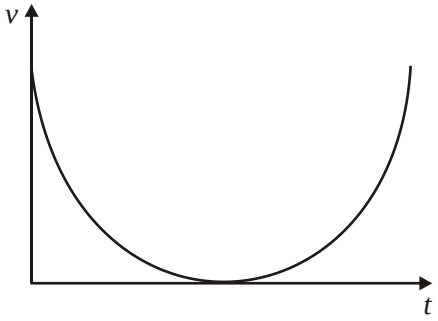
**NAME:** _____ **DATE:** _____ PHYSICS

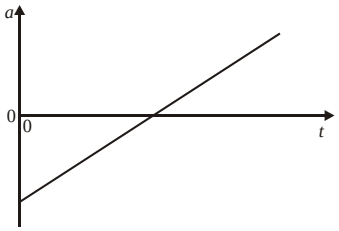
**PAPER 1 REVISION**

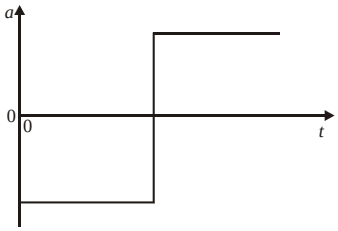
## 2.1 Kinematics

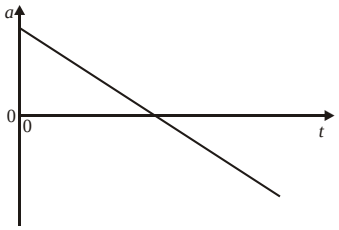
**1.** The graph shows the variation with time *t* of the velocity *v* of an object.

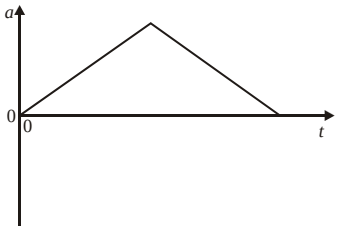



Which **one** of the following graphs best represents the variation with time *t* of the acceleration *a* of the object?

A.



B.



C.



D.


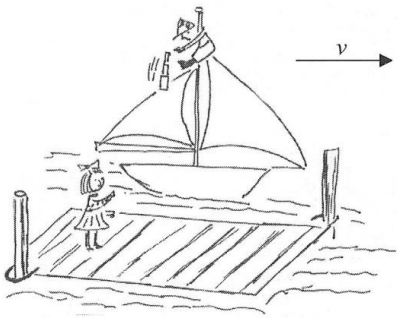

**(1)**

**2.** A ball, initially at rest, takes time *t* to fall through a vertical distance *h*. If air resistance is ignored, the time taken for the ball to fall from rest through a vertical distance *9h* is

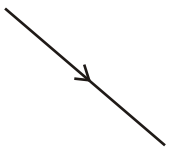
A. *3t*. B. *5t*. C. *9t*. D. 10*t*.

**(1)**

**3.** A sailing boat is moving with constant velocity *v* to the right parallel to the dock.

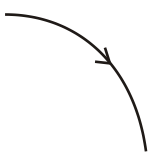


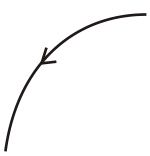

Sailor Hulot, up on the mast, drops his telescope at the moment he is opposite Lucie who is standing on the dock. Which **one** of the following best shows the path of the falling telescope as seen by Lucie?

A.


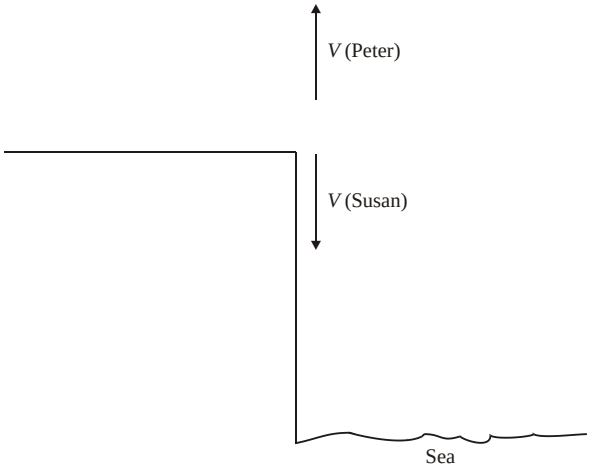
B.


**(1)**

C.


D.


