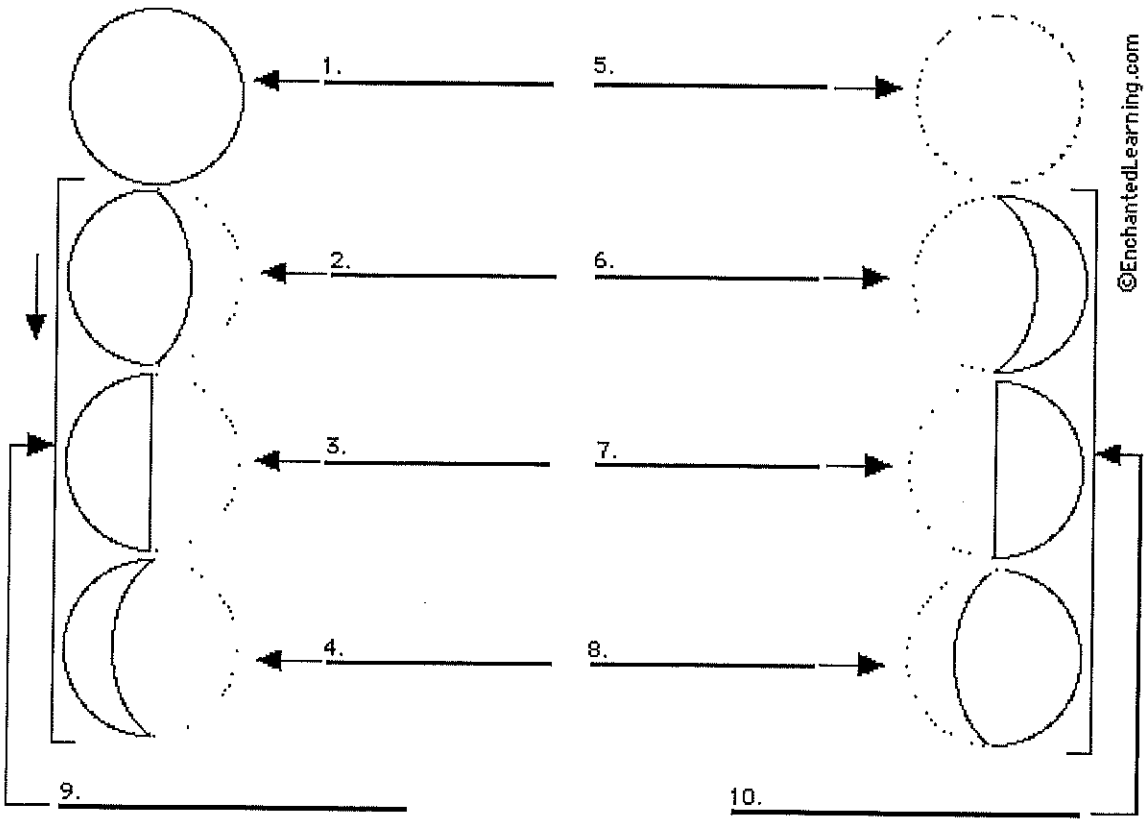
8th Grade Science

Name _____

Identifying Phases of the Moon I

Waxing Crescent – A little part of the moon's right side is lit. ***Full Moon*** - The moon's entire disk is lit because the Earth is between the sun and the moon. ***Waxing Gibbous*** – About $\frac{3}{4}^{th}$ of the right side moon's disk is lit. ***1st Quarter*** - The right half of the moon's disk is lit. ***Waxing*** – Getting larger.	***New Moon*** - The moon's disk facing us is dark because the moon is between the sun and the Earth. ***Last Quarter*** - The left half of the moon's disk is lit. ***Waning Crescent*** - A little part of the moon's left side is lit. ***Waning Gibbous*** - About $\frac{3}{4}^{th}$ of the left side moon's disk is lit. ***Waning*** – Getting smaller.



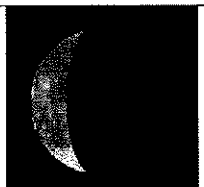
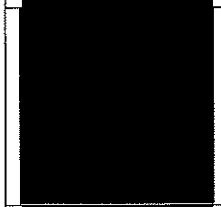
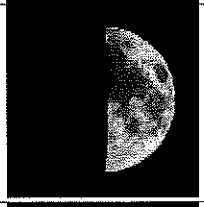
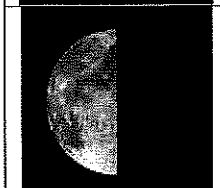
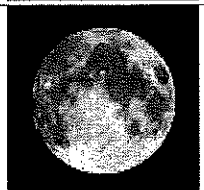
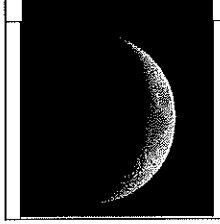
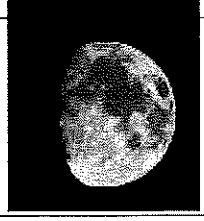
Are Moons 1-4 waxing or waning?

Are Moons 5-8 waxing or waning?

