A force which increases uniformly from 0 to a maximum value of F is applied to an object. The object does not move until the force exceeds $0.5F$. As the force increases from $0.5F$ to F the object moves a distance x in the direction of the force. What is the work done by this force?

A. $0.25Fx$

B. $0.5Fx$

C. $0.75Fx$

D. Fx

Which of the following is a unit of energy?

A. $\mathrm{kgm^{-1}s^{-1}}$

B. $\mathrm{kgm^{2}s^{-2}}$

C. $\mathrm{kgms^{-2}}$

D. $\mathrm{kgm^{2}s^{-1}}$

The force of air resistance F that acts on a car moving at speed v is given by $F=kv^2$ where k is a constant. What is the unit of k?

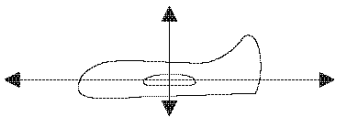
A. $\mathrm{kgm^{-1}}$

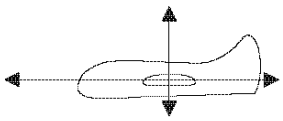
B. $\mathrm{kgm^{-2}s^{2}}$

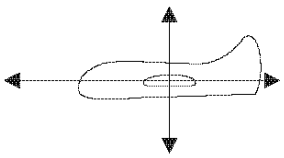
C. $\mathrm{kgm^{-2}}$

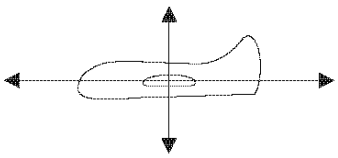
D. $\mathrm{kgm^{-2}s^{-2}}$

A model plane flies with constant velocity at constant height. Which diagram represents the forces acting on the plane?

A. 

B. 

C. 

D. 

The net force on a body is F. The impulse of F is equal to the

A. change in momentum of the body.

B. rate of change of momentum of the body.

C. change of kinetic energy of the body.

D. change of total energy of the body.

In an inelastic collision

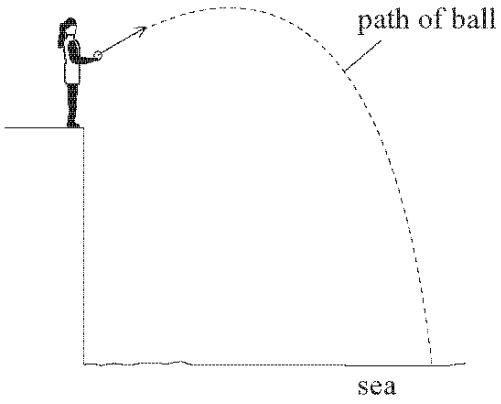
A. momentum and kinetic energy are both conserved.

B. momentum is conserved but kinetic energy is not.

C. kinetic energy is conserved but momentum is not.

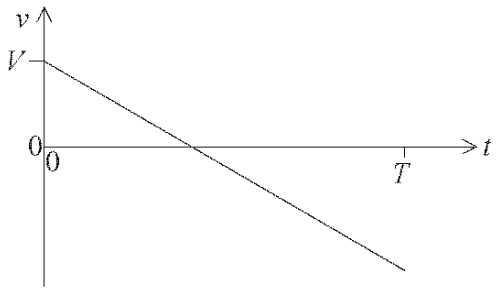
D. neither momentum nor kinetic energy are conserved.

A ball is thrown from the top of a cliff. The initial magnitude of the velocity of the ball at time $t=0$ is V. The ball hits the sea at time $t=T$. Air resistance is negligible.



Which graph shows how the **vertical** component of the velocity v of the ball varies with t as it falls to the sea?

A.



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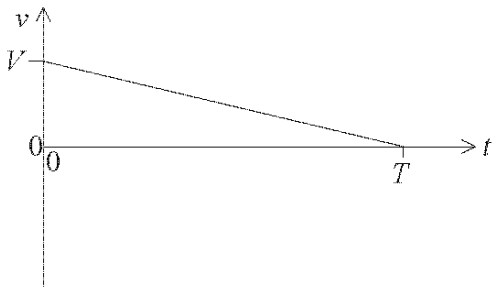
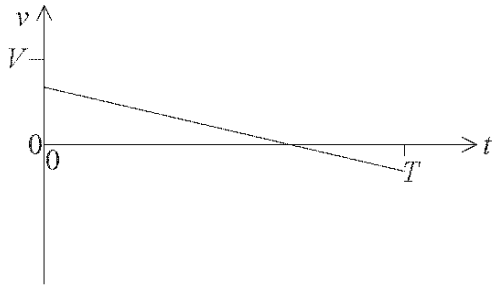
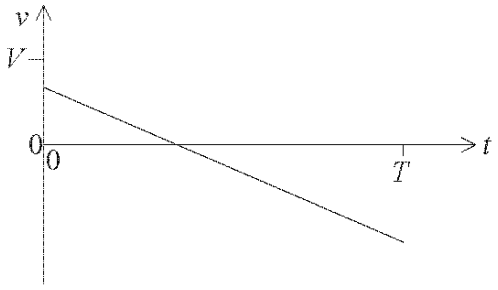


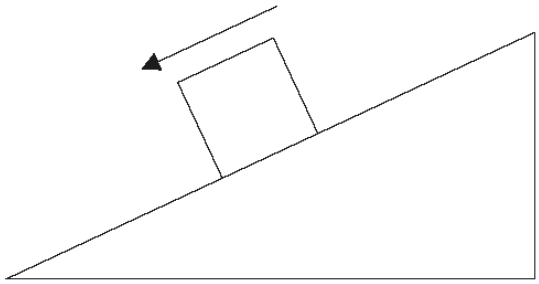
C.