**4.** Peter and Susan both stand on the edge of a vertical cliff.




Susan throws a stone vertically downwards and, at the same time, Peter throws a stone vertically upwards. The speed $V$ with which both stones are thrown is the same. Neglecting air resistance, which **one** of the following statements is true?

A. The stone thrown by Susan will hit the sea with a greater speed than the stone thrown by Peter.

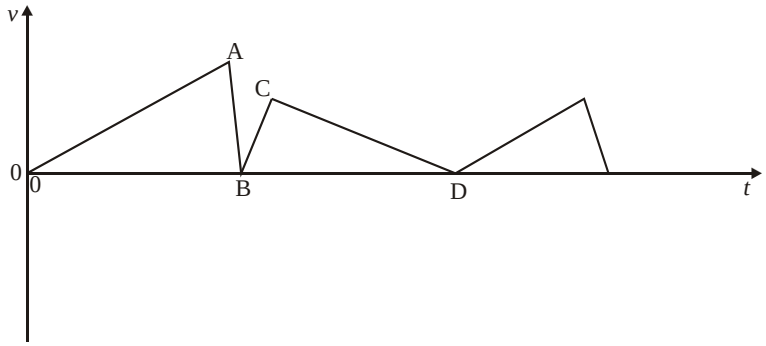
B. Both stones will hit the sea with the same speed no matter what the height of the cliff.

C. In order to determine which stone hits the sea first, the height of the cliff must be known.

D. In order to determine which stone hits the sea first both the height of the cliff and the mass of each stone must be known.

**(1)**

**5.** A ball is dropped from rest at time $t = 0$ on to a horizontal surface from which it rebounds. The graph shows the variation of time $t$ with **speed** $v$ of the ball.

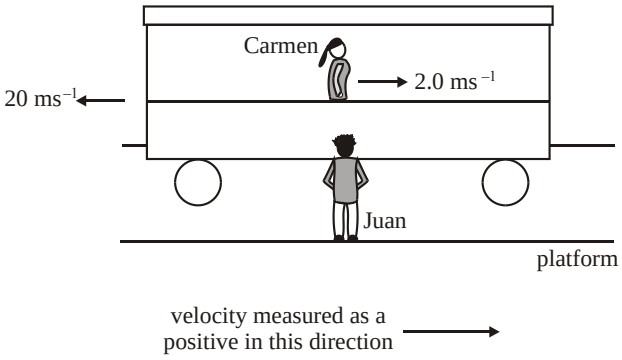



Which **one** of the following best represents the point at which the ball just loses contact with the surface after the first bounce?

A. A B. B C. C D. D

**(1)**

**6.** Juan is standing on the platform at a railway station. A train passes through the station with speed 20 m $s^{-1}$ in the direction shown measured relative to the platform. Carmen is walking along one of the carriages of the train with a speed of 2.0 m $s^{-1}$ measured relative to the carriage in the direction shown. Velocity is measured as positive in the direction shown on the diagram.



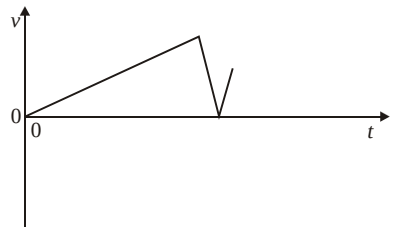

The velocity of Carmen relative to Juan is

A. –22 m $s^{-1}$. B. –18 m $s^{-1}$. C. +18 m $s^{-1}$. D. +22 m $s^{-1}$.

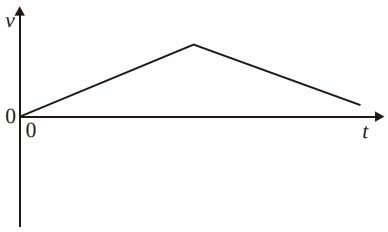
**(1)**

**7.** A ball is dropped from rest at time $t = 0$ on to a horizontal surface from which it rebounds. Which **one** of the following graphs best shows the variation of **speed** $v$ of the ball with time $t$ from the time $t = 0$ to the time that the ball leaves the surface?

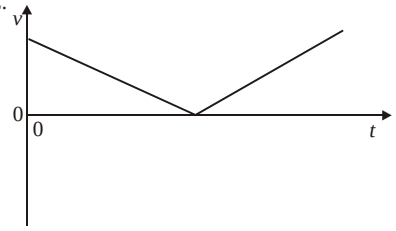
A.



