Questions 1 and 2 refer to the graph below.

The graph is a displacement-time graph for a runner.
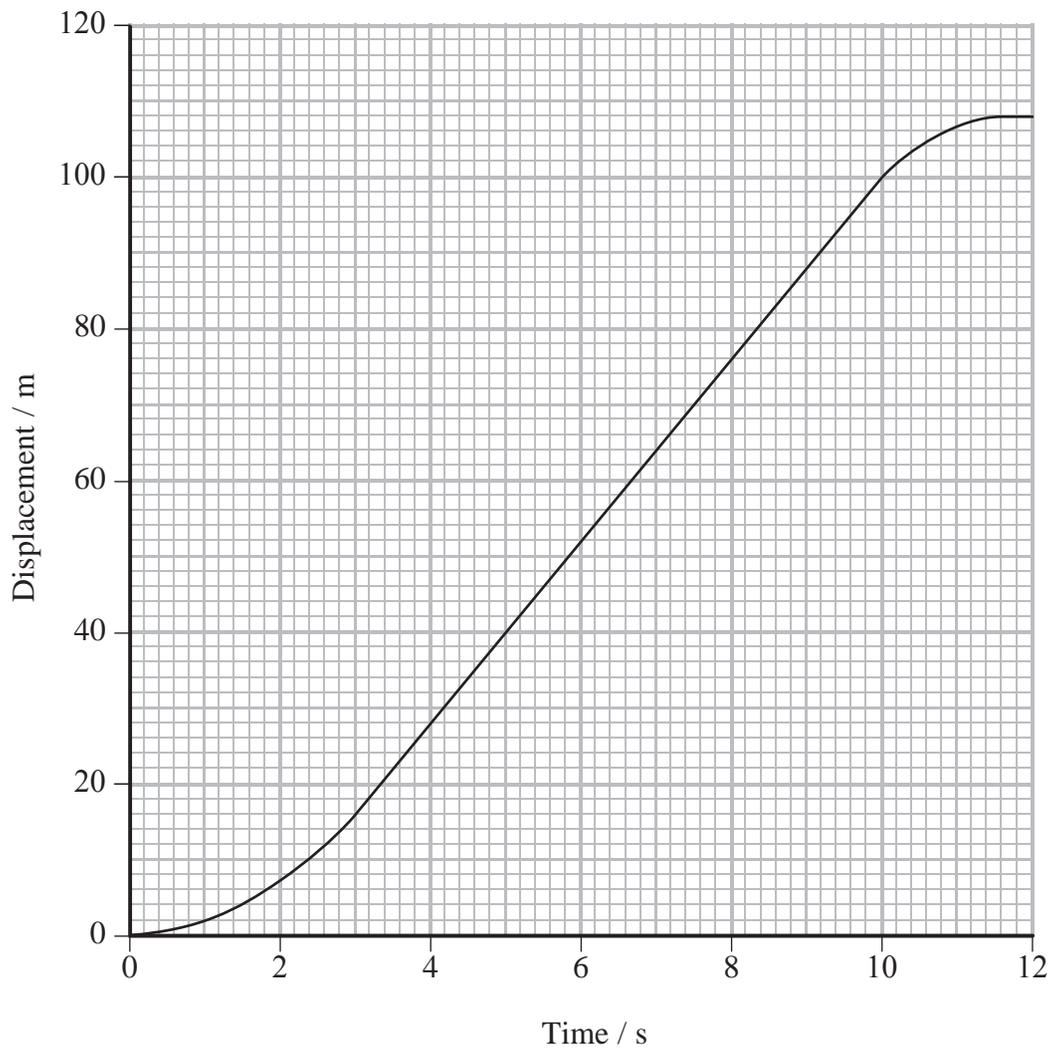
1   The velocity of the runner at 5 s is approximately

☒ **A**   8 m s^{-1}

☒ **B**   9 m s^{-1}

☒ **C**   12 m s^{-1}

☒ **D**   40 m s^{-1}

(Total for Question = 1 mark)

