



USING THE FORCE
TO SUCCEED!



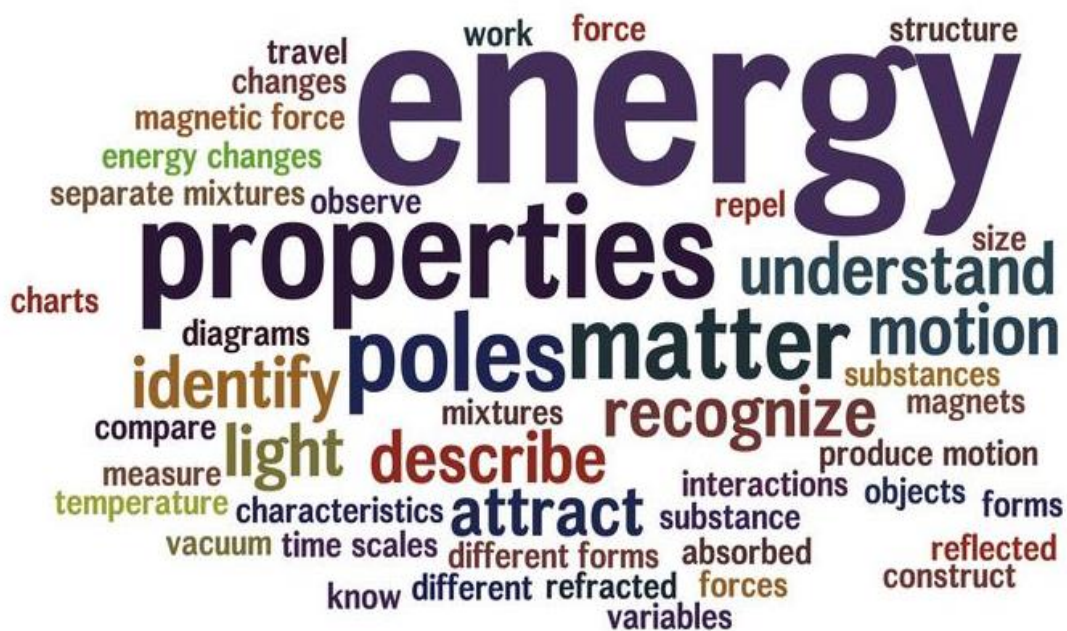
Ponce de Leon Middle School

Physical Science 2017

Summer Instructional Packet

DIRECTIONS:

1. You are required to complete the Summer Instructional Packet.
2. Turn in your completed package to your teacher, when you return to school in August.



Name: _____ Date: _____ Science Teacher: _____



Multiple Choice: *Identify the choice that best completes the statement or answers the question.*

- 1 A scientific hypothesis:
 - A is one that can be tested.
 - B is a prediction of the outcome of an experiment.
 - C may be modified as new evidence becomes available.
 - D may be described by all of the above.
- 2 Natural laws are:
 - F rules that explain how all things in the entire universe always behave.
 - G a process of discovering the answers to questions.
 - H a preliminary explanation.
 - I a form of inquiry.
- 3 All of the following are very important parts of learning through inquiry EXCEPT:
 - A asking questions instead of being given answers.
 - B proposing explanations.
 - C collecting evidence to evaluate your hypotheses.
 - D always getting the right answer immediately.
- 4 The set of rules that explains how everything in the universe works are called:
 - F hypotheses
 - G deductions
 - H theories
 - I natural laws
- 5 A scientific explanation supported by much evidence collected over a long period of time is a:
 - A hypothesis.
 - B deduction.
 - C theory.
 - D law.
- 6 In order for evidence to be considered **scientific** evidence, it must be:
 - F the opinion of an important scientist.
 - G objective and repeatable.
 - H deduced by a detective.
 - I testable.
- 7 What does it mean for scientific evidence to be objective?
 - A The evidence describes only what actually happened as exactly as possible.
 - B The evidence can be seen independently by repeating the same experiment the same way.
 - C The evidence includes the input of important scientists.
 - D The evidence includes opinions and feelings.
- 8 The advantage of using the scientific method is that:
 - F its cautious building of evidence-based understanding is dependable and logical.
 - G its random way of trying everything covers all options.
 - H any evidence in disagreement with a theory can be thrown out.
 - I continual testing leads to mistakes being made.
- 9 How are scientific theories related to natural laws?
 - A Theories are the set of rules that the universe follows.
 - B Theories are scientists' explanations of natural laws.
 - C Natural laws are the method of testing theories.
 - D Natural laws are the process of learning based on hypotheses and testing.