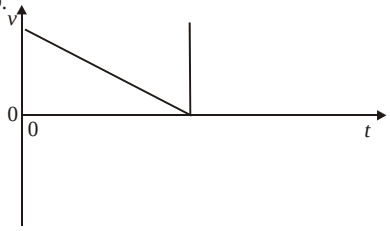

B.




C.




D.



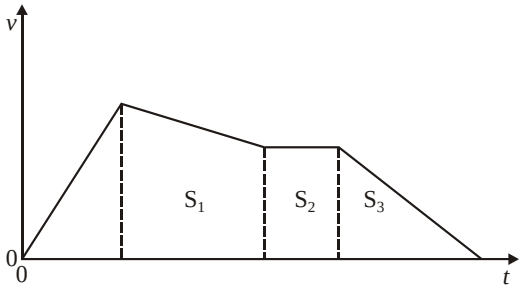

**(1)**

**8.** Which **one** of the following is a correct definition of *displacement*?

A. Distance from a fixed point
B. Distance moved from a fixed point
C. Distance from a fixed point in a given direction
D. Distance moved in a given direction

**(1)**

**9.** The variation with time $t$ of the speed $v$ of a car moving along a straight road is shown.




Which area, $S_1$, $S_2$ or $S_3$, or combination of areas, represents the total distance moved by the car during the time that its speed is reducing?

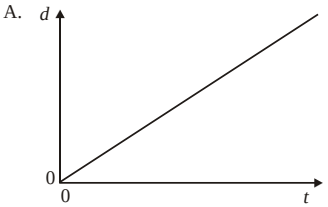
A. $S_1$ B. $S_3$

C. $S_1 + S_3$ D. $S_1 + S_2 + S_3$

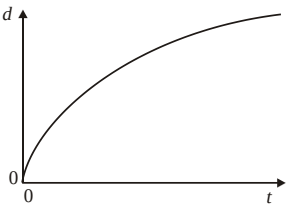
**(1)**

**10.** A ball is held at rest in air. The ball is then released. Which **one** of the graphs best shows the variation with time $t$ of the distance $d$ fallen by the ball?

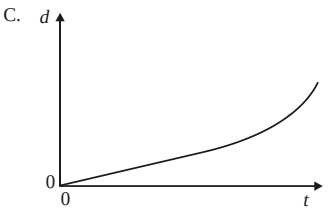
A.



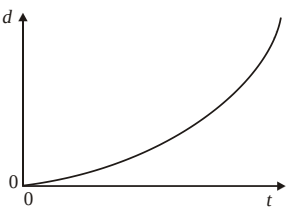

B.




C.

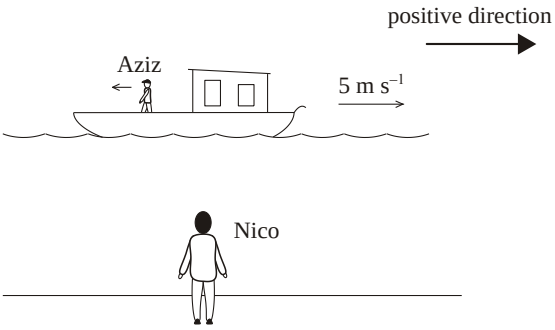



D.




**(1)**

**11.** A boat is moving in the direction shown with a speed of 5 m $s^{-1}$ as measured by Nico who is at rest on the beach. Aziz walks along the deck of the boat in the direction shown with a speed of 2 m $s^{-1}$ measured relative to the boat.




If velocity is measured as positive in the direction shown, the **velocity** of Nico relative to Aziz is

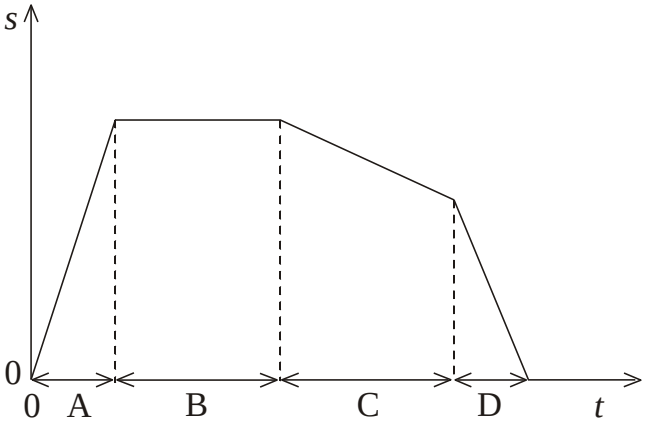
A. − 7 m $s^{-1}$.  B. − 3 m $s^{-1}$.

