Eighth Grade "Physics" Assessment

1a. Distance traveled in a certain amount of time is called
   a. density
   b. speed

1b. _____ is distance traveled in a certain amount of time.

1c. Speed is _____ traveled in a certain amount of _____.

2a. The difference between speed and velocity is that velocity always has to have a _____.
   a. specific direction
   b. specific temperature

2b. Unlike speed, measurements of velocity must include a specific _____.

2c. What is the main difference between speed and velocity?
_____
_____

3a. Velocity can change when either _____ or direction changes, or both.
   a. force
   b. speed

3b. What two things can cause a change in velocity? _____ and _____

3c. Write a scenario in which a car changes velocity in two ways.
_____
_____
_____

4a. _____ speed = total distance divided by total time.
   a. maximum
   b. average

4b. Average speed equals total_____ divided by _____ time.

4c. How would you find average speed for a car that travels 30 miles in 15 minutes?
_____
_____

5a. The formula for speed is "speed = _____divided by time".
   a. distance
   b. velocity

5b. The formula for speed is “speed = distance _____time”.

5c. What is the formula for speed?

_____

6a. Choose the unit for speed:
- a. miles per hour
- b. grams per milliliter

6b. Choose the unit for speed:
- a. seconds per meter
- b. miles per hour
- c. meters per gram
- d. Newtons per hour

6c. Give two common units for speed:

_____

7a. Force is a _____ or _____ that produces a change in the state of motion of an object.
- a. push/pull
- b. roll/spin

7b. _____ is a push or pull that produces a change in the state of motion of an object.
- a. Mass
- b. Speed
- c. Work
- d. Force

7c. Give the definition for force:

_____
_____
_____
_____

8a. What would you need to do to a skateboard to put a force on it?
- a. push it
- b. stand on it
- c. attach a rope to it and pull it
- d. all of the above

8b. How would you exert a force on a skateboard if it was sitting on the sidewalk?

_____
_____

8c. Give three examples of exerting forces on objects:
1. _____
2. _____
3. _____

9a. Choose the best example of a common force:
a. gravity
b. rain

9b. Write an example of a common force; one that you are experiencing right now:
_____

9c. Give three examples of forces that you are experiencing right now:
1. _____
2. _____
3. _____

10a. A force has to go in a certain _____.
a. pattern
b. direction

10b. A force has to have something in common with velocity. What is it?
a. it has to go a distance
b. it has to have a time
c. it has to have a direction
d. it has to have speed

10c. How is force like velocity?
_____
_____
_____
_____

11a. The unit for force in the metric system is _____.
a. grams
b. newtons

11b. What is the metric unit for force? _____

11c. What is the metric unit for force, and why is it called that?
_____
_____
_____
_____

12a. In the United States, we measure the force of Gravity, or weight, with the unit called _____.

a. pounds
b. knots

12b. The unit we us in the United States to measure the force of gravity on objects is the _____.

12c. In the United States, we use the pound to measure what?

_____

13a. When we add all the forces on an object together, we call the resulting force the _____force.

a. net
b. gravity

13b. Adding together all the forces that affect an object is called finding the _____ force.

a. because
b. net
c. gravitational
d. effective

13c. After adding all the forces together that are acting on an object, we have found the _____ force on that object.

14a. When all the forces pushing and pulling on an object cancel each other out, nothing _____.

14b. What happens when all of the forces on an object are balanced?

_____

_____

14c. What would have to happen between all the forces on an object for the object to not move?

_____

_____

_____

_____

15a. If some of the forces on an object are greater than others, what will happen to the object's motion?

a. it will change
b. it will not change

15b. The motion of an object will _____ if the forces acting on the object are not balanced.

15c. Explain the effects of unbalanced forces on an object:

_____
_____
_____
_____

16a. Objects with more _____ need more force to change their motion.
a. pressure
b. mass

16b. Objects with more _____ need more force to change their motion.

16c. What effect does mass have on the amount of force needed to change the motion of an object?

_____
_____
_____

17a. What force do all objects experience when they are in a fluid?
a. buoyancy
b. density

17b. Where does the force of buoyancy work on objects?
a. on the ground
b. in a liquid

17c. Where does the force of buoyancy operate?

_____
_____

18a. The force of buoyancy works upward, against the force of _____, which pulls downward.

18b. The force of buoyancy works in which direction? _____

18c. Which direction does buoyant force work in, and what does it work against?

_____
_____

19a. Buoyant force is equal to the _____ of the fluid displaced by the object.
a. size
b. weight

19b. Buoyant force is equal to the weight of the _____ displaced by an object.

