

## CHAPTER 2

1

If you measured the distance travelled by a snail in inches and the time it took in minutes, what would be the units of its speed?

2

Which of the following could not be a unit of speed?

km/h, s/m, mph, m/s, m s.

3

Table 2.2 shows information about three cars travelling on a motorway.

- Which car is moving fastest?
- Which car is moving slowest?

Vehicle	Distance travelled / km	Time taken / minutes
car A	80	50
car B	72	50
car C	85	50

4

An interplanetary spacecraft is moving at 20 000 m/s. How far will it travel in one day? (Give your answer in km.)

5

How long will it take a coach travelling at 90 km/h to travel 300 km along a highway?

6

Sketch a distance against time graph to show this: 'The car travelled along the road at a steady speed. It stopped suddenly for a few seconds. Then it continued its journey, at a slower speed than before.'

7

A car travels at a steady speed. When the driver sees the red traffic lights ahead, she slows down and comes to a halt. Sketch a speed against time graph for this journey.

8

A runner accelerates from rest to 8 m/s in 2 s. What is his acceleration?

9

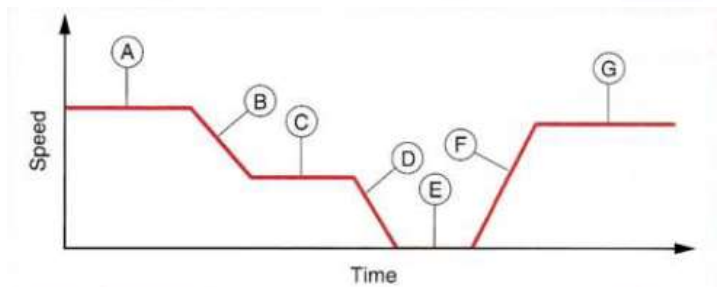
Table 2.4 shows information about a train journey. Use the data in the table to plot a distance against time graph for the train. Find the train's average speed between Beeston and Deeville. Give your answer in km/h.

Station	Distance travelled / km	Time taken / minutes
Ayton	0	0
Beeston	20	30
Seatown	28	45
Deeville	36	60
Eton	44	70

10

Look at the speed against time graph in Figure 2.11. Name the sections that represent:

- steady speed
- speeding up (accelerating)
- being stationary
- slowing down (decelerating).



11

- Draw a speed against time graph to show the following motion. A car accelerates uniformly from rest for 5 s. Then it travels at a steady speed of 6 m/s for 5 s.
- On your graph, shade the area that shows the distance travelled by the car in 10 s.
- Calculate the distance travelled in this time.

12

A runner accelerates from rest with an acceleration of  $4 \text{ m/s}^2$  for 2.3 s. What will her speed be at the end of this time?

13

A car travels for 10 s at a steady speed of 20 m/s along a straight road. The traffic lights ahead change to red, and the car slows down with a constant deceleration, so that it halts after a further 8 s.

- Draw a speed against time graph to represent the car's motion during the 18 s described.
- Use the graph to deduce the car's deceleration as it slows down.
- Use the graph to deduce how far the car travels during the 18 s described.

14

A car can accelerate at  $5.6 \text{ m/s}^2$ . Starting from rest, how long will it take to reach a speed of 24 m/s?

15

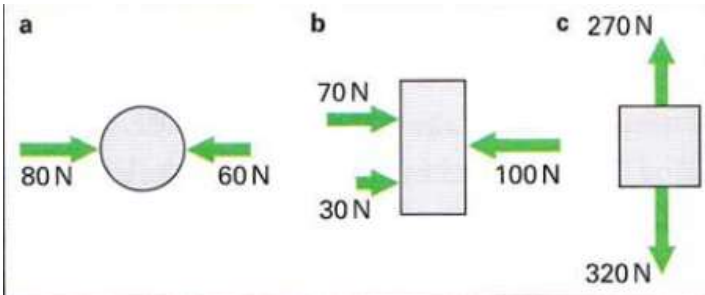


Figure 3.7 shows the forces acting on three objects. For each, say whether the forces are balanced or unbalanced. If the forces are unbalanced, calculate the resultant force and give its direction. Say how the object's motion will change.

16

What force is needed to give a car of mass 600 kg an acceleration of  $2.5 \text{ m/s}^2$ ?

17

What acceleration is produced by a force of 2000 N acting on a person of mass 80 kg?

18

One way to find the mass of an object is to measure its acceleration when a force acts on it. If a force of 80 N causes a box to accelerate at  $0.1 \text{ m/s}^2$ , what is the mass of the box?

19

A train of mass 800 000 kg is slowing down. What acceleration is produced if the braking force is 1 400 000 N?

20

An aircraft can fly at a top speed of 600 km/h.

- What will its speed be if it flies into a head-wind of 100 km/h? (A head-wind blows in the opposite direction to the aircraft.)
- The pilot directs the aircraft to fly due north at 600 km/h. A side-wind blows at 100 km/h towards the east. What will be the aircraft's resultant velocity? (Give both its speed and direction.)

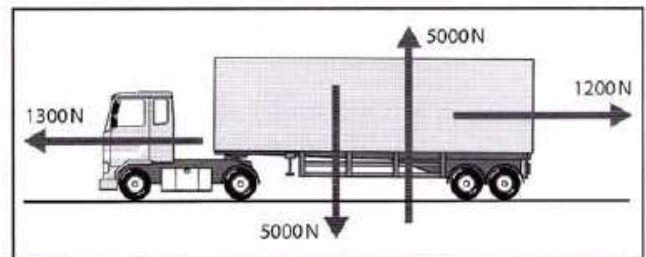
21

An astronaut is weighed before he sets off to the Moon. He has a mass of 80 kg.

- What will his weight be on Earth?
- When he arrives on the Moon, will his mass be more, less, or the same?
- Will his weight be more, less, or the same?

22

3.5 Figure 3.16 shows the forces acting on a lorry as it travels along a flat road.



- Two of the forces have effects that cancel each other out. Which two? Explain your answer.
- What is the resultant force acting on the lorry? Give its magnitude and direction.
- What effect will this resultant force have on the speed at which the lorry is travelling?

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- Calculate the resultant force on the diver.
- Explain how his motion will change.

