

# **Air and Aerodynamics and Flight Review**

## **Grade Six**

## Air and Aerodynamics and Flight Vocabulary

**Air pressure-** the amount of air placed in or around an object

**Air resistance-** the amount of air that pushes against an object

**Air Flow-** the direction in which air moves past an object

**Expand-** when an object takes up more space

**Compression (compress)-** air pressed into a smaller space

**Accelerate-** speed up

**Decelerate-** slow down

**Aerodynamics-** the study of air and how it moves around objects.

**Bernoulli's Principle-** moving air has less pressure than still air

**Law of Flight:** objects go from high pressure to low pressure.

**Newton's Third Law:** if there is a force in one direction, there is an equal force in the opposite direction

**Glider:** a plane that does not have an engine. They rely on thermals (upward air currents) to provide lift.

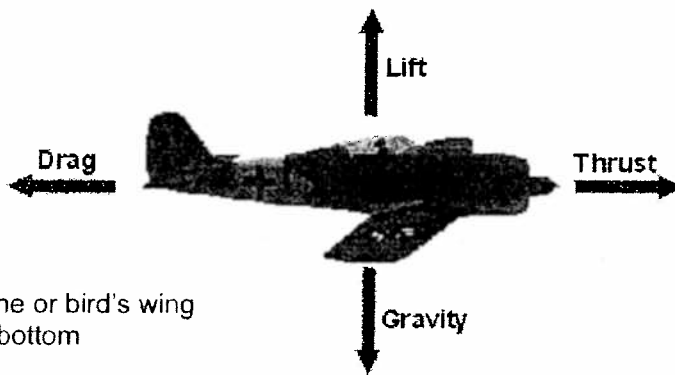
### Forces in Flight

**Lift-** upward force

**Gravity-** downward force

**Drag-** backwards force

**Thrust-** forward force



**Airfoil-** the shape of an airplane or bird's wing  
Curved on top and flat on the bottom

### Parts and Movements of a plane

**Fuselage-** main part of the plane; where passengers, crew and cargo are

**Propeller-** moves the plane through the air

**Jet engines-** take in air, compress it, then the air is forced out

**Ailerons;** flaps on the wings of a plane tht move up of down: do not need to move together. Control the roll of a plane

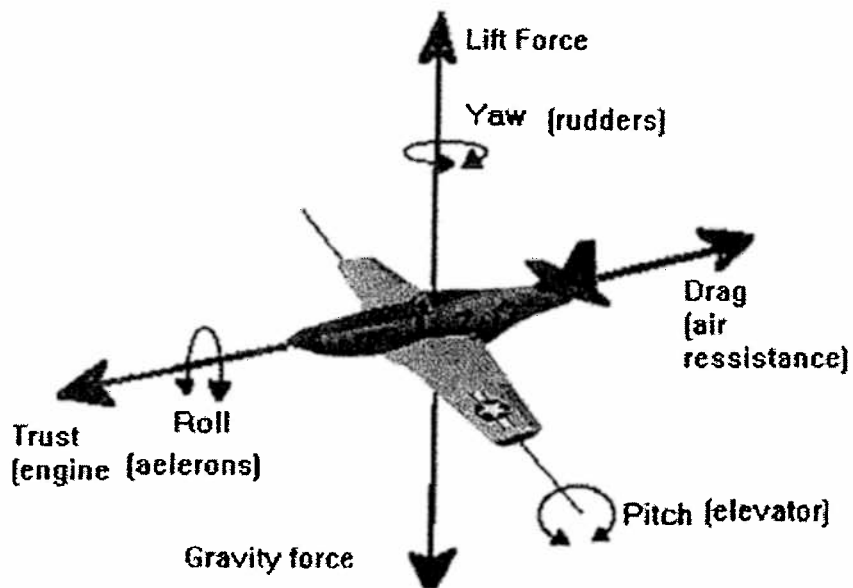
**Roll-** when one wing dips lower than the other; movement is up or down of horizontal

**Elevators-** flaps on the tail of a plane; move together. Control the pitch of a plane

**Pitch-** when a plane moves up or down. Movement is vertical.

**Rudder-** the flap on the tail of a plane that turns the plane laterally left or right; controls the yaw.

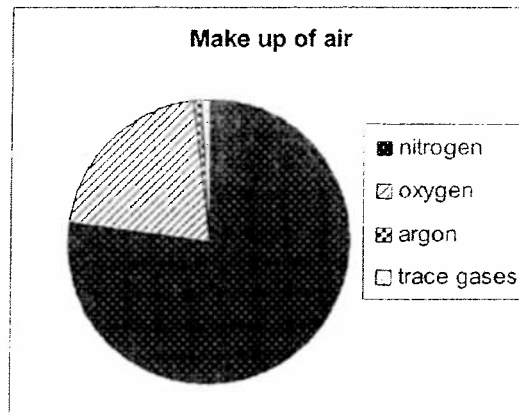
**Yaw-** when a plane turns left or right; movement is lateral



## Air and Aerodynamics Study guide

**Air** – the air we breathe is made of different gases

| Gas               | Percent in Air |
|-------------------|----------------|
| Nitrogen          | 79 %           |
| Oxygen            | 21 %           |
| Argon             | 1 %            |
| Other trace gases | Less than 1%   |



**Air exists** because: *properties*

- ◆ It takes up space
- ◆ It has volume
- ◆ It has weight
- ◆ Air has mass
- ◆ It has pressure

### ① **Air takes up space**

- ◆ Run a garbage bag through the air- it fills with air = air takes up the space in the bag
- ◆ Put a cup upside down in water. The cup will not fill with water because air is taking the space up in the cup. You must let the air out (by tipping the cup) in order for water to fill up the space.

