8th UNIT 2 TEST REVIEW   Name _____   Date _____

1. Using yourself as a reference point, how can you tell if another object is in motion? (Hint – use the definition of motion!).

If I am the reference point I can tell if an object is in motion by being able to see if its distance from me is changing.

2. Using yourself as a reference point, where would you need to be in order for the Earth to be in motion?

On the sun would be a good spot since it is stationary in reference to the earth.

3. To your point of view, is an object on your lap, while you are sitting in a moving car, in motion? Explain!
No, the object is not in motion from my reference point because it is not changing its distance from me; the object and I are both moving at the same speed – the speed of the car.

For all problems you must show the formula with units, your work and correct units. <u>Circle</u> *your final answer.*

Speed = distance / time   Distance = speed x time   Time = distance / speed

4. You arrive in my class 45 seconds after leaving math, which is a distance of 20 m east. What is your **velocity**?

V = 20m/45s = .4 m/s EAST

5. You need to get to class, 90 meters away, and you can only walk in the hallways at about 1.5 m/s. How much **time** will it take to get to your class?

Time = 90 m$/$1.5m/s
= 60 s
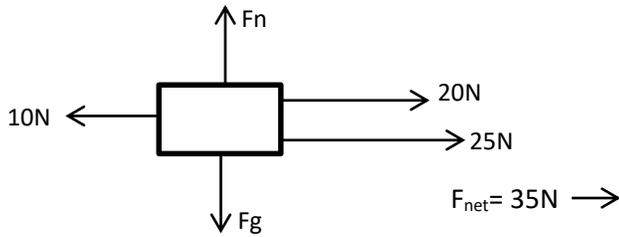
6. How far can you ride your bike in 20 minutes at a speed of 12.5 mi/minute?

Distance = 20 min x 12.5 mi/min = 250 mi

7. Assuming that distance is the same, which has a stronger gravitational pull on an object, the sun or the earth, and why?

Assuming the objects are the same distance from the sun and the earth, the sun has a stronger gravitational force than the earth because it is much more massive (1 million times more massive).

8. You are pushing, with a force of 20 N, and another student is pulling, with a force of 25 N, a big box of science supplies down the hall (towards Mr. Glass' classroom). The floor exerts a frictional force of 10 N on the box. Draw a force diagram (in the box) for this scenario that includes the net force and in what direction is the box moving?

Fn

10N

20N

25N

F_{net}= 35N →

Fg

9. Draw a free-body diagram of an object, weighing 312 N in a state of free-fall.
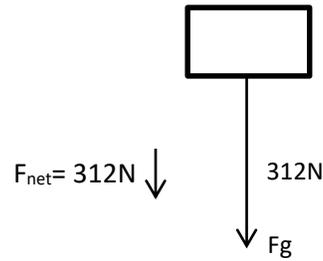
F_{net}= 312N

312N

Fg

10. Why is an object's mass the same, but the object's weight different on Earth verses on the Moon?

The earth is much more massive than the moon so the acceleration due to gravity is much larger as well (9.8 m/s^2 on Earth and 1.6 m/s^2 on the moon). Fg = your mass x the acceleration due to gravity. Mass is the amount of matter in an object; this does not change with your location.

11. What is the weight (in newtons), of a 4500 kg meteorite when it is near the earth's surface?

F = 4500 kg x 9.8 m/s^2 = 44100 N

12. If all forces are balanced that are being exerted on an object, what can you predict about the object's motion?

The object is either moving at a constant velocity or is at rest. An unbalanced force is needed for an object to accelerate.

13. When air resistance is a force acting on an object, at what point does a falling object fall at a constant velocity?

When the force of air resistance is equal to the force of gravity – hence, balanced forces.

Use the information and diagram below to answer questions 14-16 (use the F = m x a from Newton's 2nd law).

A car is pulling a trailer. The car's engine exerts a 6000 N force pulling the car to the left. In addition, the car and the trailer each experience a 1000 N frictional force as they are being pulled, as shown. Assume no other forces act on the car and trailer.

14. What is the magnitude of the net force on the car and trailer?
   A. 2000 N
   B. 4000 N
   C. 5000 N
   D. 8000 N

Engine   Car   Trailer

6000 N   1000 N   1000 N
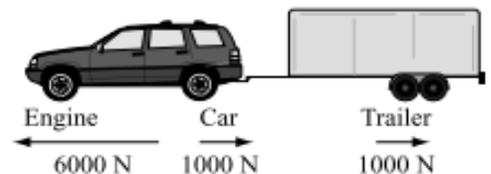
15. Which statement best describes the car and trailer's motion?
   A. They will move to the left at a constant velocity.
   B. They will move to the left and their speed will decrease.
   C. They will move to the left and their speed will increase.
   D. They will remain at rest.

16. Together, the car and trailer have a mass of 2000 kg. If the net force acting on the car and trailer stays the same as above, at what rate will the car and trailer accelerate? Show your work below!

A. 2 m/s²   B. 2000 m/s²   C. 0.5 m/s²   D. 3 m/s²

17. Explain how Newton's first law makes it a good idea to wear a seatbelt while in a moving car.

Newton's first law of motion explain how objects remain moving at a constant velocity unless affected by an unbalanced force – in a car you are moving at the same velocity as the car; if the car suddenly stops your body will continue to move forward because the force that stopped the car is NOT being applied to your body, it is ONLY being applied to the car. The seat belt provides an opposing force so that you stop moving forward when the car stops.

18. Will an object accelerate if the net force acted upon it is Zero N? Why or why not?

No, objects only accelerate when they experience an unbalanced force; when forces are balanced the net force equals zero.

19. A man with a mass of 80 kg falls off the top of a building and accelerates toward the ground. What is the force of gravity acting on the man?

F_g = 80 kg x 9.8 m/s²
F_g = 784N

20. A man doing push-ups presses down on the ground with his hands with a force of 100 N. With what force does the ground push up on the man?

The ground pushed up on him with a force of 100 N

21. A 0.14-kilogram baseball is thrown in a straight line at a velocity of 30 m/s. What is the momentum of the baseball?

P = .14 kg x 30 m/s
P = 4.2 kg·m/s

22. What is the mass (in kg) of a truck if it produces a force of 14,000 N while accelerating at a rate of 5 m/s²?

Mass = 14,000N/5m/s²
mass = 2800 kg

23. On the moon, which will hit the ground first when dropped at the same time from the same height, a boulder or a feather and why? Both objects will hit the ground at the same time because there is no air resistance.

24. Action force: a dog pulls rightward on a leash? The leash pulls leftward on the dog with the same force.

25. Action force: the car's tires push on the road; reaction force: the road pushes on the car's tires

26. Study your glossary words – you will need to know the definitions for the test.