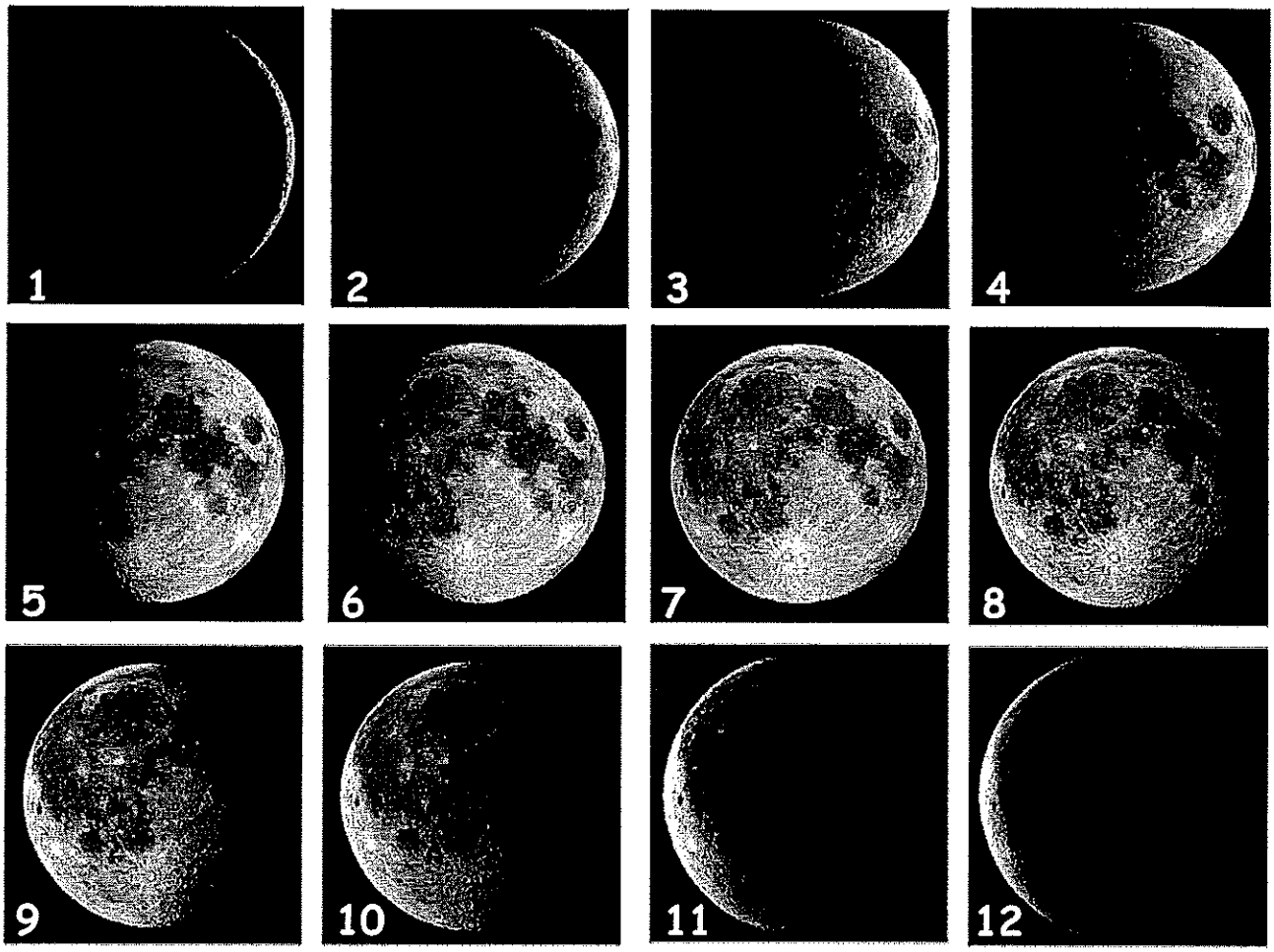
Identifying the Phases of the Moon II

Waxing Crescent – when we can see only a sliver of the moon's disk (*right*-hand side). ***Full Moon*** – when the moon's disk is light because the Earth is between the sun and the moon ***Waxing Gibbous*** – when we can see roughly three-quarters of the moon's disk (the *right* side of the moon is lit). ***First Quarter*** – can see one-half of the moon's disk (at First Quarter, you see the *right* half of the moon lit [this one-quarter of the entire moon's surface]).	***New Moon*** – when the moon's disk is dark (and invisible to us) because the moon is between the sun and the Earth ***Last/3rd Quarter*** – can see one-half of the moon's disk (at Last/3rd Quarter, you see the *left half* of the moon lit [this one-quarter of the entire moon's surface]). ***Waning Gibbous*** – when we can see roughly three-quarters of the moon's disk (the *left side* of the moon is lit). ***Waning Crescent*** – when we can see only a sliver of the moon's disk (*left*-hand side).

Using the table above, write the phase of the moon shown in the picture.

Identifying Phases of the Moon III



Using the pictures above, complete the worksheet.

Which image shows First Quarter? _____ Full? _____ Third Quarter? _____

Which images are crescents? _____ Gibbous? _____

Which images are waxing? _____ through _____

Which images are waning? _____ through _____

Identifying Phases of the Moon IV

For each of the diagrams below, ***identify the exact phase*** of each and then ***order*** the phases (1 thru 8) in sequence beginning with the New Moon as #1.

A

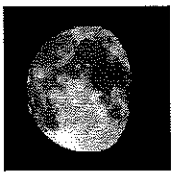
Phase:

Order:

B

Phase:

Order:



C

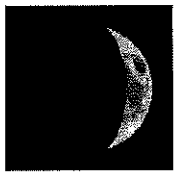
Phase:

Order:

D

Phase:

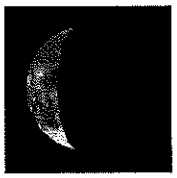
Order:



E

Phase:

Order:



F

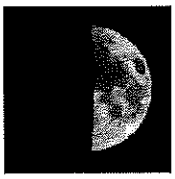
Phase:

Order:

G

Phase:

Order:



H

Phase:

Order:

Phases:

1. New Moon
2. Waxing Crescent
3. 1st Quarter
4. Waxing Gibbous
5. Full Moon
6. Waning Gibbous
7. Last Quarter
8. Waning Crescent

Name_____ Date_____ Class_____

Earth, Moon, and Sun *Section Summary*

Phases, Eclipses, and Tides Worksheet

Key Concepts

- What causes the phases of the moon?
- What are solar and lunar eclipses?
- What causes the tides?

As the moon moves, the positions of the moon, Earth, and the sun change in relation to each other. **The changing relative positions of the moon, Earth, and the sun cause the phases of the moon, eclipses, and tides.**

The moon revolves around Earth about once every 27.3 days. It also rotates on its own axis about once every 27.3 days. The same side of the moon always faces Earth. The different shapes of the moon you see from Earth are called **phases. The phase of the moon you see depends on how much of the sunlit side of the moon faces Earth.**

When the moon's shadow hits Earth or Earth's shadow hits the moon, an eclipse occurs. An **eclipse** occurs when an object in space comes between the sun and a third object, and casts a shadow on that object. There are two types of eclipses: solar and lunar.

A solar eclipse occurs when the moon passes between Earth and the sun, blocking the sunlight from reaching Earth. The moon's shadow then hits Earth. So a **solar eclipse** occurs when a new moon blocks your view of the sun. The darkest part of the moon's shadow is called the **umbra.** From any part of the umbra, the moon completely blocks light from the sun. Only people in the umbra see a total solar eclipse. Another part of the shadow is less dark and larger than the umbra. It is called the **penumbra.** From within the penumbra, people see a partial eclipse because part of the sun is still visible.

A lunar eclipse occurs at a full moon when Earth is directly between the moon and the sun. **During a lunar eclipse, Earth's shadow falls on the moon.** Earth's shadow also has an umbra and a penumbra. When the moon is completely within Earth's umbra, you see a total lunar eclipse. A partial lunar eclipse happens when the moon moves partly into Earth's umbra.

Tides are the rise and fall of the ocean's water every 12.5 hours or so. The force of gravity pulls the moon and Earth toward each other. **Tides are caused mainly by differences in how much the moon pulls on different parts of Earth.** As Earth rotates, the moon's gravity pulls water toward the point on Earth's surface closest to the moon. The moon pulls least on the side of Earth farthest away. Two tides occur each day because of this difference in the pull of the moon's gravity.

