

# 5th Grade Science Study Guide

## Science Process Skills

### Observing

We observe when we use one or more of our senses to find out about objects, events, or living things. An observation is a fact learned directly through the senses.

- Don't just look - use more than your eyes
- Use all of your senses
- Fully describe what you sense – add details
- Be sure to observe how things change (before, during, and after an event)

### There are two types of observations:

1) **Qualitative Observations** are those that describe what something looks, smells, tastes, sounds, or feels like.

*Example: The flower is red and smells sweet.*

2) **Quantitative Observations** are those that provide some type of measurement or comparison.

*Examples: The rock has a mass of 5 grams. The boy has two arms. There are fewer students in the science class than the math class.*

### Communicating

We communicate when we send or receive information. Be clear and use details when you communicate.

- Use several ways to communicate
- Describe an object or event, include changes if there are any
- Use simple, clear language

### Classifying

We classify when we use observations to group objects or events according to how they are similar or different.

- What are the properties of the objects or events
- Divide into two groups and then see if each group can be divided into smaller groups
- Be sure to write down how you classified the objects or events so that you can tell someone else how you did it

### Measuring

We measure when we compare something to standard or nonstandard units. Length, mass, and time are the basic units of measurements.

- In science, always use metric units
- Be as accurate as possible
- Be sure to use the right units and the right instrument to measure

### Inferring

We infer when we use what we already know to draw conclusions and figure out reasons for events that we don't witness.

- Make an observation.
- Think of several inferences as to what you are seeing.
- Think of ways that you can find out which one is right.

**Inference** – an explanation of an observation based on prior knowledge (experience or facts).

*Example: The holes in the leaf were made by an insect.*

## Predicting/Hypothesizing

We predict (make hypotheses) when we make a forecast about what will happen in the future. The prediction is based on what you already know and data that you have collected.

- Make observations and measurements (collect data)
- Look for patterns in what you have observed
- Make a prediction based on what you know
- Test your prediction to see if you are right
- Make a new prediction if you are wrong
- 

**(Prediction)** – tell what will happen next.

*Example: The Clemson Tigers will win their next football game.*

## COMMUNICATING

We communicate when we give or receive information. Precise language is needed for describing an observation, reporting a measurement or interpreting data.



How do I communicate?

1. Observe, then describe enough properties of an object or event so someone can identify it.
2. Describe changes in the properties of an object or event.
3. Describe and order changes in the properties of an object or event.
4. Use diagrams, charts, graphs, writing, speaking, visuals, and photos to communicate.

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## CLASSIFYING

We classify when we use observations to group objects or events according to similarities and differences. Classification schemes can be one-two- or multistage.



How do I classify?

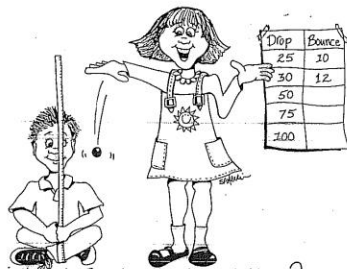
1. Observe a set of objects or events. Think about their properties.
2. Divide the set into 2 or more groups based on one observable property.
3. Divide the group(s) on the basis of a second observable property.
4. Continue to divide the groups on the basis of observable properties.
5. Put the properties used into an outline or diagram.

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## PREDICTING

We predict when we make a forecast about what will happen in the future. Predictions are based on prior knowledge, gained through experiences and data that is collected.



How do I make accurate predictions?

1. Make observations and/or measurements. Recall past experiences.
2. Use your knowledge to search for patterns in the data. Make inferences.
3. Make predictions about future events. Use your inferences.
4. Test those predictions to determine validity.
5. After testing, revise predictions if necessary.

## INFERRING

We infer when we use our past experiences to draw conclusions and make explanations about events not directly observed.



How do I infer?

1. Make an observation of an object or event.
2. Use your past experiences. Think of several inferences.
3. Decide what new observations would support those inferences.
4. Make new observations to determine if each of the inferences is an acceptable explanation.

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## Science Investigation

A **fair test** is one in which only one variable is changed or tested.

A **manipulated (independent) variable** is the one factor that is changed or tested by the student doing the investigation. Always put it on the x-axis. This is what is changed on purpose by the investigator.

Think: “I” in independent variable is what “I” change.

A **responding (dependent) variable** is the result of the changing of the manipulated variable. Always put it on the y-axis. Think: “D” in dependent variable “depends” on what “I” change.

**Controlled variables** stay the same or unchanged during the investigation.

## Steps to an Investigation

- 1.) **Question** – Ask a question that can be tested.
- 2.) **Research** - the topic
- 3.) **Prediction** – What do you predict will happen?
- 4.) **Design Your Experiment** – Materials and Procedure
- 5.) **Record and Organize Data** – graphs, table, charts.
- 6.) **Explain Results**– What happened? Compare the results to your prediction.

### Example of an Investigation

Sam sets up an investigation to find out how sunlight affects plant growth. He gives 2 plants the same amount of water each day, but he places one plant in the sunlight, and the other plant in the shade. The plant in the sunshine grows 5 cm taller than the plant in the shade during the 2 weeks of the investigation.

The **Independent Variable** is the location of the plants.

The **Dependent Variable** is the height of the plants.

The **Controlled Variables** include the type of plants and the amount of water.

How can tools and instruments (including a timing device and a 10x magnifier) be used safely and accurately when conducting a scientific investigation?

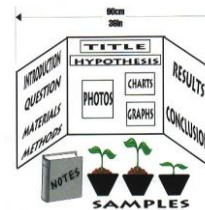
**Science Tools Chart**

<b>Name of tool</b>	<b>When used</b>	<b>Units measured</b>
Eyedropper	Move small amounts of liquid	Drops or ml
Magnifier	Make objects look larger	
Ruler	Measures length and width	cm and mm
Pan Balance	Compare mass of objects	Grams
Thermometer	Measure temperature	degrees Celsius
Beaker	Measure volume of liquids	L and ml
Forceps / Tweezers	Pick up / hold small objects	

Graduated Cylinder	Measure volume of liquids	ml
Graduated Syringes	Measure volume of liquids	ml
Meter Stick	Measure length and width	m and cm
Compass	Tell direction	Degrees (N,S,E,W)
10 x Magnifier	Make objects look 10 times bigger	
Timing Device	Measure time	hours, minutes, and seconds

What safety procedures should be followed when conducting investigations?

