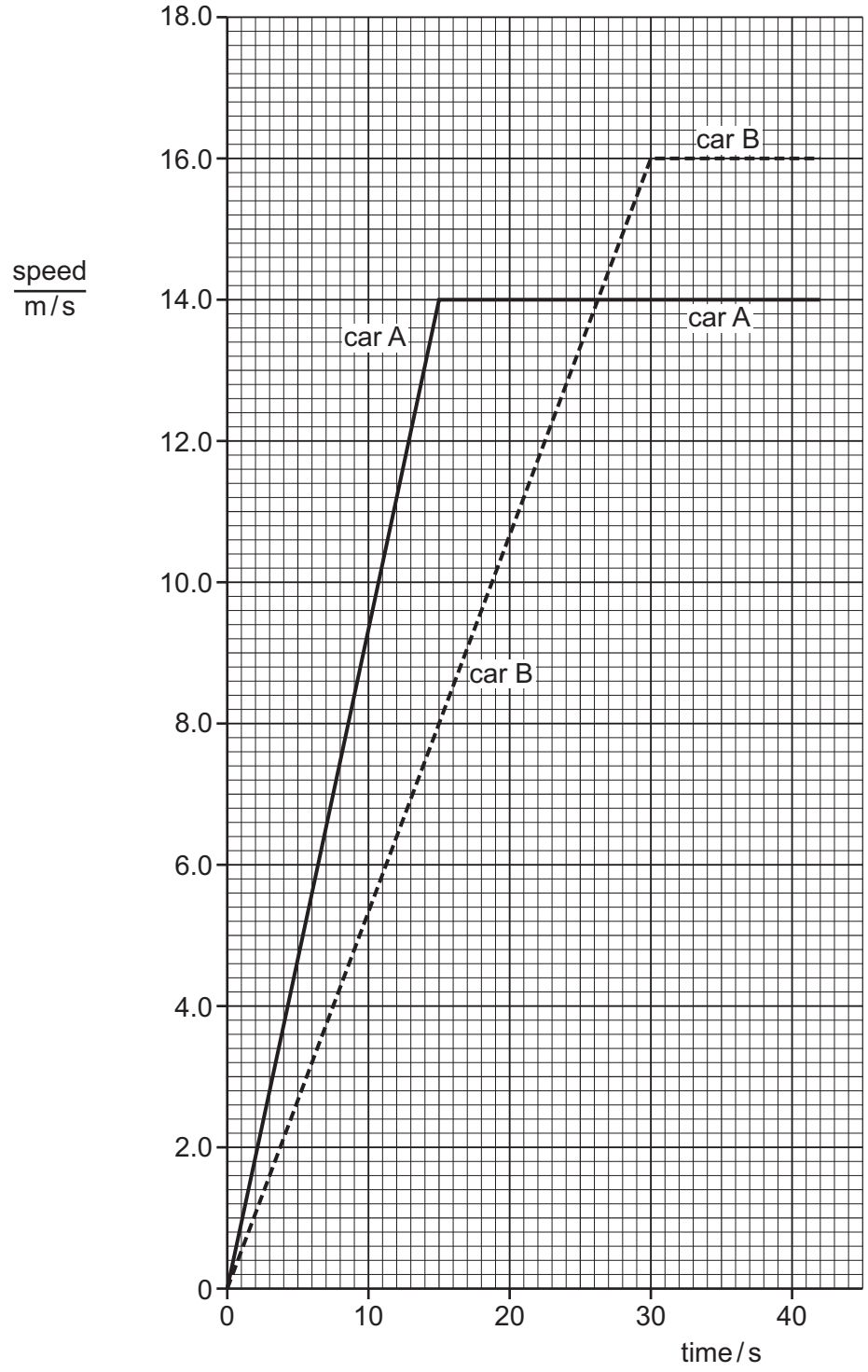
Using this information, sketch a speed–time graph on the grid, suggesting how the speed of this child varies during the race.