### **Air has volume**

- ◆ You can measure the volume of air in a room- take the measurements of the room ( length X width X height). This will equal the volume of air in the room.

### **Air has weight**

- ◆ tie two equal size balloons on the ends of a stick. Balance them. Pop one balloon. The other balloon filled with air will fall towards the ground because it has weight.

### **Air has mass**

- ◆ measure a balloon that is not blown up on a scale. Record its mass. Blow up the balloon with air. Remeasure the balloon on the scale. The difference is the mass of the air

### **Air has pressure**

- ◆ air pressure increases the closer you are to sea level
- ◆ air pressure decreases as you go up a mountain.

| Air        | Higher or Lower Pressure |
|------------|--------------------------|
| Cold air   | higher                   |
| Warm air   | lower                    |
| Still air  | higher                   |
| Moving air | lower                    |

**Bernoulli's principle** states that faster flowing fluids (gases and liquids) have lower pressure than slower flowing fluids

### Hot Air Balloons

- Hot air balloons work because hot air rises. Blowing hot air into the envelope of the balloon makes the air in the balloon less dense. Once the air in the balloon is less dense than the outside air, the balloon will rise (it is more buoyant).
- Hot air balloons use the blower to create lift and the air currents to create thrust.
- Air balloons are controlled by the slits in the envelope- opening the slits causes the balloon to descend.

**Aerodynamics** is the study of air and how it moves around objects

To make objects more aerodynamics:

- you can study how air moves around the object in a wind tunnel
- Objects that are aerodynamic tend to be rounder (curved) and lighter.

### Forces in Flight

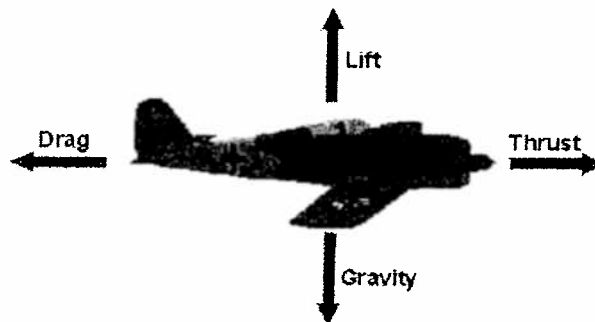
**Lift**- upward force

**Gravity**- downward force

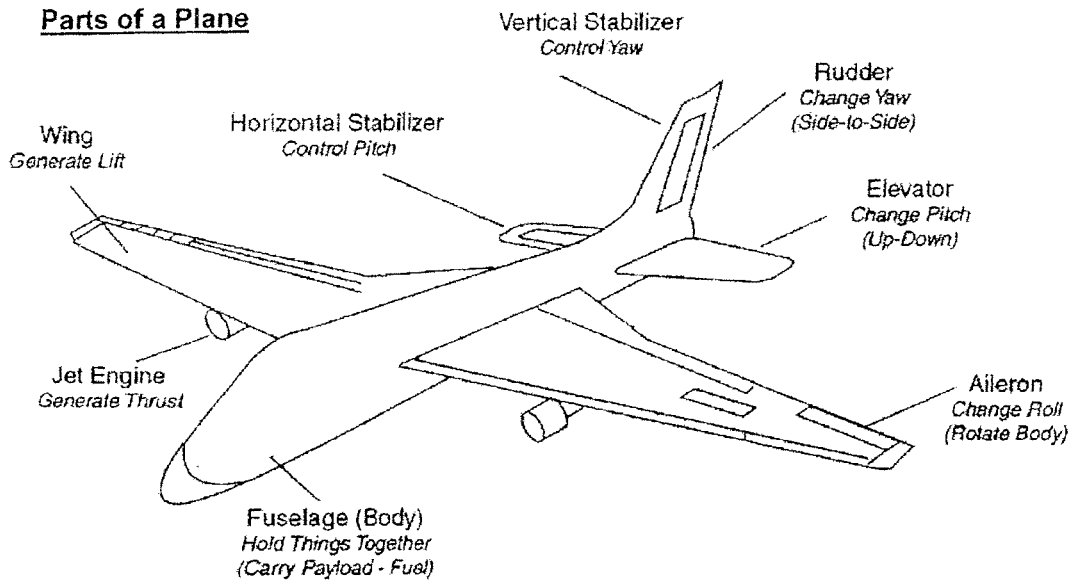
**Drag**- backwards force

**Thrust**- forward force

| Force  | Opposite force | Greater force = What happens  |
|--------|----------------|---|
| lift   | gravity        | Lift is greater = plane will go up<br>Gravity is greater = plane will go down     |
| thrust | drag           | Thrust is greater = plane will speed up<br>Drag is greater = plane will slow down |



## Parts of a Plane



## Parachutes

Parachutes work by increasing drag. The design of a parachute will determine how fast it falls and lands and if you can maneuver in the air.

A large canopy will increase drag  
A wide narrow canopy will allow for greater control in the air.