Twice a month, the moon, Earth, and the sun are in a straight line. The combined forces of the gravity of the sun and moon produce an especially high tide—called a **spring tide**—and an especially low tide. Also twice a month, the pull of gravity of the sun and moon are at right angles to each other. At those times the high tide is lower than usual, and is called a **neap tide.** The low tides then are higher than usual.

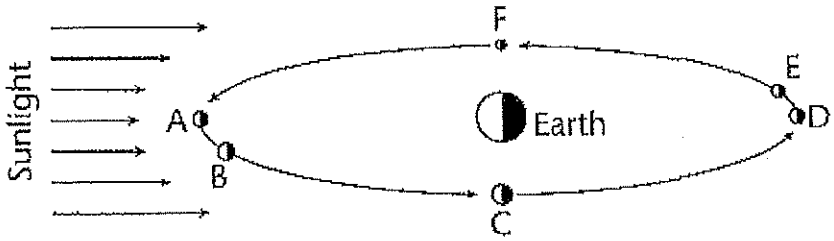
Name _____ Date_____ Class _____

Phases, Eclipses, and Tides Worksheet

Understanding Main Ideas

Use the following figure to answer questions 1 and 2. Write your answers on a separate sheet of paper.

1. What phases of the moon would someone on Earth see when the moon is at positions A through F?



Phase at A_____

Phase at B _____

Phase at C _____

Phase at D _____ Phase at E_____ Phase at F_____

2. What kind of tide (spring or neap) will occur when the moon is at positions A, C, D, and F?

A_____ C_____ D_____ F_____

Building Vocabulary

From the list below, choose the term that best completes each sentence, and write it in the blank.

phase gravity penumbra umbra solar
tides lunar eclipse spring neap

3. A(n) _____ tide occurs when the sun is at right angles to the line between Earth and the moon.

4. A(n) _____ occurs when the moon's shadow hits Earth or Earth's shadow hits the moon.

5. A person standing in the moon's _____ would see a partial solar eclipse.

6. Differences in the moon's pull on different parts of Earth cause_____.

7. A person standing in the moon's _____ would see a total solar eclipse.

8. The_____ of the moon you see depends on how much of the sunlit side of the moon faces Earth.

9. A(n) _____ tide occurs when the sun, moon, and Earth line up.

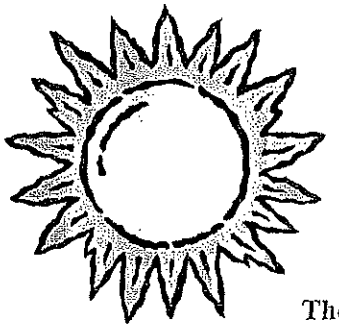
10. A(n) _____ eclipse occurs at a full moon when Earth is directly between the moon and the sun.

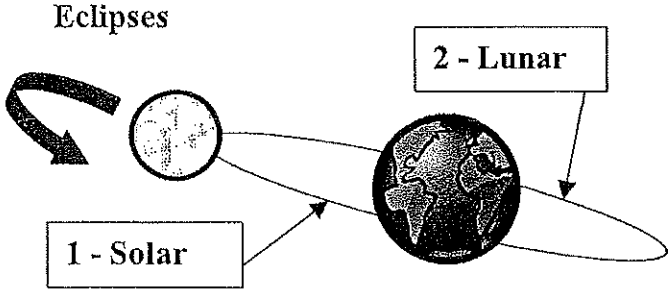
11. A(n) _____ eclipse occurs when the moon passes between Earth and the sun.

12. The force of _____ pulls the moon and Earth toward each other.

Name _____ Date _____

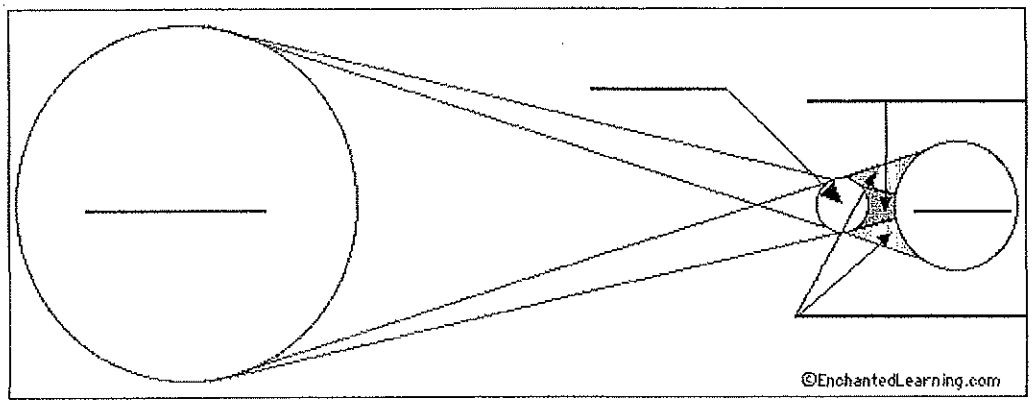
Eclipses



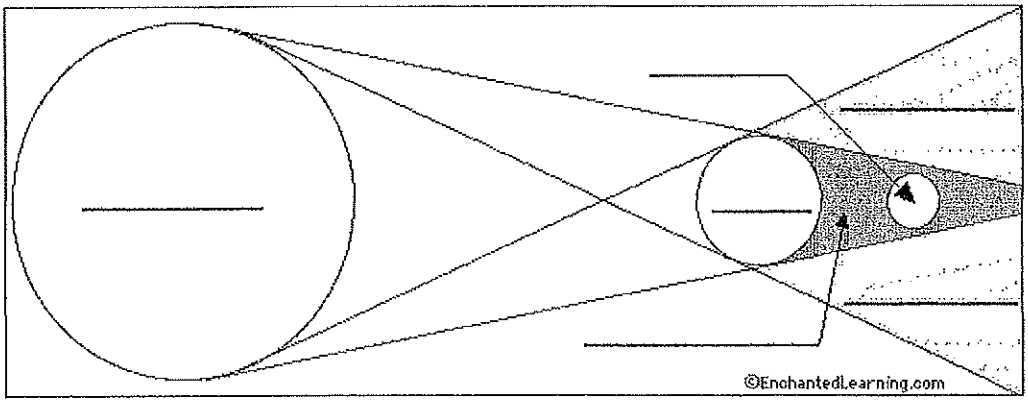


The moon's orbit is tilted 5 degrees from the Earth's orbit. There are two points in this orbit that can cause an eclipse to occur.