## Safety in Science



1. Always wear appropriate safety equipment such as goggles or an apron when conducting an investigation.
2. Be careful with sharp objects and glass. Only the teacher should clean up broken glass.
3. Do not put anything in the mouth unless instructed by the teacher.
4. Follow all directions for completing the science investigation.
5. Follow proper handling of animals and plants in the classroom.
6. Keep the workplace neat. Clean up when the investigation is completed.
7. Practice all of the safety procedures associated with the activities or investigations conducted.
8. Tell the teacher about accidents or spills right away.
9. Use caution when mixing solutions.
10. Use caution when working with heat sources and heated objects.
11. Wash hands after each activity.

## The Scientific Method

How do scientists do what they do?

Well, **YOU** know because you're a scientist, too!

**Observation** is an important part--  
in fact it's the part at the very start.

For it's observation that causes you to wonder why  
earthworms do what they do and clouds form in the sky.

Your **hypothesis** is a "best guess" based on what you know  
about how things work--now you're ready to go!

**Experimentation** lets you test the hypothesis you've made--  
to see if your best guess can make the grade.

And because **variation** is found in nature everywhere,  
**repeated trials** should be done, and done with care.

And don't forget to decide what **variables** you'll test.

**You** change the **independent variables**, but not the rest.

Recording your **data** is very important, too;

so you can **analyze** the results and others can repeat what you do.

When you've summarized your results and your experiment is done,  
you'll have more information about nature and you'll have had some fun.

So, now you know that the **scientific method** is really cool,  
and that scientists don't just measure--they **RULE!**

## Technological Design

**Technology** is any tool or process designed to help society in some way. Technology applies scientific knowledge in order to develop a solution to a problem or create a product to help meet human needs.

Steps in the technological design process include:

### **Identifying a problem or need**

Research and gather information on what is already known about the problem or need

### **Designing a solution or a product**

Generate ideas on possible solutions or products

### **Implementing the design**

Build and test a solution or a product

### **Evaluating the solution or the product**

Determine if the solution or product solved the problem.

The steps of the design can be communicated using descriptions, models, and drawings.

A **scientific model** is an idea that allows us to create explanations of how something may work.

Models can be physical or mental.

Line Graphs are used to show changes over time.

To construct a line graph the following steps should be followed:

- Draw a horizontal line (x-axis) and a vertical line (y-axis) that meet at a right angle.
- Identify the **independent** (manipulated) variable and the **dependent** (responding) variable from the data.
- The independent (manipulated) variable is written on the x-axis.
- The dependent (responding) variable is written on the y-axis.
- Include appropriate units of measurement for each variable.
- Look at the range of data (lowest and highest) to determine the *intervals* or *increments* (numbers on the x-axis and the y-axis).
- The increments do not need to be the same for both the x-axis and the y-axis, but should be consistent on either axis.
- Label the point at the right angle as zero (0).

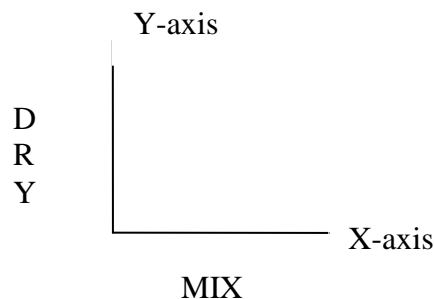
Plot the data on the graph as matched pairs. For example, every independent (manipulated) variable number will have a corresponding dependent (responding) variable number.

Connect the points on the line graph.

Write an appropriate title for the graph that contains the names of both variables.

**DRY** represents **D**ependent-**R**esponding-**Y**-axis.

**MIX** represents **M**anipulated **I**ndependent-**X**-axis.

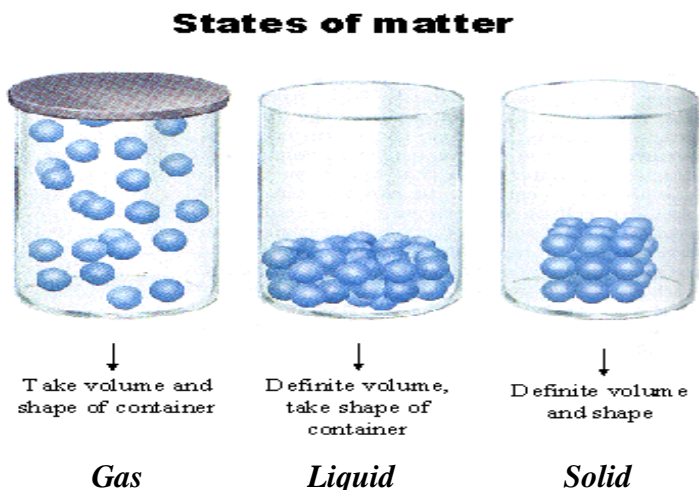


## Properties of Matter

**Matter** is anything that takes up space and has mass.

It is made of very small **particles**.

**Physical Properties of matter** include volume, shape, and the movement and spacing of particles.



### Gases

- **Gases** have no definite shape or volume, but take the shape and volume of their containers, filling the space available.
- The particles easily move far apart from each other and spread out through the available space.

### Liquids

- **Liquids** have a definite volume, but take the shape of their containers.
- The particles are also close to one another, but they are able to move apart from each other and flow from place to place.
- The volume of a liquid can be measured using a graduated cylinder or graduated syringe.

### Solids

- **Solids** have a definite shape and volume.
- Particles in a solid are very close to one another (dense) and vibrate, but stay in the same place.
- The volume of a solid with rectangular sides can be determined by measuring with a ruler and multiplying height x width x length.
- The volume of an irregularly shaped solid can be determined by water displacement in a graduated cylinder.
- The volume of water displaced equals the volume of the object.

