Name:

IGCSE Physics: **w25 21**

2 An athlete runs at a speed of 8 m / s for 10 s, and then at a speed of 6 m / s for 12 s.

Which calculation gives the average speed of the athlete in m / s?

A $\frac{8+6}{2}$

B $\frac{(8\times10)+(6\times12)}{22}$

C $\frac{(8\div10)+(6\div12)}{22}$

D $\frac{(10\div8)+(12\div6)}{22}$

IGCSE Physics: **w25 22**

2 How is the deceleration of an object calculated from a speed–time graph?

A It is the area under the graph.

B It is the gradient of the graph.

C It is the difference between two readings on the horizontal (x) axis.

D It is the difference between two readings on the vertical (y) axis.

IGCSE Physics: **w25 23**

2 A car driver applies the brakes to bring a car to rest with a constant deceleration of 4.0 m / s^2 in a time of 8.0 s.

What is the average speed of the car during this time?

A 4.0 m / s **B** 8.0 m / s **C** 16 m / s **D** 32 m / s

3 An object is falling in a uniform gravitational field.

After a certain time, it reaches terminal velocity.

Which row is correct?

	velocity of object	acceleration of object
A	increases then decreases	positive then negative
B	increases then decreases	positive then zero
C	increases then constant	positive then negative
D	increases then constant	positive then zero

1 **(a)** A hard ball is dropped vertically downwards.

Fig. 1.1 shows the speed–time graph for the ball from when it is dropped until it hits the ground.

Air resistance is ignored.

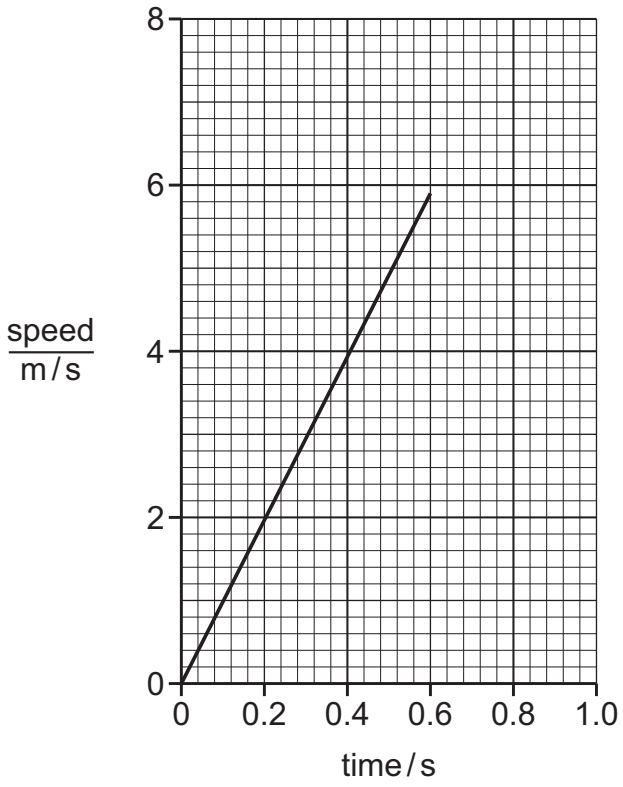


Fig. 1.1

(i) Describe the motion of the ball in Fig. 1.1.

.....

..... [1]

(ii) Show that the distance travelled by the ball is 1.8 m.

[2]

(iii) The mass of the ball is 0.54 kg. Calculate the gravitational potential energy stored in the ball immediately before it is dropped.

(2)

gravitational potential energy = ... [2]

(iv) Determine the kinetic energy of the ball when it has fallen half way to the ground.

kinetic energy = ... [1]

(b) The same ball is dropped from an aeroplane. Air resistance acts on the ball.

Explain how the vertical motion of the ball changes, from when it is dropped to just before it hits the ground.

Use the idea of forces in your answer.

.....

.....

.....

.....

..... [3]

(c) A soft ball is dropped by a student so that it bounces on the ground.

Fig. 1.2 shows the height–time graph for the ball. The height is measured from the ground.

The ball bounces four times.

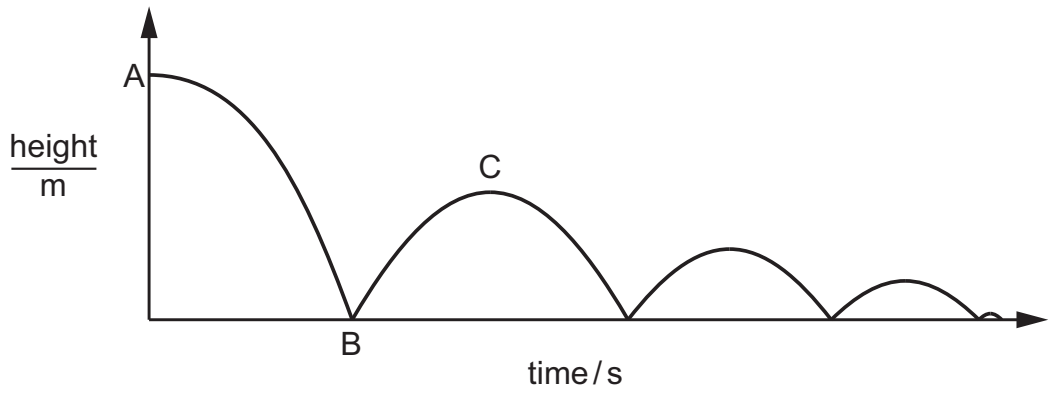


Fig. 1.2

Explain why the change in height of the ball between B and C is less than the change in height between A and B.