1



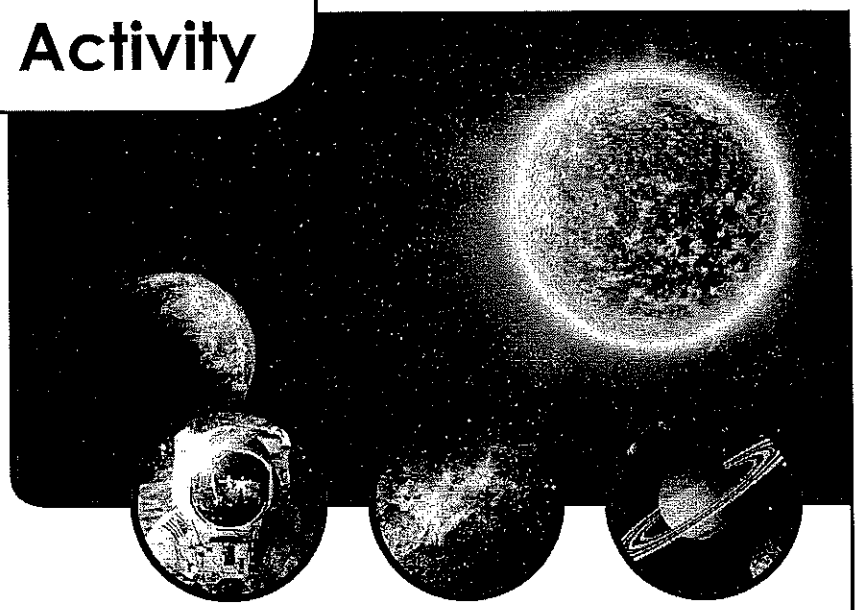
2



Fill in the blanks using this word bank & then color in the diagram:

Earth – (BLUE) the planet on which we live.
Moon – (WHITE) the natural satellite of the Earth.
Penumbra – (GRAY) the area in which the shadow of an object (the moon on the Earth) is partial, and the area in which a partial solar eclipse is experienced.
Sun – (YELLOW) the star in our Solar System.
Umbra – (BLACK) the area in which the shadow of an object (the moon on the Earth) is total, and the area in which a total solar eclipse is experienced.

Solar System Scavenger Hunt Activity



Materials:

Solar system questions worksheet (pages 2-3)
18 solar system fact cards (pages 4-8)
Tape and scissors

Preparation

Print the fact cards on card stock or brightly-colored paper and cut them apart along the dotted lines.

Make copies of the solar system questions worksheet (2-sided). Each student will need his or her own copy.

Hide all 18 solar system fact cards around your classroom where students will be able to find them. You can put them on the back of your classroom door, on chairs, on the computer keyboard, on the sides of student desks, or wherever you like.

Activity

Students receive copies of the question worksheet. They have to search the classroom to find the fact cards to answer the questions.

After they have completed the question sheet, you can go over the answers together with the class.

Management tips

You may want to make this a silent activity so students don't share answers with each other.

You can have the kids work by themselves or with partners.

Don't be afraid to hide the facts in tough places. Kids think it's more fun when they have to search around a little.

Examples of good hiding spots might include:

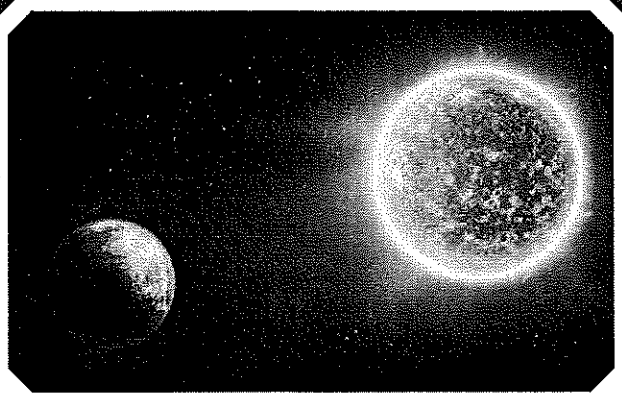
- sticking out of a book, like a bookmark
- the back of the classroom door
- laying flat on the bookshelf
- on the back of the teacher's chair
- on the side of your computer monitor

Have a plan for students who finish early. You may want to have an assignment for them to complete when they're done, or you may have them help other students find fact cards.

Scavenger Hunt

Solar System

Fact Card 1

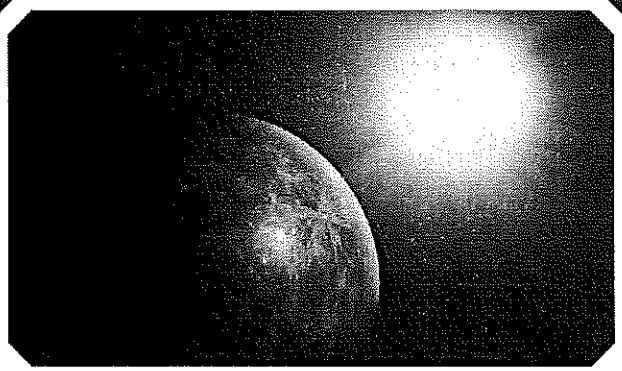


The sun is 93-million miles away from Earth. This is equal to 146-million kilometers.

Scavenger Hunt

Solar System

Fact Card 2

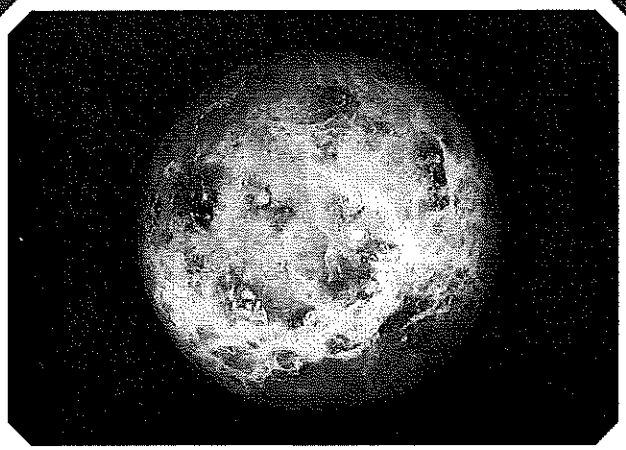


Mercury is the closest planet to the sun, but it is not the hottest. Venus is the hottest planet because it has many clouds that trap in heat.

Scavenger Hunt

Solar System

Fact Card 3



Venus has more volcanoes than any other planet.

Scavenger Hunt

Solar System

Fact Card 4

There is only one star in our solar system - the sun.
Our galaxy has millions of stars.

Scavenger Hunt

Solar System

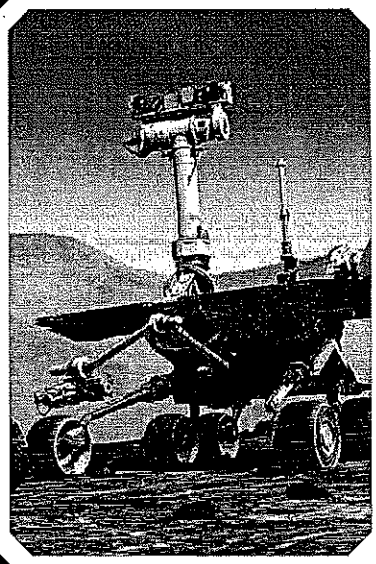
Fact Card 5

Earth is the only planet people have ever walked on. Astronauts have also walked on the Earth's moon, but that's not a planet.

