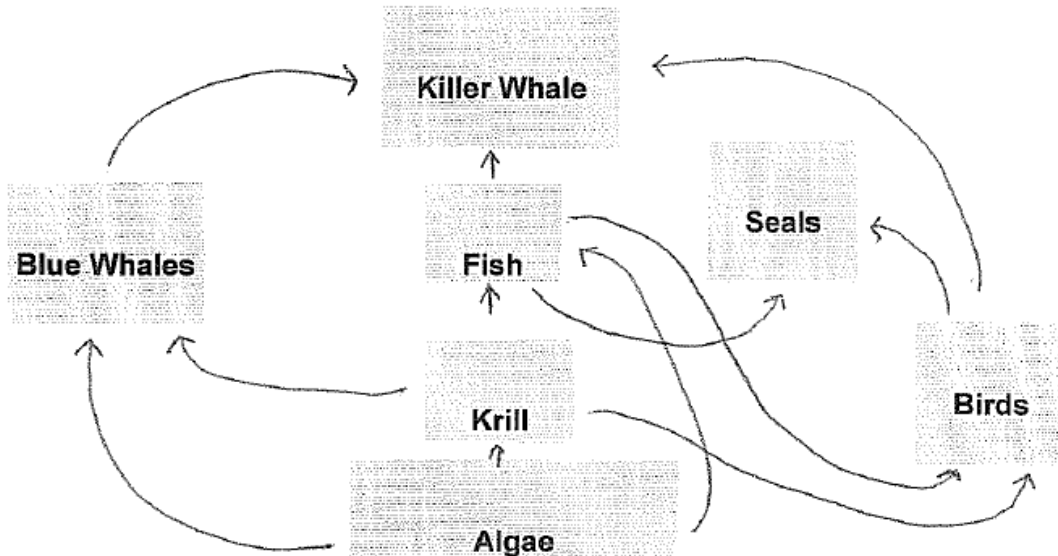


**NAME/EMAIL ADDRESS:**

**Task 1: Sustainable Ecosystems and Human Activity**



1. Name the different types of ecosystems.

2. The best description of this type of the ecosystem above is:

aquatic      terrestrial      both      neither

3. If the krill population was to be reduced by a disease, how many of the other animals would be affected?

2                      3                      4                      5

4. How might this food web be affected if humans accidentally introduced adult green sea turtles (herbivores) into the ecosystem?

5. Describe what could happen to the balance in this food web if humans killed most of the fish in the ecosystem.

6. Predict the effect on the food web if humans allowed a chemical pesticide to leak into the water component of this ecosystem.

*Define the following terms:*

Ecosystem

Aquatic

Terrestrial

Food Web

Population

## Task 2: Periodic Table of the Elements

1. The chemical formula for aluminum oxide is  $Al_2O_3$ . Which element is the metal?

Al Aluminum

O Oxide

2. Which element is more like Cl chlorine (#17) in a chemical reaction?

Kr Krypton (#36)

F fluorine (#9)

3. Which element's atomic structure is bigger?

Pt platinum (#78)

In indium (#49)

a. How do you know this?

4. How many electrons does Ni nickel have in its atomic structure?

20

29

28

27

b. How do you know this?

5. How many energy levels does Bi bismuth (#83) have in its atomic structure?

4

5

7

6

b. How do you know this?

6. *Define the following:*

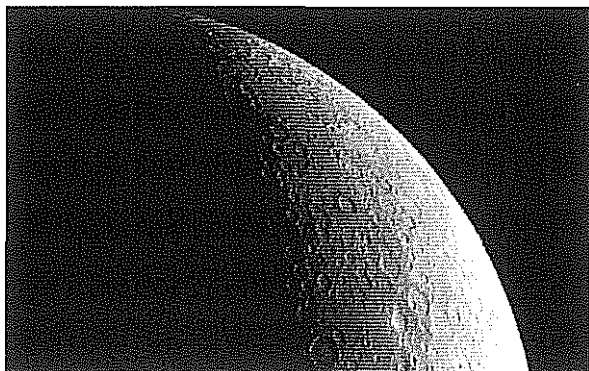
Periodic table

Metal

Metalloid

Nonmetal

### **TASK 3: SPACE EXPLORATION**



Mercury is the planet closest to the Sun. After the demotion of Pluto to "dwarf planet," Mercury is now considered the smallest planet in the solar system.

