Name: _____ Group: _____

1. When Nicole runs a marathon from the start of the race to the end when she's hugging her opponent, energy begins as _____ and ends up as _____ .
    A. Chemical, Thermal
    B. Chemical, Kinetic
    C. Kinetic, Thermal
    D. Kinetic, Gravitational Potential
    E. Gravitational Potential, Kinetic

A pendulum is pulled to the side. After it is released, it swings to the other side and back. There is no friction. The lowest point that the Bob can reach is considered the zero potential energy level.

2. The highest point that it will reach on the left side is
    A. It will not swing
    B. Postion B
    C. Position C
    D. Position D
    E. Position E

3. At position B, what type of energy does the pendulum have?
    A. Kinetic
    B. Potential
    C. A combination of both Kinetic and Potential
    D. Thermal

4. At position D, what type of energy does the pendulum have?
    A. Kinetic
    B. Potential
    C. A combination of both Kinetic and Potential
    D. Thermal

5. If an object carries a net electrical charge, it will
    A. repel all other objects
    B. repel all plastic objects
    C. repel objects with the opposite charge
    D. repel objects with a like charge

6. If an object carries a net electrical charge, it will attract bits of paper
   A. only if it has a positive charge
    B. only if it has a negative charge
    C. if it has either a positive or a negative charge

7. An item with a positive charge
    A. gained protons
    B. lost electrons
    C. lost protons
    D. gained electrons
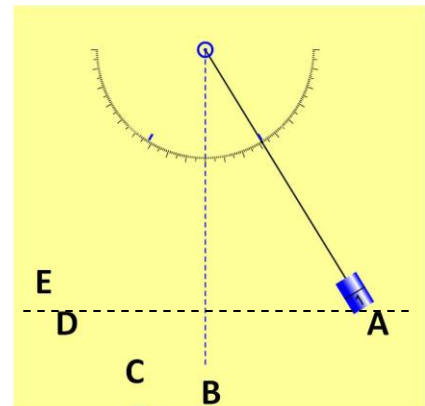
8. All magnets
    A. have a net electrical charge
    B. are attracted to all metals
    C. both A and B
    D. neither A or B

9. Energy contains mass
    A. True
    B. False

10. A person has a magnet and they cut the North end off and throw it away. Now they are left with a
    A. South pole
    B. North pole
    C. North and a South pole
    D. It is no longer a magnet

11. In lab, magnets *strongly* attracted
    A. A nail, paperclip and aluminum rod
    B. A nail and paperclip
    C. plastic pipe, clear plastic and glass test tube
    D. A and C
    E. B and C

12. Power is
    A. energy output per unit time
    B. a form of Energy
    C. a force
    D. All of the above
    E. None of the above

13. Consider the 1kg of feathers and 1 kg of gold, the
    A. 1 kg of gold has a smaller weight
    B. 1 kg of feathers has a smaller weight
    C. 1 kg of feathers and 1 kg of gold have equal weight
    D. Depends on the temperature and pressure of the room.

14. What does the density of an object have to be to float in water?
    A. less dense than water
    B. more dense than water
    C. Both of the above
    D. Density alone is not enough information

Low Density **Water** **High Density**

| 0 | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 |

Density (kg/L)
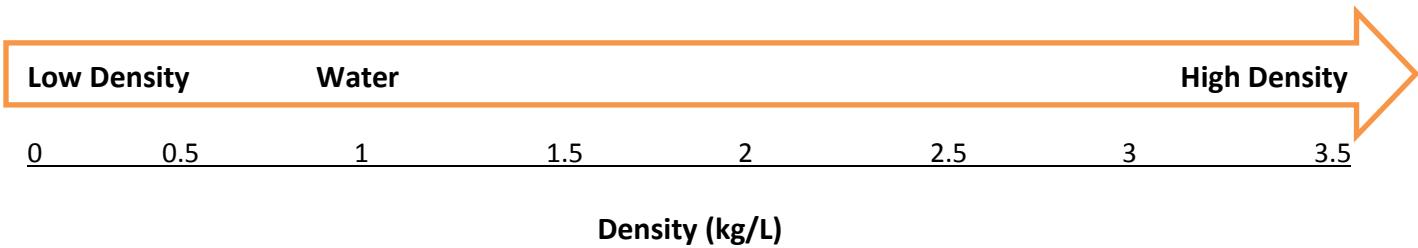
15. At the point labeled "1.5" on the Density line above is it most appropriate to write:
    A. Sinks quickly
    B. Barely sinks
    C. Barely floats
    D. Floats well
    E. Not enough information

You have 5 blocks of different shapes, different sizes, and different materials. You put them in water and see that some float and some sink (see picture).