Scavenger Hunt

Solar System

Fact Card 6

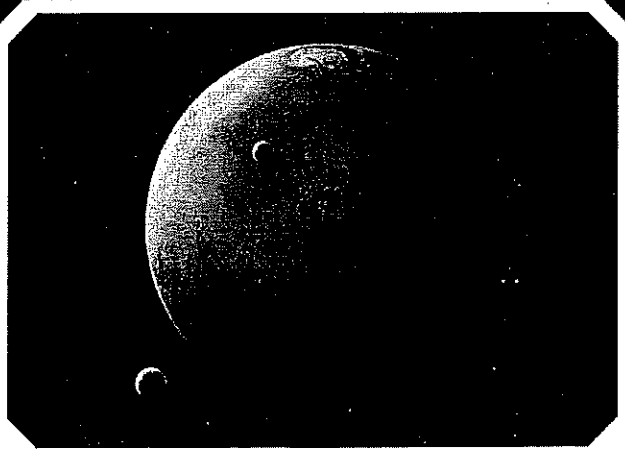


Scientists have sent robots, called rovers, to explore Mars. The rovers drive around the surface of Mars, take pictures, and send them back to Earth.

Scavenger Hunt

Solar System

Fact Card 7

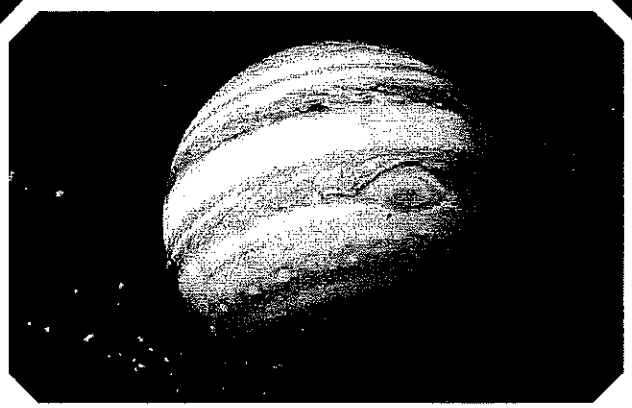


Mars has two small moons, named Phobos and Deimos.

Scavenger Hunt

Solar System

Fact Card 8

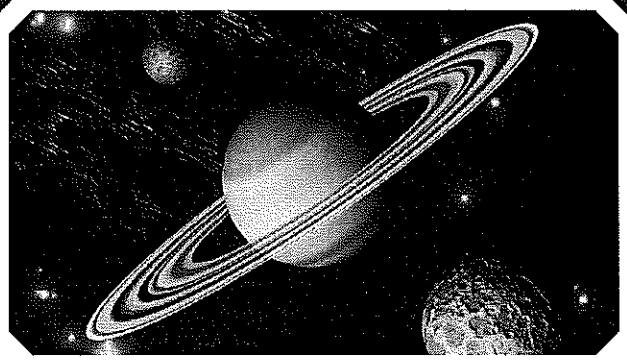


Jupiter, the largest planet, has a "Great Red Spot." The red spot is a huge wind storm.

Scavenger Hunt

Solar System

Fact Card 9

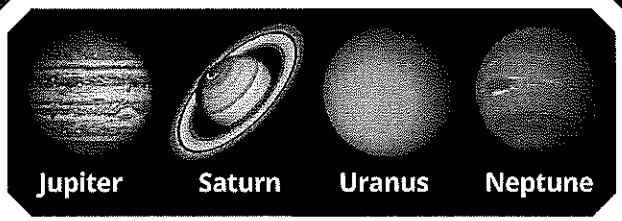


Saturn is famous for its bright rings, but it isn't the only planet with rings. Jupiter, Uranus, and Neptune also have them.

Scavenger Hunt

Solar System

Fact Card 10

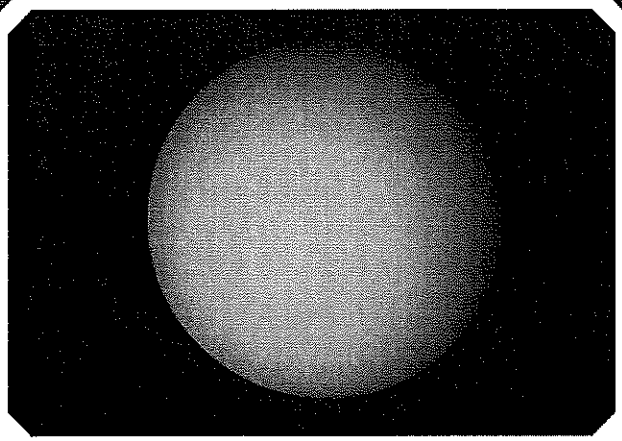


Jupiter, Saturn, Uranus, and Neptune are known as "Gas Giants" because they're made of mostly gas.

Scavenger Hunt

Solar System

Fact Card 11

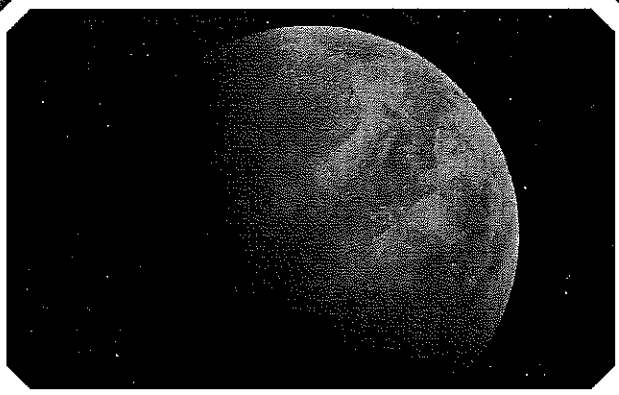


Uranus is the coldest planet in our solar system.

Scavenger Hunt

Solar System

Fact Card 12



Neptune is the stormiest planet. Its wind storms blow three times as fast as hurricanes on Earth.

Scavenger Hunt

Solar System

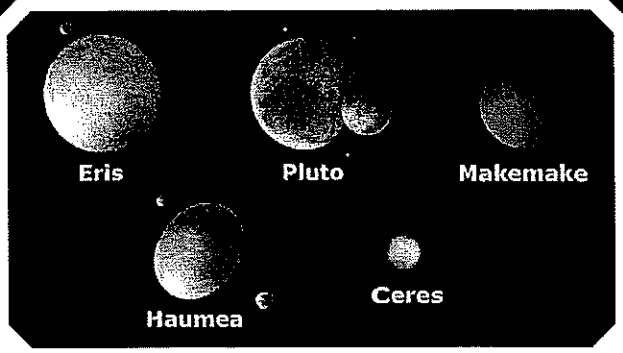
Fact Card 13

Pluto used to be considered a planet. Scientists decided it was too small to be a "real planet," so it is now a dwarf planet.

