

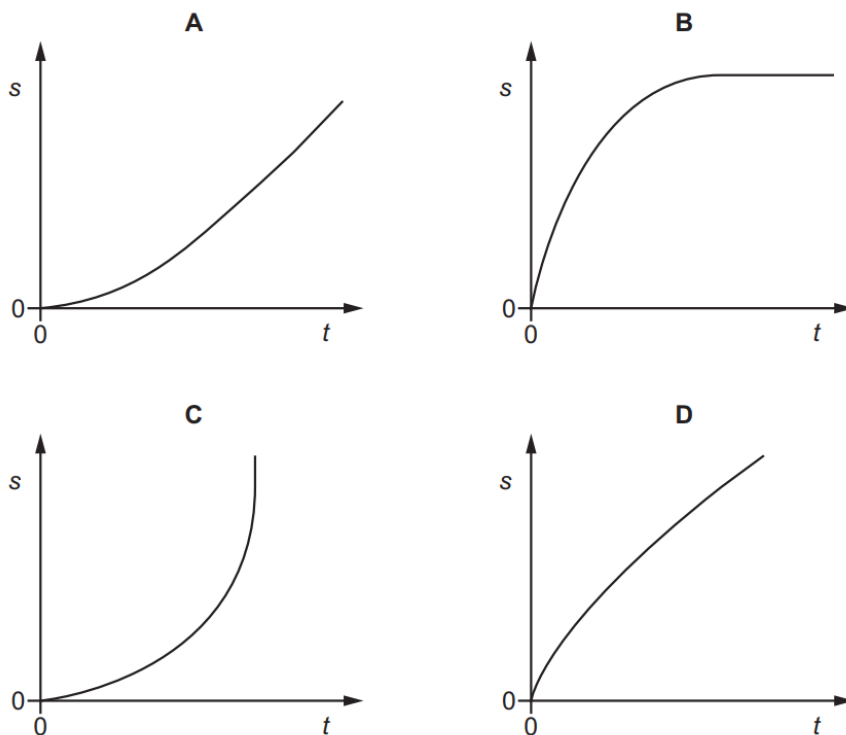
CIA A-Level Physics 9702 Paper 1

**Kinematics (2018 – 2019)**Compiled by [digitalblackboard.io](http://digitalblackboard.io)

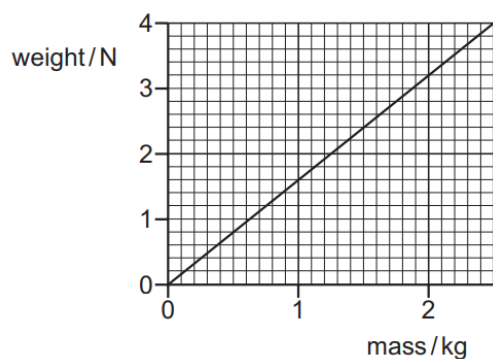
9702/11/M/J/18

- 6 A tennis ball falls freely, in air, from the top of a tall building.

Which graph best represents the variation with time  $t$  of the distance  $s$  fallen?



- 7 The graph shows the variation with mass of the weight of objects on a particular planet.

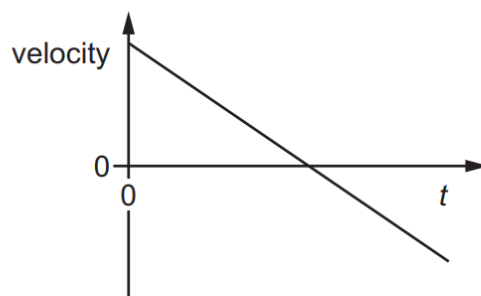


What is the value of the acceleration of free fall on the planet?