**Mixture:** a combination of two or more substances

- These substances are not permanently combined.
- They can be separated from the mixture and be the same as they were before mixed.



**Solution:** a mixture in which all parts are mixed evenly

- One part dissolves but the solution can be separated back into the separate substances.



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## **Remember**

A solution is a type of mixture, but not all mixtures are solutions

The greatest amount of a substance in a solution is called the **Solvent** (usually a liquid)

The smallest amount of a substance in a solution is called the **Solute** (usually a solid).

In the Kool-Aid solution, the powder is the solute and the water is the solvent.

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**A way to remember solvent and solute: solvent has more letters than solute and the solvent is usually the greatest part of a solution.**

**Concentration:** determined by the amount of solute in the solvent

The more solute a solution has compared to the amount of solvent, the more concentrated it is said to be...

When two solutions contain the same amount of solvent, the one with the greater amount of solute is the **more concentrated solution**.

In order to make a solution **more** concentrated--more solute is added.

To make a solution **less** concentrated—more solvent is added.

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## **Remember**

Think about the Kool-Aid. The more powder you add to the water the sweeter it will taste – more concentrated.

If the Kool-Aid is too sweet, add more water to make it less concentrated.

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**Sometimes when 2 or more substances combine they form a NEW substance with different properties.**

Examples:

- To make a cake, you can mix flour, water, egg, oil, and sugar, but after baking in the oven, the cake has different properties.
- Adding vinegar to baking soda will produce a gas.
- When steel wool is exposed to water, rust is formed.



## **Use the processes of filtration, sifting, magnetic attraction, evaporation, chromatography, and floatation to separate mixtures**

**Filtration** is used to separate solid particles from a liquid.

· For example, pouring the mixture through a filter paper in a funnel will trap the solid particles and only allow the particles of the liquid to pass through. This method is used in water treatment plants as part of the process for separating dirt and other solid particles from water to produce clean drinking water.

**Sifting** is used to separate smaller, solid particles from larger solid particles.

· For example, the mixture of different sized solid particles can be put into a container that has a screen material at the bottom with holes of a certain size. When the mixture is shaken, the smaller particles go through the screen leaving the larger particles in the container.

· Cooks sift flour to get a small particle size for baking leaving larger particles of flour in the sifter above the screen.

**Magnetic attraction** is used to separate magnetic material from a mixture of other substances.

· When a magnet is stirred through the mixture, it pulls out the magnetic material from the mixture.

· A cow magnet, for example, is given to a cow to swallow. It stays in the first stomach of the cow keeping magnetic materials like wire and other harmful materials that cows swallow from going into the rest of their digestive system.

**Evaporation** is used to separate a solid that has dissolved in a liquid solution. The solution is heated or left uncovered until all the liquid turns to a gas (evaporates) leaving the solid behind.

· Salt in salt water or ocean water, for example, is separated by heating the solution until all the water evaporates leaving the solid salt in the container.

**Chromatography** is used to separate and analyze the solutes in a solution.

· For example, a small amount (2-3 drops) of the solution is put on a piece of filter paper, which is put in a solvent. · The substances in the solution that dissolve most easily travel the furthest; and

substances that do not dissolve easily do not travel very far.

· The bands of color that are formed allow scientists to identify the substances in the solution by comparing them

to the location of known substances forming bands of color on different filter papers.

**Floatation** is used to separate solids that float from the remaining liquid in a mixture.

· The solids are stirred and when they float to the top, they are skimmed off the surface of the liquid and put into a different container. Pepper can be separated from water by floatation.

**Rate of dissolving is the amount of time a solute takes to dissolve in a solvent.**

**Temperature change, particle size, and stirring can affect the rate of dissolving.**

### **Temperature change**

Usually, if the temperature increases, more of the solute will dissolve faster.

### **Particle size**

Usually, if the particle sizes are smaller (*crushing or breaking apart*), more of the solute will dissolve faster.

### **Stirring**

Usually, if the solution is stirred, more of the solute will dissolve faster.

## **Water, Air, and Soil Pollution**

Because substances can mix with and dissolve in water, air, and soil, pollution can occur that harms our environment.

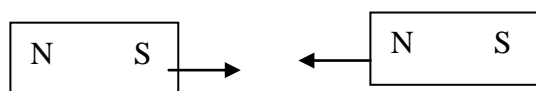
## Forces and Motion

A **force** is a push or a pull. Forces make things move faster, slower, stop, or change directions.

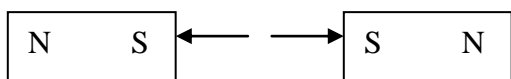
### Types of Forces

#### Magnetism

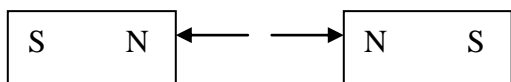
- A force that acts at a distance and cannot be seen.
- Materials that create this force are said to be magnetic and are called *magnets*.
- The needle of a compass moves because of Earth's *magnetism*.
- When like poles (S-S or N-N) of magnets are near each other, the magnetic force causes the poles to repel, and the magnets push away from each other.
- When opposite poles: north pole and south pole (N-S or S-N) of magnets are near each other, the magnetic force causes the poles to attract, and the magnets pull toward each other.
- The closer the objects, the greater the magnetic force.
- The magnetic force is greatest at the poles of magnets.



Opposite poles attract



Like poles repel



#### Gravity

- A pull that attracts objects to each other.
- This attraction is not noticeable unless one of the objects is very large, for example a planet, moon, or the Sun.
- The force of gravity between Earth and anything on it is extremely noticeable because the mass of Earth is so large. The pull of Earth's gravity makes any object fall to the ground.
- As the Moon goes around Earth, its gravity pulls on Earth causing water in the oceans to move toward the Moon.
- Earth's gravity also pulls on the Moon. This force of gravity keeps the Moon moving around Earth.
- Similarly, the pull of the Sun's gravity keeps Earth moving around the Sun.