19c. What is buoyant force equal to?

_____

20a. We can find the density of an object by dividing the object's mass by its _____.
a. volume
b. weight

20b. What is the formula to find the density of an object?
a. d = m/v
b. d = s/t

20c. Find the density of an object with a mass of 20 grams and a volume of $10cm^3$. Tell your procedure for finding it.

_____
_____
_____

21a. Weight is really how much mass something has and how much _____ is pulling down on it.
a. density
b. gravity

21b. Weight = mass x _____

21c. How much does an object with a mass of 200kg weigh at sea level on earth?

_____
_____
_____
_____

22a. Which is the easier way to find out the volume of a lumpy solid?
a. See how much it raises the water level in a graduated cylinder when it is placed in the water.
b. Measure all the different sides with a ruler and do the math.

22b. What is the easiest way, in the lab, to find out the volume of an irregularly shaped solid?

_____
_____
_____

22c. If you were using the water displacement method of measuring the volume of an object, would it matter whether the object was hollow or not? How would this relate to the object's density?

_____
_____
_____
_____

23a. Archimedes was the scientist who found the principles of _____ through experiments with solids and liquids.

a. pressure
b. buoyancy

23b. Which scientist figured out the principles of buoyancy, in part when he realized that the water level in his bath rose when he got in. "Eureka!"

a. Freud
b. Newton
c. Einstein
d. Archimedes

23c. Tell about Archimedes' experiments, and what major principle he explained.

_____
_____
_____
_____

24a. If an object is very heavy for its size, it will _____ in water.

a. sink
b. float

24b. If an object has a density of $3 g/cm^3$, it will _____when put in water.

24c. How does the density of an object have to compare to the density of a fluid if the object will float in the fluid?

_____
_____

25a. What is done when force is exerted through a distance?

a. power
b. work

25b. Work is done when force is exerted through a _____.

25c. What are the two components that must be present for work to be done?

_____
_____

26a. The formula for work is “work = force x _____.”
   a. distance
   b. weight

26b. W= f x d is the formula for _____.
   a. Watts
   b. Weight
   c. Work
   d. Water

26c. How much work is done if a person moves a 20 Newton box up a 2 meter flight of stairs?
_____
_____

27a. The metric unit for work begins with a J. Which is it?
   a. Johansen
   b. Joule

27b. The metric unit for work is _____.
   a. Watt
   b. Newton
   c. Meter
   d. Joule

27c. What are the two forms of the metric unit for work?
   1. _____
   2. _____

28a. If something has _____ it has the ability to do work.
   a. density
   b. energy

28b. Energy can be defined as “the ability to do _____”.

28c. Define energy and give an example of an object with energy.
_____
_____
_____
_____

29a. Energy is different from work because for something to have energy, it doesn’t have to _____.
   a. exist
   b. move

29b. Energy is different from work in that things with energy don't have to actually _____.

29c. How can an object with energy differ from an object doing work?
_____
_____
_____
_____

30a. When work is done, _____ is transferred.
a. pressure
b. energy

30b. What is transferred when work is done?
a. energy
b. pressure
c. weight
d. force

30c. Give an example of how energy transfers when work is done.
_____
_____
_____
_____

31a. The two main types of energy, that all the other kinds can be called, are Potential energy and _____ energy.
a. kinetic
b. nuclear

31b. The two major types of energy, into which all other kinds can be classified, are p_____ energy and k_____ energy.

31c. Name the two major types of energy, into which all other kinds can be classified.
1. _____
2. _____

32a. Choose which of the below can be classified as potential energy.
a. gravitational
b. sound

32b. Give an example of potential energy: _____

32c. List three objects/substances with potential energy and tell specifically what about them is potential.

_____
_____
_____
_____

33a. Which of these types of energy could be called kinetic energy?
a. heat
b. chemical

33b. Explain what is present in an object with kinetic energy:

_____
_____

33c. Give an explanation of an object possessing kinetic energy, but don't use an object that is moving, like a ball rolling. Be creative!

_____
_____
_____

34a. Objects with kinetic energy are always _____, even if it's microscopic.
a. stable
b. moving

34b. Objects with _____ energy are always moving, even if we can't see it.

34c. What is the important factor that signifies whether an object has kinetic energy or not?

_____
_____
_____
_____

35a. Energy is never actually lost, it just _____ form.

35b. According to the Law of Conservation of Mass and Energy, if energy seems to be lost in one place, what has actually happened to it?