[3]

[Total: 3]

9 The diagram shows the speed–time graphs for two cars, A and B.



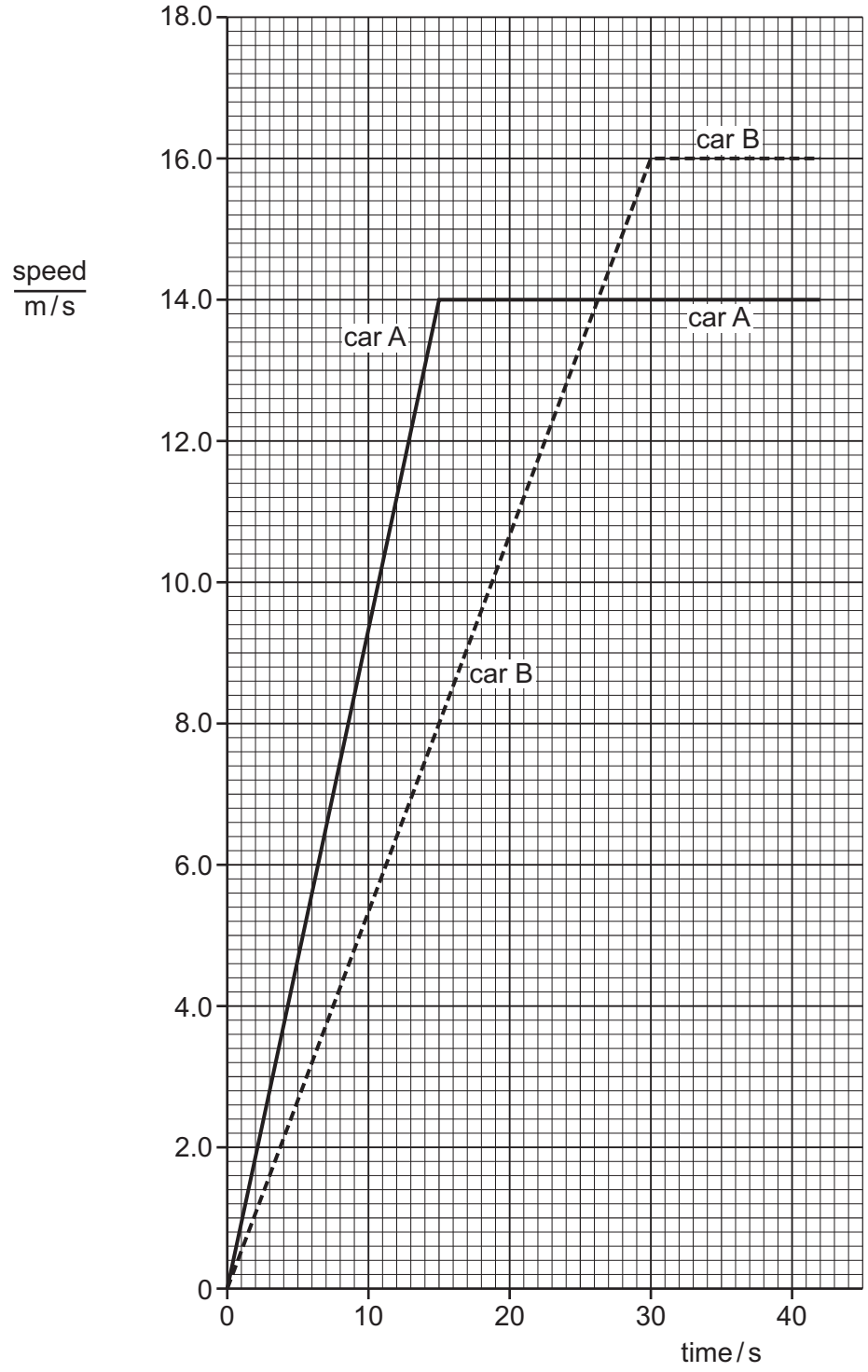
State and explain which car, A or B, has the greater acceleration during the first 10 seconds. Use information from the speed–time graphs in your explanation.

.....