#### Friction

- The force that tries to stop motion between two surfaces that are touching.
- The effect of friction can be observed as an object slides across a surface and slows down.
- The rougher the surfaces are, and the harder the surfaces press together, the more friction there will be.
- Friction can be reduced by using **Lubrication** (oil, wax, or grease). Rollers can also reduce friction.
- Without friction, it would be very hard to slow or stop the motion of objects.

**Three ways the effect of friction on moving objects can be changed.**

**1. Texture of the surface**

- **Rough surfaces** tend to create more friction.
- **Smooth surfaces** tend to create less friction.

**2. Amount of surface area**

- The amount of surface area affects the friction between objects in liquids and gases.
- The amount of surface area affects the friction on a moving object under the following circumstances: air resistance (such as the size of a parachute) or the resistance of an object as it glides through water (such as a boat).
- The amount of surface area in contact usually does not affect friction between two solids.

**3. Lubrication**

- **Lubrication**, for example oil or grease, reduces the effects of friction.
- Without lubrication, moving parts of machines would slow down or stop very quickly.

**The motion of an object can be explained by describing the position, direction, and speed.**

**Position**

- The *position* of an object is its location relative to another object (the reference point) for example “above”, “below”, “beside”, “behind”, “ahead of” plus the distance from the other object. The distance (length) from the reference point changes when the object moves.

**Direction**

- *Direction* of motion is the course or path that an object is moving and can be determined by reading a compass using the terms “north”, “south”, “east”, or “west.” Direction can also be described using the terms “right”, or “left,” “forward,” or “toward” relative to another object, or “up”, or “down” relative to Earth.

**Speed**

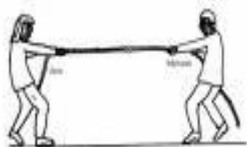
- A measure of how fast an object is moving.

**Unbalanced forces affect the rate and direction of motion in objects.**

**Unbalanced Forces** cause changes in motion (will cause an object to start, speed up, slow down, stop, or change its direction).

**Balanced Forces** do not change the motion of objects. The forces are equal in strength but opposite in direction.

Balanced force



Both sides are pulling equally causing no change in motion.

Unbalanced force



**Rate of motion** is the speed of the object or how fast or slow the object is moving.

- Unbalanced forces can change the rate or direction of motion of an object in different ways

**Object at rest**

- If an unbalanced force acts on an object at rest the object will move in the direction of the force. A stronger force (push or pull) will make it move faster.

## Object in motion

· If an object is moving, an unbalanced force will change the motion of the object in different ways depending on how the force is applied. The unbalanced force may speed the object up, slow it down, or make it change directions.

- If the force is applied in the same direction as the object is moving, the object will speed it up.
- If the force is applied in the opposite direction as the object is moving, the object will slow it down or stop it.
- If the force is applied to the side of the moving object, the object will turn.

## **A change in forces or a change in mass affects the motion of an object.**

### Force

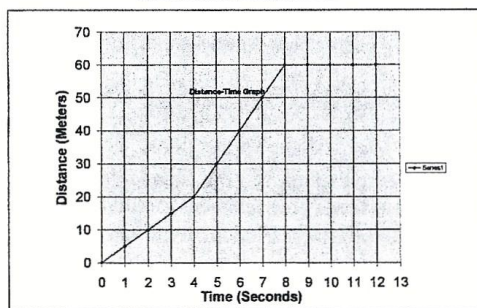
- If there are two objects with the same mass and one is acted on by a greater force than the other, the one acted on by the greater force will have the greatest change in speed.
- It will speed up the most or slow down the most in a given amount of time.

### Mass

- If there are two objects, one with a greater mass than the other, and the same amount of force is applied to each object, the object with the lesser mass will have the greater change in speed.
- It will speed up or slow down more in a given amount of time.
- It is harder to change the speed of the object with the greater mass than the object with the lesser mass.

**Line graphs are used to show the motion of an object. Look at the data collected in the chart below and see how it is used to create a graph.**

Time (Sec)	Distance (meters)
0	0
1	5
2	10
3	15
4	20
5	30
6	40
7	50
8	60
9	60
10	60
11	60



Distance-Time Graph

To construct a distance-time graph, follow the correct procedures for producing a graph:

- Correct placement of dependent and independent variables (DRY-MIX)
- Correct labeling of the axes
- Title the graph
- Correct placement of intervals

Use the distance line graph to determine:

- Distance the object traveled after a certain amount of time
- Distance the object travels during a particular time interval
- If the object is moving or stationary during a particular time interval

Compare the motion of the objects on the graphs below to determine if the object is moving faster or slower during different time intervals.

<p>Moving at about 10 meters / second</p>		<p>Stopped moving at 35 meters</p>	
<p>Not moving at all</p>		<p>Stopped moving after 4.5 seconds</p>	
<p>Moving very quickly (about 50 m/s)</p>		<p>Started moving after 4.5 seconds</p>	
<p>Moving very slowly (about 1 m/s)</p>		<p>Always moving, but at different speeds</p>	

## Landforms and Oceans

Earth's oceans and land can be affected in constructive ways and destructive ways by natural processes.

**Constructive** - Processes that create landforms (**deposition, landslides, volcanic eruptions, floods**)

**Destructive** - Processes that destroy landforms (**weathering, erosion, landslides, volcanic eruptions, earthquakes, floods**)

**Natural processes that can affect Earth's oceans and land include:**

### Weathering

Weathering is a term used to describe processes that break down rocks at or near the surface of the earth.

Weathering can be either physical or chemical.

These processes cause the surface of the earth to dissolve, decompose, and break into smaller pieces.

Weathering can be caused by:

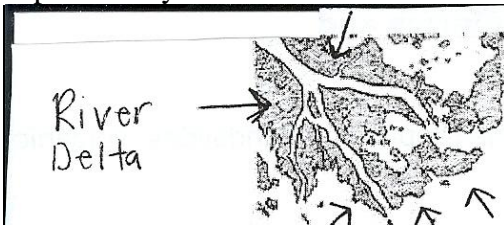
- Water
- Plants (roots break apart rocks)
- Temperature changes (water freezes in cracks of rocks)

### Erosion

Erosion is the movement of **sediments** and soil by wind, water, ice, and gravity.