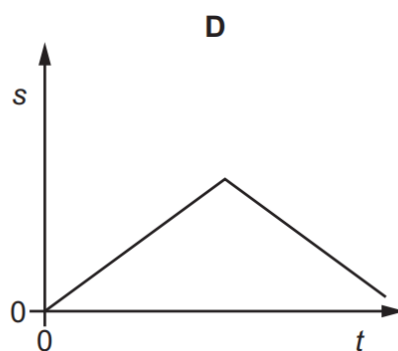
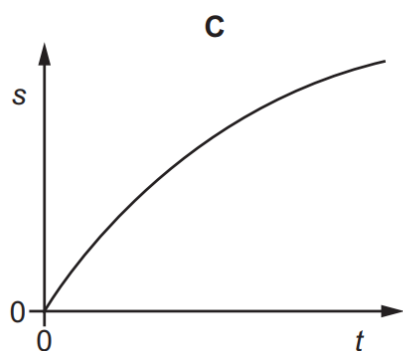
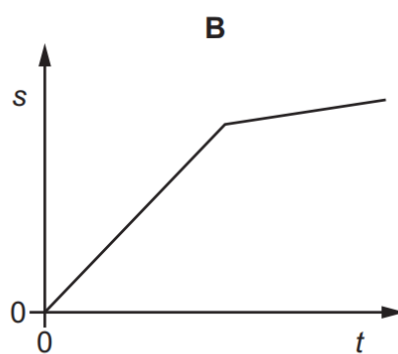
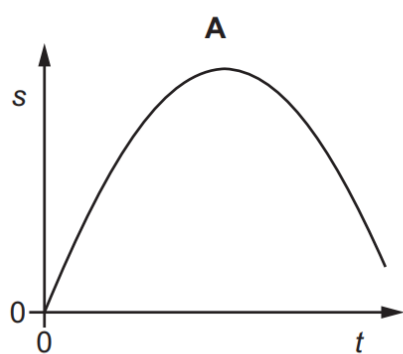
- A**  $0.63\text{ms}^{-2}$     **B**  $1.6\text{ms}^{-2}$     **C**  $3.2\text{ms}^{-2}$     **D**  $9.8\text{ms}^{-2}$

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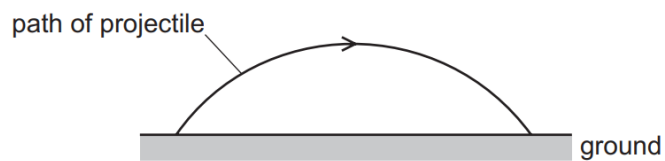
5 The velocity of an object changes with time  $t$  as shown.



Which graph best shows the variation with time  $t$  of the displacement  $s$  of the object?

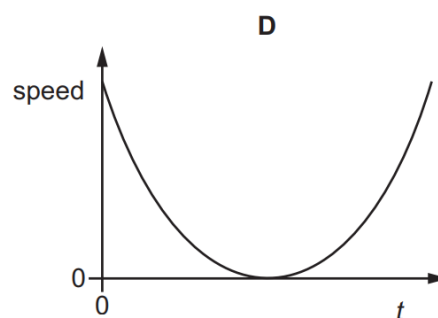
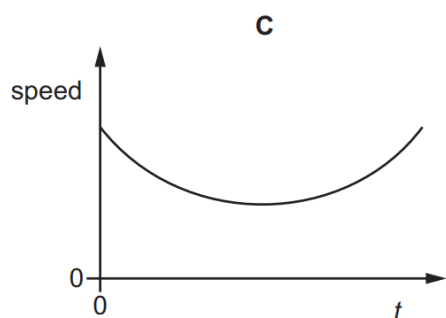
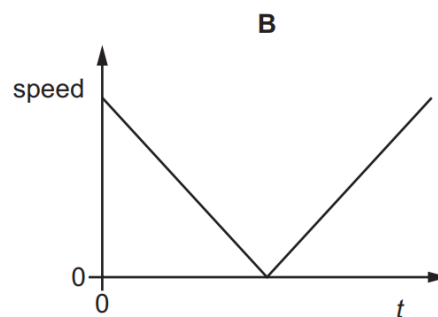
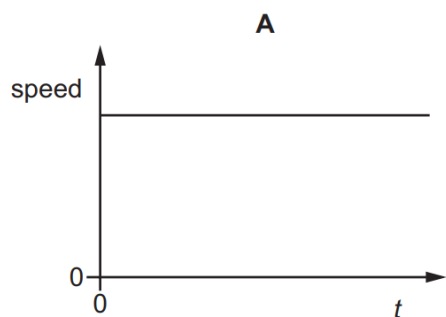


- 6 A projectile is launched at an angle to the horizontal at time  $t = 0$ . It travels over horizontal ground, as shown.



Assume that air resistance is negligible.