- 10 Once a scientific theory has been accepted:
- F its evidence does not need to be repeated.
 - G it continues to be tested against new evidence.
 - H it can never be changed or revised.
 - I it is considered to always be true.
- 11 Which of the following hypotheses could be tested by an experiment?
- A A chocolate bar tastes better than potato chips.
 - B The harder you push a small wagon, the faster it goes.
 - C Aliens control everything that happens on Earth.
 - D All of the above
- 12 After testing, you find that your hypothesis is not true. What does this mean?
- F The experiment is a failure.
 - G The results are useless.
 - H The design of the experiment was bad.
 - I The results may be useful, but further testing and redesign of the experiment may be needed.
- 13 Which of the following is an example of deduction?
- A Antoine concludes that since the street is wet, it must have rained.
 - B Antoine calls the weather service to find out if it might rain.
 - C Antoine hoses down the street with water.
 - D Antoine sees that the street is wet and wears his boots to keep his feet dry.

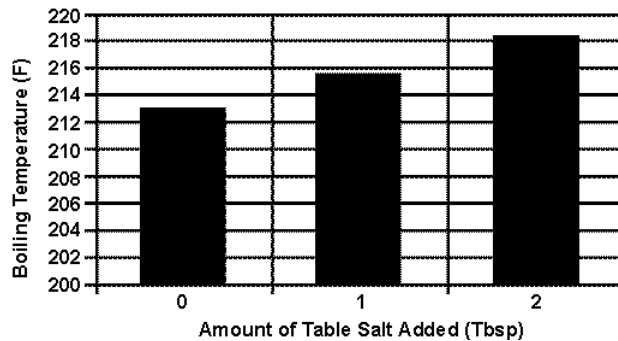
Jeremy decides to cook some pasta noodles. He notices that the directions say to add salt to the water before bringing the water to a boil. The next day, Jeremy asks his science teacher, Ms. Jackson, a question: “How does adding salt affect the boiling temperature of water?” Of course, Ms. Jackson asks Jeremy to plan and conduct an experiment to find the answer.

The following questions are based on the experiment Jeremy does to find an answer.

- 14 Which of the following was the **control variable** for Jeremy’s experiment?
- F One quart of boiling water with salt added
 - G One quart of boiling water with no salt added
 - H One quart of room temperature water with salt added
 - I One quart of room temperature water with no salt added
- 15 Jeremy writes an excellent **hypothesis** before beginning his experiment. Which of the following is the hypothesis he wrote?
- A Pasta manufacturers and salt companies have signed a business deal.
 - B Adding salt to pasta water makes the pasta taste better.
 - C Adding salt to pasta water will cause the water to boil at a higher temperature.
 - D Certain types of salts will not dissolve in boiling water.



- 16 The following graph summarizes Jeremy's results. What conclusion can be made from these results?



- F Adding salt to the water causes the water to boil at a higher temperature.
G Adding salt to the water causes the water to boil at a lower temperature.
H Adding salt to the water has no effect on the temperature of the boiling water.
I There is not enough information for a valid conclusion.
- 17 Which of the following would be the best conclusion that Jeremy could make about his experiment?
A There is no obvious benefit of adding salt to pasta water.
B Salt clings to the cooking pot and allows the pot to hold more heat.
C Adding salt to the water chemically breaks down the pasta to make it softer.
D When you add salt to pasta water, the water can get hotter and pasta is cooked faster.

Jordan noticed that as he stood farther away from his desk lamp, the light from the lamp seemed dimmer. He borrowed a light meter from his brother, who is a photographer, and decided to test his observation.

