Name: _____ Period_____ Date : _____

Unit 1 – Introduction to Science

Objectives:

Branches of Science
- Branches of Earth Science

Scientific Method – Steps
- Purpose/Question
- Research
- Hypothesis
- Experiment
- Observations
- Analysis & Conclusion
- Ask a new question

Observation v. Inference

Classification

Independent v. Dependent Variable

Data Collection
- Instruments
- Metric System
- Metric Conversion
- Density

Mapping the Earth
- Latitude and Longitude
- Contour Lines

Unit 1 – Introduction to Science

1.	Science –
2.	Fact -
3.	Geology –
4.	Oceanography –
5.	Meteorology –
6.	Astronomy -
7.	Hypothesis –
8.	Theory –
9.	Scientific Method
10.	Control Group
11.	Experimental group –
12.	Independent Variable –
13.	Dependent -
14.	Control Factors –
15.	Observation –
16.	Inference –
17.	Conclusion –
18.	Metric System –
19.	Gram –
20.	Liter –
21.	Meter –
22.	Mass-
23.	Volume –
24.	Density- D = m/v

8TH GRADE GENERAL SCIENCE
INTRODUCTION TO SCIENCE
UNIT 1

NAME_____

Branches of Science:

1._____ - The study of energy (example: molecules in motion)

2. _____ - The study of the inorganic components of the Earth. (example: weather and rocks)

3. _____ - The study of living things. (example: animals and plants)

Branches of Earth Science:

1. **Geology** - _____

_____

2. **Meteorology** - _____

_____

3. **Astronomy** - _____

_____

How do scientists obtain new information?

1. _____

2. _____

3. _____

Cyclic Event – is an event that is predictable and reoccurring
Examples:

_____, _____,

_____, _____, _____

What is used to make an **OBSERVATION?**

_____

What does it mean to make an **INFERENCE?**

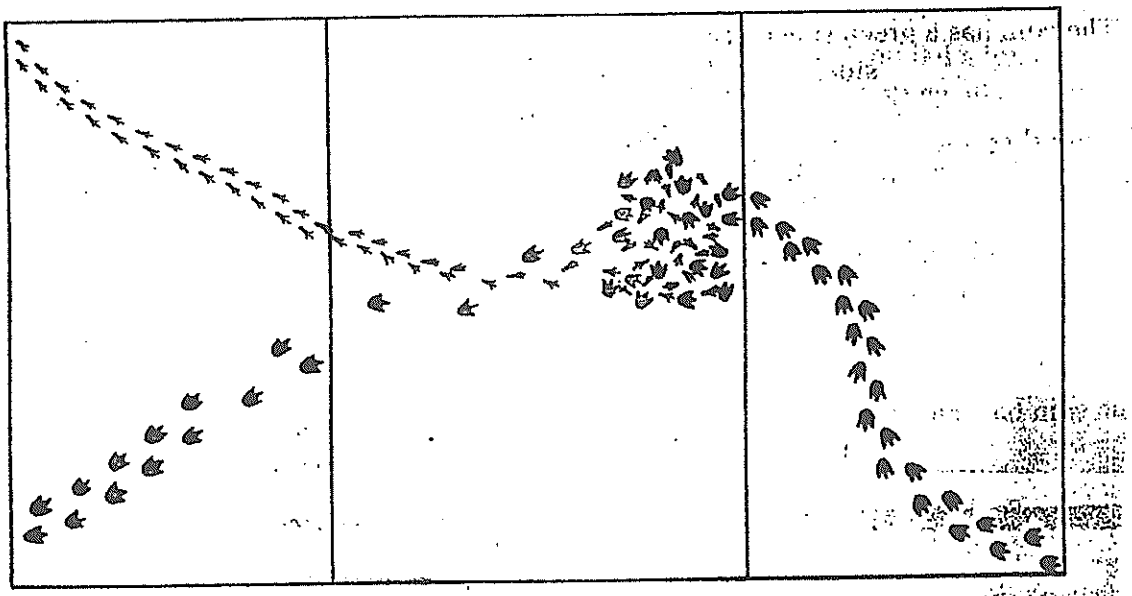
_____

Activity 2

FORMULATING INFERENCES FROM OBSERVATIONS ABOUT EVENTS

This next activity is designed to help you learn to formulate inferences about events. Every inference must be based on an observation, so you will first be making careful observations and then interpreting or explaining those observations. These interpretations or explanations of observations are inferences. (This is also a very good activity to use as inferential thinking in creative writing!)

Observe these *tracks in the snow*. To help you think more logically about the picture, it has been separated into frames. Make at least two observations about each frame, and for each observation write at least one inference that could be drawn from that observation. (More than one inference can be drawn from one observation.) Draw a line from each inference to the observation on which it is based.



Position 1 Position 2 Position 3

Name _____

Date _____
Period _____

Next to each of the following statements place the letter
O. . . . . If the statement is an observation
I . . . . . If the statement is an inference

Circle the letter O if the observation is an extended observation.

1. The grass is green.

2. The house is old.

3. The dog weighs 15 pounds.

4. The ice is cold.

5. The road is 17 miles long.

6. The road is long.

7. The fish is going to die.

8. The 300 pound man is over-weight.

9. The car went from 0 to 60 miles per hour in 6.3 seconds.

10. The car is eventually going to move.

11. The radishes will be fully grown in 25 days.

12. The dog smells.

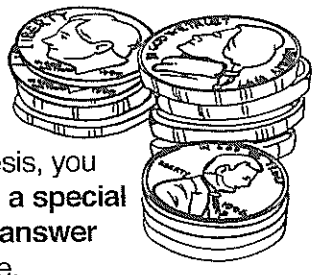
13. The dog has not had a bath recently.

14. The water is hot.

15. The temperature of the water is 112 degrees fahrenheit.

Name _____

Step 3: Form a Hypothesis (Part 1)



After developing a research question, identifying the variables, and researching information about the variables, it's time to develop a hypothesis. In writing a hypothesis, you are trying to answer your research question before you experiment. **A hypothesis is a special type of prediction that is a possible explanation for a set of observations or an answer to a scientific question.** Just like a research question, a hypothesis must be testable.

