A body moves in a straight line. In order for the equations for uniformly accelerated motion to be applied, which condition **must** be true?

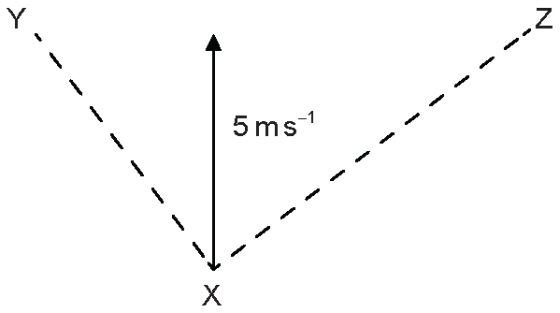
A. A constant net force acts on the body of fixed mass.

B. A constant net force acts on the body.

C. The body falls towards the surface of a planet.

D. The body has an initial velocity of zero.

A velocity of 5 $m\,s^{-1}$ can be resolved along perpendicular directions XY and XZ.



The component of the velocity in the direction XY is of magnitude 4 $m\,s^{-1}$. What is the magnitude of the component in the direction XZ?

A. 4 $m\,s^{-1}$

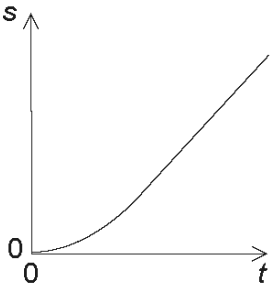
B. 3 $m\,s^{-1}$

C. 2 $m\,s^{-1}$

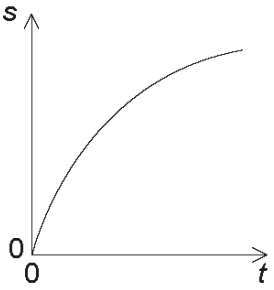
D. 1 $m\,s^{-1}$

A tennis ball is dropped from the top of a tall building. Air resistance is **not** negligible. Which graph shows the variation with time *t* of the displacement *s* of the ball?

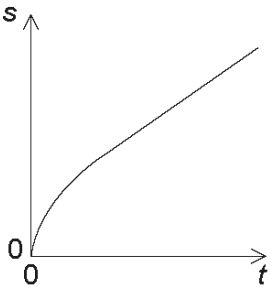
A.



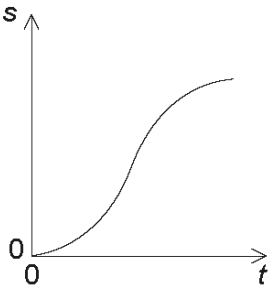
B.



C.



D.



Which of the following is a condition for an object to be in translational equilibrium?

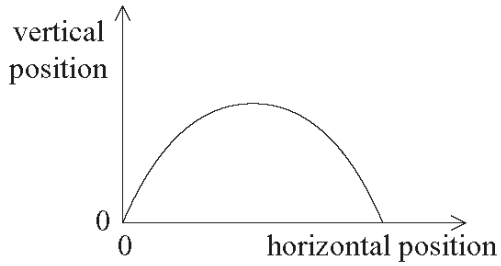
A. The object must be moving at constant speed.

B. The velocity of the object in any direction must be zero.

C. The forces acting horizontally on the object must equal the forces acting vertically on the object.

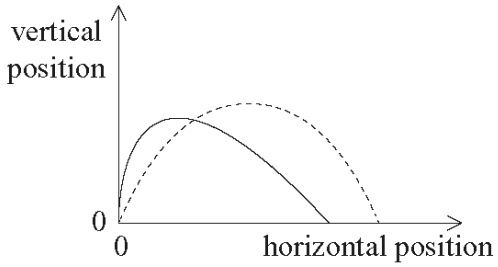
D. The resultant force acting on the object must be zero.

The diagram shows the trajectory of an object projected in the absence of air resistance.

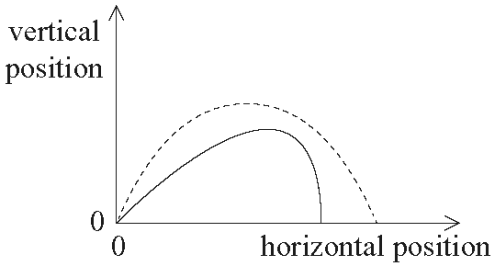


The object is then projected with the same initial conditions but air resistance is taken into account. Which of the following is the trajectory when air resistance is taken into account? The original trajectory is shown as a dotted line.

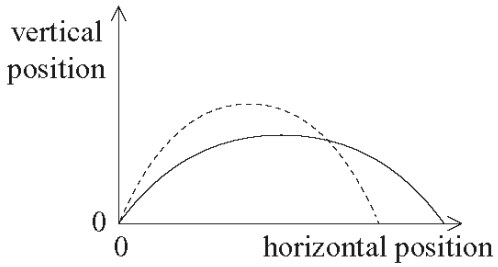
A.