2 The velocity-time graph for the runner over the full 12 s is v

    A   B   C   D

☒ **A**

☒ **B**

☒ **C**

☒ **D**
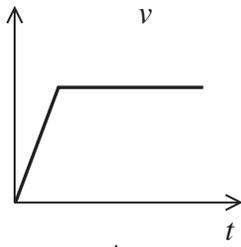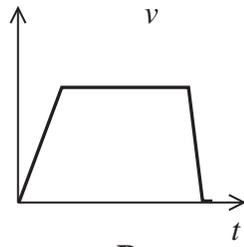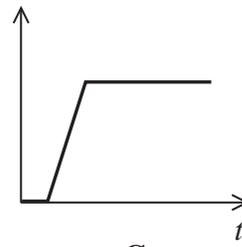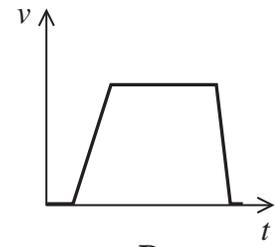
(Total for Question = 1 mark)

3 Which of the following graphs could be the velocity-time graph for the ball?

Velocity

Time

A

Velocity

Time

B

Velocity

Time

C

Velocity

Time

D

☒ **A**

☒ **B**

☒ **C**

☒ **D**
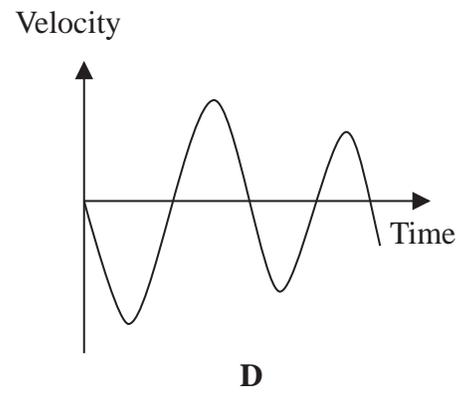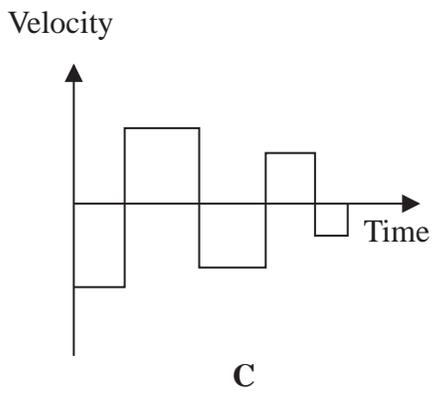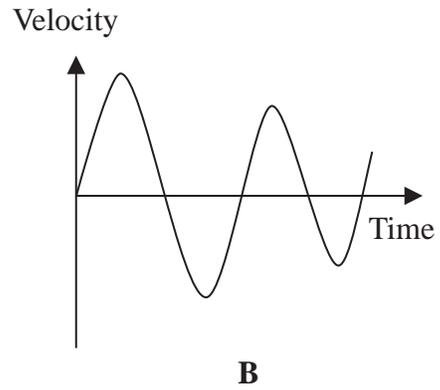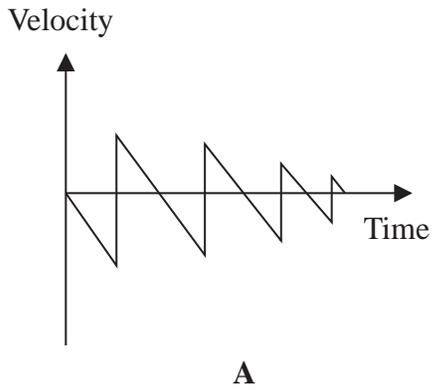
(Total for Question = 1 mark)

4 A ball is rolled along a horizontal surface. Frictional forces slow the ball to rest.

The velocity-time graph for the ball is shown.
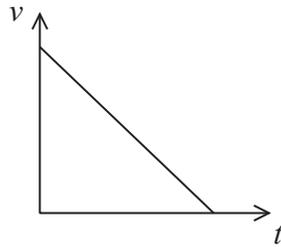
Select the row of the table that correctly gives the corresponding displacement-time and acceleration-time graphs for the ball.