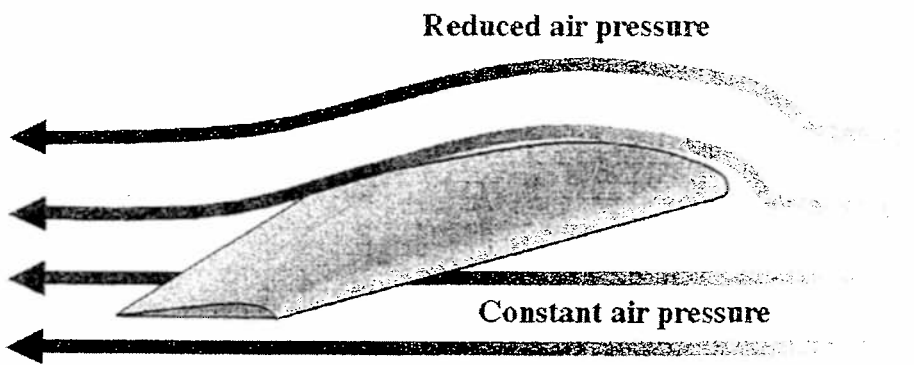
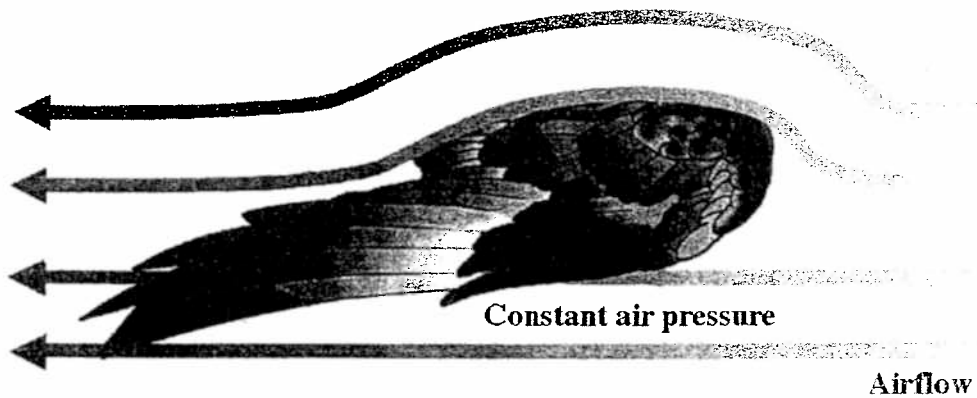
## Airfoils

Air foils are curved on the top and flat on the bottom. Air moves faster over the top of the airfoil than on the bottom. The air on the top of the airfoil has low pressure and the air on the bottom, because it is moving slower, has high pressure. This creates lift.

## Things that fly

Birds and insects have special adaptations for flight

| Birds  | Insects  |
|--|--|
| <ul style="list-style-type: none"> <li>• have hollow bones that make them lightweight but strong</li> </ul>  | <ul style="list-style-type: none"> <li>• Light weight and small</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Have feathers</li> </ul>  | <ul style="list-style-type: none"> <li>• May have one or two sets of wings</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Have strong pectoral muscles that allow them to flap their wings</li> </ul>   | <ul style="list-style-type: none"> <li>• Have strong pectoral muscles that allow them to move wings</li> </ul>                     |
| <ul style="list-style-type: none"> <li>• Wings shaped like an airfoil</li> </ul>   | <ul style="list-style-type: none"> <li>• Wings shaped like an airfoil</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Aerodynamic shape</li> </ul>  | <ul style="list-style-type: none"> <li>• Aerodynamic shape</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Primary and secondary feathers each have a role in flight. Primaries allow the bird to maneuver in the air. Secondaries catch air.</li> </ul> | <ul style="list-style-type: none"> <li>• Wings are very thin with a network of veins. Veins make the wings very strong.</li> </ul> |



# **Evidence and Investigation Review**

## **Grade Six**



## Evidence and Investigation Study Guide

How do police and investigators solve crimes?

**Observations** are information gathered through our senses (see, smell, touch, taste, hear)

**Inferences** are a conclusion about something based on an observation.

Example: Jim observed that there was a broken window in the classroom. The glass was on the inside of the classroom. Jim inferred that the window was broken from the outside of the classroom.

**Classify** means to arrange things in groups according to similar qualities. Dichotomous keys are an easy way to help to identify things.

**Evidence** is any bit of information, physical markings or objects that give people a reason to believe something.

### **Common types of evidence are**

- ◆ Fingerprints
- ◆ Materials and fibers
- ◆ Tire tracks
- ◆ Animal tracks
- ◆ Shoeprints or footprints
- ◆ Soil samples
- ◆ Hand writing samples
- ◆ Witness identification

### Fingerprints

**Fingerprints** are a mark left by the tiny ridges of you finger tip. These markings are left by dust or other particles on the oil of your skin.

There are 4 main types of fingerprints



Arch

Whorl

Loop

Composite

**The arch** fingerprint goes from one side of the finger to the other

**The whorl** fingerprint has a central circle area with ridges circling around it. The whorl ridges do not go from one side to the other.

**The loop** fingerprint begins at one side of the finger, loops around and the ridge ends at the same side of the finger that it began.

**The composite** fingerprint is a combination of the whorl, arch or loop together on the finger.

Within a fingerprint, there are characteristics that help investigators match up fingerprints. These are **ridge characteristics**. These might include:

- ◆ Forks (bifurcation) - here 1 ridge splits to form 2 ridges
- ◆ A island- a short ridge is by itself in not attached to any other ridges
- ◆ A ridge ending- where a ridge just ends

**Fingerprints can be lifted** off of surfaces using powders, brushes and tape.

Smooth surfaces are easier to lift prints off of than rough surfaces. Some surfaces are not good for lifting prints off of.