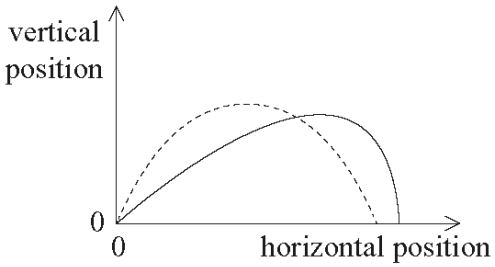
B.



C.



D.



A metal sphere is at rest on a bench. According to Newton's third law of motion, what is a possible action-reaction pair for this situation?

	Action	Reaction
A.	downwards gravitational force of Earth on the sphere	upwards gravitational force of the sphere on Earth
B.	upwards gravitational force of Earth on the sphere	downwards gravitational force of the sphere on Earth
C.	upwards electrostatic force acting on the sphere due to the atoms in the bench surface	upwards gravitational force of the sphere on Earth
D.	upwards electrostatic force acting on the sphere due to the atoms in the bench surface	downwards gravitational force of the sphere on Earth

An object of mass m_1 has a kinetic energy E_1. Another object has a mass m_2 and kinetic energy E_2. The objects have the same momentum. What is the ratio $\frac{E_1}{E_2}$?

A. 1

B. $\sqrt{\frac{m_2}{m_1}}$

C. $\frac{m_2}{m_1}$

D. $\left(\frac{m_2}{m_1}\right)^2$

No external forces act on a given system during an inelastic collision. For this system, which is correct about the conservation of kinetic energy and the conservation of linear momentum?

	Kinetic energy	Linear momentum
A.	must be conserved	may be conserved
B.	must be conserved	must be conserved
C.	is not conserved	may be conserved
D.	is not conserved	must be conserved

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.

A constant force of 12 N is applied for 3.0 s to a body initially at rest. The final velocity of the body is $6.0\,\text{m s}^{-1}$. What is the mass of the body?

A. 1.5 kg

B. 6.0 kg

C. 24 kg

D. 36 kg

A projectile is fired from level ground with speed v at an angle θ to the ground. Ignoring air resistance, which of the following is a correct expression for the maximum height reached by the projectile?

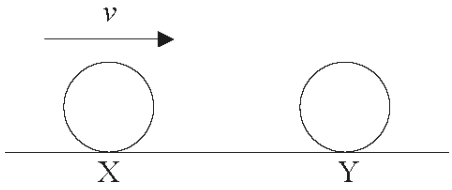
A. $\dfrac{v^2 \sin^2 \theta}{2g}$

B. $\dfrac{v^2 \cos^2 \theta}{2g}$

C. $\dfrac{v \sin \theta}{g}$

D. $\dfrac{v \cos \theta}{g}$

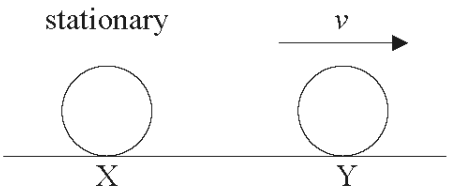
A ball X moving horizontally collides with an identical ball Y that is at rest.



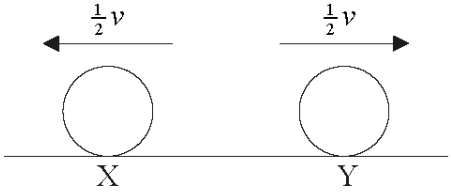
X strikes Y with speed v.

What is a possible outcome of the collision?

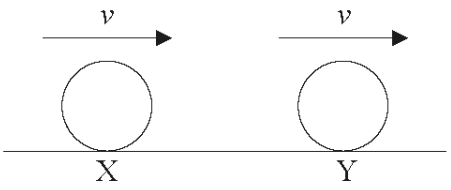
A.



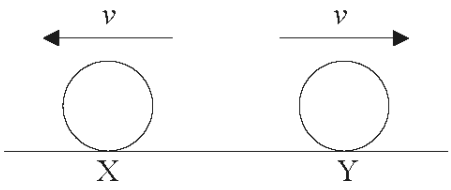
B.



C.



D.



A cart of mass 4.0 kg is being pulled with a force of 24 N. The cart accelerates at 3.0 m s^{-2}. What is the net force on the cart?

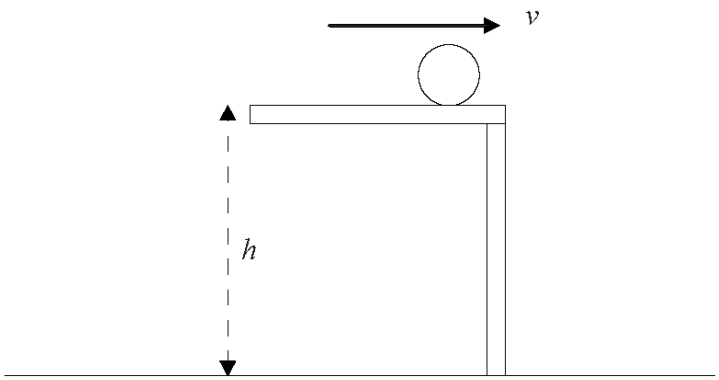
A. 6.0 N

B. 8.0 N

C. 12 N

D. 24 N

A ball of mass m is projected horizontally with speed v from a height h above the floor. Air resistance is negligible.