Scavenger Hunt

Solar System

Fact Card 14

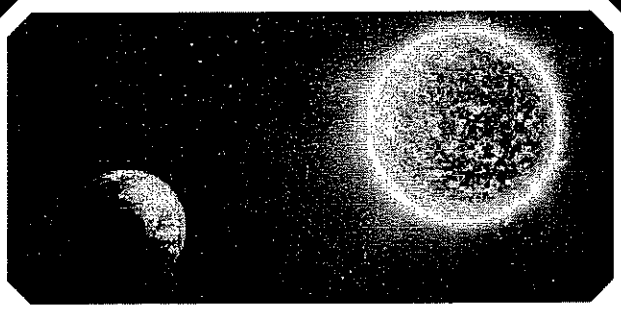


There are five known dwarf planets in our solar system. Their names are Pluto, Ceres, Haumea, Makemake, and Eris.

Scavenger Hunt

Solar System

Fact Card 15

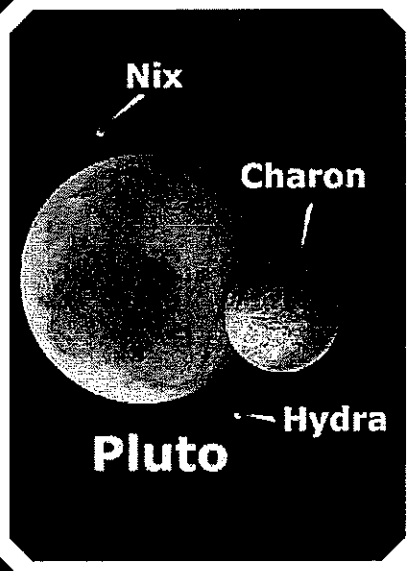


It takes light eight minutes to travel from the sun to Earth. The sunlight you see outside right now, actually left the sun's surface eight minutes ago.

Scavenger Hunt

Solar System

Fact Card 16

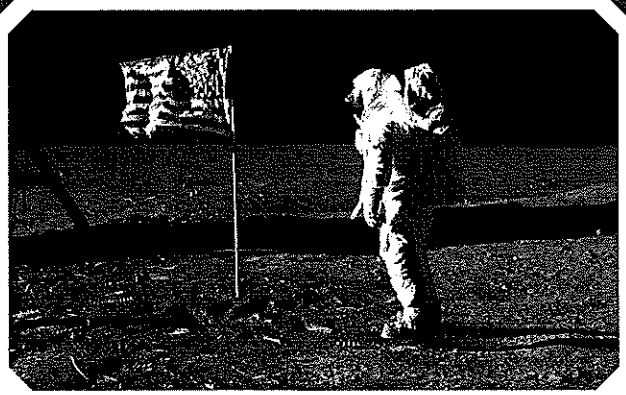


Pluto has three moons. Their names are Charon, Nix, and Hydra.

Scavenger Hunt

Solar System

Fact Card 17

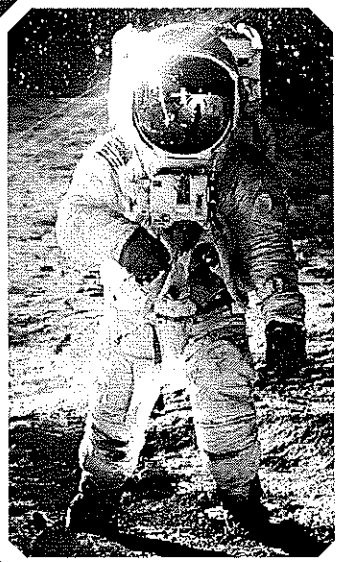


Neil Armstrong and Buzz Aldrin were the first people to walk on the moon.

Scavenger Hunt

Solar System

Fact Card 18



Twelve astronauts have walked on the moon. The first astronaut walked on the moon in 1969. The last astronaut walked on the moon in 1972.

Name: _____ Side A

Solar System Scavenger Hunt

Fact Card 1: How far away is the sun?

_____

Fact Card 2: What is the hottest planet?

_____

Fact Card 3: Which planet has the most volcanoes?

_____

Fact Card 4: How many stars are in our solar system?

_____

Fact Card 5: Name all of the planets people have walked on.

_____

Fact Card 6: What does a Mars rover do?

_____

Fact Card 7: Name all of Mars' moons.

_____

Fact Card 8: What is Jupiter's "Great Red Spot"?

_____

Fact Card 9: Name all of the planets that have rings.

_____

Solar System Scavenger Hunt

Fact Card 10: Name all four "Gas Giants."

_____

Fact Card 11: What is the coldest planet in our solar system?

_____

Fact Card 12: How fast do winds blow on Neptune's wind storms?

_____

Fact Card 13: Why isn't Pluto considered a planet any more?

_____

Fact Card 14: Name all five dwarf planets in our solar system.

_____

Fact Card 15: How long does it take light to travel from the sun to Earth?

_____

Fact Card 16: Name Pluto's three moons.

_____

Fact Card 17: What were the names of the first two people to walk on the moon?