	Displacement-time graph	Acceleration-time graph
☒ **A**		
☒ **B**		
☒ **C**		
☒ **D**		

(Total for Question   1 mark)

5 A projectile is launched at an angle of 45° to the horizontal.

Ignoring air resistance, which pair of graphs correctly shows how the vertical and horizontal components of velocity vary with time for the projectile until it lands?

		Vertical component	**Horizontal component**
☒	**A**	Velocity vs Time (parabolic arch)	Velocity vs Time (horizontal constant line)
☒	**B**	Velocity vs Time (parabolic arch)	Velocity vs Time (upward sloping line)
☒	**C**	Velocity vs Time (downward sloping line crossing axis)	Velocity vs Time (horizontal constant line)
☒	**D**	Velocity vs Time (downward sloping line crossing axis)	Velocity vs Time (upward sloping line)

(Total for Question 4 = 1 mark)

6   The graph shows stress against strain up to the breaking point for two materials X and Y.
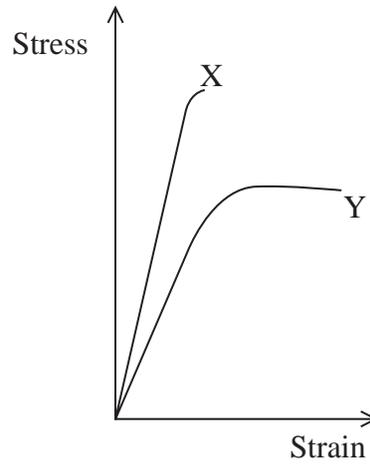
Which row in the table correctly identifies the behaviour of each material?

	X	**Y**
☒ **A**	brittle	ductile
☒ **B**	ductile	brittle
☒ **C**	ductile	hard
☒ **D**	brittle	hard

(Total for Question 5 = 1 mark)

7 A ball of volume V_b and density ρ_b is released in a volume V_l of liquid with density ρ_l.
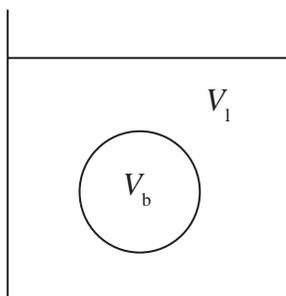
The upthrust on the ball is given by

☒ **A** $V_b \rho_b g$

☒ **B** $V_b \rho_l g$

☒ **C** $V_l \rho_b g$

☒ **D** $V_l \rho_l g$

(Total for Question 6 = 1 mark)

8 Displacement can be found from the

☒   **A** area under a distance-time graph.

☒   **B** area under a velocity-time graph.

☒   **C** gradient of a distance-time graph.

☒   **D** gradient of a velocity-time graph.

(Total for Question   1 mark)

9 Distance travelled can be found from the

☒   **A** area under a velocity-time graph

☒   **B** area under an acceleration-time graph

☒   **C** gradient of a force-time graph

☒   **D** gradient of a velocity-time graph

(Total for Question   = 1 mark)

10 A ball is thrown straight up in the air and caught when it comes down. Which graph best shows the velocity of the ball from the moment it is released until just before it is caught?

