

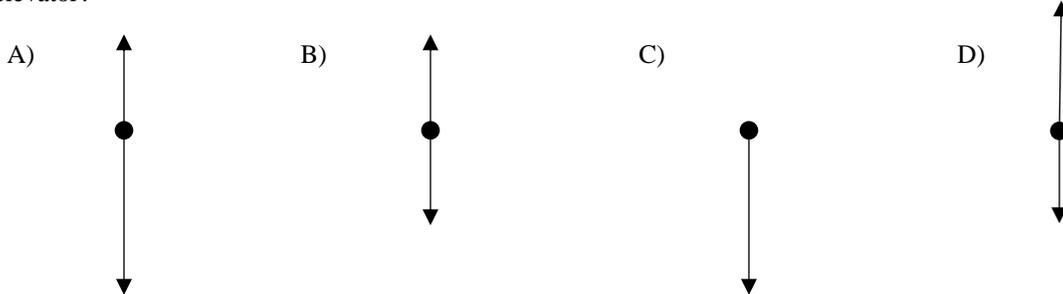
Physics 112
FA: U2S2 - Newton's Laws of Motion #1 (A2018)

Name - _____

Part 1 – Multiple Choice (Value – 14)

Choose the letter of the best answer and print the letter on the line provided.

- ___ 1. A measure of inertia is
A) weight
B) mass
C) velocity
D) force
- ___ 2. A newton, the SI unit of force, can be expressed as
A) kgm/s^2
B) kg/ms^2
C) kg^2/m
D) kgm^2/s^2
- ___ 3. Action-reaction forces
A) sometimes act on the same object.
B) always act on the same object.
C) may be at right angles.
D) always act on different objects.
- ___ 4. A passenger standing in a moving bus facing forward suddenly falls forward. This can be an indication of which of the following?
A) The bus speeds up.
B) The bus doesn't change its velocity.
C) The bus slows down.
D) The bus turns to the right.
- ___ 5. An elevator moves downward at a constant speed. Which of the following is an appropriate FBD for the elevator?



- ___ 6. According to Newton's second law of motion, acceleration is directly proportional to net force. This means that a larger force
A) produces a smaller acceleration.
B) doesn't affect acceleration.
C) produces a larger acceleration.
D) produces a smaller mass.

- ___ 7. Which of Newton's laws best explains why motorists should buckle-up?
A) the first law
B) the second law
C) the third law
D) the law of gravitation
- ___ 8. Mass and weight
A) both measure the same thing.
B) are two different quantities.
C) are exactly equal.
D) are both measured in kilograms.
- ___ 9. What can you say about the forces acting on a pencil at rest on your desk?
A) There are no forces acting on the pencil.
B) $\vec{N} = \vec{W}$
C) $N > W$
D) $N = W$
- ___ 10. A person walking on a level surface moves forward because of
A) his feet pushing forward on the ground.
B) his feet pushing backward on the ground.
C) the ground pushing forward on his feet.
D) the ground pushing backward on his feet.
- ___ 11. In the absence of a net force, a moving object will
A) stop immediately.
B) slow down and eventually come to a stop.
C) go faster and faster.
D) move with constant velocity.
- ___ 12. A net force F accelerates a mass m with an acceleration a . If the same net force is applied to mass $2m$, then the acceleration will be
A) $a/2$.
B) $4a$.
C) $2a$.
D) $a/4$.
- ___ 13. A child's toy is suspended from the ceiling by means of a string. The Earth pulls downward on the toy with a force with a magnitude of 8.0 N. If this is the "action force," what is the "reaction force"?
A) The string pulling up on the toy with an 8.0 N force.
B) The toy pulling up on the Earth with an 8.0 N force.
C) The ceiling pulling up on the string with an 8.0 N force.
D) The string pulling down on the ceiling with an 8.0 N force.
- ___ 14. Which of the following indicates that an object has been subjected to an unbalanced force?
A) the object speeds up
B) the object slows down
C) the object changes direction
D) all of the above

Part 2 – Problems (Value – 37)

Solve the problems on your own loose leaf. Show your work.

1. A motorcycle and its rider are moving at 12.0 m/s [W]. A force of 1.55×10^3 N [W] accelerates the motorcycle and rider uniformly for 2.98s. In this time, they travel a distance of 63.0 m. What is the combined mass of the rider and her motorcycle? (9)
2. You want to move a 38 kg steel crate across a steel floor. What is the magnitude and direction of the force with which you must push to start the crate moving if the crate is to be moved to the left? Include an FBD for the crate just before it starts to move. (8)

Note:

| Surfaces | μ_s | μ_k |
|-----------------|---------------------------|---------------------------|
| Steel on steel | 0.15 | 0.060 |

3. A force of 165 N is applied to a box to drag it across a rough wooden floor. If the box accelerates at a rate of 3.45 m/s^2 and the coefficient of friction between the box and floor is 0.49, what is the mass of the box? Include a labeled FBD for the box. (10)
4. You are traveling in your car at a velocity of 24.0 m/s east when you slam on your brakes. You skid 29.7 m before stopping. What is the coefficient of friction between your car tires and the road? Include an FBD for your car while it's skidding. (10)