The horizontal distance travelled by the ball to the point where it lands on the floor depends on

A. m and h only.

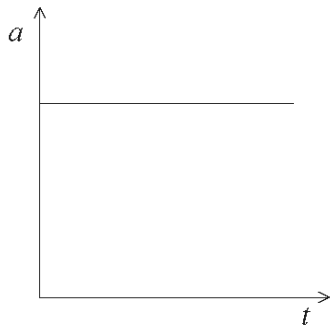
B. m and v only.

C. h and v only.

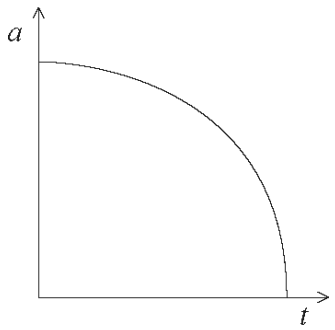
D. m, h and v.

An object is dropped from rest above the Earth's surface. Air resistance acts on the object. What is the variation of acceleration a with time t for the object?

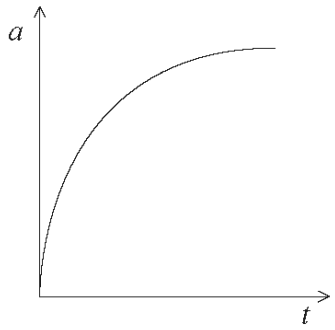
A.



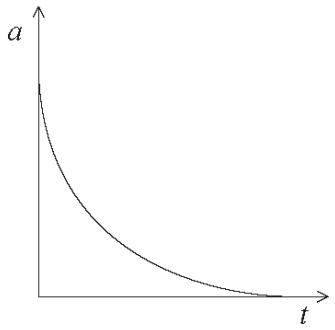
B.



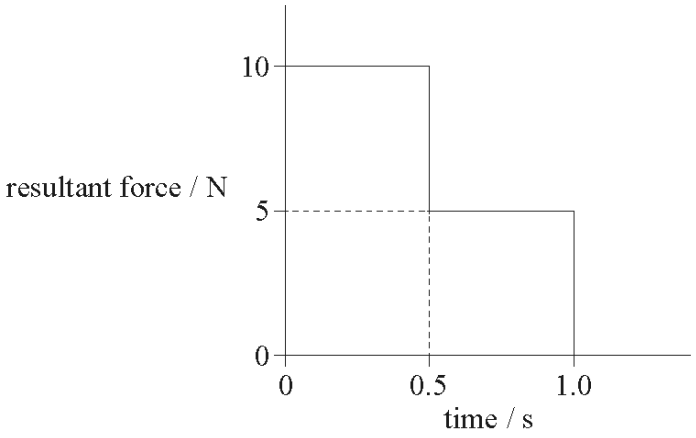
C.



D.



The resultant force acting on an object of mass 5.0 kg varies with time as shown. The object is initially at rest.



What is the speed of the object after 1.0 s?

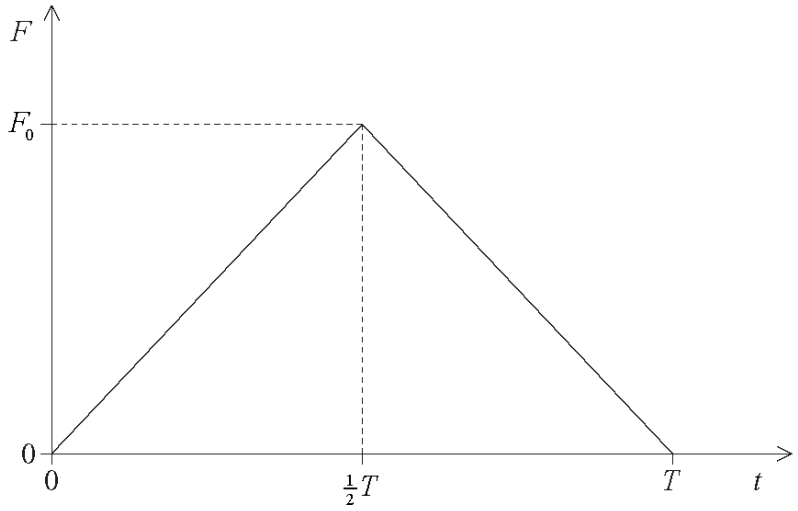
A. $0.50\,m\,s^{-1}$

B. $1.0\,m\,s^{-1}$

C. $1.5\,m\,s^{-1}$

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

A ball is moving horizontally and strikes a vertical wall from which it rebounds horizontally. The sketch graph shows how the contact force F between ball and wall varies with time of contact t.



The maximum value of F is F_0 and the total time of contact between ball and wall is T.

What is the change in momentum of the ball?

A. $\frac{F_0 T}{2}$

B. $F_0 T$

C. $\frac{F_0}{2T}$

D. $\frac{F_0}{T}$