Good surfaces: glass, mirrors, smooth plastic, smooth metal

Bad surfaces- bricks, materials, wood

**Fingerprints can only be matched** if they have a suspect to compare samples to or if the suspect has fingerprints in a database.

### Shoepprints

Shoepprints can be classified by size, pattern of the print, wear of the pattern.



- ◆ *Lots of tread on shoe*
- ◆ *Different tread on toes than on middle and back*
- ◆ *Heavy tread on outside on heel and toe*
- ◆ *Shaka Logo in middle of shoe*
- ◆ *Right shoe*

When trying to identify specific wear patterns, look for wear on the heel, on the toes, and the wear on the treads

**Looking at the tread** on a shoeprint can give investigators an idea of what type of shoe it is

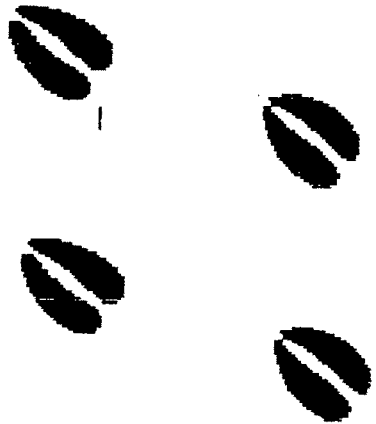
Example: hiking shoe- lots of deep tread  
 Dress shoe- no tread

Looking at the direction of the shoeprints and the depth of the shoe prints can help investigators figure out which direction the person was going. Looking at the spacing between the shoeprints can tell investigators if the person was running (large space) or walking (smaller space) →



| Running  | Walking   |
|--|---|
| <ul style="list-style-type: none"> <li>◆ Large space between prints</li> <li>◆ Deeper prints</li> <li>◆ Outline may not be as clear (dirt kicked up)</li> <li>◆ Line of prints are straighter- no as parallel</li> </ul> | <ul style="list-style-type: none"> <li>◆ Smaller spaces between prints</li> <li>◆ Shallower prints</li> <li>◆ Outline clearer</li> <li>◆ Less of a straight line – more parallel</li> </ul> |

Animal prints can also be identified based on the pattern left in the soil.

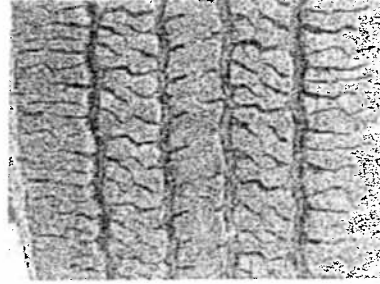


| Observation   | Inference |
|---|-----------|
| <ul style="list-style-type: none"> <li>◆ Hoofed animal</li> <li>◆ 2 hooves on foot</li> <li>◆ 4 feet same size</li> </ul> | Deer      |

## Tire tracks

Tire tracks can be classified based on

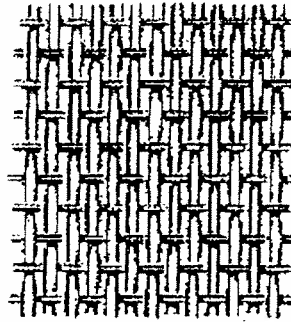
- ◆ type of tread
- ◆ size of tread
- ◆ wear of tread



## Fibers and Fabric

Investigators classify fibers and fabrics by:

- ◆ color
- ◆ pattern of weave
- ◆ texture
- ◆ strength
- ◆ flammability



## Soil samples

Soil samples can be classified based on:

- ◆ color
- ◆ pH
- ◆ smell
- ◆ make up (composition)
- ◆ size of particles

## Handwriting Samples

Handwriting samples can be compared by looking at:

- ◆ the loops in the letters
- ◆ the crosses on the t
- ◆ the spaces between the letters and the words
- ◆ the slant of the letters
- ◆ the size of the letters
- ◆ the dotting of letters ( i , j )
- ◆ a combination of writing and printing
- ◆ the pressure on the page

Investigators can also use **chromatography** to compare sample of ink by separating them into the colors that they are made up of.

Permanent inks (**solute**) will not separate in water (**solvent**). Permanent inks are **insoluble** in water. They will separate in other solvents.

Non-permanent inks (**solute**) will separate in water (**solvent**). Non-permanent inks are **soluble** in water.

Witness identification uses the characteristics of a person to help identify him or her. These characteristics might include:

- ◆ hair color
- ◆ eye color
- ◆ height
- ◆ shape of face
- ◆ weight
- ◆ distinguishing marks (tattoos, scars)

# **Sky Science Review**

**Grade Six**




## *The Earth's Moon*

- Neil Armstrong became the first person on the moon on July 20, 1969
- The lunar surface contains **maria, craters, and mountains**
- **Maria** are lunar basins or seas. They are broad and smooth plains. They were formed from hardened lava.
- **Craters** are impressions on the moon's surface. They are round with rugged rims. They are formed when meteorites impact upon the moon's surface.
- **Mountains** are mountains on the moon. The tallest mountain is 1 930 meters tall.
- Impacts from meteorites break up the moon's rock into a fine dust which covers the moon's surface.
- The moon is Earth's satellite- it travels around the Earth
- The moon is 4 times as small as the Earth.
- The moon has a weak gravitational pull and has lost its atmosphere.
- Life cannot exist on the moon. It has no surface water or air.
- The moon has no weather
- The temperature for the side of the moon that faces the Sun can rise to over 250oF (121oC). At night the moon loses that heat and temperature drops to -260oF or (-162oC)
- The moon reflects the light of the Sun
- The moon always keeps the same side facing the Earth
- The period of rotation and period of revolution are both 27 days.