Velocity

Time

A

Velocity

Time

B

Velocity

Time

C

Velocity

Time

D
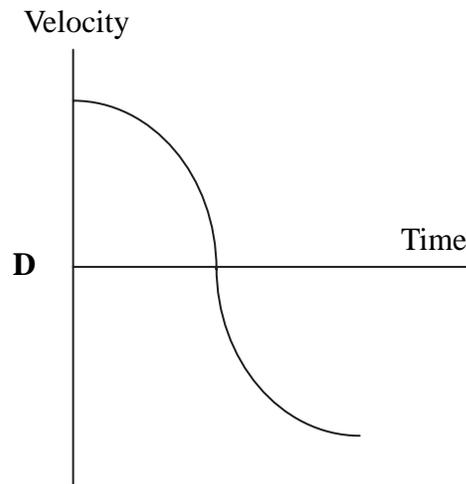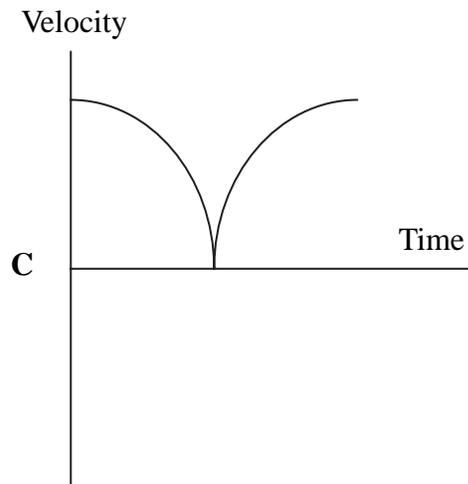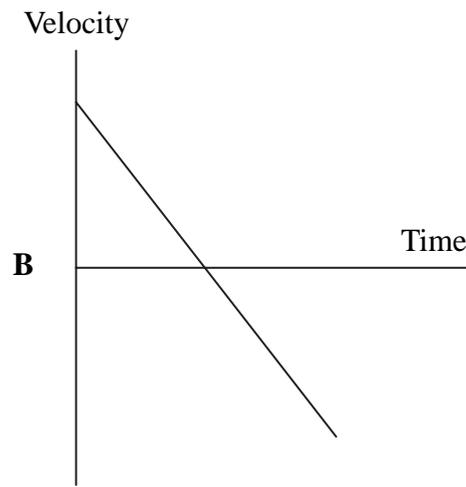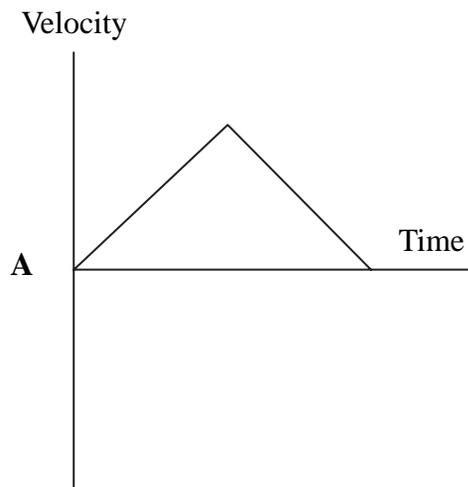
☒ **A**   ☒ **B**   ☒ **C**   ☒ **D**

(Total for Question = 1 mark)

Use the following graph to answer Questions 11 and 12

The graph shows how velocity varies with time for an object.
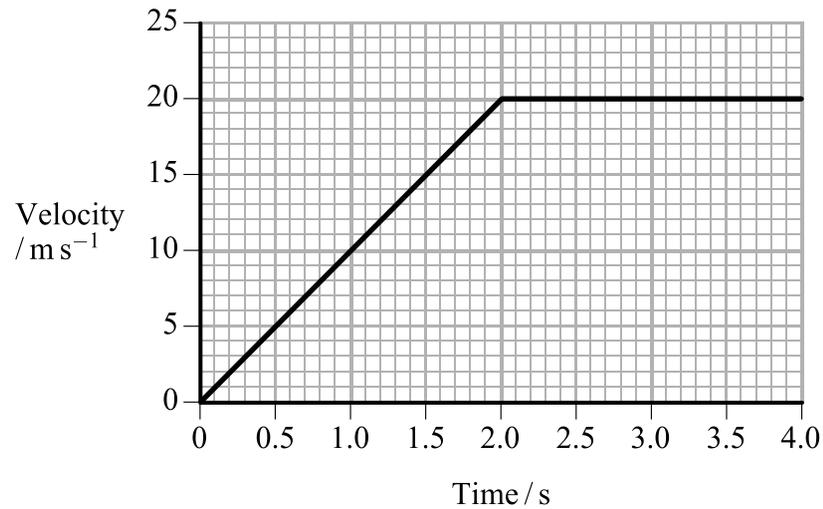
11. The total distance travelled by the object in 4 s is

☒　　**A** 20 m

☒　　**B** 40 m

☒　　**C** 60 m

☒　　**D** 80 m

(Total for Question = 1 mark)

12　The acceleration at 3 s is

☒　　**A** 10 m s^{-2}

☒　　**B** 7 m s^{-2}

☒　　**C** 5 m s^{-2}

☒　　**D** 0 m s^{-2}

(Total for Question = 1 mark)

13 A ball is thrown vertically upwards. It reaches a maximum height, moves downwards and is caught by the thrower at a time *t*.