C. + 3 m $s^{-1}$.  D. + 7 m $s^{-1}$.

**(1)**

**12.** The graph below shows the variation with time *t* of the displacement *s* of a car. In which time interval is the speed greatest?

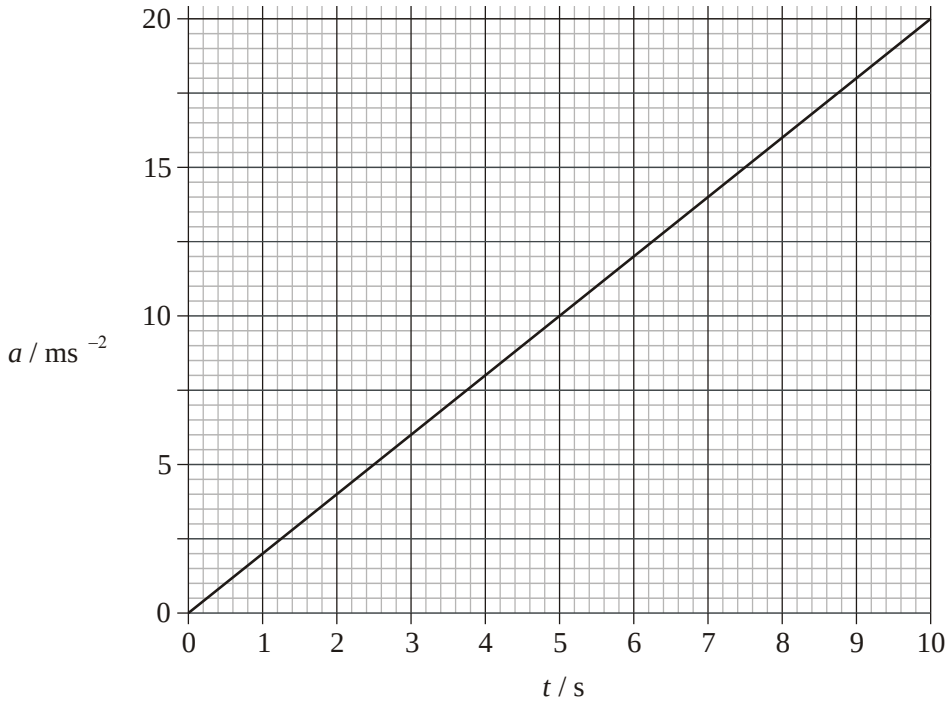
**(1)**




**13.** The graph shows the variation with time *t* of the acceleration *a* of an object.

The object is at rest at time *t* = 0.

Which of the following is the velocity of the object at time *t* = 6.0 s?




A. 0.50 m $s^{-1}$.

B. 2.0 m $s^{-1}$.

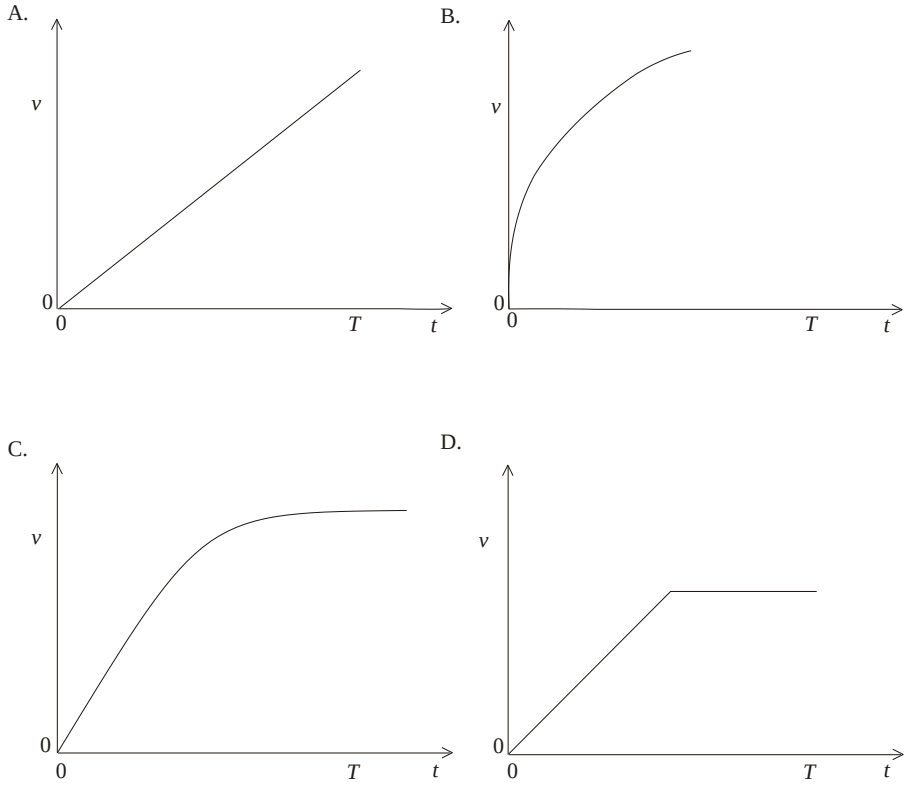
C. 36 m $s^{-1}$.