..... [2]

[Total: 2]

10 The diagram shows the speed–time graphs for two cars, A and B.

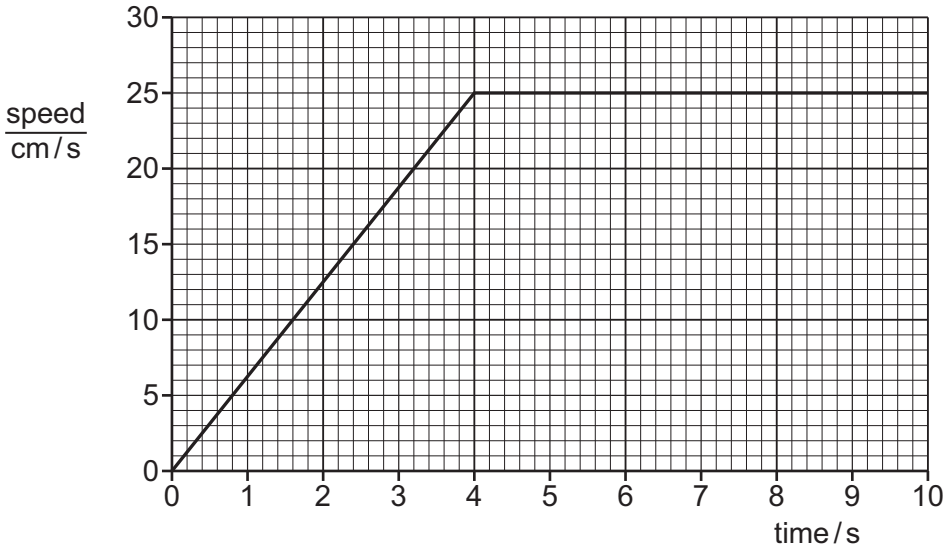


Determine the speed of car A at time = 10 s.

speed = ... m/s [2]

[Total: 2]

11 The diagram shows the speed–time graph for a trolley as it travels down a slope



Determine the distance moved by the trolley from time = 0 to time = 4.0 s.

distance = ...cm [3]

[Total: 3]

12 A battery provides energy to an electric car.

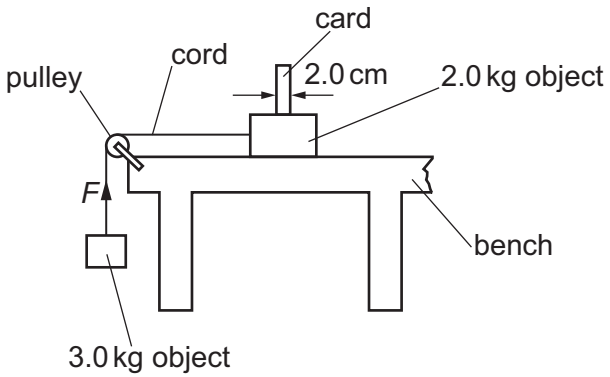
The electric car has an acceleration of 2.9 m / s^2 when it moves from rest. The combined mass of the car and its driver is 1600 kg.

Calculate the time taken to reach a speed of 28 m / s.

time = ... [2]

[Total: 2]

13 The diagram shows an object of mass 2.0 kg on a bench. This object is connected by a cord, passing over a pulley, to an object of mass 3.0 kg.



The 2.0 kg object is released from rest and accelerates at 4.0 m / s^2.

The 2.0 kg and 3.0 kg objects have a constant acceleration.

(a) Show that the speed of the objects 0.80 s after release is 3.2 m / s.

[2]

(b) A card, of width 2.0 cm, is fixed to the 2.0 kg object. As the 2.0 kg object moves to the left, the card passes through a beam of light that is perpendicular to the card.

Using the speed given in **(a)**, calculate the time taken for the card to pass through the beam of light.

time = ... [2]

[Total: 4]

14 When a car is decelerating, there is a constant resistive force F on the car due to the brakes.

The deceleration of the car is greater than $\frac{F}{m}$ and is **not** constant.

Explain why the deceleration is **not** constant.

.....

.....

..... [2]

[Total: 2]

15 Explain what is meant by deceleration.

.....

.....

..... [2]

[Total: 2]

16 A car of mass m is travelling along a straight, horizontal road at a constant speed v.

At time $t = 0$, the driver of the car sees an obstruction in the road ahead of the car and applies the brakes.

The car does **not** begin to decelerate at $t = 0$.

Suggest **one** reason why the car does **not** begin to decelerate at $t = 0$.

.....

..... [1]

[Total: 1]