- 18 To determine the relationship between distance from his lamp and the brightness of his lamp Jordan should:
F perform a scientific experiment.
G assume that the lamp must be losing electricity as he moves away from it.
H ask someone at home.
I There is no way to figure out the relationship.
- 19 Jordan used a light meter to measure the brightness of his lamp at various distances. Distance is the:
A control variable.
B hypothesis.
C analysis.
D experimental variable.
- 20 A variable that should be considered a control variable in Jordan's experiment is:
F the distance from the lamp.
G the light bulb.
H the amount of time the lamp is turned on.
I the cost of the light meter.
- 21 Which of the following information is scientific evidence that could be used to evaluate Jordan's hypothesis?
A A sketch of the layout of his room showing the lamp and the brightness of the light at different distances.
B A paragraph describing exactly how far away Jordan was from the light and what the light meter reading was each time.
C A chart of the light meter measurements at different distances.
D All of the above



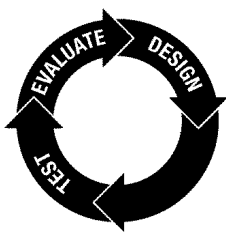
- 22 A control variable is:
- F a variable that stays the same throughout an experiment.
 - G a variable that is changed in an experiment.
 - H the largest, most powerful variable in an experiment.
 - I rarely used in scientific experiments.

A friend tells you that a different size of ball bearing might make your skateboard move faster. You try three different sizes and keep track of the time to roll 50 feet. You write down exactly how you tried the ball bearings on your skateboard and make a chart of the time it took to roll the 50 feet for each size ball bearing.

- 23 The size of the ball bearing is the:
- A control variable.
 - B experimental variable.
 - C significant difference.
 - D conclusion.
- 24 The chart you wrote could be considered the:
- F procedure.
 - G evidence.
 - H experimental variable.
 - I control variable.
- 25 Which of the following could be considered control variables?
- A The skateboard, the ball bearings
 - B The skateboard, the distance rolled
 - C The ball bearings, the time it took to roll
 - D The ball bearings, the distance rolled
- 26 If the outcome of your experiment does not support your hypothesis, what should you do?
- F Throw the experiment away.
 - G Change the data so it fits your hypothesis.
 - H Change the hypothesis so it fits your data.
 - I Erase the data from your science notebook.

27

Engineering Cycle



The picture shows the process of the engineering cycle. Which of the following best describes the missing step?

- A Build a prototype
- B Apply for a patent
- C Mass produce
- D Sell stocks



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- 28 The application of science to meet human needs and solve problems is called:
- F science.
 - G engineer.
 - H technology.
 - I experiment.
- 29 What would be the best source for finding out the most detail about a new scientific discovery?
- A Internet
 - B TV news
 - C Your friend
 - D Science journal
- 30 Why are prototypes developed by engineers?
- F To test a design and see if it works
 - G To create a conceptual design
 - H To publish in a scientific journal
 - I To learn the basic principles of how things work
- 31 Which of the following would be useful to an engineer while solving a design problem?
- A Evaluations
 - B Testing
 - C Prototypes
 - D All of the above
- 32 Which of the following is an example of technology?
- F Electricity
 - G Gravity
 - H Mass balance
 - I The Sun
- 33 How can scientists reduce the bias in their experiments?
- A By being truthful in reporting their results
 - B By reporting only the results that support their conclusions
 - C By getting their results on the news
 - D All of the above

Completion: Complete each statement.

Select the correct term to complete each sentence. There are extra terms in the list.

1000	error	distance
100	seconds	hours
10	position	vector
1	measurement	meter
0.01	SI	English System
0.001	foot	minutes

- 34 _____ is the amount of space between 2 points.
- 35 Although many units exist for measuring time, science problems most often use _____.
- 36 A(n) _____ consists of a value and a unit.



- 37 Scientists use _____ units because they are easier to work with.
- 38 Most road signs in the United States use _____ units.
- 39 The _____ is the basic SI distance unit.
- 40 A meter is _____ times larger than a millimeter.
- 41 A conversion factor is a ratio with a value of _____.