D. 72 m $s^{-1}$.

**(1)**

**14.** An object is dropped from rest from a point several hundred metres above the surface of the Earth at time $t = 0$. The object strikes the ground at $t = T$ and air resistance is **not** negligible.

Which of the following sketch graphs best shows the variation with time $t$, of the speed $v$ of the object?




**(1)**

**15.** Which of the following is a correct definition of average acceleration?

A. $\frac{\text{change in velocity}}{\text{time taken}}$

B. $\frac{\text{velocity}}{\text{time taken}}$

C. $\frac{\text{change in speed}}{\text{time taken}}$

D. $\frac{\text{speed}}{\text{time taken}}$

**(1)**

**16.** A small steel ball falls from rest through a distance of 3 m. When calculating the time of fall, air resistance can be ignored because

A. air is less dense than steel.

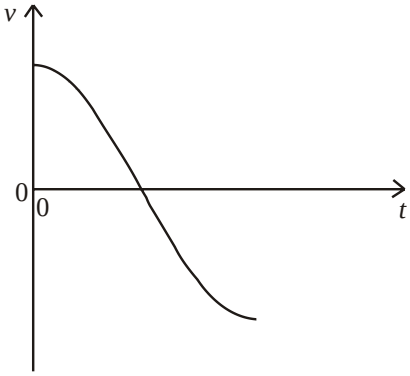
B. air resistance increases with the speed of the ball.

C. the air is not moving.

D. air resistance is much less than the weight of the ball.

**(1)**

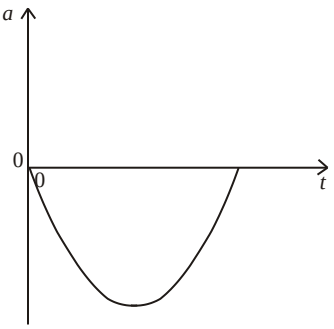
**17.** The graph shows the variation with time $t$ of the velocity $v$ of an object moving along a straight line.



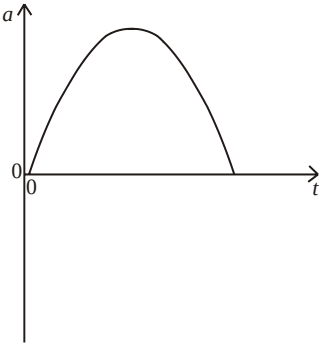

Which graph shows the variation with time $t$ of the acceleration $a$ of the object?

**(1)**

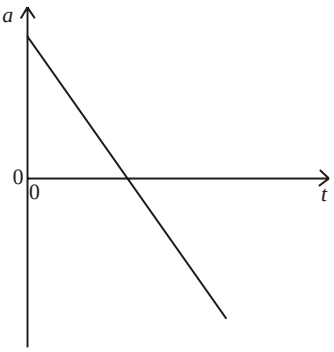
A.



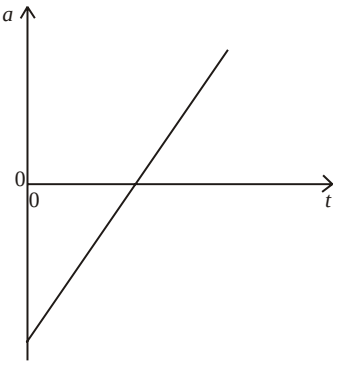

B.



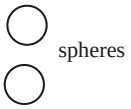

C.