Which of the following is the kinetic energy-time graph for the ball?

A

B

C

D

☒ **A**

☒ **B**

☒ **C**

☒ **D**
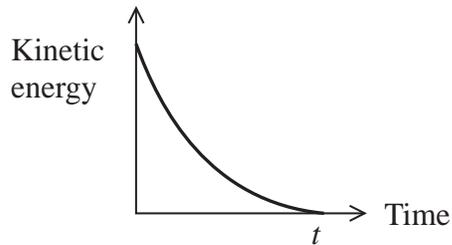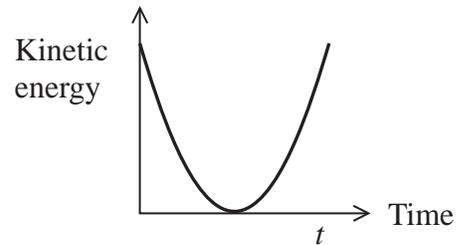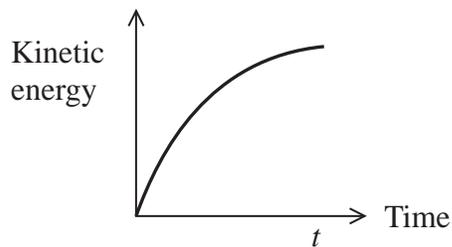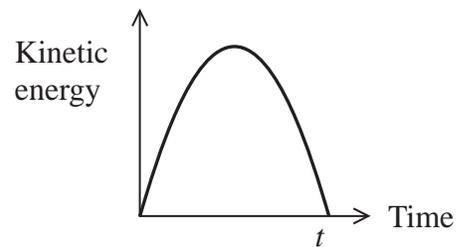
(**Total for Question = 1 mark**)

Questions 14 and 15 refer to the graph below.

The velocity-time graph for an object is shown.
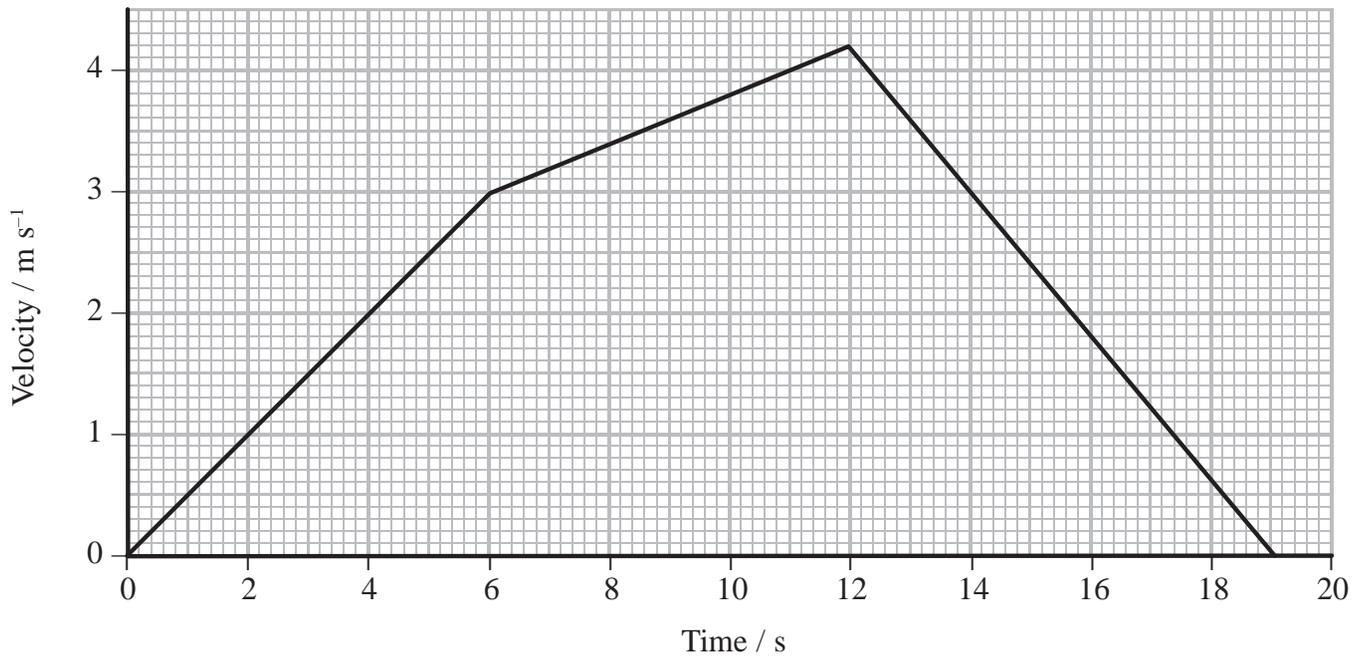
14   The initial acceleration of the object is