_____

35c. Explain the Law of Conservation of Mass and Energy:

_____
_____
_____

36a. When we measure how much work gets done and how long it takes to do it, we call it a measurement of _____.
   a. velocity
   b. power

36b. To measure the power we use, we have to know how much _____ was done, and how long it took to do it.

36c. What two factors do we need to know in order to figure out the power of a system?
   1. _____
   2. _____

37a. The formula for power can be either "Power = Work/time" OR "Power = _____/time".
   a. distance
   b. energy

37b. What do the P,W, E, and t stand for in this formula: P = W/t or P = E/t ?
   P_____ W_____ E_____ t_____

37c. Write both of the variations of the formula for power:
   1. _____
   2. _____

38a. The metric unit for power is the _____, or the Joule/second.
   a. watt
   b. kilogram

38b. The two units for power in the metric system are _____.
   a. watt and gram
   b. Joule and meter
   c. Joule/second and watt
   d. meter and gram

38c. How much power is produced in a light bulb that uses 30 Joules of electricity in 10 seconds? Please use both of the possible units for power in your answer.
   _____
   _____

39a. When we use electrical power in our homes, we are billed for _____ of power used. This unit is equal to 1000 Watts.

39b. Electrical power is measured traditionally in _____, because a Watt is too small.

39c. What unit is used to measure electrical power usage in the U.S.?
_____

40a. When we compare the English system of measurement to the Metric system, we see that One Horsepower unit equals 746 _____ of power.
a. Newtons
b. Watts

40b. One Horsepower in the English system of measurement is equal to _____ Watts of power in the Metric system.
a. 1000
b. 746
c. 5280
d. 100

40c. One Horsepower in the English system of measurement is equal to what in the Metric system? _____ _____

41a. In the English system of measurement, the unit for power is not always called Horsepower. If you measure how many feet an object is lifted, how many pounds it weighs, and how many seconds it takes to lift it, we come up with the unit called _____.
a. Kilowatts
b. foot-pounds per second

41b. The English system is not limited to Horsepower when measuring power. The other unit used is called the _____.
a. Kilowatts
b. foot-pounds per second
c. meters per second
d. miles per hour

41c. The rarely used unit for Power in the English system of measurement has to do with force, distance and time. It is called the _____- _____ / _____

The following Colorado Model Content Standards are addressed in this assessment by the questions indicated:

Questions 20a, 20b, 20c, 21a, 21b, 21c, 22a, 22b, 22c, 33a, 33b, 33c: Standard 1. Students understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations.

All Questions: Standard 2. Physical Science: Students know and understand common properties, forms, and changes in matter and energy.

Questions 14a, 14b, 14c, 19a, 19b, 19c, 33a, 33b, 33c: Standard 4. Earth and Space Science: Students know and understand the processes and interactions of Earth's systems and the structure and dynamics of Earth and other objects in space.

Questions 28a, 28b, 28c, 34a, 34b, 34c: Standard 5. Students know and understand interrelationships among science, technology, and human activity and how they can affect the world.

Answer Key

1a. b. speed
1b. speed
1c. distance, time

2a. a. specific direction
2b. direction
2c. Acceptable answers could include:
-speed is just distance over time, while velocity is speed in a specific direction

3a. b. speed
3b. change speed, change direction
3c. Acceptable answers could include:
-Scenario must include the car speeding up or slowing down and changing direction.

4a. b. average
4b. distance, total
4c. ave. s = tot. d/ tot. t, so 30miles/15min = 2mile/min

5a. a. distance
5b. divided by or the mathematical symbol
5c. speed = distance/time or s=d/t

6a. a. miles per hour
6b. b. miles per hour
6c. Acceptable answers could include:
-any two units that involve distance/time
-the most common are miles/hr or m/sec

7a. a. push/pull
7b. d. force
7c. Acceptable answers could include:
-A force is a push or pull that may cause a change in an object's motion.

8a. d. all of the above
8b. Acceptable answers could include:
-pushing it or pulling it in some way
8c. Acceptable answers could include:
-pushing or pulling in some way; movement does not have to result

9a. a. gravity
9b. Answers will vary, but gravity will be the most common.
9c. Answers will vary, but will probably include gravity, air pressure, hand pushing pencil, etc.

10a. b. direction
10b. c. it has to have a direction
10c. Acceptable answers could include:
-Force, like velocity, must work in a specific direction. If movement occurs, force must be exerted in the same direction as the movement.