## *PHASES OF THE MOON*

- The Moon rotates on its axis every 27 1/3 days.
  - The Moon revolves around the Earth every 27 1/3 days.
  - New Moon means no moon. The Moon is between the Earth and the Sun.
  - The new Moon rises at sunrise, is highest in the sky at noon, and sets at sunset. No lunar surfaces are visible.
  - The first quarter Moon rises at noon, is highest in the sky at sunset, and sets at midnight.
  - The full Moon has the Earth between the Sun and the Moon.
  - The full Moon rises at sunset, is highest in the sky at midnight, and sets at sunrise. During a full Moon, the maria (light areas) and the craters (the dark areas) are easy to see.
  - The last quarter (3<sup>rd</sup> quarter), the position of the Sun, Moon, Earth is as follows:
  - During the last quarter, the Moon rises at midnight, is highest in the sky at sunrise, and sets at noon.
  - During the quarter and crescent phases, the craters and mountains cast shadows and become very visible.
- 

## Planets

The order of the planets, from the Sun out are:

Mercury

Venus

(My Very Excellent Mother Just Sent Us Nine Pizzas)

Earth

Mars

Jupiter

Saturn

Uranus

Neptune

Pluto

The Inner Planets are Mercury, Venus, Earth, Mars. They are called the Rocky planets.

The outer planets are Jupiter, Saturn, Uranus, Neptune, Pluto. They are the Gas planets.

The inner and outer planets are separated by the asteroid belt between Mars and Jupiter.

| Category                                  | Sun             | Mercury       | Venus          | Earth           | Mars           | Jupiter         | Saturn                  | Uranus          | Neptune         | Pluto         |
|---|-----------------|---------------|----------------|-----------------|----------------|-----------------|-------------------------|-----------------|-----------------|---------------|
| <b>Distance from Sun (Millions of Km)</b> |                 | 57.9          | 108.2          | 149.6           | 227.9          | 778.3           | 1 427                   | 2 871           | 4 497           | 5 913         |
| <b>Period of revolution</b>               |                 | 88 days       | 224 days       | 365 days        | 687 days       | 12 years        | 29 years                | 84 years        | 165 years       | 248 years     |
| <b>Diameter (km)</b>                      | 1.39 million    | 4880          | 12 100         | 12 756          | 6 786          | 143 200         | 120000                  | 51 800          | 49 528          | 2330          |
| <b>Atmosphere</b>                         | Hydrogen Helium | Virtualy none | Carbon Dioxide | Nitrogen Oxygen | Carbon Dioxide | Hydrogen Helium | Hydrogen Helium Methane | Hydrogen Helium | Hydrogen Helium | Methane ?     |
| <b>Moons</b>                              |                 | 0             | 0              | 1               | 2              | 16              | 18+ (?)                 | 15              | 8               | 1             |
| <b>Rings</b>                              |                 | 0             | 0              | 0               | 0              | 1               | 1 000 (?)               | 11 (?)          | 4               | 0             |
| <b>Rotation Period</b>                    | 26.8 days       | 58.9 days     | 243 days       | 24 hours        | 24 hours       | 10 hours        | 10 hours 40 min.        | 17 hours.       | 16 hours        | 6 days 9hours |

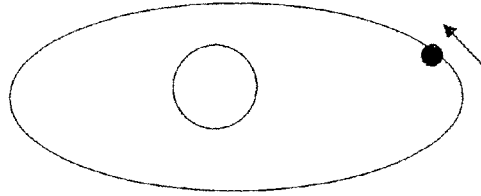
Moons of other planets have similarities and differences to our own Moon.

| Similarities            | Differences  |
|-------------------------|--|
| Are called satellites   | Some are different shapes- not all are spherical (circle shaped) |
| Orbit around the planet | Some are made up of different materials                          |
|                         | Some are different weight and mass                               |



## The Sun

- Our sun is a yellow dwarf star which means that it is relatively young. It is about 5 billion years old.
- The sun provides the Earth with heat and light.
- We orbit the sun in an elliptical orbit counterclockwise



- The Sun's temperature is about 31 350 000 ° C.
- Viewing the sun directly is very dangerous. Telescopes and probes help us to view the sun indirectly and safely.

## The Seasons

There are 4 main seasons in the Northern Hemisphere

| Season | Date it begins | Tilt   | Rays                                    |
|--------|----------------|--|---|
| Summer | June 21        | Northern hemisphere towards the sun          | Direct<br>Not slanted<br>Warm           |
| Fall   | September 21   | Neither tilted towards or away from the sun  | Neither direct nor indirect rays        |
| Winter | December 21    | Northern hemisphere tilted away from the Sun | Indirect rays<br>Slanted<br>Not as warm |
| Spring | March 21       | Neither tilted towards or away from the sun  | Neither direct nor indirect rays        |

- March 21 (1<sup>st</sup> day of Spring) and September 21 (1<sup>st</sup> day of Fall) are equinoxes. On those dates, there are 12 hours of sunlight and 12 hours of night.
- June 21 (1<sup>st</sup> day of summer) and December 21 (1<sup>st</sup> day of Winter) are solstices. On June 21 we have the longest day of sunlight and the shortest night. On December 21, we have the shortest day of sunlight and the longest night.
- The Southern Hemisphere has the opposite seasons that we do.

| Northern Hemisphere | Southern Hemisphere |
|---------------------|---------------------|
| Summer              | Winter              |
| Fall                | Spring              |
| Winter              | Summer              |
| Spring              | Fall                |

- We have seasons because of the tilt of the Earth on its axis and the revolution of the axis around the Sun.
  - The Earth takes 365 days to revolve around the Sun and complete all 4 seasons.