☒ **A**   0.40 m s^{-2}

☒ **B**   0.50 m s^{-2}

☒ **C**   2.0 m s^{-2}

☒ **D**   9.0 m s^{-2}

(**Total for Question = 1 mark**)

15   The displacement of the object during the time of deceleration is

☒ **A**   29 m

☒ **B**   –29 m

☒ **C**   15 m

☒ **D**   –15 m

(**Total for Question = 1 mark**)

16 A lift carries people from one floor up to the floor above. Which graph shows how the acceleration of the lift varies with time for the complete journey? Assume that the upward direction is positive.

Acceleration
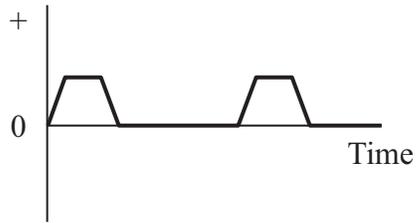
A

Acceleration
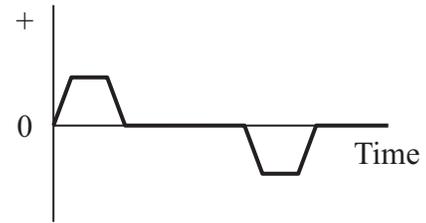
B

Acceleration
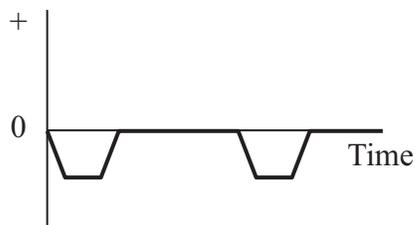
C

Acceleration

D

☒   **A**

☒   **B**

☒   **C**

☒   **D**
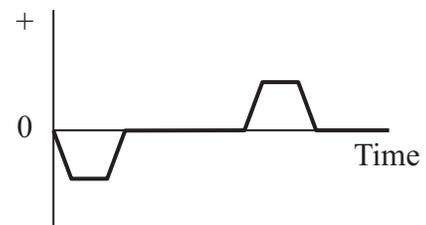
(Total for Question   1 mark)

17 Acceleration can be found from the

⊠   **A** area under a distance-time graph.

⊠   **B** area under a velocity-time graph.

⊠   **C** gradient of a distance-time graph.

⊠   **D** gradient of a velocity-time graph.

(Total for Question   1 mark)

18 Velocity can be found from the

⊠   **A** area under a displacement-time graph

⊠   **B** area under a force-time graph

⊠   **C** gradient of a displacement-time graph

⊠   **D** gradient of an acceleration-time graph

(Total for Question = 1 mark)