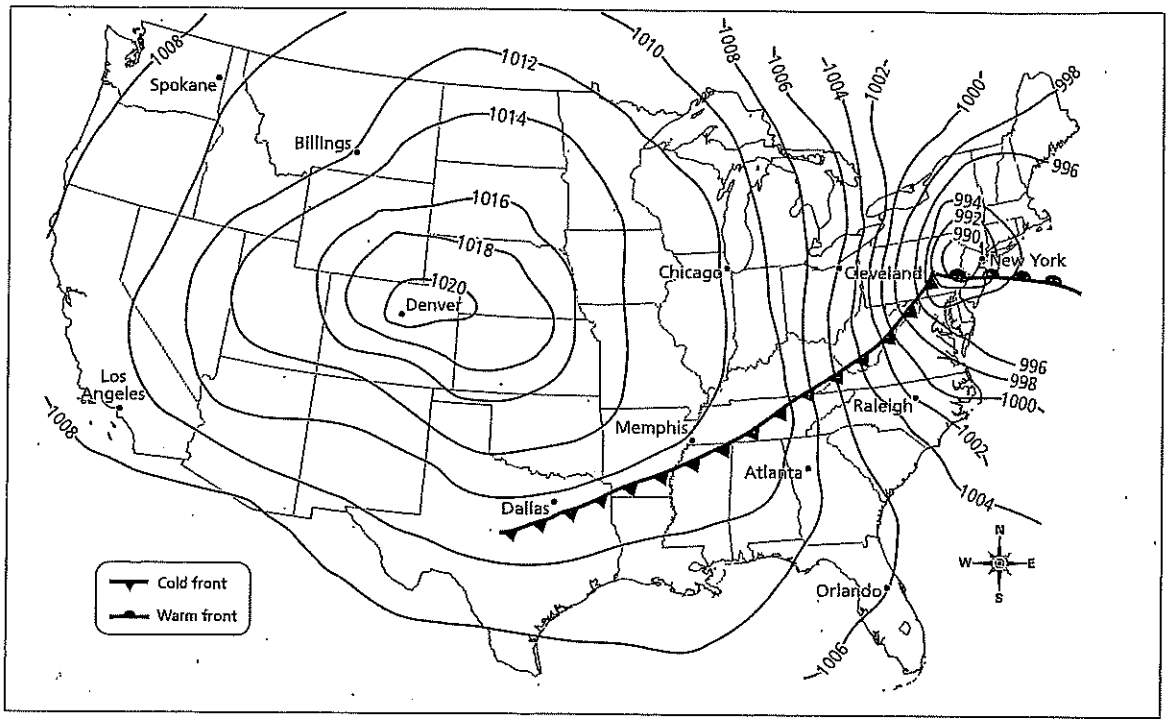
_____

Fact Card 18: When was the last time someone walked on the moon?

_____

4 Communicate Results

Use data from the table and the map to answer the questions below.



A According to the data in the table, where are the centers of the high and low pressure systems at this time? Mark them on the map using an H or an L.

B Add the temperature listed in the table for each city to the map.

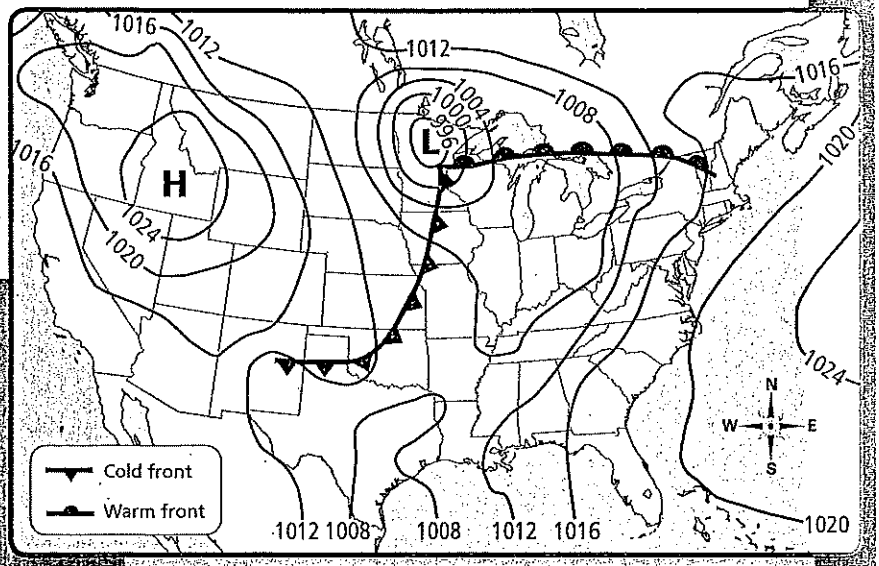
C Imagine that you are a meteorologist in Atlanta and this is the current map. What temperature change would you predict over the next few hours, and why?

D What pressure change would you predict for Denver over the next few days, and why?

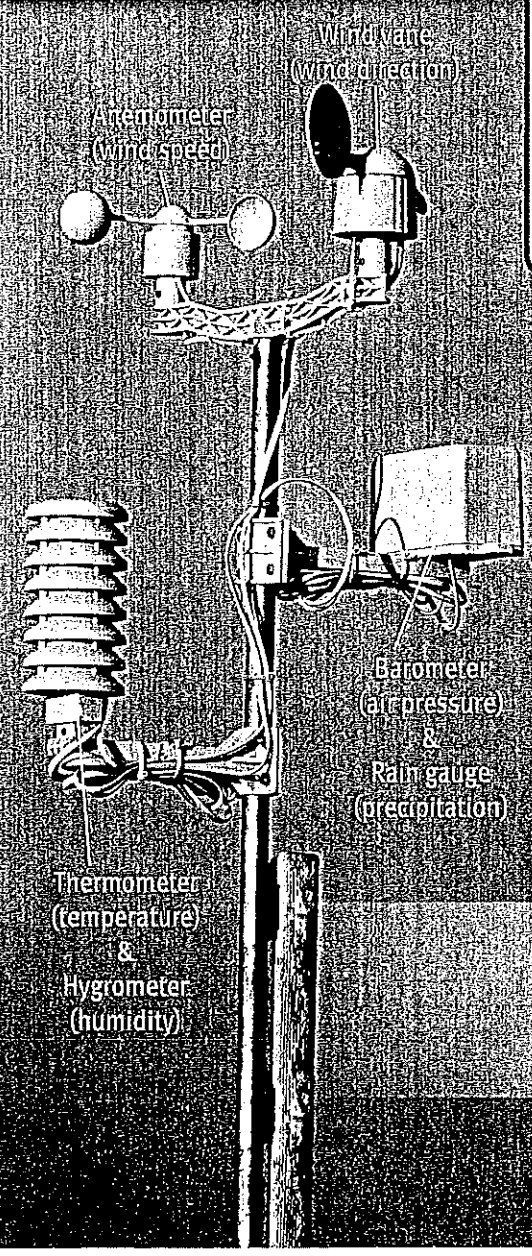
Forecast Data Come Out of the System

Weather maps are one type of output from a weather forecasting system. On a weather map you can find information about atmospheric pressure, and about the direction and temperature of moving air. The numbered lines on a weather map are called *isobars*. Isobars connect areas that have the same atmospheric pressure. Isobars center around areas of high and low pressure. An area of high pressure (H) indicates a place where cool, dense air is falling. An area of low pressure (L) indicates a place where warm, less dense air is rising. Pressure differences cause air to move. The leading edge of a cool air mass is called a *cold front*. The leading edge of a warm air mass is called a *warm front*. On a weather map, blue lines with triangles show cold fronts and red lines with half circles show warm fronts.

The direction of the triangles or half circles on a map shows which way a front is moving. Wind direction is described in terms of the direction from which the wind is blowing. A west wind is blowing from west to east.



2 Analysis How would you describe the wind direction behind the warm and cold fronts shown on the map?



Weather instruments constantly measure conditions in the atmosphere and deliver data.

You Try It!

Now it's your turn to use weather data to make a forecast.

You Try It!

Now it's your turn to become part of the weather forecasting system. The table and map on these pages show some weather data for several cities in the United States. You will use those data to analyze weather and make predictions.

1 Identify Inputs

Which information in the table will you use to determine where the high and low pressure areas may be located?

City	Barometric pressure (mbar)	Wind direction	Temperature (°F)
Atlanta	1009	S	63
Chicago	1012	W	36
Cleveland	1006	S	35
Denver	1021	S	34
New York	990	S	58
Billings	1012	SW	28
Spokane	1009	SW	27
Los Angeles	1009	W	68
Dallas	1012	NW	50
Memphis	1012	NW	45
Orlando	1006	S	78
Raleigh	998	S	60

2 Identify Outputs

What outputs from weather stations are included on a weather map?