Temperatures on the daylight side of Mercury can reach 850 degrees Fahrenheit and plunge to minus 150 degrees on the night side. Mercury rotates slowly: one rotation takes 59 days, or

two thirds of a Mercury year, which is 88 days in length. It has a large iron core and thin outer crust, which leads many planetary scientists to believe that a large collision early in the solar system stripped away much of the outside of Mercury.

For years, many planetary scientists did not express much curiosity about Mercury, which looked gray and cratered a slightly larger version of the Moon.

But data released from NASA's Mercury Messenger spacecraft, which entered orbit around Mercury in March 2011, is painting a more vibrant picture of the solar system's innermost planet.

In November 2012, NASA scientists reported finding ice near Mercury's poles. Lots of it-enough to encase Washington, D.C., in a frozen block two and a half miles deep.

The ice was found in the deep pits near the poles, where the Sun never shines and temperatures can dip to as cold as minus 370. The ice is almost pure water, which indicates that it arrived within the last few tens of millions of years, possibly from a comet that smacked into Mercury.

The water could also be an intriguing resource for people. Between the scorched equator and the frozen poles, temperatures on Mercury can be temperate, especially a few feet below the surface, where the soil insulates against the temperature swings between day and night an ideal locations to build a colony.

Among Messenger's other findings: Some of Mercury's topography is not seen anywhere else in the solar system rimless pits, for instance and its mineralogy is vastly different from the Moon's, whose rocks have much less potassium.

And high resolution images of craters revealed irregular pits, ranging in width from several hundred feet to a few miles. The pits do not have rims like craters produced by impacts, leading the scientists to speculate that they were etched by some unstable material that evaporated quickly when exposed at the surface.

Mercury has been seen close up, but briefly, in half a dozen flybys by NASA probes: three by the Mariner 10 in the 1970s and three by the Messenger before it settled into an elliptical orbit around the planet.

1. Why after so many years, are scientists intrigued by the Planet Mercury?

2. Do you think that humans would be able to live on Mercury one day? Give two reasons.

3. How long does it take for the Planet Mercury to rotate?

4. *Define the following terms:*

Meteorology

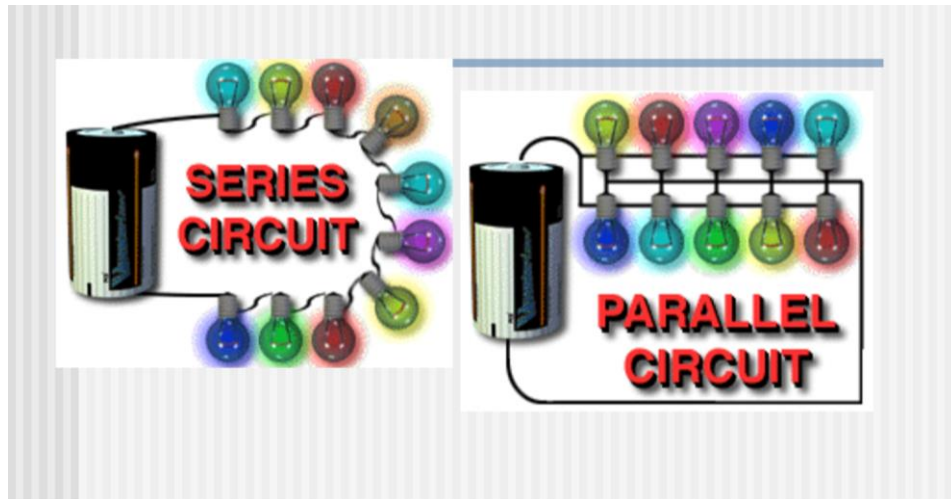
Geology

## Task 4: Electrical Applications

1. Fill in the missing types of circuits in order to complete the definitions.

There are two basic types of electric circuits. They differ in the number of loops through which current can flow. You can see an example of each type of circuit in Figure below.

- A \_\_\_\_\_ circuit has only one loop through which current can flow. If the circuit is interrupted at any point in the loop, no current can flow through the circuit and no devices in the circuit will work in the series circuit in Figure below, if one light bulb burns out the other light bulb will not work because it won't receive any current. Series circuits are commonly used in flashlights.
- A \_\_\_\_\_ circuit has two loops through which current can flow. If the circuit is interrupted in one of the loops, current can still flow through the other loop. For example, if one light bulb burns out in the parallel circuit in Figure below, the other light bulb will still work because current can bypass the burned-out bulb. The wiring in a house consists of parallel circuits.