Which graph best shows the variation with  $t$  of the speed of the projectile from when it is launched to when it lands on the ground?



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- 6 A rock on the surface of Mars is projected vertically upwards with an initial speed of  $9.4 \text{ m s}^{-1}$ . The rock rises to a height of 12 m above the surface.

Assume there is no atmosphere on Mars.

What is the acceleration of free fall near the surface of Mars?

- A  $0.39 \text{ m s}^{-2}$       B  $3.7 \text{ m s}^{-2}$       C  $7.4 \text{ m s}^{-2}$       D  $9.8 \text{ m s}^{-2}$

**9702/11/O/N/18**

- 6 A tennis ball is thrown horizontally in air from the top of a tall building.

The effect of air resistance is **not** negligible.

What happens to the horizontal and to the vertical components of the ball's velocity?

|          | horizontal component of velocity | vertical component of velocity |
|----------|----------------------------------|--------------------------------|
| <b>A</b> | constant                         | constant                       |
| <b>B</b> | constant                         | increases at a constant rate   |
| <b>C</b> | decreases to zero                | increases at a constant rate   |
| <b>D</b> | decreases to zero                | increases to a maximum value   |

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- 6 A sprinter runs a 100 m race. The sprinter has a constant acceleration from rest of  $2.5 \text{ m s}^{-2}$  until reaching a speed of  $10 \text{ m s}^{-1}$ . The speed then remains constant until the end of the race.

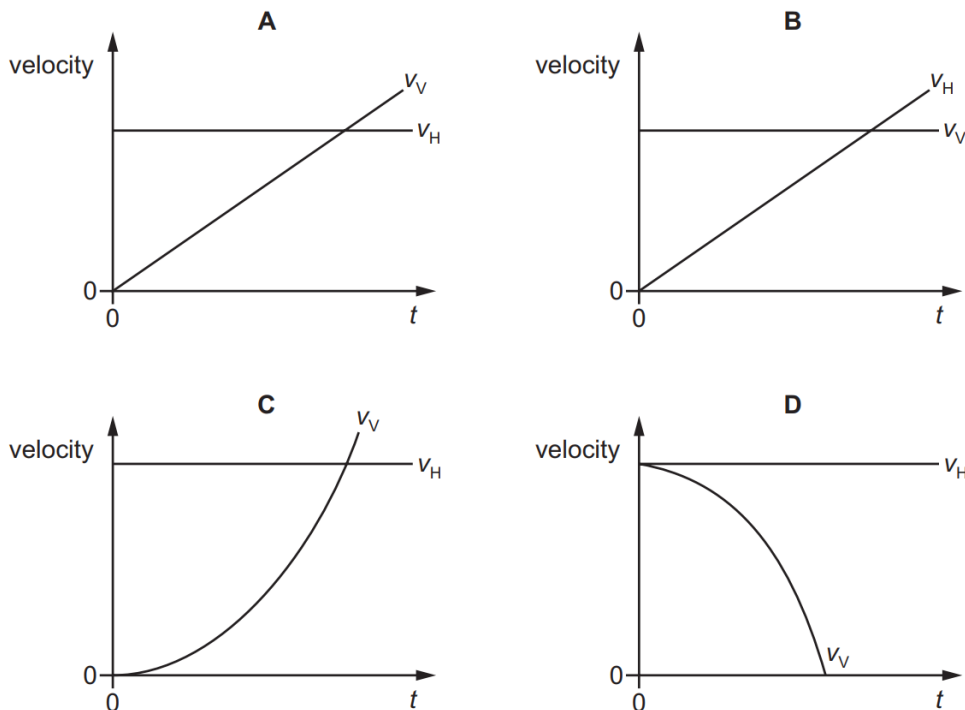
Which time does it take the sprinter to run the race?