A hypothesis is not a fact, but merely one possible way to explain a group of observations. While a hypothesis is made prior to completing the experiment, it is more than just a guess about what will happen. It should express a logical explanation based on prior observations and research.

Suppose you were asked this research question: "How many drops of water will fit on the head of a penny?" If you don't have much experience dropping water on a penny, it would be difficult to create a hypothesis. It's likely you would be randomly guessing at the answer.

1. Predict (Random Guess): How many drops of water do you think can fit on the head of a penny? _____

Turn a penny heads-up and count the drops of water squeezed from an eyedropper without spilling over.

2. How many drops actually fit on the head of the penny? _____

Since you now have some experience with putting water on a coin, you will be better suited to form a hypothesis for this research question: "How many drops of water will fit on the head of a nickel?"

3. Write your hypothesis: _____

4. Which do you think is more accurate: your hypothesis about water on a nickel (#3) or your prediction about water on a penny (#1)? Explain.

_____

_____

5. What factors did you consider when writing your hypothesis about water on a nickel?

_____

_____

Turn a nickel heads-up and count the drops of water squeezed from an eyedropper without spilling over.

6. How many drops actually fit on the head of a nickel? _____

7. How did your results (#6) compare to your hypothesis (#3)? _____

8. Was your hypothesis for the nickel test more or less accurate than your prediction for the penny test? Why?

_____

_____

Here's one more research question: "How many drops of water will fit on the head of a dime?"

9. Write your hypothesis: _____

Turn a dime heads-up and count the drops of water squeezed from an eyedropper without spilling over.

10. How many drops actually fit on the head of a dime? _____

11. How did your dime results (#10) compare to your hypothesis (#9)? _____

12. Which hypothesis (penny, nickel, or dime) was most accurate? _____

THE STEPS OF THE SCIENTIFIC METHOD

(How scientists examine the world)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

Controlled experiment – _____

_____

Independent Variable – _____

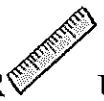
Dependent Variable – _____

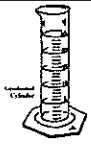
_____

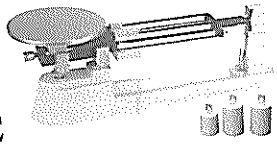
(Ex. If a student eats beans for dinner, then he will pass a lot of gas. (FARTS)

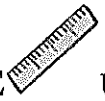
Beans = Independent Variable (Always the IF)
Passing Gas = Dependent Variable (Always the THEN)

COMMON SCIENTIFIC INSTRUMENTS

RULER  **Use:** _____ **Unit:** _____

GRADUATED CYLINDER  **Use:** _____ **Units:** _____

SCALE  **Use:** _____ **Units:** _____

DISTANCE  **Use:** _____ **Units:** _____

STOP WATCH  **Use:** _____ Units: _____

Name _____ Period _____ Date _____

Scientific Method Review

1. List the steps of the scientific method.

2. What is a hypothesis?

3. State the difference between the control and variable factors.

4. How many variable factors does a good experiment have? Control factors?

5. State the difference between the experimental and control group.

6. What is the significance of the control group?

7. Define independent and dependent variable.

8. After experimental data is gathered, how can it be organized?

9. Differentiate between observation and inference.

10. Why is it important to have a large sample size when conducting an experiment?

THE METRIC SYSTEM

Define: _____

Length is _____

Unit used to measure **LENGTH**: _____

Mass is _____

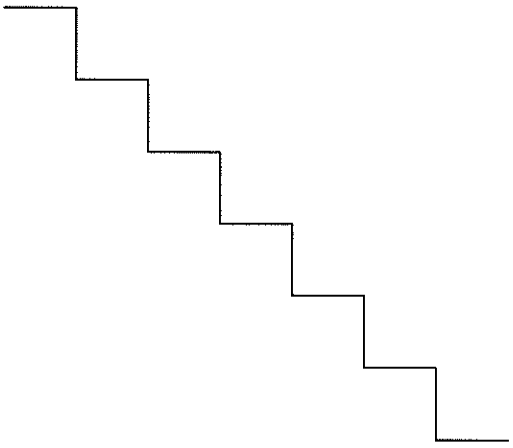
Unit used to measure **MASS**: _____

Volume is _____

Unit used to measure **VOLUME**: _____

METRIC CONVERSTIONS

Kilo - Hecto - Deka - Unit (m, l, g) - Deci - Centi – Milli



Practice:

10.0 m = _____ cm	1250 ml = _____ l
950.0 mg = _____ g	12.8 kg = _____ g
3.5 l = _____ ml	0.004 km = _____ cm
1.7 km = _____ cm	6578 ml = _____ l

METRIC ACCURACY:

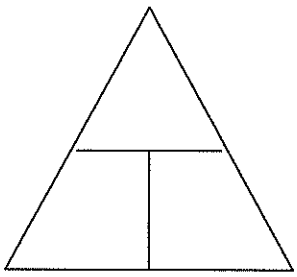
To the nearest **TENTH** means: _____ example: _____

To the nearest **HUNDREDTH** means: _____ example: _____

To the nearest **THOUSANDTH** means: _____ example: _____

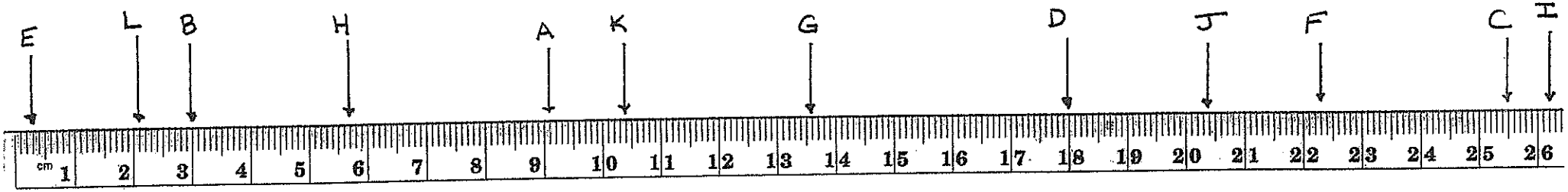
Density Formula:

D = _____



M = _____

V = _____



Numbered lines are centimeters (cm).