4. Compare the difference in the pathways of electricity in Circuit I (Series) and Circuit II (Parallel).

5. If the loads are light bulbs in Circuit II and load A stopped working what will happen to the other lights?

6. How does a short circuit occur?

7. *Define the following:*

Loads



Electric circuit

Electric Power

***Experiment:***

Materials to build 2 circuits 2 6v batteries (1 per circuit], 7 wires with alligator clips (series uses 3, parallel uses 4), 4 bulbs and sockets (2 per circuit), 2 switches (1 per circuit)

8. Assemble a series circuit with two lights that are turned off/on with a switch. Why do both lights go out when one of them is removed?

9. Assemble a parallel circuit with 2 lights that are turned off/on with a switch. Why don't both lights go out when one of them is removed?

10. If you added another light to each circuit, predict how it would affect the brightness of all the lights in each circuit.

## Task 5: Cells and Cancer

*1. Define the following:*

Cell

Tissue

Cell division

Mitosis

Diffusion

Nucleus

2. Cell division is called:

mitosis

diffusion

nucleus

3. Tissue that grows from uncontrolled cell division is called a :

gall

stone

boil

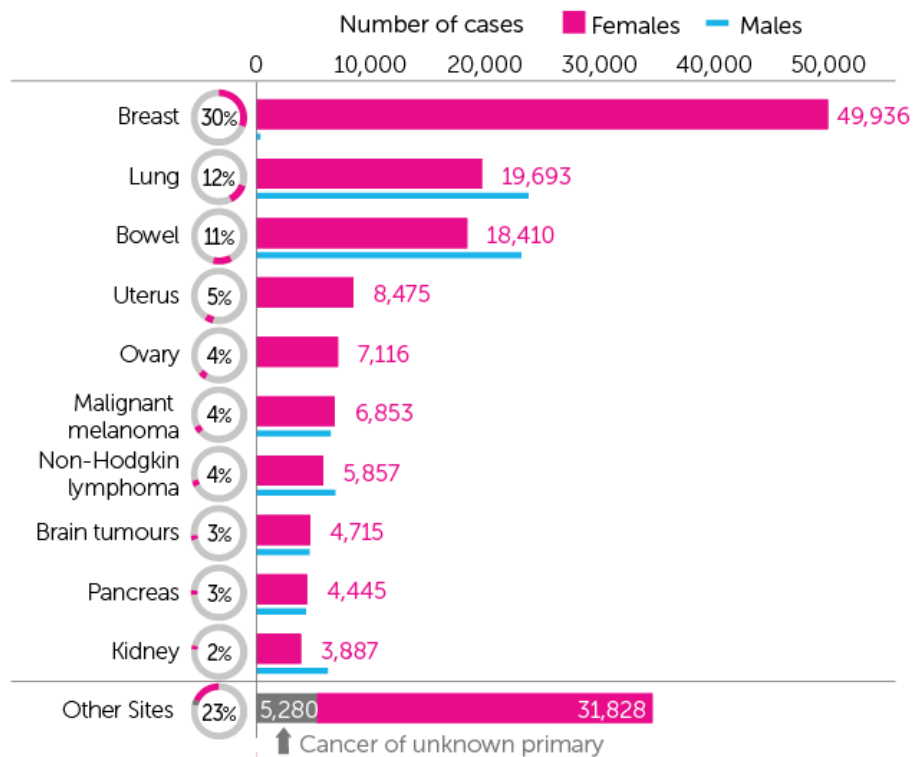
tumour

4. Cancer cells can move into other organ and tissues in the body (called metastasis) from the original location. Which system would transport these cells?

circulatory system

breathing system

digestive system



5. Consider the data in the chart above for 2012. In 2 or 3 sentences write your observations

6. Do you think that this will change over the next 20 years?

7. If you were to add up the percentages of Lung and Breast cancers for women, what would the total percentage be?

## Task 6: Reactions of Acids and Bases

1. Acids and bases are identified by a number system (1-14) called the pH scale. Which number represents a base?

7                      11                      1                      5

2. Acids are common ingredient found in:

fruit                      soaps                      detergent                      eggs

3. All acids have this element in their chemical formula:

Nitrogen                      oxygen                      hydrogen

### ***Experiment:***

Equipment glass or beaker, 1tbsp baking soda and 2 tbsp of white vinegar.