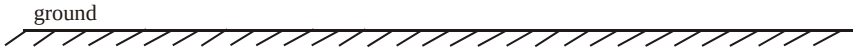

D.




**18.** Two identical metal spheres are held above the ground as shown.




(not to scale)




The separation between them is small compared to their distance above the ground. When the spheres are released, the separation of the spheres will

A. remain constant.

B. decrease continuously.

C. increase continuously.

D. increase initially and then remain constant.

**(1)**

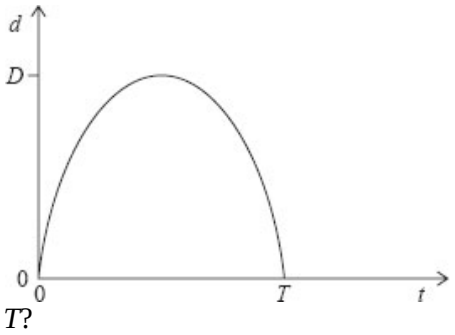
**19.** An object is falling, in air, towards the Earth's surface.

What changes occur in the acceleration and in the velocity of the object as it approaches terminal velocity?

| | acceleration | velocity |
|---|---|---|
| A. | decreases to zero | increases continuously |
| B. | decreases to zero | increases to a constant value |
| C. | constant | increases to a constant value |
| D. | constant | increases continuously |

**(1)**

**20.** A ball is thrown vertically upwards from the ground. The graph shows the variation with time $t$ of the vertical displacement $d$ of the ball.

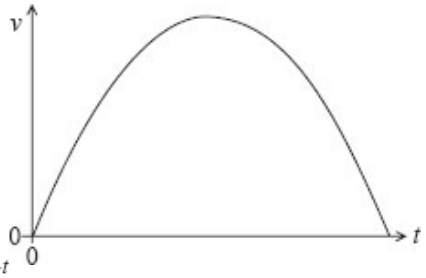



Which of the following gives the final displacement after time $T$ and the average speed between time $t$ = 0 m aand time $t$ = $T$?

| | Displacement | Average speed |
|---|---|---|
| A. | 0 | 0 |
| B. | 0 | $\frac{2D}{T}$ |
| C. | $2D$ | $\frac{2D}{T}$ |
| D. | $2D$ | 0 |

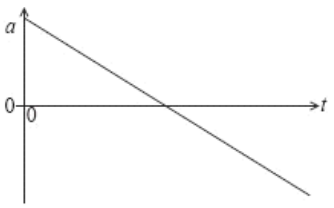
**(1)**

**21.** The graph shows the variation with time $t$ of the velocity $v$ of an object moving on a straight-line. Which of the graphs below best represents the variation with time $t$ of the acceleration $a$ of the object?

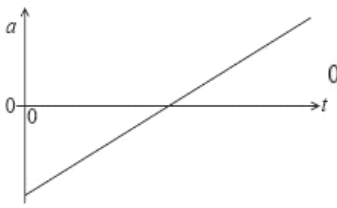



**(1)**

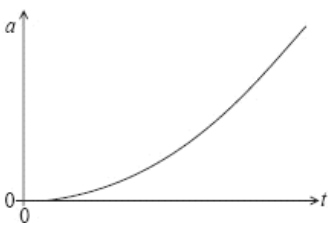
A.



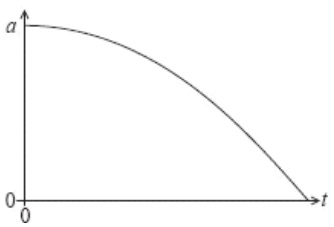

B.




C.




D.