What do the other lines represent?_____

Directions:

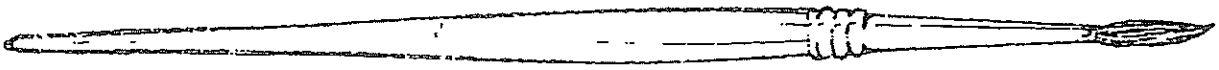
- Write each measurement in the centimeter (cm) column.
- Convert each measurement to millimeters (mm) and meters (m).

Letter	mm	cm	m	Letter	mm	cm	m
A				G			
B				H			
C				I			
D				J			
E				K			
F				L			

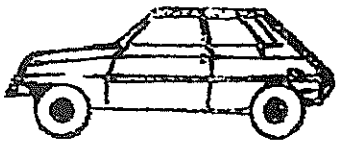
01

Name_____ MEASURING IN TENTHS OF A CENTIMETER

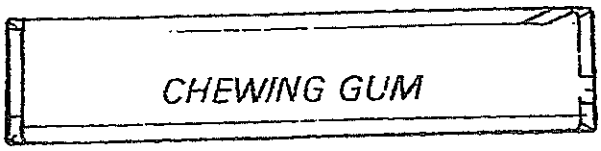
Use your metric ruler to measure the length of each object. Give each answer to the nearest tenth of a centimeter. Your error of measurement should not be more than .1 centimeter.



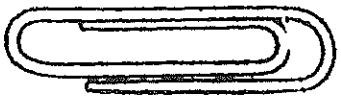
_____ cm



_____ cm

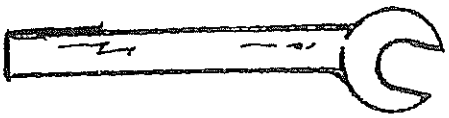


_____ cm

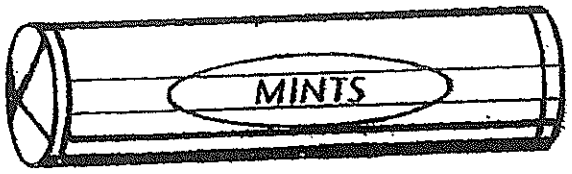


_____ cm

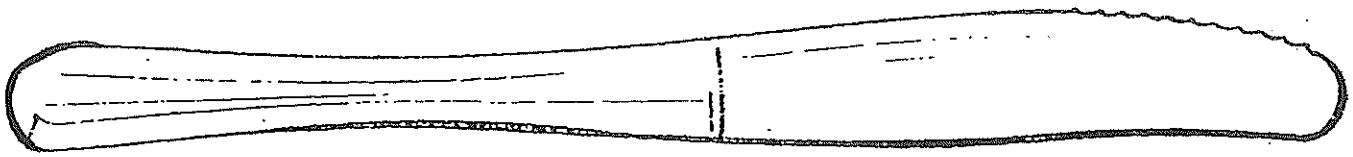
_____ cm



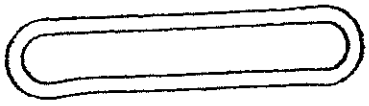
_____ cm



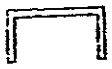
_____ cm



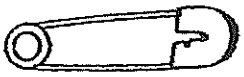
_____ cm



_____ cm

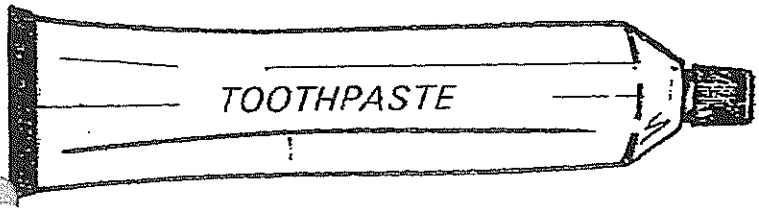


_____ cm

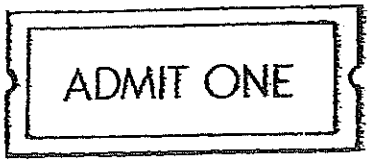


_____ cm

_____ cm



_____ cm



_____ cm

_____ cm

NAME_____ DATE_____ PER____

METRIC CONVERSION WORKSHEET

k h da (~) d c m

1) 5000 mm=_____M

2) 60 L =_____ml

3) 12 cl=_____ml

4) 23 Kl=_____L

5) .5 M=_____cm

6) 65 Kg=_____g

7) 1775 g=_____cg

8) 9800 cl=_____L

9) 54 Kg=_____g

10) 2.75 g=_____cg

11) 350 cm=_____M

12) 150 Km=_____M

13) 1500 cg=_____g

14) 2650 cm=_____M

15) 345 mg=_____cg

16) 33 g=_____mg

17) 4.8 cm=_____mm

18) 2300mg=_____g

19) 67500 ml=_____L

20) 73 M=_____mm

12

Metric Conversions Practice

K H D u d c m

1. 5.24 km = _____ m
2. 3.02 cm = _____ m
3. 4.78 m = _____ cm
4. 3.91 mm = _____ m
5. 10.05 mm = _____ cm
6. .0093 Km = _____ mm
7. .898 Km = _____ m
8. 24.29 m = _____ mm
9. 257 mm = _____ km
10. 9,900 cm = _____km
11. .12345 km = _____cm
12. 37 mm = _____cm
13. 50 cm = _____mm
14. 10.56 mm = _____ m
15. 5.33 km = _____ m
16. 7.77 cm = _____ mm
17. 85m = _____ km
18. 4.24 mm = _____ cm

DENSITY, MASS and VOLUME

If an object has a mass of 240g on Earth, the mass of the object on the moon will be? (more, less, the same)

Why? _____

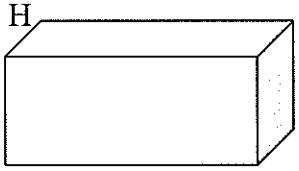
If an object is **cut in half**, what happens to its **density**? _____

Why? _____

VOLUME Formula:

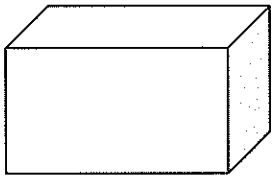
V = _____

Label: L, W, H



Calculate the volume of the following box:

Length = 4.0 cm
Width =3.2cm
Height = 12.3



Volume = _____

Volume = _____

Volume = _____ (Don't forget UNITS!!)