16. Which of the blocks has the **smallest density?**
    A. Block A
    B. Block B
    C. Block D
    D. Blocks A, B and D
    E. Blocks C and E
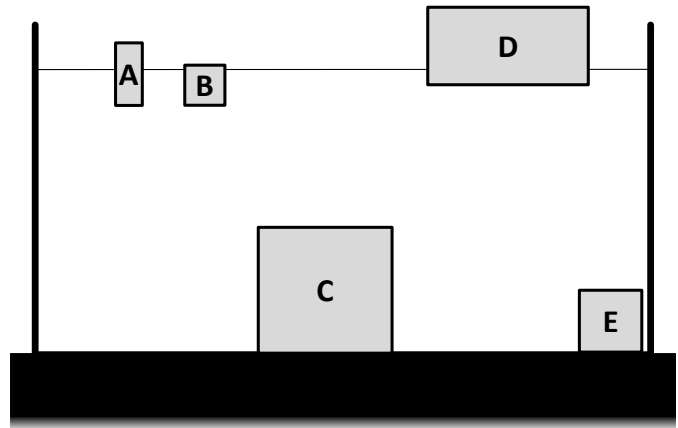
17. Which of the blocks has the **largest density?**
    A. Block A
    B. Block B
    C. Block D
    D. Could be either blocks A, B or D
    E. could be either Blocks C or E

18. If you compare Blocks C and E, which of the blocks has the **largest volume?**
    A. Block C
    B. Block E
    C. Blocks C and E have the same volume
   D. Not enough information

You have 5 blocks that are the same size, but different masses. The lightest one is 1kg, the heaviest one is 5kg. The picture shows how the 2kg and 5kg blocks float and sink in water.

19. If you place the 3 Kg block in the water, it will
    A. float with part of the block above the water
    B. float with just the top of the block at the water
    C. float at any depth it is placed
    D. Sink
    E. Not enough information
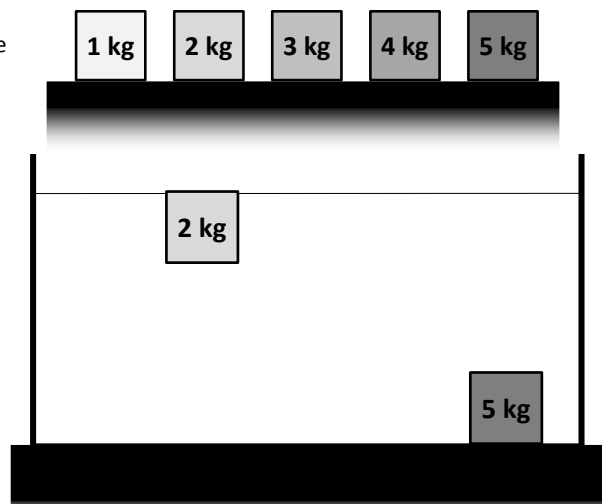
The diagram to the right shows two identical cylinders filled to the same level with water. Also shown are two marbles, one glass and one steel. The two marbles are the **same size** but the steel one is much heavier than the glass one.
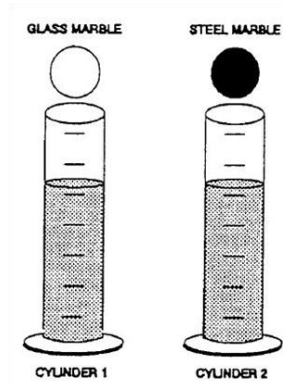
20. When the glass marble is put in Cylinder 1 it sinks to the bottom and the water level rises to the 6th mark. If you put the steel marble into Cylinder 2, what will happen? The steel marble will

    A. float

    B. sink and the water will rise to the 6th mark.

    C. sink and the water will rise higher than the 6th mark.

    D. sink and the water will rise but lower than the 6th mark.

21. A person stands on a bathroom type scale on earth and then travels to the moon with the scale. When they stand on the scale on the moon, the scale will read less because

    A. A person weighs less on the moon

    B. A person has less mass on the Moon

    C. A and B

    D. The scale will not read less

    E. None of the above

A.   B.   C.
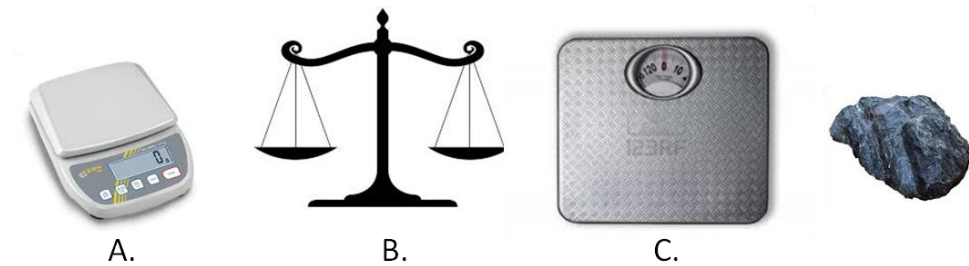
22. Which of the devices above will measure this rock the same on the moon compared to on Earth?