3 Identify System Processes

How will you process the information in the table and on the map to make predictions? Describe how you will use the inputs to develop an output.

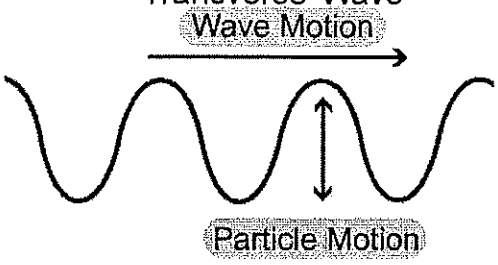
Waves: Introduction and Types

Name _____

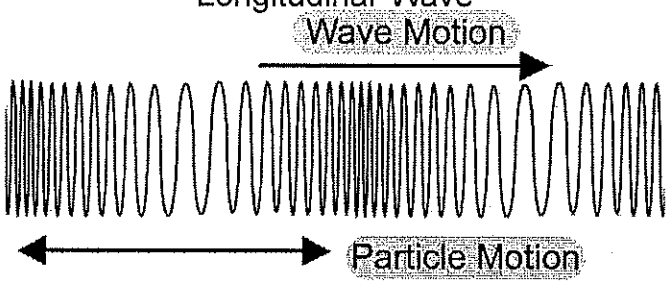
Instructions: Read through the information below. Then complete the statements at the bottom of the page using the BOLD words from the page.

A wave is a transfer of energy through a medium from one point to another. Some examples of waves include; water waves, sound waves, and radio waves. Waves come in two different forms; a **Transverse** Wave which moves the medium *perpendicular* to the wave motion, and a **Longitudinal** Wave, which moves the medium *parallel* to the wave motion.

Transverse Wave



Longitudinal Wave

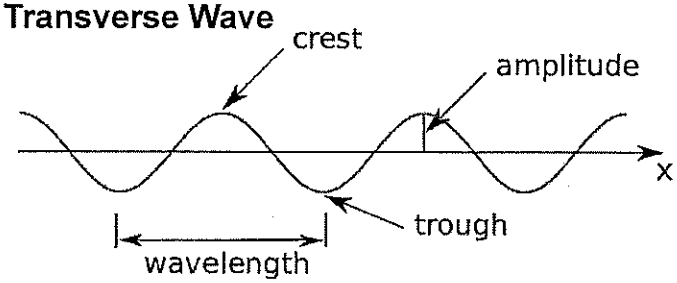


Examples of Transverse waves would be a vibrating guitar string or electromagnetic waves, while an example of a Longitudinal wave would be a "Slinky" wave that you push and pull.

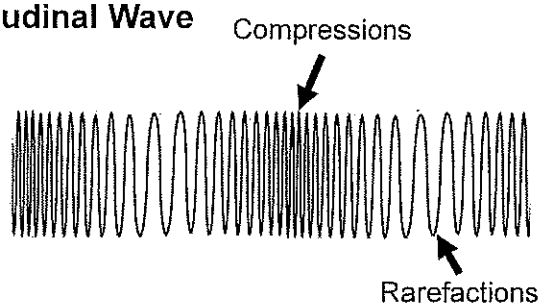
Waves have several properties which are represented in the diagrams below. In a Transverse wave the **Crest** and Troughs are the locations of maximum displacement up or down. The **Amplitude** is the measurement of maximum displacement. The **Wavelength** is the distance of one complete wave cycle. For example; the distance from crest to crest or trough to trough would be 1 wavelength.

In a Longitudinal wave, areas of maximum displacement are known as **Compressions** and **Rarefactions**. The stronger the wave, the more compressed and spread out the wave medium becomes.

Transverse Wave



Longitudinal Wave



Fill in the statements using the BOLD words from the above information.

1- Wave motion that is Parallel to wave direction describes a _____ wave.

2- A _____ is the maximum upwards displacement in a Transverse wave.

3- One complete wave cycle is referred to as a _____.

4- Wave motion that is Perpendicular to wave direction describes a _____ wave.

5- A _____ or _____ is the maximum displacement in a Longitudinal wave.

6- An Ocean wave would be an example of a _____ wave.

7- The distance from one trough to another trough is called a _____.

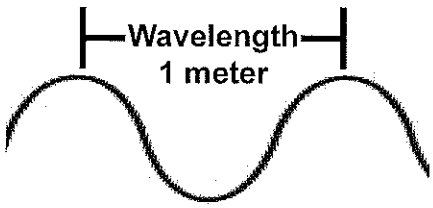
8- The measurement of displacement is called a wave's _____.

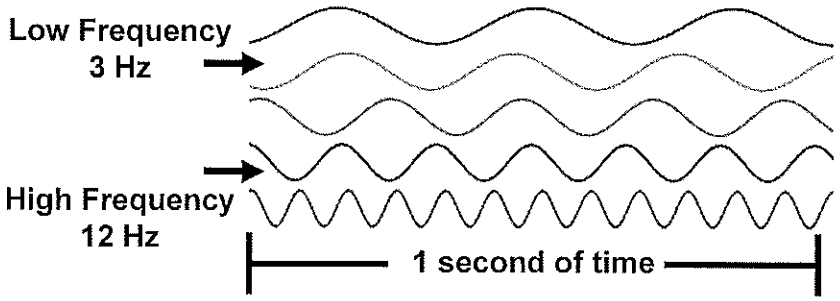
Waves: Velocity and Frequency

Name _____

Instructions: Read through the information below. Then complete the calculation problems at the bottom of the page.

The velocity of a wave can be calculated if you have enough information. First you need to know the *Wavelength*, or the length of one complete wave cycle. This could be measured Crest to Crest, Trough to Trough, or any other complete cycle of a wave. The second aspect you need is the wave *Frequency*, or the number of waves or vibrations produced per second. The frequency is measured in Hertz and the Wavelength is measured in meters.





The equation for calculating the velocity of a wave is:

Velocity = Wavelength x Frequency $V = \lambda \times f$

This equation works for any wave form, water, sound, or radio waves.

EXAMPLE: A wave as a Wavelength of 5 meters and a Frequency of 10 Hz.
What is its velocity?

V = 5 x 10 → *V= 50 meters per second*

Solve using the wave velocity equation: *(Show your equation set up and math work)*

1- A wave has a Wavelength of 12 meters and a Frequency of 10 Hz.
What is its velocity?

2-A wave has a Wavelength of 3 meters and a Frequency of 15Hz.
What is its velocity?

3-A wave has a Wavelength of 18 meters and a Frequency of .5 Hz.
What is its velocity?

4- A wave has a Wavelength of .5 meters and a Frequency of 100 Hz.
What is its velocity?