The volume of a rock can be measured during a _____.

DENSITY - _____

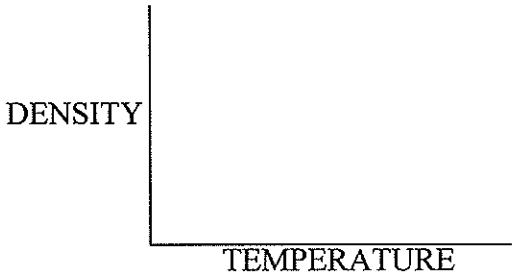
DENSITY NEVER CHANGES unless you ADD HEAT, TAKE AWAY HEAT, ADD OR TAKE AWAY PRESSURE!!

When an object is **HEATED** it will _____ and the atoms become _____ packed.

This makes the object _____ dense.

When an objected is **COOLED** it will _____ and the atoms become _____ packed.

This makes the object _____ dense.



DENSITY PRACTICE
Date_____

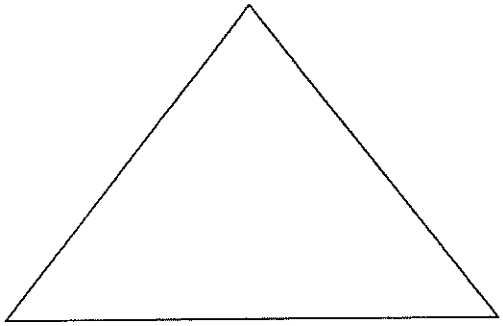
Name_____
Period _____

DENSITY PRACTICE WORKSHEET

Directions:

- Write which formula you are using in the space provided
- Show all work
- Record answer

1. Fill in the Density triangle and use it to solve the following problems.



2. Mass = 20g
   Denisty = 5g/ml
   Volume = _____

   Formula used:
   Show calculations:

3. Density = 10 g/cm^3
   Volume = 2 cm^3
   Mass = _____

   Formula used:
   Show calculations:

4. Mass = 50 g
   Volume = 25 cm^3
   Density = _____

   Formula used:
   Show calculations:

Complete problem from rock slide:

(Write formula) Density = _____

(Input data) Density = _____

(Calculate) Density = _____ (DON'T FORGET UNITS!!)

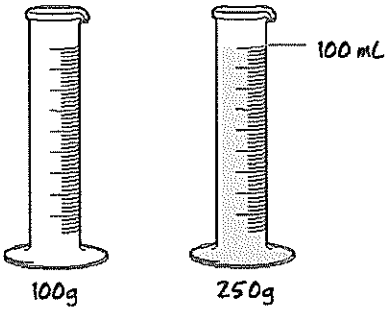
Complete problem from box slide: (Mass = 120g)

Volume = _____ Density = _____

Volume = _____ Density = _____

Volume = _____ Density = _____

Solve for the density of the liquid.



Mass = _____

Volume = _____

Density = _____

Workspace:

Density of WATER = _____

Any material with a density more than water it will _____.

Any material with a density less than water it will _____.

If an object has a mass of 25g and a volume of 50ml, will it sink or float in liquid water?

Workspace:

Circle one: Object will sink / Object will float

During which phase of matter **(solid, liquid or gas)** are most materials…

MOST DENSE - _____ **LEAST DENSE** - _____

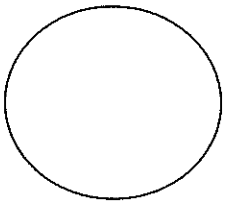
LATITUDE AND LONGITUDE

Latitude and Longitude is the _____ used to locate any point on planet Earth.

What are **latitude** lines?

_____.

Draw in the latitude lines:

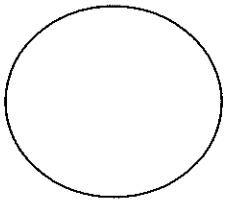


The _____ is the 0 degree line of latitude.

How is latitude measured? _____.

What are **longitude** lines? _____.

Draw in the longitude lines:

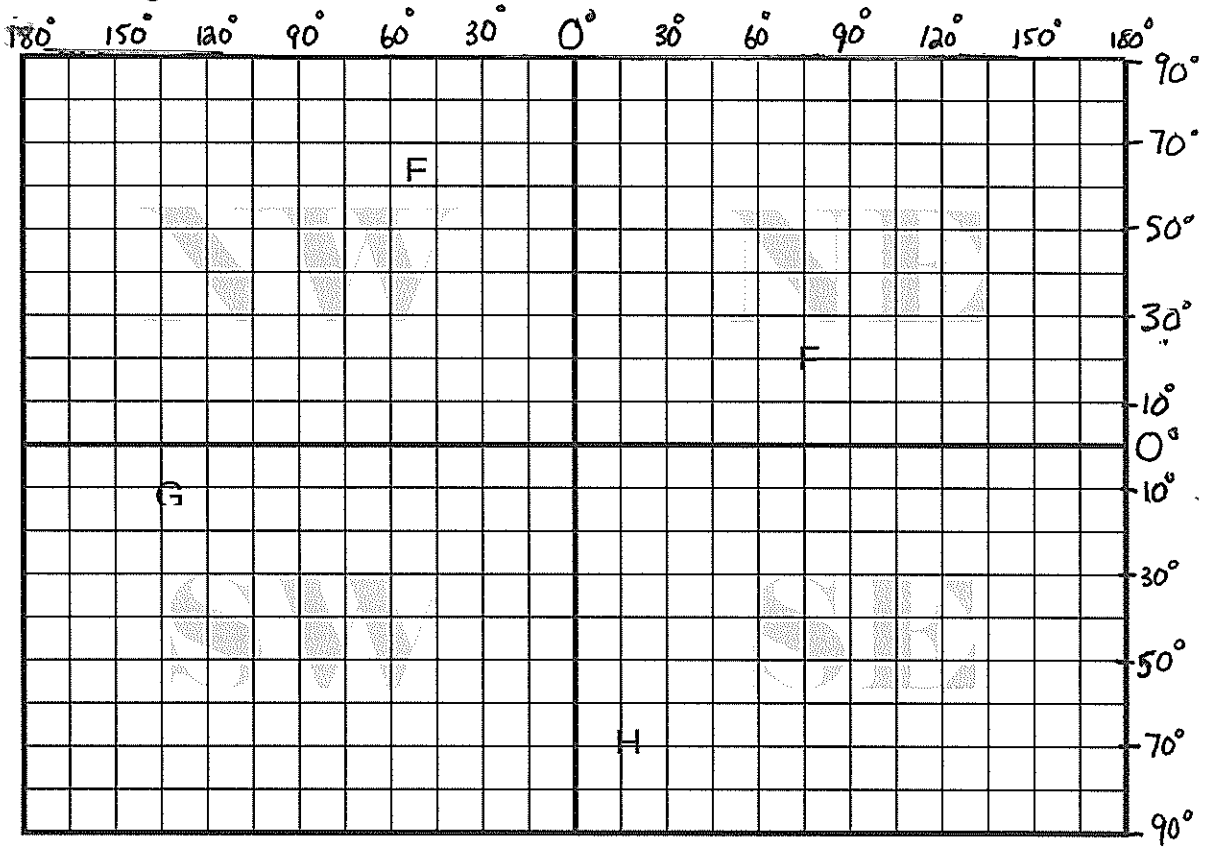


The _____ is the 0 degree line of longitude.

How is longitude measured? _____.

Directions: Plot the following points.

A – 25N, 100W
B – 30S, 100E
C – 80S, 65W
D – 45N, 105E



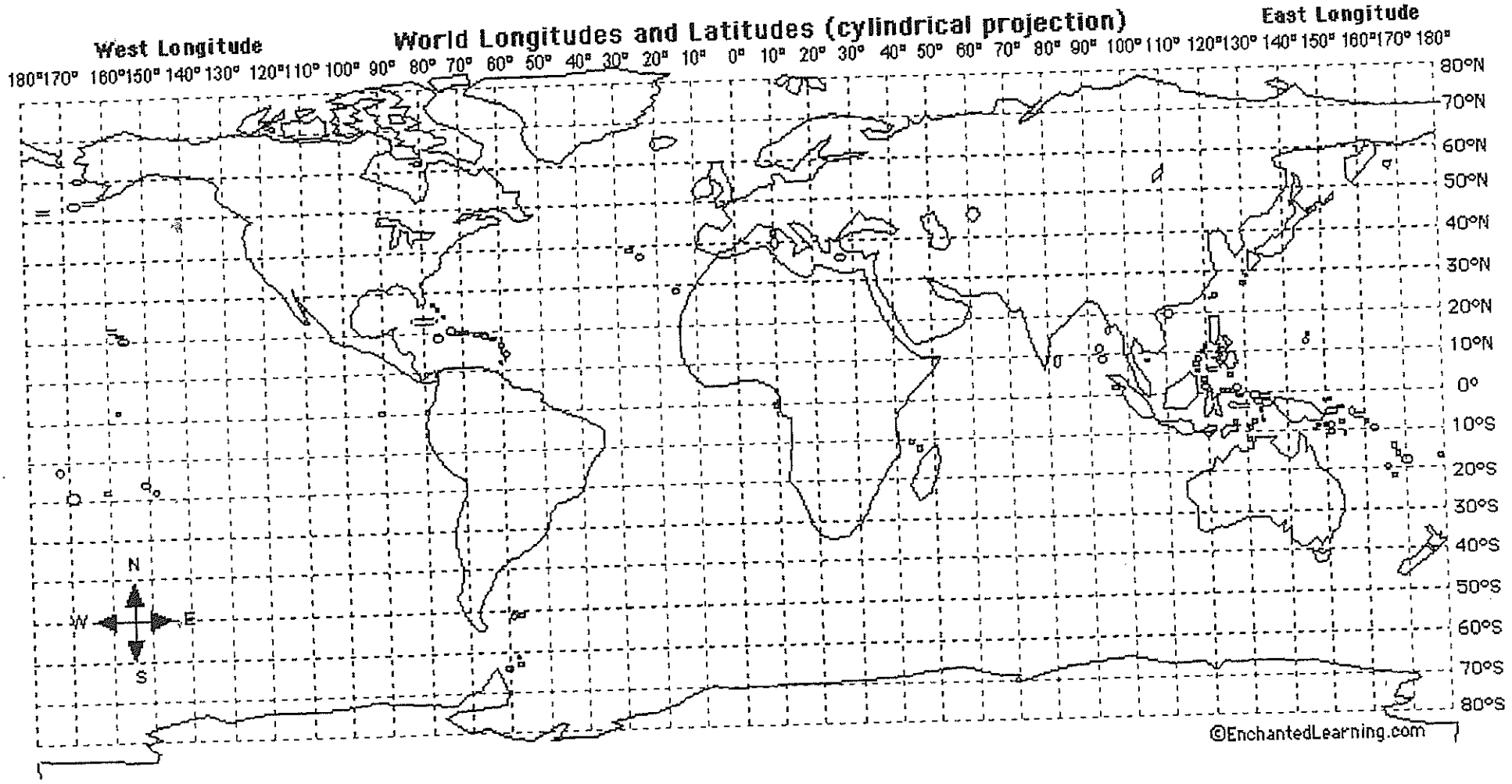
Full Name _____ Class Period _____

Latitude and Longitude
Locating the World's Capitols

Draw a red line along the equator (0 degrees latitude).
Draw a blue line along the Prime Meridian (0 degrees longitude).

Mark the following locations on your map with a dot and the appropriate symbol.