Procedure: Put the baking soda into the glass or beaker. Add the vinegar and observe for one minute.

Record all observations in the chart below

BEFORE	AFTER

2. Which chemical was the acid and which chemical was the base?

6. What occurred when you put the two ingredients together? How do you know this?

*7. Define the following:*

Acid

Base

Chemical Reaction

Neutralization

Indicators

## Task 7: Evidence for Climate Change

1. The atmosphere is thinner over the Arctic due to sunlight being reflected into space.

True

False

2. All carbon dioxide gas on Earth comes from humans.

True

False

3. One of the biggest causes of the "Greenhouse Effect" is the exhaust from automobiles.

True

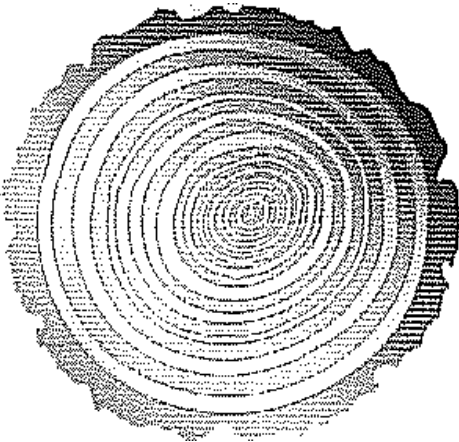
False

4. Weather and climate refer to the same thing.

True

False

5. When looking at a cross section of a tree trunk, compare the width of the rings from the centre (oldest ones) to the bark the rough dark outer layer. Tell how you know that the climate has changed over the years.



5. Give two examples that indicates Global Warming?

6. *Define the following:*

Weather

Climate

Greenhouse Effect

Global Warming



## Task 8: Application of Light

1. Define the following:

Ray

Incident ray

Reflected ray

Diffused light

Angle of incidence

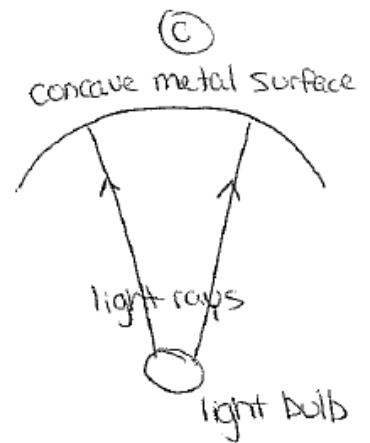
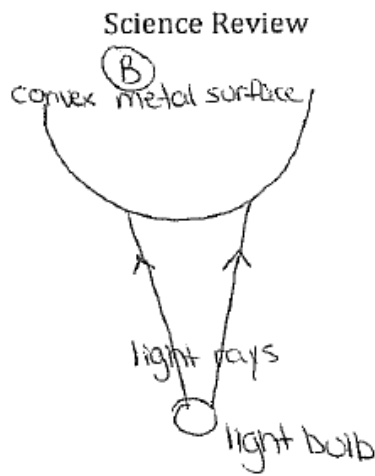
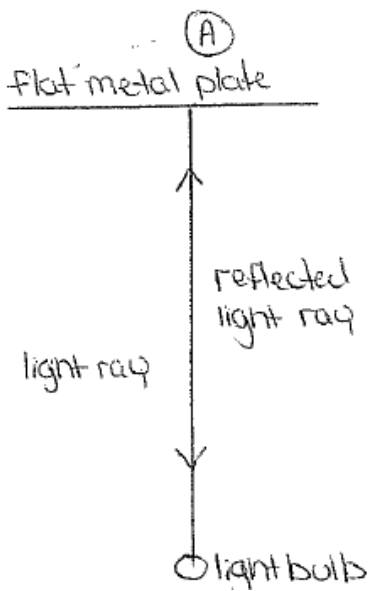
Angle of reflection

2. Light always travels in a straight line.

True      False

3. When a ray of light hits a smooth shiny surface the angle of incidence equals the angle of reflection.

True      False



4. Diffused light is light that is reflected off a non-shiny surface such as polished waxed floor.

True      False

Explain how the lighting fixture in the hall will look for Fixture B and Fixture C

FIXTURE B	FIXTURE C