    A. A

    B. B

    C. C

    D. A and C

    E. None of the above

23. Magnesium's symbol is?

    A. M

    B. Ma

    C. Mg

    D. Mn

24. The symbol for Potassium is

    A. P

    B. Ph

    C. Po

    D. K

25. He stands for...?

    A. Helium

    B. Hydrogen

    C. Hendrox

    D. Iron

26. What do the groups/families in the periodic table have in common?
    A. The number of total electrons
    B. Similar masses
    C. Similar characteristics
    D. The number of neutrons

27. The ability to pound a metal into a flat sheet without breaking it is
    A. Conductivity
    B. Luster
    C. Ductile
    D. Malleability

28. What tool is used to find mass in the laboratory?
    A. Scale
    B. Meter stick
    C. Graduated cylinder
    D. Balance

29. What is the base unit for measuring distance in the SI system?
    A. Gram
    B. Liter
    C. Meter
    D. Newton

30. How many kilograms in 8000 grams?
    A. 0.0008 kg
    B. 8 kg
    C. 80 kg
    D. 8000 kg

31. Which metric unit would be most convenient for measuring the length of a ladybug?
    A. Millimeter
    B. Centimeter
    C. Meter
    D. Gram

32. Of the choices below, which represents the largest SI prefex?
    A. centi
    B. milli
    C. Mega
    D. Tera

33. The symbol Ag stands for which element?
    A. Copper
    B. Silver
    C. Gold
    D. Mercury

34. **5 pts** A pendulum made from a string and a mass starts from rest as shown. There is a barrier placed at the black dot. Draw below *on the same diagram* how the pendulum will look when it has swung as far left as it can go. Draw both the string and the bob. Be very clear about the final height (on the left) compared to the original height (on the right).
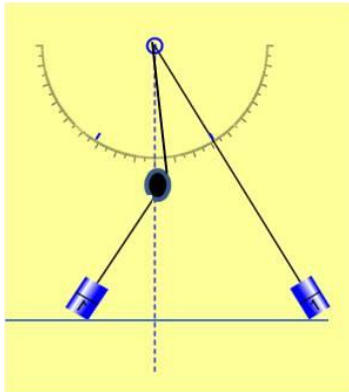
35. **8 pts** Cameron decided she wanted to figure out the amount of horsepower she could produce in a short burst so she timed how long it took her to sprint up a flight of stairs. She measured the height difference from the ground floor to the next level to be 210 cm. She has a mass of 50 kg and was able to sprint to the top in 1.8 seconds. Useful equations: Potential energy = mass*gravity*height, Power = Energy/time. Useful data: g = 9.8 m/s^2, 746 Watts = 1 hp. *Use the factor label method for all conversions.*

Mass = 50 kg
Height = 210 cm (1m / 100 cm) = 2.1 m
Gravity = 9.8 m/s^2
Time = 1.8 s

Change in potential energy = 50 kg * 9.8 m/s2 * 2.1 m = 1029 J
Power = 1029 J/ 1.8 s = 571.7 Watts

Now need horsepower so 571.7 W (1 hp / 746 W) **= 0.76 hp**

36. **5 pts** How is the arrangement of items in the supermarket similar to the arrangement of the elements on the periodic table?

In a supermarket food items are arranged by type. There is the produce section, the deli for meats and cheeses, the bakery, the canned goods, dairy products. The periodic table is also arranged by type of element. For example, there are metals, non-metals and noble gasses.

37. **8 pts** Explain what the following measurements might mean as they are applied to a beaker filled with a liquid in the laboratory?
A. 256 grams
Grams are a measure of mass. This is probably the mass of the beaker and liquid found by placing it on a balance.

B. 7.5 centimeters
Centimeters are a measure of length. Since this is a beaker, it could be the height of the liquid in the beaker, or the height of the beaker itself, or the diameter of the beaker. It was probably measured with a ruler or meter stick.

C. 413 milliliters

Milliliters area a measure of volume. Beakers are often labeled with milliliters so this is probably the value that can be read on the side of the beaker at the top of the liquid.

D. 28 ^{o}C
Degrees Celcius are a measure of temperature. It was probably measured with a thermometer.

38. 5 pts (*extra credit*) Explain how you can use a magnet to create AC current. Include diagrams

When electons experience a *changing* magnetic field, they will move. If you change a magnetic field from one direction to the other back and forth, the electrons will move one way, then the other, then back again etc… When electrons move back and forth that is an AC current. AC stands for Alternating Current. One way to do this was seen on the simulation Faraday's Electromagnetic Lab. In that simulation we see a magnet attaching to a water wheel. There is a coil of wire right next to the water wheel. The water makes the magnet rotate which means the the end of the magnet facing the coil of wire keeps changing which means the magnetic field in the coil changes from one direction to the next and back again. This makes the electrons move back and forth. There are other ways to move a magnet and cause an alternating current, this is just one example.