### Deposition

Deposition is the dropping, or **depositing**, of sediments by water, wind, or ice. It builds new land on Earth's surface, like a delta at the end of a river or the pile up of a sand dune in the desert. Shells on the beach are deposition by ocean waves.



Deposition begins with a “D” and Dunes and Deltas begin with a “D”.

**Chant:**

**Weathering will break rocks down**

**Erosion moves it all around**

**Put it here and then we're done**

**Now we have deposition**

## **Landslides**

Landslides are mass movements of land due to gravity.

Landslides can cause buildings to fall, or power and gas lines to break.

Landslides even occur on the continental slope in the ocean.

## **Volcanic eruptions**

Volcanoes are mountains with openings in Earth's crust through which magma, gases, and ash reach Earth's surface.

When the magma erupts from the volcano the top of the mountain can be changed, either built up or exploded off.

The lava and ash can destroy forests and bury fields.

Volcanic eruptions can even change Earth's weather patterns.

Volcanic eruptions also occur under the oceans; these volcanoes that are built up are called *Seamounts*. If the seamount rises above the ocean surface it is called a *volcanic island* (for example Hawaii or Japan).

## **Earthquakes**

Earthquakes are vibrations on Earth's surface caused by sudden movement in the Earth, often along a **fault**, a break in Earth's surface.

Some earthquakes cause little damage and some cause a lot of damage.

Large earthquakes can cause landslides.

Earthquakes under the ocean can cause huge waves, called *tsunamis* that destroy land and cause great damage if they come ashore.

## **Floods**

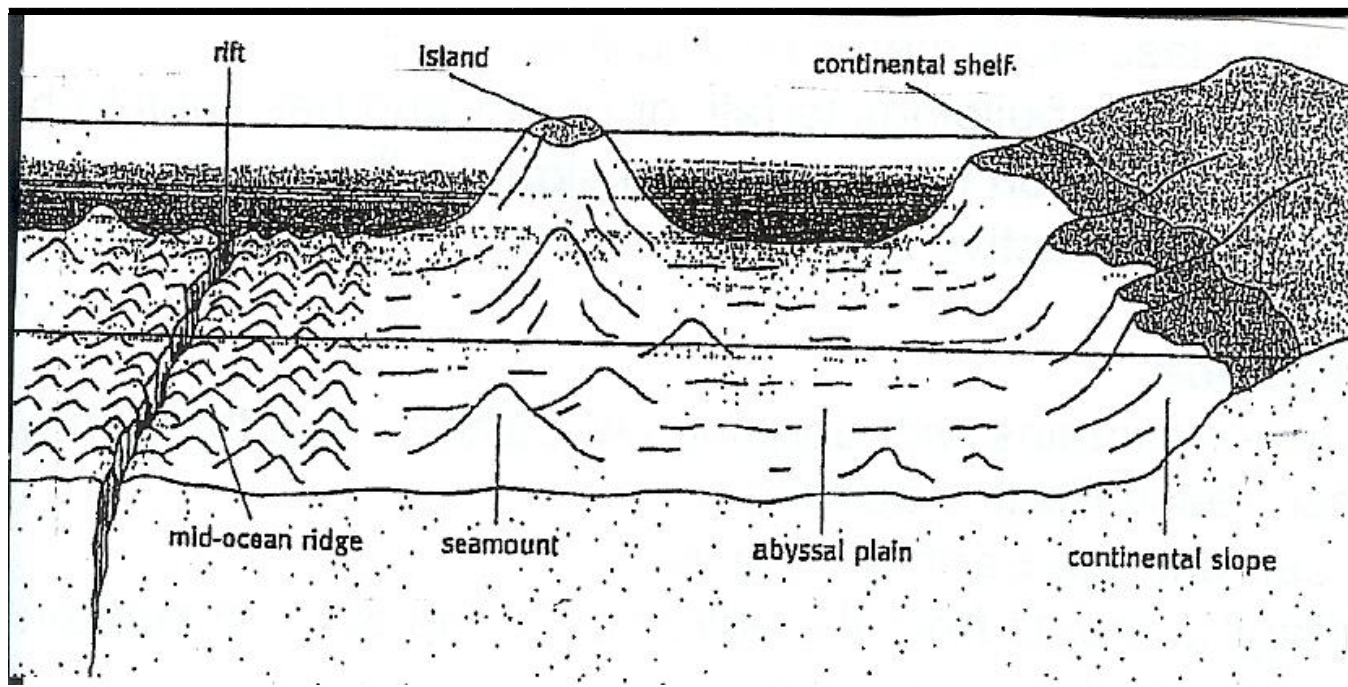
Floods occur when a large amount of water covers land that is usually dry.

When the flood occurs; rapid erosion can take place and move soil and sediments away.

When the flood recedes; new sediment is left behind and can build up rich soil deposits.



## Landforms of the Ocean Floor



### Continental shelf

The edges of the continents slope down from the shore into the ocean.

The part of the continent located under the water is known as the **continental shelf**.

The width of the continental shelf can vary.

In some places the continental shelf is fairly shallow and in other place it becomes very deep, but it is not the deepest part of the ocean.

### Continental slope

The steep slope where the continental shelf drops to the bottom of the ocean floor is called the **continental slope**. The depth of the ocean water increases greatly here.

### Mid-ocean ridge

On the bottom of the ocean, there is a central ridge, or mountain range, that divides the ocean floor into two parts called the **mid-ocean ridge**.

Volcanic mountains not formed on the mid-ocean ridge are called **seamounts**.

### Rift zone

In the center of the highest part of the mid-ocean ridge is a narrow trench called a **rift**.

Underwater volcanic activity that adds mountains to either side of the mid-ocean ridge occurs at the **rift zone**.

### Trenches

There are many steep-sided canyons and deep, narrow valleys in the bottom of the ocean.