Symbol	City	Latitude	Longitude
B	Beijing	40°N	116°E
C	Cairo	30°N	31°E
CT	Cape Town	34°S	18°E
H	Hong Kong	22°N	114°E
J	Jakarta	6°S	106°E
LA	Los Angeles	34°N	118°W
LI	Lima	12°S	77°W
LO	London	51°N	0°W
MC	Mexico City	19°N	99°W
MO	Moscow	55°N	37°E
MU	Mumbai	19°N	72°E
NA	Nairobi	1°S	37°E
NO	New Orleans	30°N	90°W
NY	New York	40°N	74°W
R	Rio de Janeiro	23°S	43°E
SE	Seattle	47°N	122°W
SY	Sydney	34°S	151°E
TK	Tokyo	35°N	139°E
T	Toronto	43°N	79°W


World Longitudes and Latitudes (cylindrical projection)
West Longitude
East Longitude
180° 170° 160° 150° 140° 130° 120° 110° 100° 90° 80° 70° 60° 50° 40° 30° 20° 10° 0° 10° 20° 30° 40° 50° 60° 70° 80° 90° 100° 110° 120° 130° 140° 150° 160° 170° 180°
80°N
70°N
60°N
50°N
40°N
30°N
20°N
10°N
0°
10°S
20°S
30°S
40°S
50°S
60°S
70°S
80°S
N
W
E
S
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State the coordinates of each of the letters on the map.

E = _____ **F =** _____ **G =** _____ **H=** _____

Longitude is based on Earth's _____ (SPINNING)

Each hour, Earth rotates _____ per hour.

How many TIME ZONES are there? _____.

People on the SAME LINE OF LONGITUDE have the same _____.

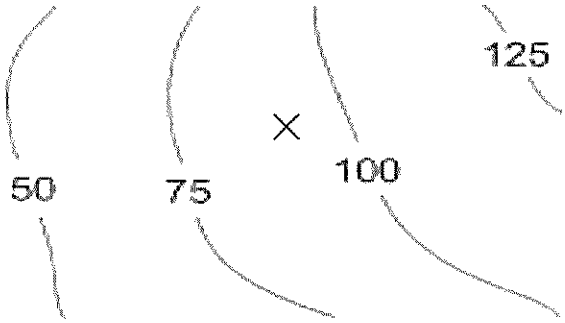
TOPOGRAPHY MAPS

What is the purpose of a topography (Contour) map? _____.

Who uses topography maps? _____.

When might someone use a topography map? _____.

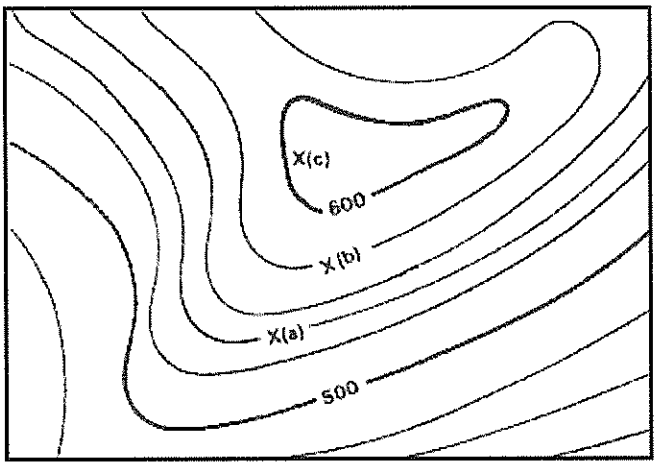
Map 1 Practice



Contour interval of this map equals - _____

What is the elevation of letter X? _____

Map 2 Practice



What is the contour interval of this map? _____

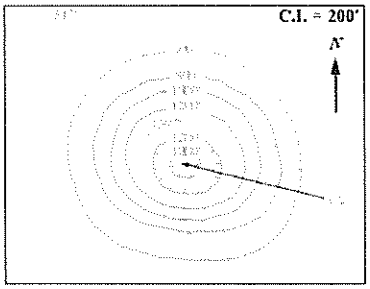
What is the elevation of letter A? _____

What is the elevation of letter B? _____

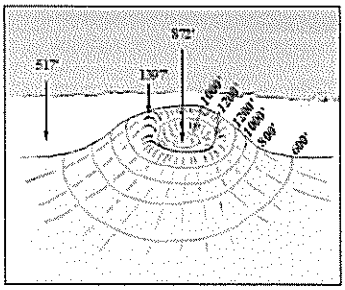
What is the highest possible elevation on this map? _____

HACHURED LINES

Topographic Map View

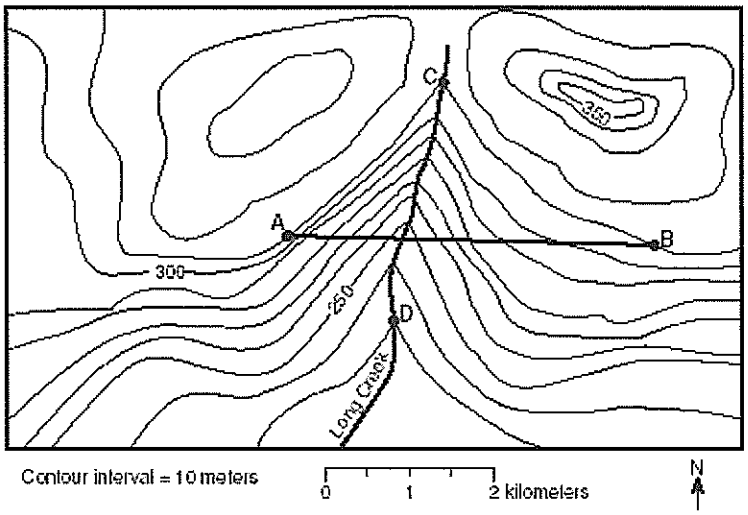


Real Life View



What do hachured lines show? _____.

FINDING RIVER DIRECTION USING A TOPOGRAPHIC MAP



If North is at the top of the page, what direction is the river flowing? _____

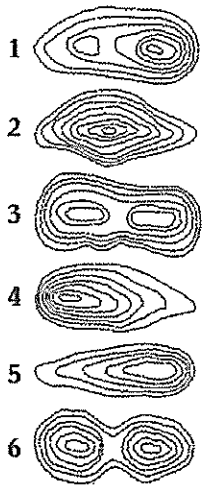
Can rivers flow North? _____

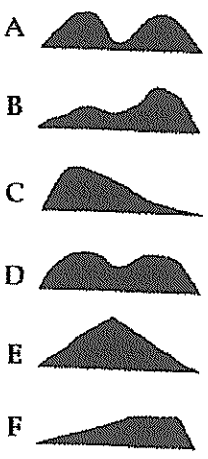
Name two ways that you can determine which way a river flows on a topographic map.