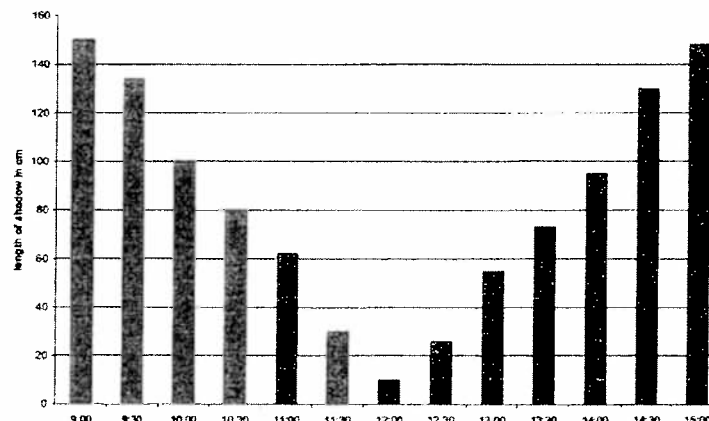


### Day and Night

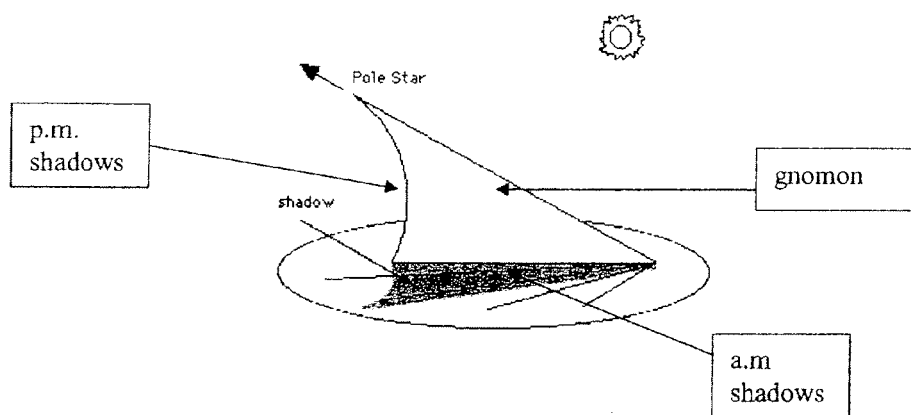
- Day and night occur on Earth because of the rotation of the Earth on its axis.
- The Earth takes 24 hours to rotate.
- The Earth rotates counterclockwise from West to East. This causes the Sun to look like it rises in the East and sets in the West.
- Only ½ of the Earth is facing the Sun at a time.

Sun Shadow on June 05

### Sun shadows



- The sun's shadows are longest during the summer and shortest during the winter.
- You can tell the time of the day in the summer time by looking at the position of the sun the sky and the position of the shadow on the ground.
- If the sun is directly above you, it is around noon.
- A sundial can be used to tell the time. It casts a shadow on the ground that can be used to judge what time it is. When the shadow line up with the gnomon, it is noon.



### *Stars and Constellations*

- Our nearest star is the Sun
- There are millions of stars in our Solar System
- Stars can be beginning their life cycle, in the middle of their life cycle, or ending their life cycle.
- A constellation is a group of stars that form a pattern in the sky.
- **Polaris** is the North Star. It is in the constellation the little dipper (Ursa Minor) over the North Pole.
- All other constellations in the Northern hemisphere seem to rotate around Polaris.

### Space Exploration

- We use different technology to explore space.
- Telescopes are used to view space from Earth
- The Hubble telescope sends back pictures from outer space.
- A satellite is something that orbits another object in space.

|              | Earth Sensing Satellites                | Space Sensing satellites                            | Communication Satellites                              | Navigation Satellites  |
|--------------|---|---|---|--|
| What they do | Sensors study different places on Earth | Above the Earth's atmosphere to study space clearly | Send radio signals from one place on Earth to another | Help guide ships and planes by listening to the signals sent |
| Examples     | Weather satellites                      | Solar Maximum satellite                             | Intelsat  | Navstar  |

- Space probes are robots that are sent out into space to study it.
- *Voyager 1* and *Voyager 2* are famous probe that have been sent out to study our planets.
- Humans are sent into space on shuttle missions and study space from the international space station

**Trees and Forests  
Review**

**Grade Six**

## Trees and Forest Vocabulary

**Forest-** trees and their environment

**Succession-** the changes in a forest over time

**Deciduous Trees-** lose their leaves in the fall

**Coniferous Trees** – evergreen trees- do not lose their leaves in the fall

### Levels of the Forest

**Upper Canopy-** top of the forest formed by leaves and branches of the tallest trees. Birds (owl, orioles, and insects (aphids, tent caterpillars) make homes here.

**Understory-** level below the canopy. Smaller trees and larger shrubs. Provides sheltered space for birds and small mammals (squirrels, woodpeckers, insects)

**Underbrush-** level before the forest floor. Ferns, wildflowers stem plants, insects, butterflies, small mammals like mice, larger mammals like deer, skunks.

**Forest Floor-** bottom level of the forest- groundcover and soil: where you find decomposers (worms, bacteria, soil insects, tree roots) and dead materials.

### Tree processes

**Transpiration-** moisture given off by plants through their leaves

**Photosynthesis-** plants convert sunlight, water, and carbon dioxide into oxygen and nutrients (sugars) for the plant to use.