Ocean **trenches** are the deepest part of the ocean basin and are deeper than any valley found on land.

### Ocean basin

Located on either side of the mid-ocean ridge is the **ocean basin**.

It is made up of low hills and flat plains.

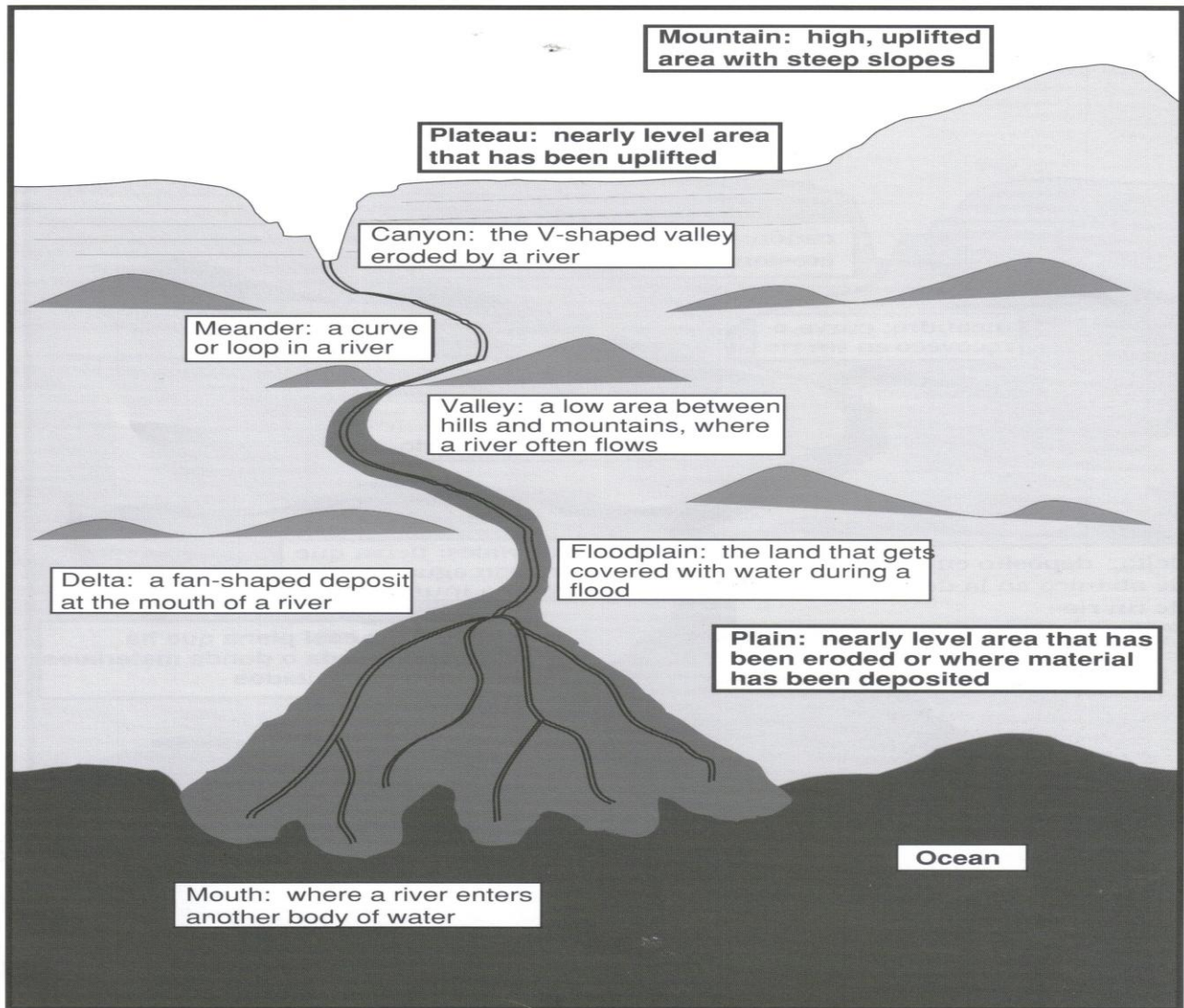
The flat area of the ocean basin is called the **abyssal plain**. Seamounts are generally formed on the ocean basin.



## Continental and Ocean Landforms

Description	Continental	Oceanic
Low land between hills of mountains	Valley	Rift
Deep valley with high steep sides	Canyon	Trench
An opening in the surface from which lava flows	Volcano	Seamount and volcanic islands
Land which rises high above the ground	Mountain range	Mid-ocean ridge
Wide, Flat areas of land	Plains	Abyssal Plains

### LANDFORM VOCABULARY



**The area where the ocean meets the land is called the Ocean Shore Zone.**

**Waves, currents, tides, and storms can affect the geologic features of the ocean shore zone.**

- Some shorelines are rocky. Shorelines made of sand are called **beaches**.
- Shorelines are always changing because of wind and water.
- Waves can wear away the land and expose a rocky shore or the waves can deposit sand along the shore and form a beach. If the waves reach the beach at an angle, the sand is moved along the coast.
- Currents, called **longshore currents**, along the shoreline can move sand from one location to another.
- Tides can bring in sand, shells, and ocean sediments at high tide and leave them behind when the tide goes out.
- Storms can cause wave action that removes sand from beaches.

**Barrier islands**

- Islands are pieces of land surrounded by water on all sides. Islands with sandy beaches are called **barrier islands**.
- These barrier islands protect the mainland from the effects of waves on its shore.
- As the waves deposit sand on the beaches, the shapes of the barrier islands change.
- Currents can move the sand from one end of the island to the other.

**Estuaries**

- All rivers flow into the oceans.
- The area where a river meets the ocean is known as an **estuary**.
- Estuaries have a mixture of freshwater and saltwater.
- Waves can deposit sand in the estuaries.
- At high tide, ocean water brings in sediments and sea life that feed and nourish life in the estuary.

**Inlets**

- *Inlets* are the water-filled spaces between the barrier islands.
- As the tides change, the amount of water in the inlet will change.
- Ocean currents and storms can change the shape of an inlet opening.

