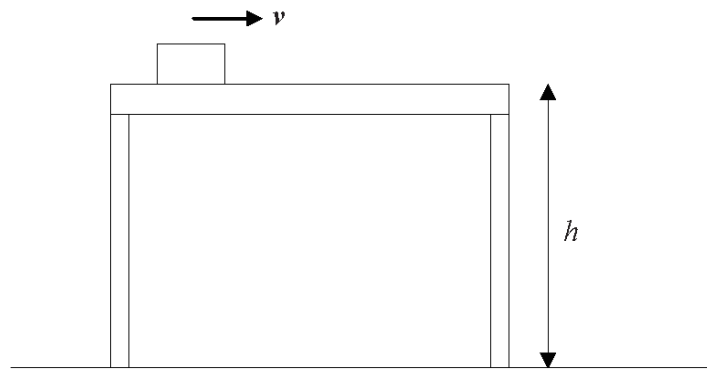The momentum of a particle stays constant provided that

A.   it moves in a circle with constant speed.

B.   its acceleration is uniform.

C.   the net internal force acting on it is zero.

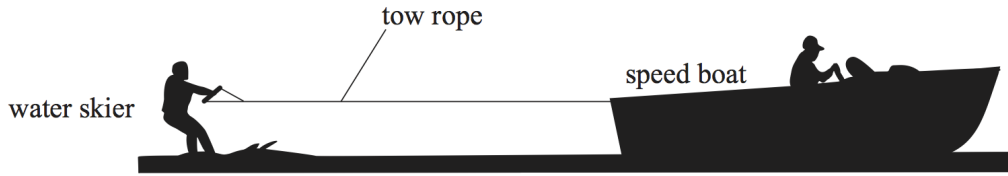D.   the net external force acting on it is zero.

A block of mass m is moving at constant velocity v along a frictionless surface that is height h above the ground.

Which expression gives the work necessary to maintain the constant velocity?

A. mgh

B. $\dfrac{1}{2}mv^2$

C. $mgh + \dfrac{1}{2}mv^2$

D.   zero

A speed boat tows a water skier so that the skier accelerates.

The magnitude of the force exerted on the skier by the tow rope must be

    I.   greater than the magnitude of the total resistive force acting on the skier

    II.   equal to the magnitude of the force exerted on the tow rope by the skier

    III.   equal to the magnitude of the force causing the boat to accelerate.

Which of the above factors is/are correct?

A.   I and II only

B.   I and III only

C.   II only

D.   III only

A ball is released at time $t=0$ above a horizontal surface. The graph shows the variation of velocity v with time. Which of the following shows the highest point of the ball after one bounce?
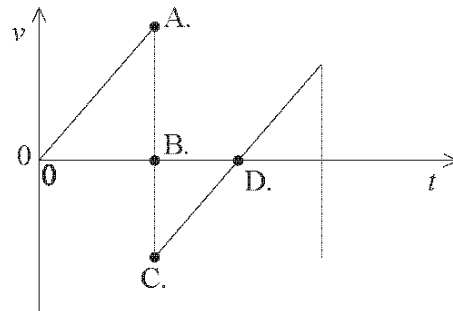
Two identical balls are dropped from a tall building, one a few seconds after the other. Air resistance is **not** negligible. As the balls fall, the distance between the balls will

A.   decrease.

B.   increase.

C.   increase then remain constant.

D.   remain constant.

A driving force F acts on a car which moves with constant velocity v. The quantity Fv is equivalent to the

A.   useful power developed by the engine of the car.

B.   work done by the car against resistive forces.

C.   energy of the car.

D.   rate of change of momentum of the car.

A ball is thrown with velocity u at an angle of 55° above the horizontal. Which of the following is the magnitude of the horizontal component of velocity?

A. $u \cos 55°$

B. $u \sin 55°$

C. u

D. $u \tan 55°$

Three coplanar forces of 5 N, 6 N and 7 N act on an object. Which force could **not** be the resultant of these three forces?

A.   0 N

B.   11 N

C.   13 N

D.   19 N

A block rests on a plane inclined at an angle θ to the horizontal. Which of the following gives the relationships for the normal reaction N and the frictional force F with the weight W?
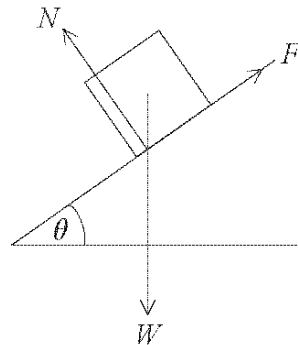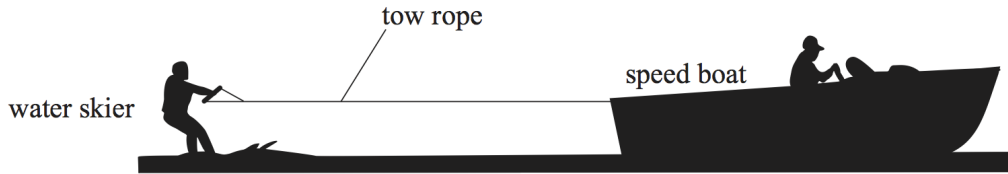