- A 8.9 s      B 10 s      C 12 s      D 14 s

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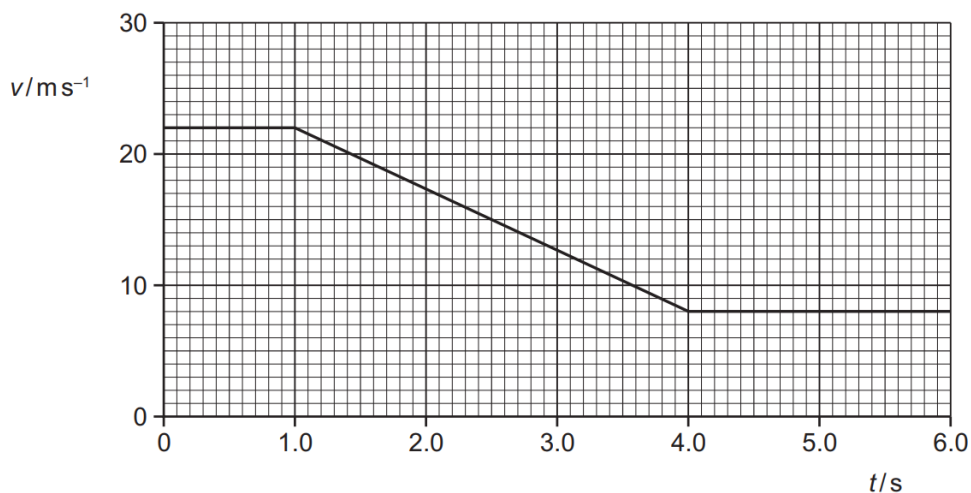
- 6 A stone is projected horizontally at time  $t = 0$  and falls. Air resistance is negligible. The stone has a horizontal component of velocity  $v_H$  and a vertical component of velocity  $v_V$ .

Which graph shows how  $v_H$  and  $v_V$  vary with time  $t$ ?



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- 6 A car travels along a straight horizontal road. The graph shows the variation of the velocity  $v$  of the car with time  $t$  for 6.0 s of its journey.



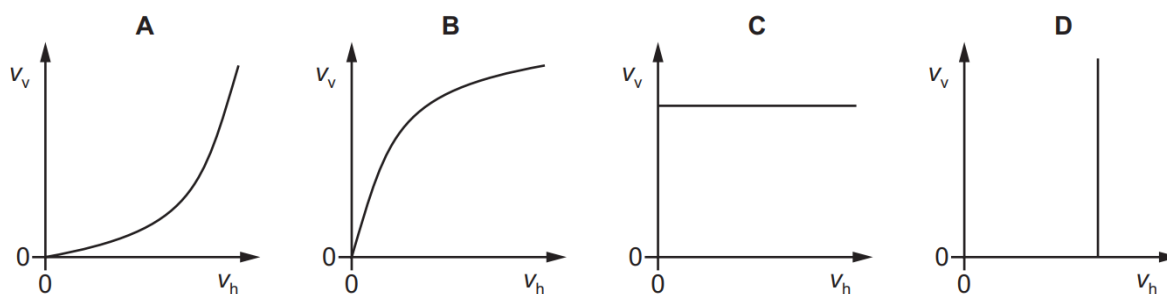
The brakes of the car are applied from  $t = 1.0$  s to  $t = 4.0$  s.

How far does the car travel while the brakes are applied?

- A 21 m      B 45 m      C 67 m      D 83 m

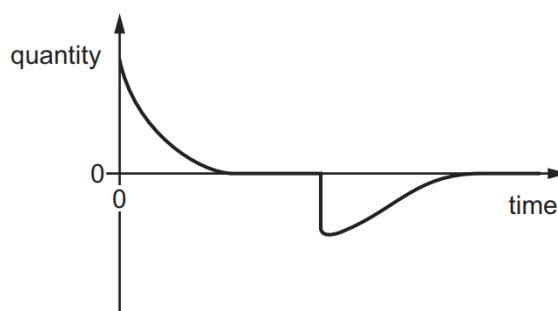
- 7 A stone is thrown horizontally from the top of a cliff and falls into the sea some time later. Air resistance is negligible.

Which graph shows how the vertical component  $v_v$  of velocity of this stone varies with its horizontal component  $v_h$  of velocity as it moves through the air?



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- 8 The graph shows how a physical quantity varies with time.

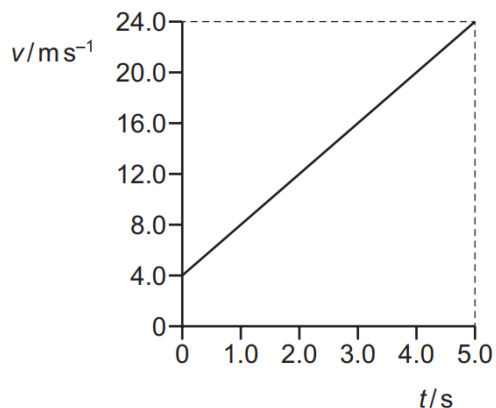


Which event could best be represented by the graph?