D.

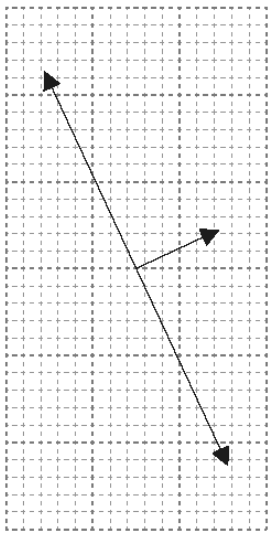


A block slides down an inclined plane at constant speed.

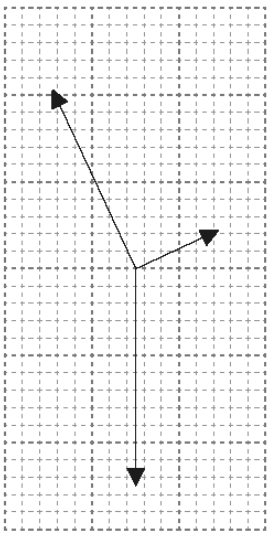


Which diagram represents the free-body diagram of the forces acting on the block?

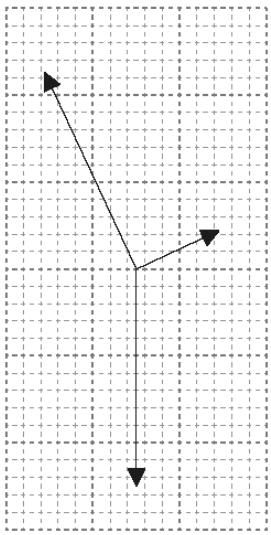
A.



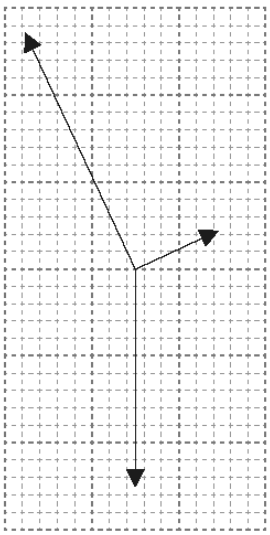
B.



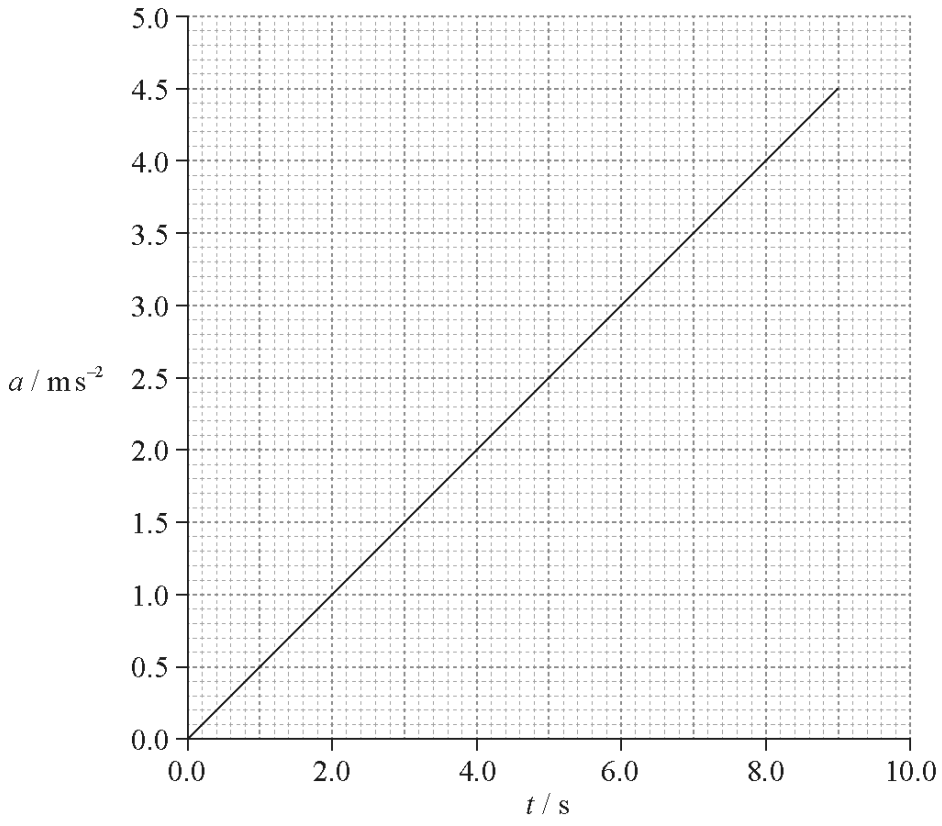
C.