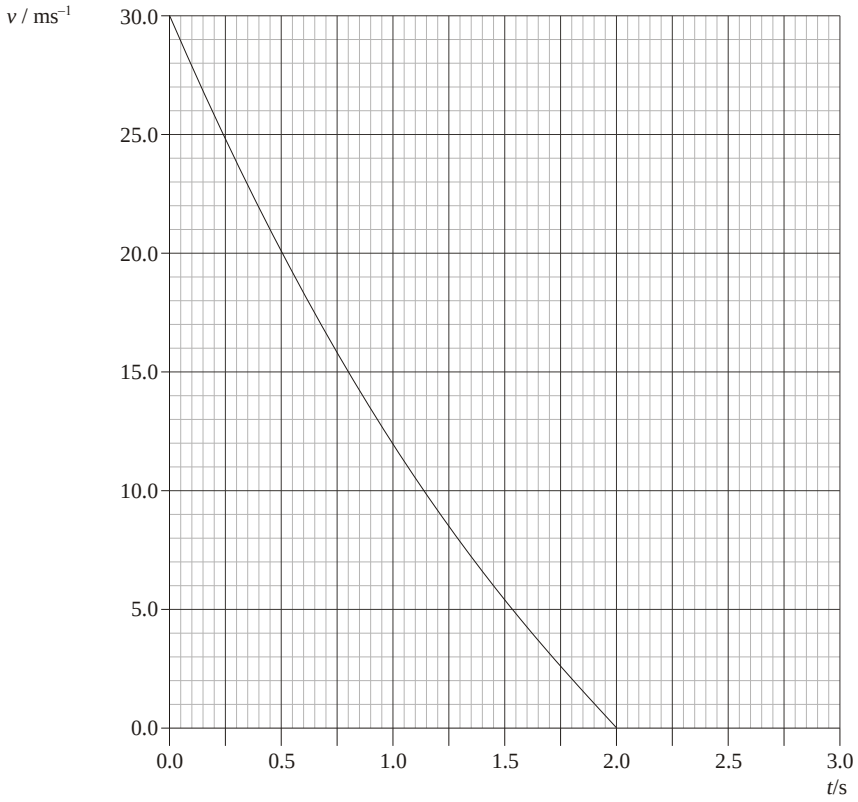
**PAPER 2 REVISION**

## 2.1 Kinematics

**22. Motion of a ball**

A ball of mass 0.25 kg is projected vertically upwards from the ground with an initial velocity of 30 m $s^{-1}$. The acceleration of free fall is 10 m $s^{-2}$, but air resistance **cannot** be neglected.

The graph shows the variation with time *t* of the velocity *v* of this ball for the upward part of the motion.




(a) State what the area under the graph represents.

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**(1)**

(b) Estimate the maximum height reached by the ball.

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**(1)**

(c) Determine, for the ball at $t = 1.0$ s,

(i) the acceleration;

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.....

.....

**(3)**

(ii) the magnitude of the force of air resistance.

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**(2)**

(d) Use the graph to explain, without any further calculations, that the force of air resistance is decreasing in magnitude as the ball moves upward.

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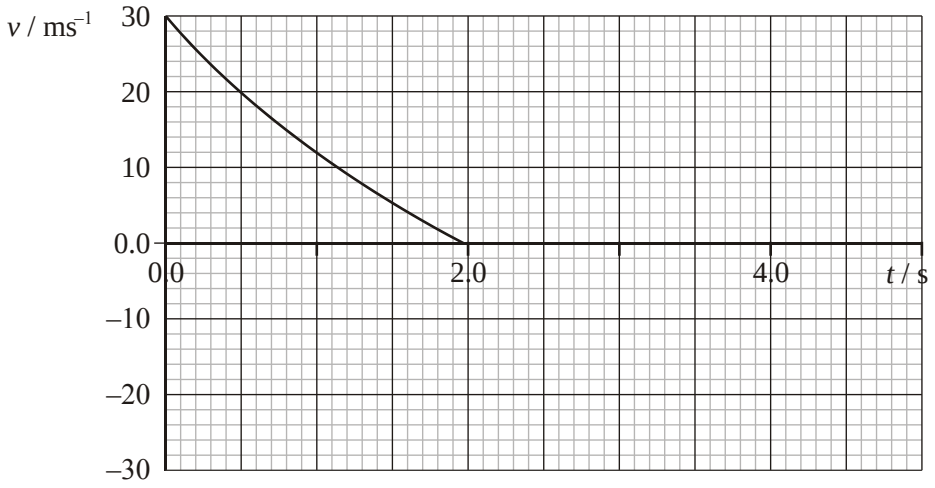
**(2)**

(e) The diagram below is a sketch graph of the upward motion of the ball.

Draw a line to indicate the downward motion of the ball. The line should indicate the motion from the maximum height of the ball until just before it hits the ground.




**(2)**

(f) State and explain, by reference to energy transformations, whether the speed with which the ball hits the ground is equal to 30 m $s^{-1}$.

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.....

.....

**(2)**

(g) Use your answer in (f) to state and explain whether the ball takes 2.0 s to move from its maximum height to the ground.

.....

.....

.....

**(2)**

**(Total 15 marks)**