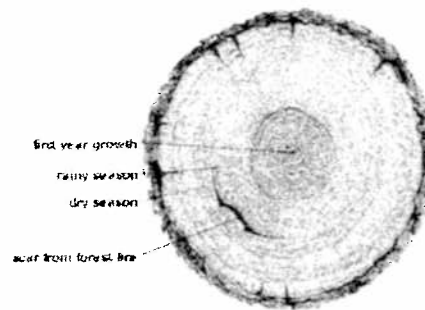
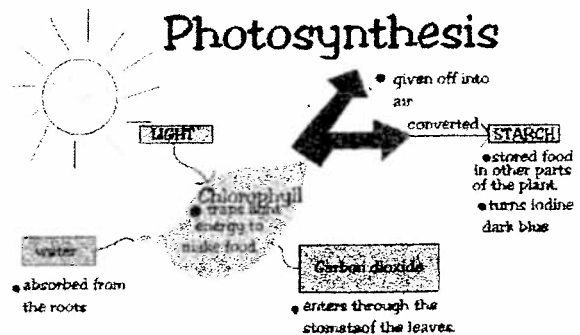
**Chlorophyll-** part in the plant cell that makes the plant green; needed for photosynthesis.

**Stomata-** tiny openings on the underside of a plant's leaves. Place where gases are exchanged

### Examining a Tree

**Tree cookie-** cross section of a tree. Helps to show the life story of a tree.

**Leaf-** the flat green part of a plant that makes food (photosynthesis)



**Leaf Scar**- the scar left by a leaf of deciduous trees when the leaf falls off in the autumn.

**Girdle**- a scar on the branch of a tree showing one year of the branches growth.

**Bark**- outside covering of a tree. Function -- protection and insulation

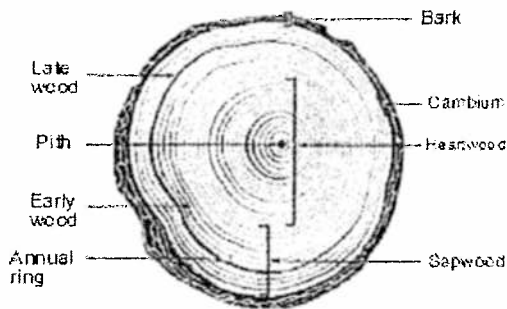
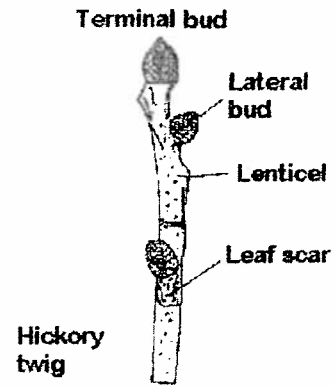
**Cambium**- inside of the trunk where the tree grows. Function- to produce new wood and bark

**Sapwood (xylem)**- the softer living part of the wood around the heartwood. Function- to move sap from the roots to the leaves

**Phloem**- the inner part of the tree. Function- carries food from the branches and leaves to the roots

**Heartwood**- the older dead part of wood near the middle of a tree. Function- for support

**Pith**- central core of the tree



### The Environment of a forest

**Ecosystem**- interactions that link the living things and the non-living things in an environment.

**Habitat**- the natural home of an organism

**Abiotic**- the non-living parts of the environment. Soil, air, water, sunlight, temperature, wind, terrain.

**Biotic**- the living parts of the environment. Plants, animals and microorganisms.

**Producer** - plants that produce their own food through photosynthesis

**Consumer-** organisms that must get their food from their environment (do not make their own)

**Primary consumer-** eats producers

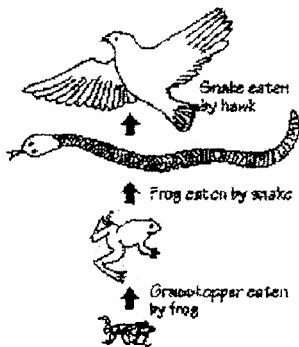
**Secondary consumer-** eats primary consumer

**Tertiary consumers-** eat secondary consumers

**Decomposers-** feed on dead materials and put nutrients back into the soil

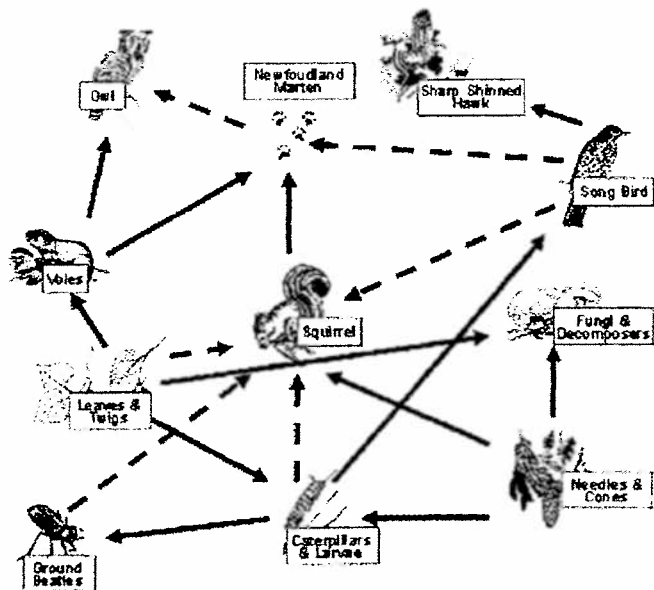
- ◆ Fungi- organisms that lack roots, stems and leaves. Cannot photosynthesize to make their own food. Examples- mildews, rusts, smuts, mushrooms, conks, molds
- ◆ Conks- fungus found attached to tree trunks. Grow like steps or shelves and have growth rings like trees.
- ◆ Lichens- a fungus and algae working together. The fungus absorbs water and nutrients and the algae produces the food
- ◆ Mycorrhizal fungi- grow on the roots of trees. Some help the tree by gathering nutrients and water, some harm trees.