- A** the acceleration of a firework rising to a maximum height and falling to the ground
- B** the acceleration of a skydiver leaving an aircraft, falling, opening a parachute and falling to the ground
- C** the speed of a javelin as it leaves an athlete's hand, falls and sinks into the ground
- D** the speed of a high jump athlete leaving the ground, jumping over a bar and descending to the ground

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- 7 The graph shows the variation of velocity  $v$  with time  $t$  for an object.



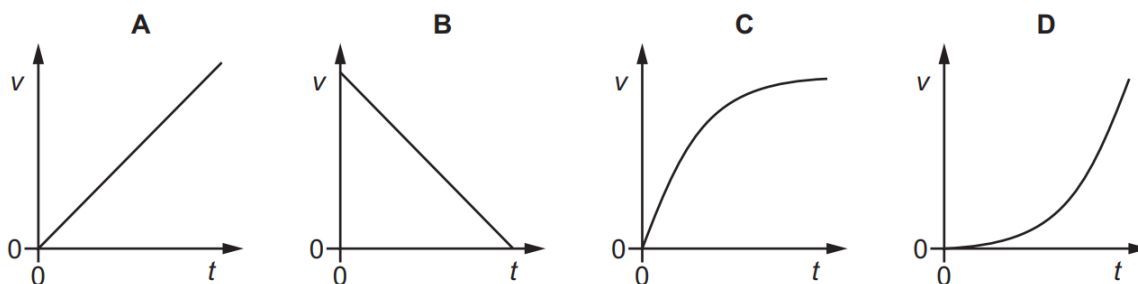
The object passes a fixed point at time  $t = 0$ .

What is the displacement of the object from the fixed point at time  $t = 5.0$  s and what is the acceleration of the object?

|          | displacement<br>/m | acceleration<br>/ms <sup>-2</sup> |
|----------|--------------------|-----------------------------------|
| <b>A</b> | 60                 | 4.0                               |
| <b>B</b> | 70                 | 4.0                               |
| <b>C</b> | 60                 | 4.8                               |
| <b>D</b> | 70                 | 4.8                               |

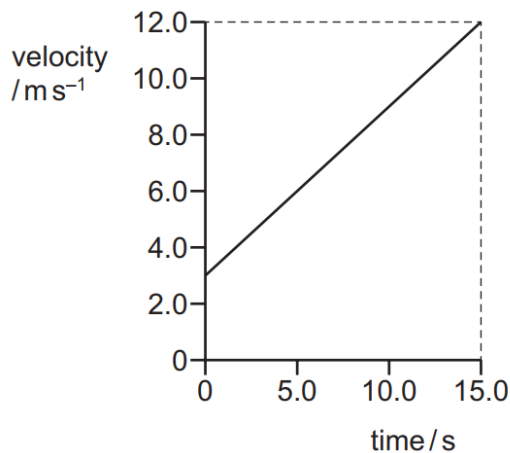
- 8 A skydiver jumps from an aeroplane and falls vertically through the air.

Which graph shows the variation with time  $t$  of the skydiver's vertical velocity  $v$ ?



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- 6 The velocity-time graph for an object of mass 2.5 kg is shown.



What is the resultant force acting on the object?

- A 0.60 N      B 0.80 N      C 1.5 N      D 2.0 N

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- 6 A ball is thrown vertically upwards from ground level and reaches a maximum height of 12.7 m before falling back to ground level.

Assume air resistance is negligible.

What is the total time for which the ball is in the air?

- A 1.61 s      B 3.22 s      C 3.88 s      D 5.18 s

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- 6 A lead sphere is released from rest at point X, a long way above the surface of a planet. The sphere falls in a vacuum. After a time of 4.0 s, it has fallen through a vertical distance of 3.0 m. Assume the acceleration of free fall is constant.

How far will the sphere have fallen from point X at a time of 20 s after its release?

- A 15 m      B 75 m      C 80 m      D 2000 m