D.



A particle accelerates from rest. The graph shows how the acceleration a of the particle varies with time t.



What is the speed of the particle at $t = 6.0\,\text{s}$?

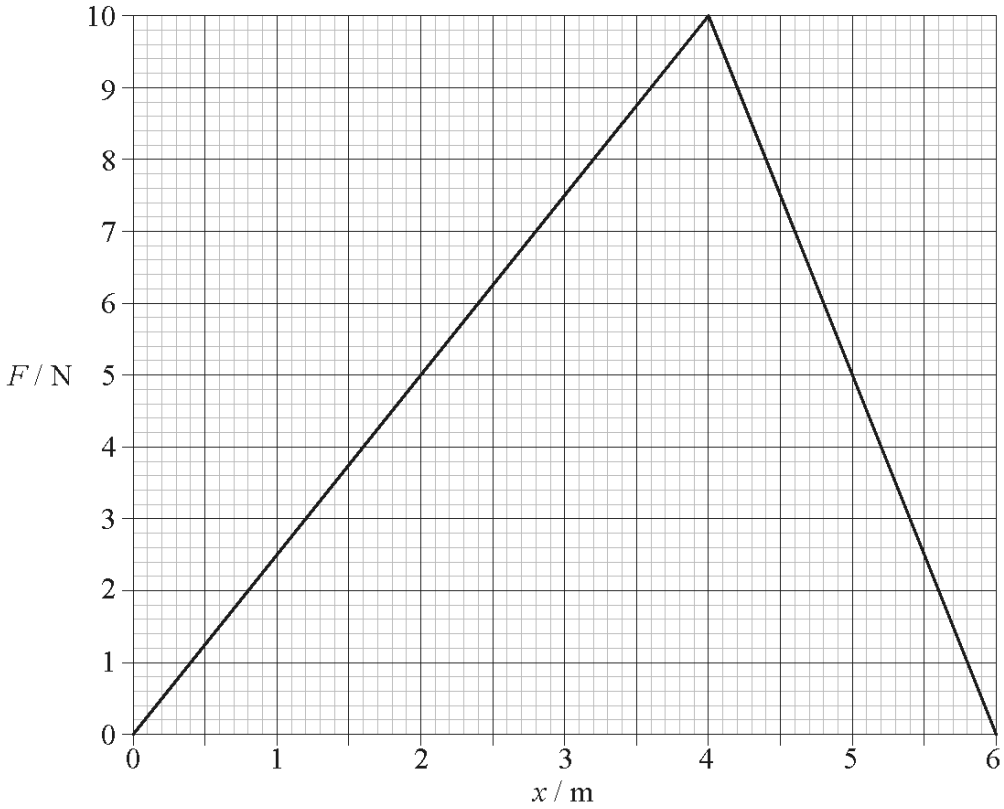
A. $0.5\,\text{m s}^{-1}$

B. $2.0\,\text{m s}^{-1}$

C. $9.0\,\text{m s}^{-1}$

D. $18\,\text{m s}^{-1}$

The graph shows how the net force F that acts on a body varies with the distance x that the body has travelled.



After travelling 6 m, the change in the kinetic energy of the body is

A. 0 J.

B. 20 J.

C. 30 J.

D. 60 J.

In the collision between two bodies, Newton's third law

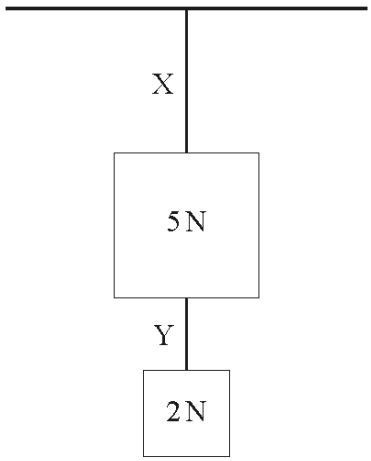
A. only applies if momentum is conserved in the collision.

B. only applies if energy is conserved in the collision.

C. only applies if both momentum and energy are conserved in the collision.

D. always applies.

Two blocks of weight 5 N and 2 N are attached to two ropes, X and Y.



The blocks hang vertically. The mass of the ropes is negligible. What is the tension in X and the tension in Y?

	Tension in X	**Tension in Y**
A.	7 N	7 N
B.	7 N	2 N
C.	5 N	2 N
D.	5 N	3 N

A truck is pulled up an inclined plane at constant speed by an electric motor. The gain in potential energy of the truck is 48 kJ. The efficiency of the electric motor is $\frac{2}{3}$.

How much energy is dissipated in pulling the truck up the plane?

A. 16 kJ

B. 24 kJ

C. 32 kJ

D. 64 kJ