.....

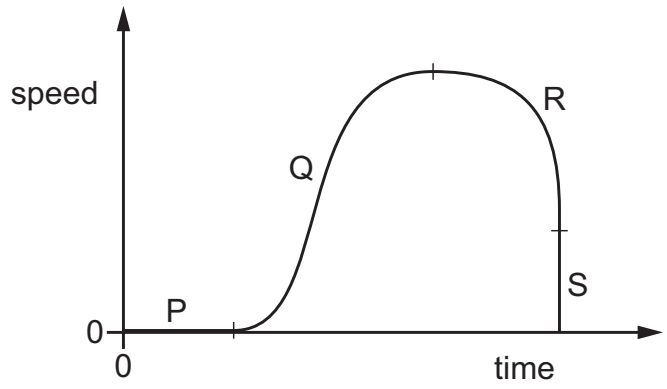
.....

.....

..... [2]

[Total: 11]

1 The speed–time graph for a racing car is divided into four sections, P, Q, R and S. The car starts the race but soon crashes into a wall of tyres.



Which sections of the graph show that there is an acceleration that is changing?

A P, Q, R and S

B Q, R and S only

C Q and R only

D R and S only

7 A stone is dropped from a tall tower and falls a distance of 50 m to the ground.

The stone has a mass of 3.0 kg.

At which speed does the stone hit the ground?

A 17 m / s **B** 31 m / s **C** 54 m / s **D** 150 m / s

1 A long tube contains oil. A small ball is held at rest at the surface of the oil. At time $t = 0$, the ball is released and begins to fall vertically through the oil.

Fig. 1.1 shows the ball falling through the oil.

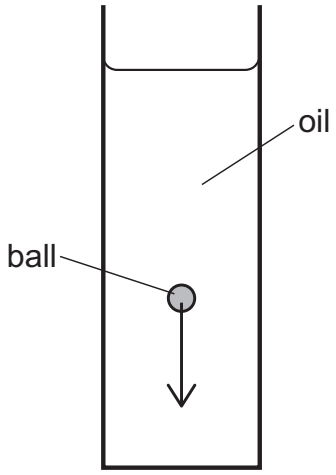


Fig. 1.1

As the ball begins to fall through the oil, it accelerates.

(a) Define acceleration.

.....

..... [1]

(b) The mass of the ball is 0.0075 kg.

Calculate the resultant force acting on the ball when it is accelerating downwards at $2.8\,m/s^2$.

resultant force = ... [2]

(c) As the ball falls, its speed v is recorded. Fig. 1.2 is the speed–time graph for the falling ball.

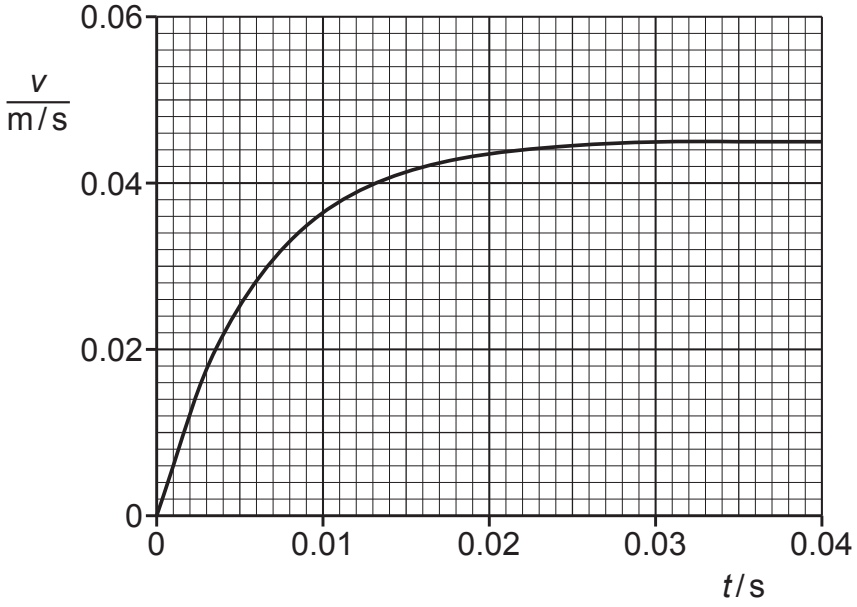


Fig. 1.2

(i) Describe what happens to the acceleration between $t = 0$ and $t = 0.040$ s.