1. _____

2. _____

Draw lines to match the correct contour map to the correct picture.

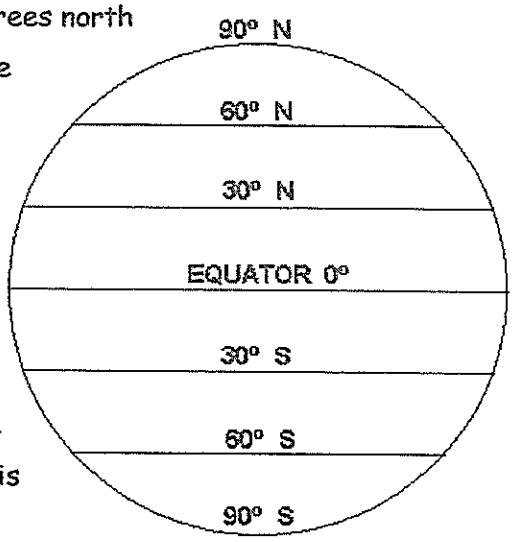




What is Latitude?

Name: _____ Class: ___

Latitude is defined as a measurement of distance in degrees north and south of the equator. The word latitude is derived from the Latin word , "latus", meaning "wide."



There are 90 degrees of latitude from the equator to each of the north and south poles. Latitude lines are pictured on the globe to the right. Latitude lines are parallel, that is they are the same distance apart. In fact, they are sometimes called parallels.

At 7,926 miles (12, 756 km) in length, the equator is the longest of all lines of latitude. It divides the earth in half and is measured as 0^{o} (zero degrees).

Positions on latitude lines above the equator are called "north" and are in the northern hemisphere. Miami, Florida, for example, is nearly twenty-five degrees north of the equator. Its approximate latitude is written as 25°N. Positions on latitude lines below the equator are called "south". Brisbane Australia, for example, is near the thirty degree latitude line too, but in the southern hemisphere. Its latitude is written as 30^{o} S.

Complete the Following

a. Lines of latitude are _____ to the equator.

b. There are _____ degrees of latitude north and south of the equator.

c. The equator is _____ degrees.

d. Another name for latitude lines is _____ .

e. The equator divides the earth into _____ equal parts.

Write a definition of latitude.

_____

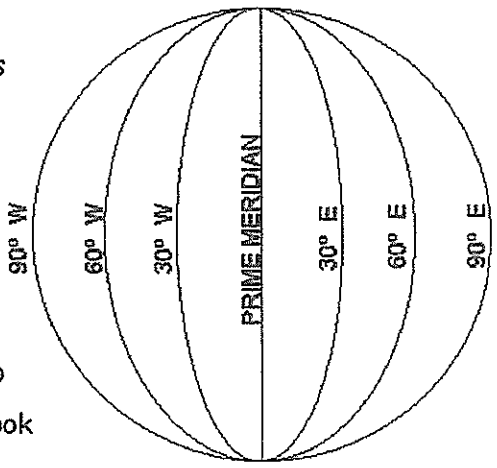
_____

_____

Prepared by Jim Cornish, Gander, Newfoundland, Canada
Graphics used with permission of The Mariners' Museum
http://www.mariner.org/age/index.htm

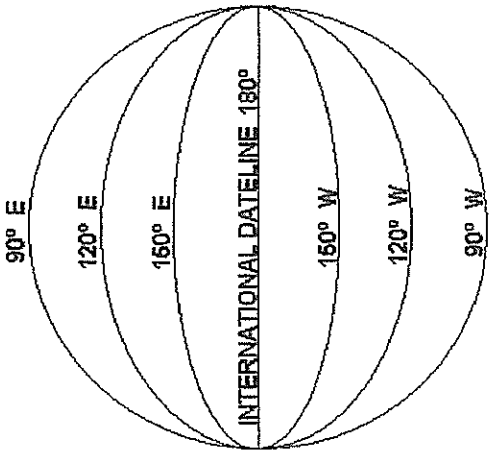
What is Longitude?

Longitude is defined as measurement of distance in degrees east or west of the prime meridian. The word longitude is derived from the Latin word, "longus", meaning "length". The prime meridian divides the earth in half too. It is also 0°. It passes through the community of Greenwich, England.



The prime meridian, as do all other lines of longitude, pass through the north and south pole. This is shown in the diagrams to the right. Longitude lines are not parallel. They make the earth look like a peeled orange.

There are 180 lines of longitude on the each side of the prime meridian. But on the opposite side, the prime meridian is not zero degrees but 180°. Here, it is called the International Date line.



Longitude lines to the left of the prime meridian give locations west, in the western hemisphere. Longitude lines to the right of the prime meridian give locations east, in the eastern hemisphere. Miami, Florida, for example, is near the 80 ° line of longitude. It is west of the prime meridian and is written 80° W.

Complete the Following

a. Longitude lines connect the _____ pole with the _____ pole.

b. The line of 0°C longitude is called the _____ .

c. Longitude lines give directions _____ and _____ of the prime meridian.

d. There are _____ degrees of longitude each side of the prime meridian.

e. Longitude lines are not _____ like latitude lines.

Write a definition of longitude.