Select the correct term to complete each sentence. There are extra terms in the list.

dependent	weight	mass
independent	x	y
direct	inverse	increases
kilogram	independent	newton
graduated cylinder	balance	dependent
decreases	volume	density

- 42 The amount of matter an object contains is called _____.
- 43 One liter of water has a mass of about one _____.
- 44 The force due to gravity on an object is called _____.
- 45 Mass is measured using a _____.
- 46 You can calculate the _____ of an object by dividing its mass by its volume ($m \div V$).
- 47 Adding more aluminum to a sheet of aluminum changes its mass and _____.
- 48 The variable plotted on the x -axis of a graph is called the _____ variable.
- 49 The _____ variable is the variable that is influenced in the experiment, and can be called the responding variable.
- 50 If an increase in one variable causes an increase in another, the variables have a(n) _____ relationship.
- 51 The underlying logic of science is a process of learning that begins with a hypothesis and is called the _____.

Select the correct term to complete each sentence. There are extra terms in the list.

objective	scientific method	engineering cycle
repeatable	experimental	control
prototype	technology	scientist
engineer	x	y

- 52 Scientific evidence that is _____ allows others who do the same experiment the same way to observe the same results.
- 53 A picture that shows how two variables are related is called a(n) _____.
- 54 On a graph, the independent variable is represented on the _____-axis.
- 55 The variable in an experiment that is changed by the investigator is known as the _____ variable.



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- 56 During an experiment, a variable whose value is kept constant is a(n) _____ variable.
- 57 A(n) _____ uses scientific discoveries to design technology to solve problems.
- 58 A(n) _____ is a working model of a design that can be tested to see if it works.

Select the correct term to complete each sentence. There are extra terms in the list.

- | | | |
|--------------|-------------|-----------|
| greater than | less than | equal to |
| vector | scalar | friction |
| tension | compression | normal |
| newton | pound | kilogram |
| net | equilibrium | free-body |

- 59 If you traveled to Mars, your mass would be _____ than your mass on Earth.
- 60 Force is a(n) _____ because it has both an amount and a direction.
- 61 The _____ is the English unit of weight equal to about 0.454 kg of mass.
- 62 The metric unit of force required for a 1-kg object to accelerate at 1 m/s^2 is the _____.
- 63 A force that resists the motion of objects or surfaces as they move over one another is called _____.
- 64 The force exerted by a surface on an object that is pressing on it is the _____ force.
- 65 The force which is the sum of two or more forces on an object is called _____ force.
- 66 A diagram shows all the forces acting on an object is a _____ diagram.

Select the correct term to complete each sentence. There are extra terms in the list.

- | | | |
|----------------|----------|----------------------|
| lever | gear | input arm |
| output arm | fulcrum | complex machine |
| simple machine | input | output |
| more | less | mechanical advantage |
| force | distance | tension |

- 67 Ramps, levers, wheels and axles, and gears are all examples of _____.
- 68 The force, energy, or power supplied to make a machine work is called _____.
- 69 A(n) _____ is a rotating wheel with teeth that transfers motion and forces.
- 70 To achieve a mechanical advantage of more than one, force is traded for _____.
- 71 If the output gear turns faster than the input gear, it will turn with _____ force.
- 72 The ratio of the output force to the input force is called _____.
- 73 The pulling force that always acts along the direction of the rope in a pulley system is called _____.



Select the correct term to complete each sentence. There are extra terms in the list.

equilibrium	liquid	absorbs
thermal energy	solid	heat
natural convection	gas	thermal radiation
forced convection	emits	conduction
Btu	higher	kilocalorie
specific heat	lower	

- 74 If equal amounts of thermal energy were added to a solid, a liquid, and a gas, the **least** amount of expansion would generally occur in the _____.
- 75 Joules, calories, and Btu's are all units used to measure _____.
- 76 The temperature of an object increases when it _____ radiation.
- 77 Thermal energy that is moving or capable of moving is called _____.
- 78 Heat flows from a body of _____ temperature to a body of _____ temperature.
- 79 The heat unit, Calorie, written with a capital C is also known as a _____.
- 80 The property of a material that indicates the amount of heat needed to raise the temperature of one kilogram by one degree Celsius is _____.
- 81 When two substances in thermal contact starting at different temperatures reach the same temperature, their condition of thermal "balance" is called thermal _____.
- 82 The process by which a mechanical device is used to move a fluid or gas to transfer heat is called _____.
- 83 The method by which heat can be transferred through a vacuum is _____.