11a. b. newtons
11b. Newton
11c. Acceptable answers could include:
-the Newton, named after Sir Isaac Newton, whose observations provided the basis for determination of force

12a. a. pounds
12b. Pound
12c. Force (of gravity)

13a. a. net
13b. b. net
13c. Net

14a. moves/happens/changes, etc. (synonyms)
14b. Either: nothing moves, or there is no change in motion
14c. Acceptable answers could include:
-all forces would have to be balanced, which means they cancel each other out

15a. a. it will change
15b. change
15c. Acceptable answers could include:
-when forces are unbalanced, some will overpower others, causing a change in motion (acceleration)

16a. b. mass
16b. mass
16c. Acceptable answers could include:
-The more mass an object has, the more force is required to change its motion. More mass = more inertia.

17a. a. buoyancy
17b. b. in a liquid
17c. In any fluid (liquid or gas)

18a. gravity
18b. upwards
18c. Acceptable answers could include:
-it works upward, against gravity

19a. b. weight
19b. fluid/liquid
19c. Acceptable answers could include:
-the weight of the fluid displaced by the object immersed in it

20a. a. volume
20b. a. d = m/v
20c. The formula for density is density = mass/volume, so 20g/10cm^3 is 2g/cm^3.

21a. b. gravity
21b. gravity
21c. weight = mass x gravity, and the average gravity at sea level is ~10m/s^2, so 200kg x 10m/s^2 = 2000N

22a. a. See how much it raises the water level in a graduated cylinder when it is placed in the water.
22b. Acceptable answers could include:
-Pour a specific amount of water into a container (like a graduated cylinder), and add the object. Measure how many mL the water level rises. This is the object's volume.
22c. Acceptable answers could include:
-If the object is hollow, you need to make sure the water can get inside it to measure the volume of the SOLID parts. If you want to know the density of the object AND the air inside it, make sure the water cannot get in.

23a. b. buoyancy
23b. d. Archimedes
23c. Acceptable answers could include:
-Archimedes proposed the principles of buoyancy. Legend has it that he noticed his bathwater rising when he entered the tub, and shouted "Eureka!"

24a. a. sink
24b. sink
24c. Acceptable answers could include:
-If an object floats, its density must be less than the density of the fluid it is placed in.

25a. b. work
25b. distance
25c. Acceptable answers could include:
-Force must be exerted in the direction of motion, and an object or substance must move over a distance.

26a. a. distance
26b. c. Work
26c. W=fd, so 20N x 2m = 40Nm or 40J

27a. b. Joule

27b. d. Joule
27c. Joule/ Newton-meter (J or Nm)

28a. b. energy
28b. work
28c. Acceptable answers could include:
-Energy is defined as the ability to do work.
-Examples will vary, but the object must be able to do work, or actually doing work.

29a. b. move
29b. move
29c. Acceptable answers could include:
-Objects with energy can be storing the energy for later use. They don't have to be moving. An object doing work has to move something through a distance.

30a. a. energy
30b. b. energy
30c. Acceptable answers could include:
-something moving and energy obviously being transferred

31a. a. kinetic
31b. (p)otential, (k)inetic
31c. potential energy, kinetic energy

32a. a. gravitational
32b. Acceptable answers could include:
-the object must not be moving, unless it has some other type of potential- can include things like gravitational, chemical, elastic, electromagnetic, etc.
32c. Answers will vary, but see answer to 30b.

33a. a. heat
33b. Acceptable answers could include:
-object must somehow be moving
33c. Acceptable answers could include, but will probably include:
-heat
-sound
-or other waves

34a. b. moving
34b. kinetic
34c. Acceptable answers could include:
-If there is any movement.

35a. changes
35b. it has transferred to another place/object/form

35c. Acceptable answers could include:
-The Law of C of M & E says that neither matter nor energy can be created or destroyed by ordinary means, they just change form.

36a. b. power
36b. work
36c. Acceptable answers could include:
-the amount of work done or energy used
-the time it took to do it

37a. b. energy
37b. (P)ower, (W)ork, (E)nergy, (t)ime
37c. either P=W/t and P= E/t Or Power = Work/time and Power = Energy/time

38a. a. watt
38b. c. Joule/second and watt
38c. P=E/t, so P= 30J/10s. P= 3J/s or 3W

39a. Kilowatts (or Kilowatt-hours)
39b. Kilowatts (or Kilowatt-hours)
39c. Kilowatts (or Kilowatt-hours)

40a. b. Watts
40b. b. 746
40c. 746 Watts

41a. b. foot-pounds per second
41b. b. foot-pounds per second
41c. Foot, pound, second (in that order)