NEWTON AND VERTICAL PROJECTILE MOTION MULTIPLE CHOICE QUESTIONS

1. The net force acting on an object is directly proportional to the ...

    A   mass of the object.

    B   acceleration of the object.

    C   change in momentum of the object.

    D   rate of change in momentum of the object.

2. A ball is thrown vertically upwards. Which ONE of the following physical quantities has a non-zero value at the instant the ball changes direction?

    A   Acceleration

    B   Kinetic energy

    C   Momentum

    D   Velocity

3. Which ONE of the following physical quantities is a measure of the inertia of a body?

    A   Mass

    B   Energy

    C   Velocity

    D   Acceleration

4. The magnitude of the gravitational force exerted by one body on another body is **F**. When the distance between the centres of the two bodies is doubled, the magnitude of the gravitational force, in terms of **F**, will now be ...

    A $\frac{1}{4}F$

    B $\frac{1}{2}F$

    C   2**F**

    D   4**F**

5. An object is thrown vertically upwards. Which ONE of the following regarding the object's velocity and acceleration at the highest point of its motion is CORRECT? Ignore the effects of friction.

	VELOCITY	ACCELERATION
A	Zero	Zero
B	Zero	Upwards
C	Maximum	Zero
D	Zero	Downwards

6. A student throws a tennis ball vertically upwards into the air. She catches the ball 10 s later at the same height from which she threw it. Which ONE of the following statements is INCORRECT with regards to the above situation?

A   The velocity of the ball decreases as it moves upwards.
B   The velocity of the ball is zero when it reaches its maximum height.
C   The ball returns to the student's hands with the same speed with which she threw the ball upwards.
D   The acceleration of the ball as it goes upwards is equal to the acceleration of the ball as it falls downwards but in the opposite direction.

7. A spacecraft of mass M is moving in free space with a velocity v when it explodes and breaks into two parts. After the explosion, a portion of the spacecraft with mass m is left stationary. Which ONE of the expressions below gives the velocity of the portion that is motion?

A $\dfrac{Mv}{(M+m)}$

B $\dfrac{Mv}{(M-m)}$

C $\dfrac{(M+m)v}{M}$

D $\dfrac{Mv}{m}$

8. A rocket of mass M, experiences a gravitational force F on the surface of the Earth, which has a radius R. The rocket blasts off to a distance R, vertically above the surface of the Earth, where its mass is now ¾ M.
The gravitational force it experiences at this height is . . .

A   F
B   3 F
C   ¾ F
D   3/16 F

9. Which ONE of the following forces always acts perpendicular to the surface on which a body is placed?

    A   Normal force

    B   Frictional force

    C   Gravitational force

    D   Tension force

10. Two isolated bodies, **A** and **B**, having masses m and $2m$ respectively, are placed a distance r apart.
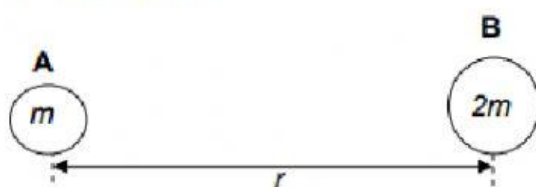
    Consider the following statements regarding the gravitational force exerted by the bodies on each other.

    (i)   The force exerted by **B** on body **A** is half that exerted by **A** on body **B**.

    (ii) The force exerted on the bodies is independent of the masses of the bodies.

    (iii) The force exerted on body **A** by **B** is equal but opposite to that exerted on body **B** by **A**.

    (iv) The forces will always be attractive.

    Which of the statements above is/are TRUE?

    A   (i), (ii) and (iv) only

    B   (ii), (iii) and (iv) only

    C   (iii) and (iv) only

    D   (iv) only

11. A ball is released from a height above the floor. The ball falls vertically and bounces off the floor a number of times. Ignore the effects of friction and assume that the collision of the ball with the floor is elastic. Take the point of release of the ball as the reference point and downward direction as positive.

    Which ONE of the following is a CORRECT representation of the position-time graph for the motion of the ball?