_____

_____

_____

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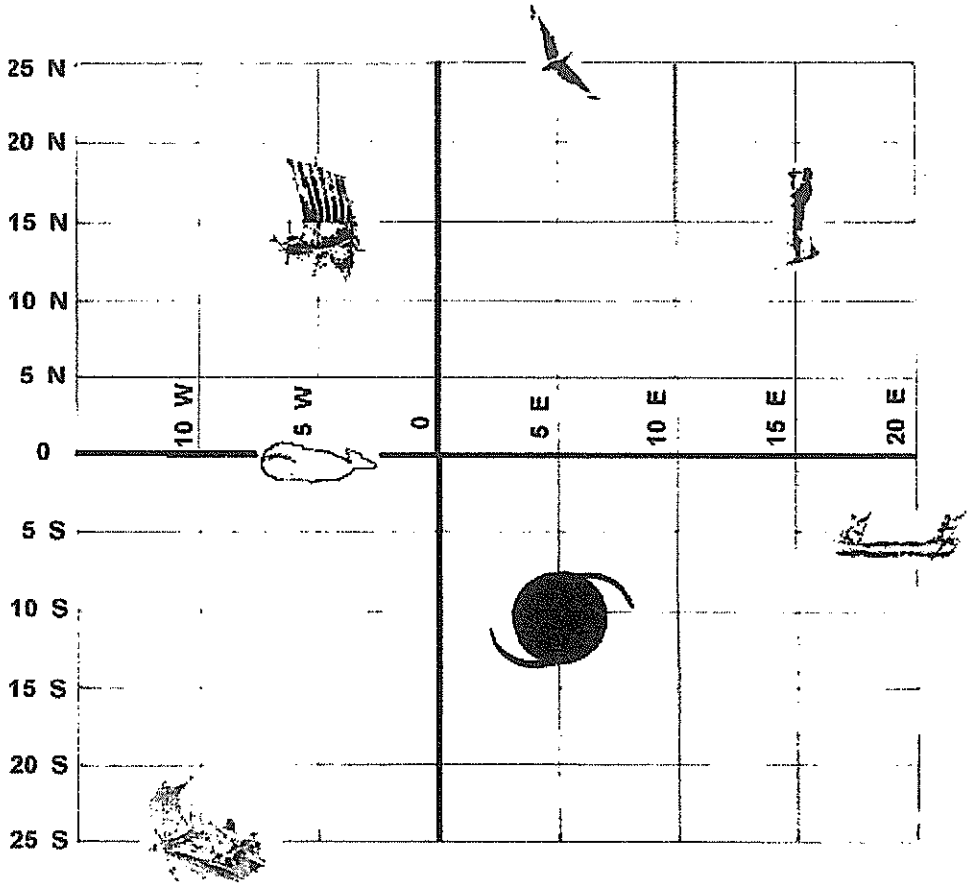
http://www.mariner.org/age/index.htm

Using Latitude and Longitude

To find your exact location on a map, you need to determine which latitude line and which longitude line meet where you are standing. When writing locations, the latitude is given first. Miami, Florida then, has a location of 25° North and 80° West. This is usually written in a short form as 25° N 80° W.

Give the latitude and longitude of the shapes positioned on the grid below.



Viking Ship _____

Hurricane _____

Tourist _____

Rafter _____

Whale _____

Canoeists _____

Flying Bird _____

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http://www.mariner.org/age/index.htm

Name:_____ Period: _____

Experimental Design Worksheet

Chris wanted to test the effect of aspirin on how tall the tomato plantsin his grden would grow. He took two pots and filled each with 250 grams of soil from the same bag and planted four tomato plants in each. The plants were placed in the same location to ensure they were at the same temperature and got the same amount of sunlight. Every other day he watered one pot with 100 mL of tap water and he watered the other pot with 100mL of tap water mixed with dissolved aspirin. The experiment ran for eight weeks. At the end of each week he measured the height of the plants and averaged the height of the four plants in each pot. He then graphed the results to show how the aspirin affected the height of the plants.

1. What would be considered the control group in this experiment?

2. What would be considered the experimental group in this experiment?

3. Write a hypothesis for this experiment in the If/Then style.

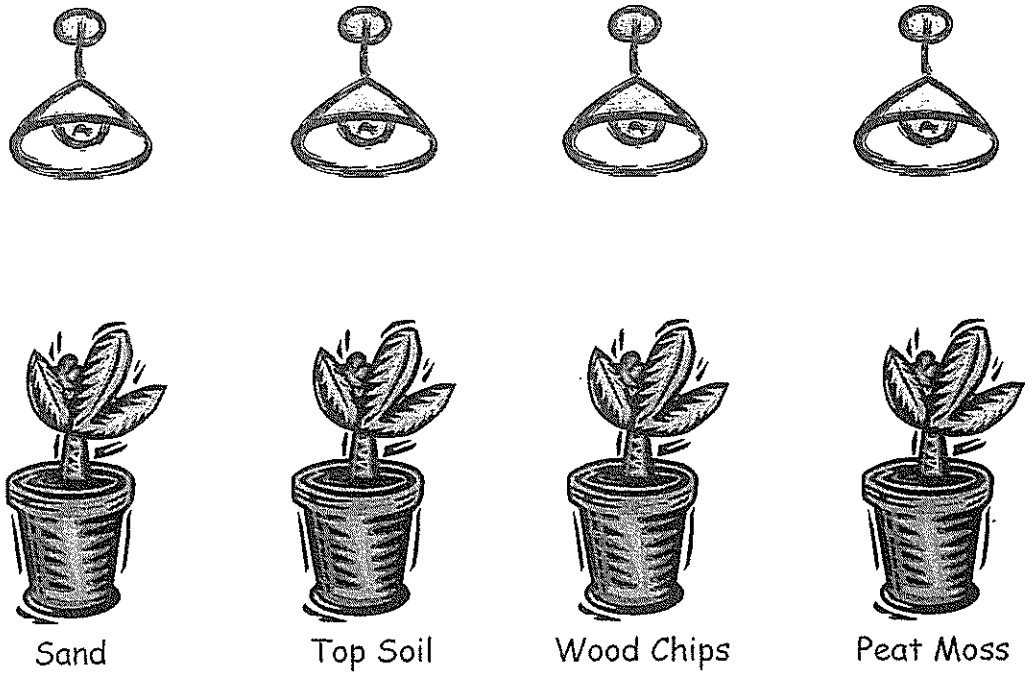
4. What is the independent variable in this experiment?

5. What is the dependent variable in this experiment?

6. What are some control factors (constants) in this experiment?

Name: _____ Period: _____

A student conducts an experiment to determine the effects of different soil on plant growth.



Sand Top Soil Wood Chips Peat Moss

1. State the problem (a question) for this experiment.
2. State a hypothesis.
3. What is the Control Group?
4. What is the Experimental Group?
5. What is the Independent Variable?
6. What is the Dependent Variable?
7. What are some Control Factors (things that are kept the same)?