Explain why this happens.

.....

.....

.....

..... [4]

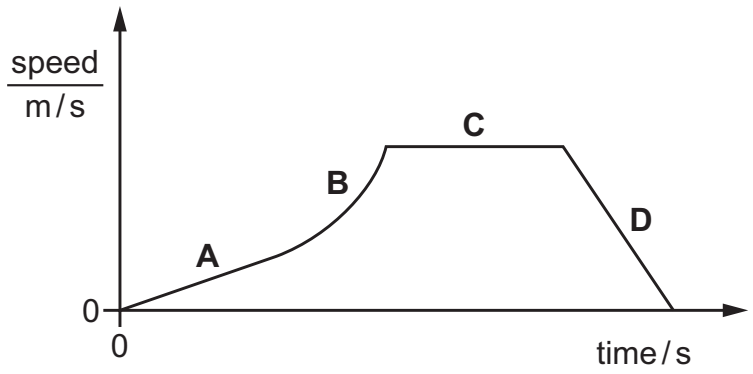
(ii) By drawing a tangent on Fig. 1.2, determine a value for the acceleration of the ball at $t = 0.010$ s.

acceleration = ... [3]

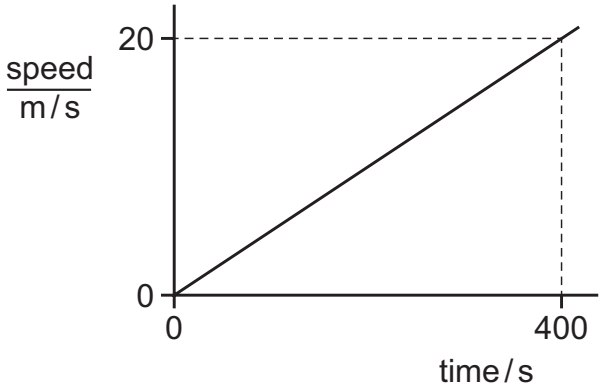
[Total: 10]

2 The graph shows the speed of a car travelling through a town.

Which section of the graph represents a period when the car is decelerating?



3 The graph represents the motion of a vehicle.



What is the distance travelled by the vehicle in 400 s?

A 20 m **B** 400 m **C** 4000 m **D** 8000 m

2 Fig. 2.1 shows a motorcyclist accelerating along a straight horizontal section of track.

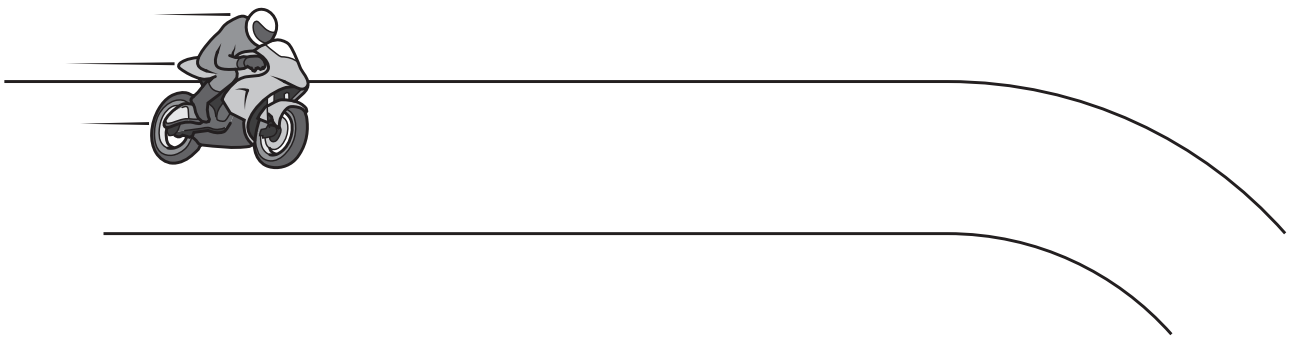


Fig. 2.1

The motorcyclist and motorcycle have a combined mass of 240 kg.

(a) On the straight horizontal section of the track, the motorcyclist accelerates from rest at $7.2\,m/s^2$.

(i) The motorcyclist reaches the end of the straight section of track in 5.3 s.

Calculate the speed of the motorcyclist at the end of the straight section.

speed = ... [2]

(ii) Calculate the resultant force on the motorcyclist and motorcycle on the straight section of track.

resultant force = ... [2]

(b) At the end of the straight section, the track remains horizontal but bends to the right, as shown in Fig. 2.1.

When the motorcyclist reaches the bend, she travels around the bend in a circular path at a constant speed.

(i) Velocity is a vector quantity.

State how a vector quantity differs from a scalar quantity.

.....

..... [1]

(ii) Describe what happens to the velocity of the motorcyclist as she travels around the bend at constant speed.

.....

..... [1]

(iii) Explain why there must be a resultant force on the motorcyclist as she travels around the bend.

.....

.....

..... [2]

[Total: 8]