	N	F
A.	$W\sin\theta$	$W\sin\theta$
B.	$W\sin\theta$	$W\cos\theta$
C.	$W\cos\theta$	$W\sin\theta$
D.	$W\cos\theta$	$W\cos\theta$

An astronaut of mass 60 kg is on board the International Space Station, which is in low orbit around the Earth. The gravitational force of attraction between the Earth and astronaut is approximately

A. zero.

B. 6 N.

C. 60 N.

D. 600 N.

A speed boat tows a water skier so that the skier accelerates.


The magnitude of the force exerted on the skier by the tow rope must be

    I.   greater than the magnitude of the total resistive force acting on the skier

    II.   equal to the magnitude of the force exerted on the tow rope by the skier

    III.   equal to the magnitude of the force causing the boat to accelerate.

Which of the above factors is/are correct?

A.   I and II only

B.   I and III only

C.   II only

D.   III only

Balls X and Y are at the same height. X is projected horizontally at the same time that Y is dropped. Y is the same size as X but has half its mass.
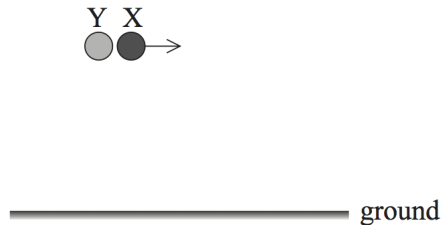
ground

Ignoring air resistance, which statement is **true**?

A.   Y will hit the ground before X.

B.   Y will hit the ground after X.

C.   Y will hit the ground at the same time as X.

D.   The outcome can only be determined if the initial speed of X is known.

A ball of mass m travels horizontally with speed v before colliding with a vertical wall. The ball rebounds at speed v in a direction opposite to its initial direction. What is the magnitude of the change in momentum of the ball?

A.   0

B. $\dfrac{mv}{2}$

C. mv

D. $2mv$

What is the correct SI unit for momentum?

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

B. $\mathrm{kg\,m^{2}\,s^{-1}}$

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

D. $\mathrm{kg\,m\,s^{-2}}$

An object is thrown upwards leaving the thrower's hand at time $t=0$. Which graph shows how speed v varies with t as the object rises and falls?

A.

B.

C.

D.
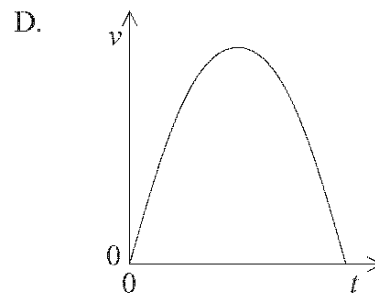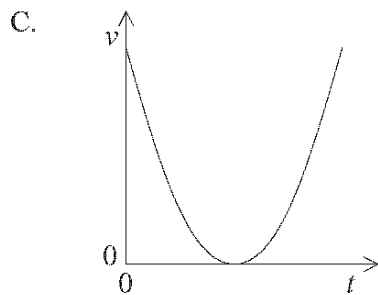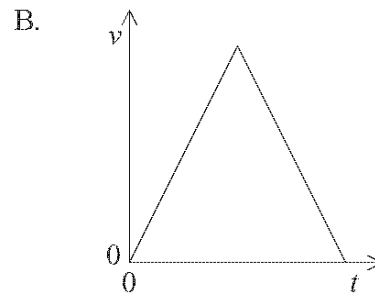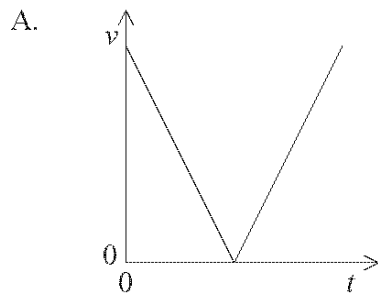
A gun fires a bullet of mass m at a horizontal velocity of v. Air resistance on the bullet is negligible. A change in which of the following will affect the time for the bullet to hit the ground?

A. m only

B. v only

C. m and v

D.   neither m nor v

Which of the following is an elastic collision?

A.   Two railway trucks collide and they link together.

B.   Two railway trucks collide and they do not link together.

C.   Two gas molecules collide and each changes direction.

D.   Two gas molecules collide and a bond is formed between them.