A

position

0

time

B

position

0

time

C

position

0

time

D

position

0

time
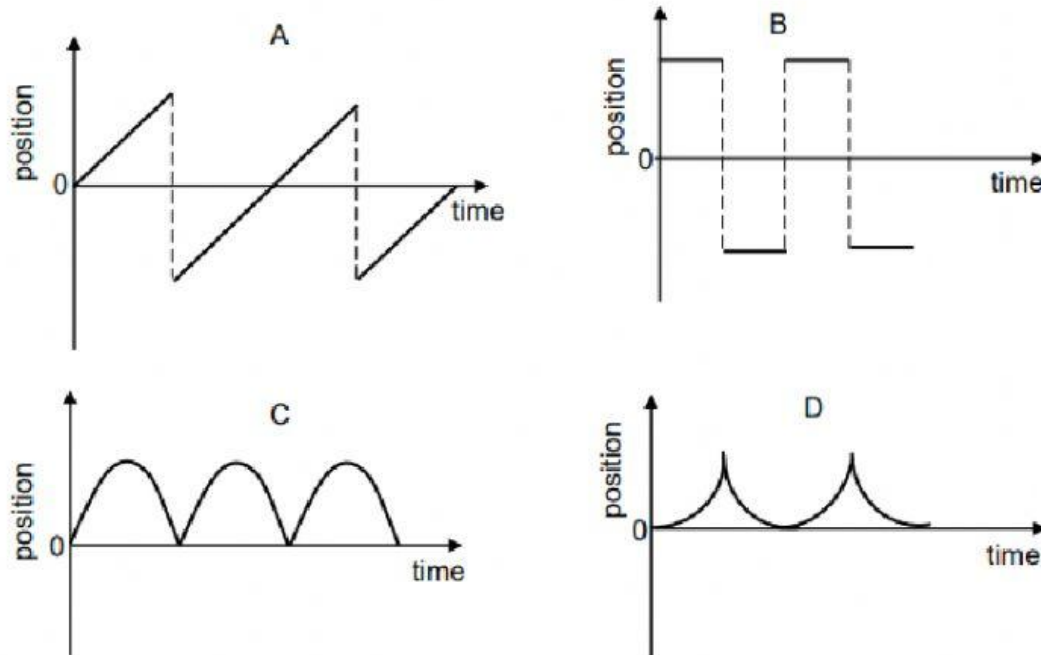
12. Two forces, F_1 and F_2, are applied on a crate lying on a frictionless, horizontal surface, as shown in the diagram below.

The magnitude of force F_1 is greater than that of force F_2.

F_1

F_2

N

W ← → E

S
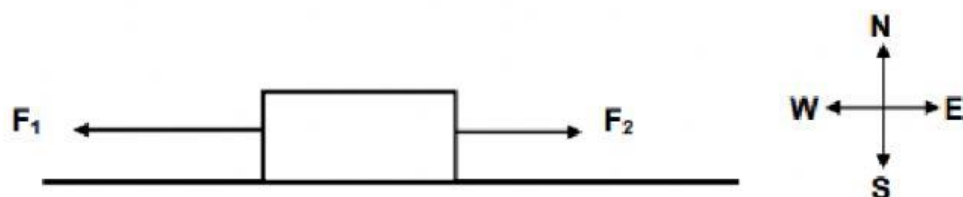
The crate will …

A   accelerate towards the east.

B   accelerate towards the west.

C   move at a constant speed towards the east.

D   move at a constant speed towards the west.

13. A person stands on a bathroom scale that is calibrated in newton, in a stationary elevator. The reading on the bathroom scale is W.

The elevator now moves with a constant upward acceleration of $\frac{1}{4}g$, where g is the gravitational acceleration.

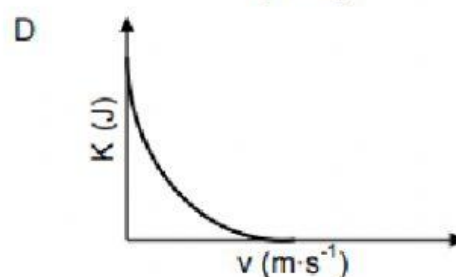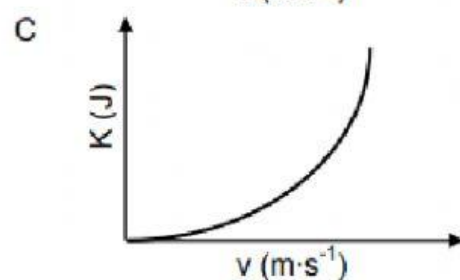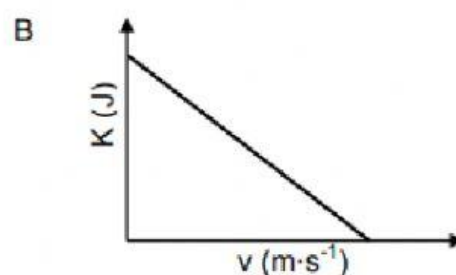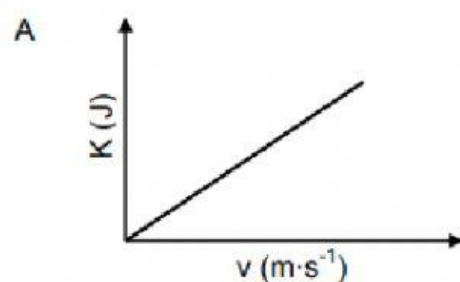What will the reading on the bathroom scale be now?