**Food chain-** the movement of food energy through the different levels of consumers. Single chain.



**Food web-** a lot of food chains intertwined forming a network of interactions.

**Nutrient cycle-** how nutrients are cycled between the biotic and abiotic parts of the environment.







## Trees and Forest Study Guide



**Trees and forests are valued** for a number of reasons:

- Forests serve as a habitat for a variety of living things (animals and plants)
- Forests are important to humans for recreation (camping, hiking),
- We get raw materials (wood, fruit) from trees
- Forests provide jobs (forest ranger, loggers)
- Forests create a life-supporting environment ( provide food, provides oxygen and exchanges carbon dioxide)

**The difference between plants and trees:**

| Trees                              | Plants                                 |
|------------------------------------|--|
| ♦ Are perennials                   | ♦ Are perennials, annuals or biannuals |
| ♦ Are tall                         | ♦ Have a stem                          |
| ♦ Made of woody materials          | ♦ Are woody or non-woody               |
| ♦ Have leaves or needles           | ♦ Have leaves                          |
| ♦ Produce flowers, fruits or seeds | ♦ Produce flowers fruit or seeds       |

Trees and forests are affected by the living parts of the forest environment (biotic) and the non-living parts of the environment (the abiotic). Some examples are

| Abiotic (non-living) | Biotic (living) |
|----------------------|-----------------|
| Sunlight             | plants          |
| Climate              | animals         |
| Rocks                | microorganisms  |
| Water                |                 |
| Wind                 |                 |
| Soil                 |                 |

There are many different types of plants and animals that live in the forest. These include:

- Producers (plants)
- Consumers
- Decomposers

All of these plants and animals interact to create food chains and food webs. An example of a food chain is:



**The nutrient cycle** shows how nutrients flow throughout an ecosystem. The nutrient cycle starts with the producer and ends with the decomposers.

**Common decomposers** include:

- Fungus- they lack roots, stems and leaves and cannot photosynthesis. Some examples are rusts, mildews, mushrooms, conks, yeasts, molds
- Conks- are a special type of fungus attached to tree trunks. They are very hard and look like steps on the trunk of a tree
- Lichens- are made up of two plants- a fungus and an algae. The fungus absorbs water and the algae produce food because it can photosynthesize.

**The water cycle** describes how water moves through the forest ecosystem. Some points to the water cycle are:

- Plants need water to live.
- Plants lose water through transpiration from their leaves
- Plants take up water from their roots.
- All water in an ecosystem is recycled- water goes into soil (precipitation), taken up by trees, given off by trees (transpiration), goes into the air as water vapor, condenses in the air and falls as precipitation.

**If one part of an ecosystem is threatened** or does not function, the rest of the forest ecosystem is affected

*Example:* If a forest is clear-cut, the soil will lose valuable nutrients. It will run off into a river if there is a heavy rain because nothing is able to keep the soil anchored. The stream may become full of silt and affect the fish and insects that use the river. The animals (consumers) that had used the forest before it was clear-cut will have to find new sources of food and protection.

Trees and plants produce oxygen and sugars in a process called photosynthesis. The trees take in carbon dioxide, water and energy from the sun and produce oxygen and sugar. Photosynthesis takes place in the leaves.

**Trees can be classified into 2 main types- coniferous and deciduous.**

| Deciduous trees   | Coniferous trees  |
|---|---|
| <ul style="list-style-type: none"><li>• Lose their leaves every fall</li><li>• Often produce flowers and fruit</li><li>• Broad leaves</li><li>• Examples native to Alberta include the aspen and poplar</li></ul> | <ul style="list-style-type: none"><li>• Do not lose leaves in fall</li><li>• Cone bearing trees</li><li>• Needle leaves</li><li>• Example native to Alberta include the Lodgepole pine and jackpine</li></ul> |

To classify trees, we can look at several different characteristics. A dichotomous key (classification key) can help us to find the name of the tree.

**To classify leaves**, we can look at:

- Leaf shape
- Margins
- Leaf arrangement
- Leaf type

**To classify bark**, we can look at

- Color
- Texture
- Pattern

We can classify trees by their general shape or silhouette.

We can look at the **growth patterns of a tree** by looking at tree cookies. We can look at the pattern of the rings and determine:

- Differences in coloration and texture of new growth and old growth
- If scars are present from fire or mechanical damage (very dark area)
- If enough nutrients were present (nice even ring growth)
- If nutrients were not present (close together ring growth)
- Crowded conditions (close together ring growth)
- Trauma damage (smaller lighter scars) from torn branches or bark
- Evenness of rings (roundness) indicating that it didn't grow on a slope or wasn't leaning in any way.

**Humans have used the forest** in a number of ways in the past and present and will in the future. These have included logging, recreation and might include some new future use.

**Humans have enhanced the forest** through protection of areas (National and Provincial parks) and have set up laws that protect animals and plants in the forest.

**Humans have threatened the forests** by over logging, cutting down areas for new house construction, and not taking care of the forest when using it for recreation.