Problems

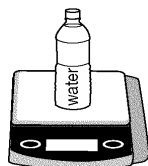
84



The school nurse measures Leo's height at 67 inches. What is his height in meters?
1 inch = 2.54 centimeters



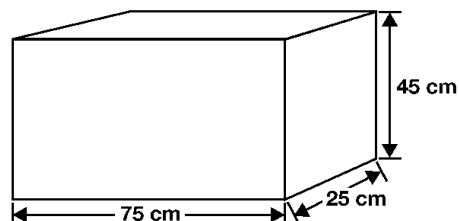
- 85 Convert 157 milligrams to grams.



You need to measure the mass of an 8-ounce bottle of water. The picture shows the electronic scale in your classroom.

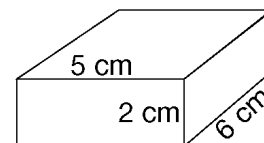
- 86 The electronic scale in your classroom has maximum reading of 500 grams. Would this scale be a good choice for measuring the 8-ounce bottle of water?
1 ounce water has a mass of about 30 grams.
- 87 You need to know the mass of the bottle of water to the nearest 0.1 gram. The electronic mass balance has a resolution of 1000 mg. Will this scale be precise enough for measuring your bottle of water?
- 88 The volume of water in a graduated cylinder is 75 mL. After a small rock is placed in the cylinder, the volume increases to 86 mL. What is the volume of the rock?
- 89 If your dog has a mass of 5600 grams, how many kilograms does this equal?

90



You just got a new fish tank and you need to determine the maximum volume that the tank can hold before you set it up. The dimensions of your tank are $75\text{ cm} \times 25\text{ cm} \times 45\text{ cm}$. What is the volume of your new tank?

- 91 Convert the following mass measurements into **grams**:
- 4.5 kilograms
 - 0.005 kilograms
 - 300 kilograms
 - 0.1 kilograms
- 92 The mass of 100 quarters is found to be 0.567 kilograms. What is the mass of a single quarter measured in grams?
- 93 Calculate the volume of an ice sculpture with a mass of 200 kilograms.
(density of ice = 920 kg/m^3)
- 94 An object has a mass of 200 g and a volume of 50 cm^3 . What is its density?
- 95 The diagram shows a $6\text{ cm} \times 5\text{ cm} \times 2\text{ cm}$ block. This block has a mass of 180 grams. What is the density of the block?





- 96 A small plastic button has a density of $2,000 \text{ kg/m}^3$. If the mass of this button is 1.0 grams, what is the volume of the button? Be careful with the units!
- 97 A graph is 50 boxes by 50 boxes. Time is plotted on the x -axis and its range is 0 to 50 minutes. Position is plotted on the y -axis and the range is 0 to 100 meters. What should the scale be for each axis of this graph?
- 98 A toddler weighs 30.0 pounds. If 1.00 newton equals the weight of 0.228 pounds, what is the weight of the toddler in units of newtons?

Table 11-1

Food	Quantity	Joules	Calories
soda	12 ounces	502,000	120
spaghetti	1/2 cup	836,000	200
chicken	3 ounces	711,000	170
beef, lean	3 ounces	711,000	170
peanut butter	1 tablespoon	418,000	100

Table 11-2

Activity	Cal/hr.
running	850
swimming	300
biking	600
walking	210
studying	100
sitting	84
dancing	350

- 99 Based on **Table 11-1**, how many Calories are in three tablespoons of peanut butter?
- 100 Based on **Table 11-2**, how many Calories will you burn up if you run for 2 hours and walk for 1 hour?
- 101 Based on **Tables 11-1** and **11-2**, how many hours of swimming will it take to burn off the Calories in one cup of spaghetti and two tablespoons of peanut butter?



NOTES:

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