A $\frac{1}{4}$W

B $\frac{3}{4}$W

C   W

D $\frac{5}{4}$W

14. Which ONE of the graphs below correctly represents the relationship between the kinetic energy (K) of a free-falling object and its speed (v)?


15. A truck of mass *2m* collides with a car of mass *m*. If the truck exerts a force of magnitude *F* on the car during the collision, then the magnitude of the force that the car exerts on the truck is ...

A   0
B   ½F.
C   F.
D   2F.

16. A net force **F** which acts on a body of mass *m* causes an acceleration *a*. If the same net force **F** is applied to a body of mass *2m*, the acceleration of the body will be ...

A   ¼a

B   ½a

C   2a

D   4a

17. A ball is thrown vertically upwards and then falls back below its original position. Which **ONE** of the following velocity-time graphs best represents the motion of the ball?

A

B

C

D
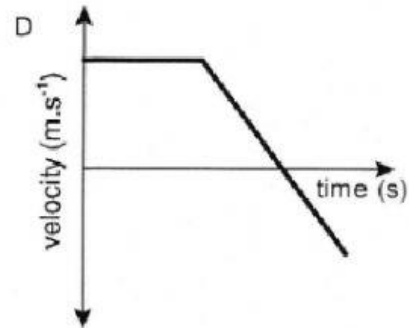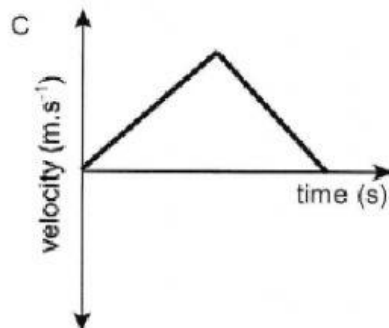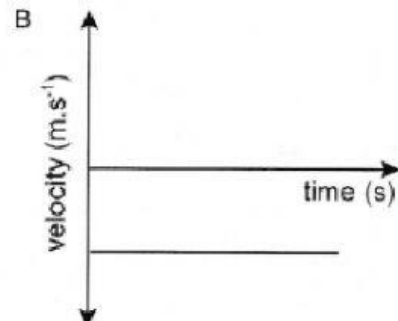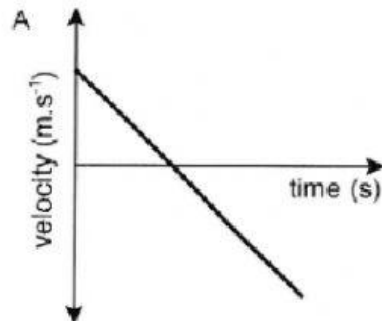
18. Two objects of masses $2m$ and m are arranged as shown in the diagram below.
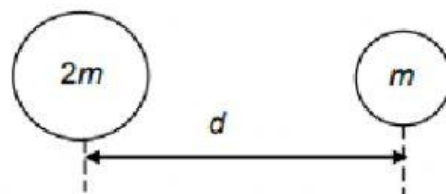
Which ONE of the changes below will produce the GREATEST increase in the gravitational force exerted by the one mass on the other?

A Double the larger mass.

B Halve the smaller mass.

C Double the distance between the masses.

D Halve the distance between the masses.

19. The statements below describe the motion of objects.

    (i)   A feather falls from a certain height inside a vacuum tube.

    (ii)   A box slides along a smooth horizontal surface at constant speed.

    (iii)   A steel ball falls through the air in the absence of air friction.

Which of the following describes UNIFORMLY ACCELERATED motion CORRECTLY?

A   (i) and (ii) only

B   (i) and (iii) only

C   (ii) and (iii) only

D   (i), (ii) and (iii)

20. The tendency of an object to remain at rest or to continue in its uniform motion in a straight line is known as …

A   inertia.

B   acceleration.

C   Newton's Third Law.

D   Newton's Second Law.

21. The mass of an astronaut on Earth is M. At a height equal to twice the radius of the Earth, the **mass** of the astronaut will be …

A $\frac{1}{4}$M

B $\frac{1}{9}$M

C   M

D   2M