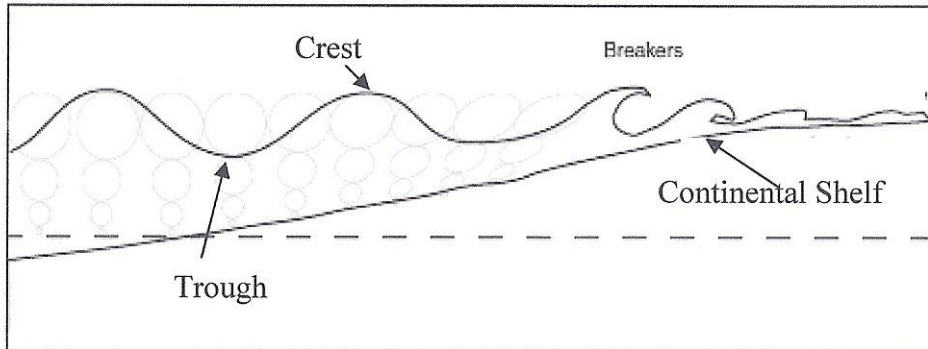


**Large storms**, for example hurricanes, can also cause massive construction or destruction of beaches, barrier islands, estuaries, and inlets because they produce high waves, storm surges, and winds.

## Water can be moved by waves, currents, and tides.

### Waves

- The repeated movement of water is known as a **wave**.
- All waves have the same parts. The highest part is known as the **crest** and the lowest part is known as the **trough**.
- Most ocean waves are caused by winds that are blown across the surface of the water.
- A wave changes shape when it reaches the shore.
- As the top of the wave curls over it forms a **breaker**.
- Sometimes giant sea waves, called **tsunamis**, are caused by underwater earthquakes, volcanic eruptions, or landslides.



### Currents

- Flowing streams of water that move continually through the ocean in a specific direction are called **currents**.
- Some currents flow at the ocean's surface and some are found deeper in the ocean.
- Surface currents are caused by the movement of Earth and by the force and direction of wind.
- The movement of Earth and winds causes these currents to flow along curved paths.
- Warm water and cold water are moved to different regions on Earth as a result of currents.
- **Warm surface currents** are driven by Earth's rotation from the tropics to higher latitudes.
- **Cold surface currents** are driven by Earth's rotation from the polar latitudes toward the equator.

### Tides

- Several times during the day, the level of water at the ocean shore changes.
- This regular rise and fall of waters in oceans and seas is called a **tide**.
- Tides are caused by the pull of the Moon's **gravity** on Earth.
- As the Moon moves in relation to Earth, the water on Earth moves too.
- As Earth spins on its axis, the part of the ocean facing the Moon will bulge.
- **High tide** occurs when the water level is at its highest point.
- **Low tide** occurs when the water level is at its lowest point.
- Tides rise and fall about twice a day.

## **Human Activity can affect the land and oceans of Earth.**

Humans can help protect the land and oceans by preserving the natural resources these areas provide. Examples of natural resources include: air, water, trees, rocks, minerals, soil, coal, and oil.

Using resources wisely is call **conservation**. Ways to conserve our resources include:

- Prevent pollution
- Reduce, Reuse, Recycle
- Clean-up projects
- Beach renourishment projects to protect sand on beaches
- Plant trees, bushes, and trees to improve air quality and keep erosion from carrying away soil

Pollution is anything that harms the natural environment.

Human activities that can pollute the environment include:

- Dumping materials from industry, mining, or agriculture onto the land or into the water
- Careless dumping of trash on land or in oceans
- Smoke from burning fuels pollutes the air
- Oil spills harm the oceans

## Cells

**The cell** is the smallest unit of living material having major structures within it allowing it to live.

Some organisms are just one cell.

Most organisms are made of more than one cell. Cells vary in size, but all cells contain these major structures:

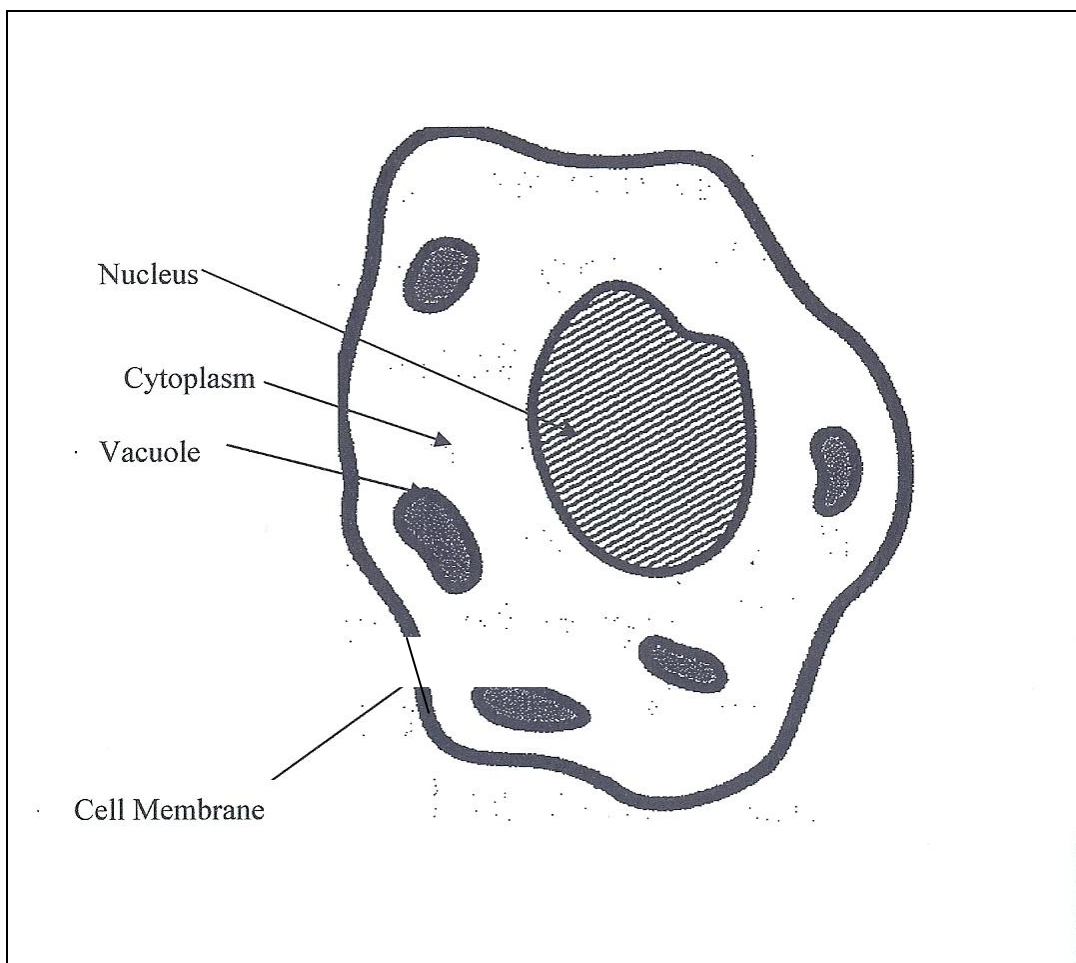
### Parts of Cells & their Functions

**Cell membrane:** Controls the movement of materials in and out of the cell.

**Cytoplasm:** The jelly-like substance in the cell in which all other organelles are floating.

**Vacuole:** Provides storage space for materials in the cell like water and other nutrients. Store wastes until the cell can get rid of it.

◀**Nucleus:** Controls everything the cell does.



## Ecosystems

An ecosystem contains all of the living (biotic) organisms and the nonliving (abiotic) factors in the environment.

### **Biotic and Abiotic Factors in an Environment**

- Bio = life
  - Biotic factors are *the living* parts of an ecosystem.  
Examples: plants – from plankton floating in the sea to the Redwood tree  
                  animals – from tiny animals in the ocean to whale
- \*\*\*once an organism is alive it is always considered biotic. \*\*\*

- A = not, bio = life
- Abiotic factors are the non-living parts of an ecosystem.  
Examples: temperature (hot or cold)  
                  amount of light (bright sun or total darkness)  
                  type of water (how much salt is in the water)  
                  quality of air and water (clean, muddy, etc.)  
                  types of soil (sand, clay, or humus)

Abiotic factors play a big role in what an ecosystem is like. Even changing one of the abiotic factors a little can make a huge change in the ecosystem.

Example: If there is a change in temperature it can become too warm or cold for organisms to survive. When these changes happen, plants and animals have to adapt or move away to survive.

### Abiotics Ain't Alive (Sung to the tune of Old MacDonald) Written by: Denise Cothran

Abiotics ain't alive,  
E – I – E – I – O.  
But all Biotics live and thrive,  
E – I – E – I – O.  
With a bunny here and a froggy there,  
Here a snake, there a plant, everywhere a  
frog-frog.  
Abiotics ain't alive,  
E – I – E – I – O.

Abiotics ain't alive,  
E – I – E – I – O.  
The non-living parts, and, there are five,  
E – I – E – I – O.  
With water here and water there,

Here a drop, there a drop, everywhere a drip  
drop,  
Abiotics ain't alive  
E – I – E – I – O.

Sun - light is another part  
E – I – E – I – O.  
Soil, Air, Heat, now that's a start,  
E – I – E – I – O.  
With soil here and air there,  
Here some dirt, there some heat, everywhere  
some fair air,  
Abiotics ain't alive  
E – I – E – I – O.



**The living organisms in an environment can be grouped in two ways:**

A population of ducks



### **1. Populations**

- All members of one kind of organism that live in a particular area.
- Some examples of a population may be all of the white-tailed deer in a forest, all rainbow trout in a stream, or all of the bald cypress trees in the swamp.
- *Microorganisms* are living things that can be a single-celled or multi-celled organism that are too small to be seen without at least a 10x magnifier.

A community of many organisms

### **2. Communities**

- A group of different populations of organisms.
- Some examples of communities are all of the squirrels, acorn trees, and grass in a park; all of the microorganisms in a pond; or all of the cacti, rattlesnakes, and scorpions in the desert.



**Aquatic & terrestrial ecosystems are alike & different.**

### **Terrestrial**

**Land-based** ecosystems include *forests* and *grasslands*.

**Forests** have many trees (with needles or with leaves), shrubs, grasses and ferns, and a variety of animals. They usually get more rain than grasslands. Temperatures in the forests may vary depending on where the forest is located.

**Grasslands** have fertile soil and are covered with tall grasses. They usually get a medium amount of rain, but less than forests. Temperatures may also vary depending on where the grassland is located. Some examples of animals that live in the grasslands are prairie dogs, bison, and grasshoppers.

### **Aquatic**

**Water-based ecosystems** may be fresh water (lakes and ponds) or saltwater (oceans, estuaries and saltwater marshes).

**Lakes and ponds** are bodies of freshwater that are surrounded by land. Ponds are usually shallower than lakes and the temperature of the water usually stays the same from top to bottom. Plants and algae usually grow along the edges where the water is shallow. Some examples of animals may be different types of fish, amphibians, ducks, turtles, or beavers.

**Oceans** are large bodies of saltwater divided by continents. Oceans have many types of ecosystems depending on the conditions (sunlight, temperature, depth, salinity) of that part of the ocean.

\* Most organisms live where the ocean is shallow (from the shoreline to the continental shelf) because sunlight can reach deep and the water is warm making food abundant. Some examples of organisms that live in the shallow ocean may be drifters (jellyfish or seaweed), swimmers (fish), crawlers (crabs), and those anchored to the ocean floor (corals).

\* Some organisms live in the open ocean, near the surface or down on the deep ocean bottom. Plankton float in the upper regions of the water. Some organisms swim to the surface to find food or for air (whales, turtles, sharks) while others stay live closer to the bottom (certain fish, octopus, tubeworms).

**Estuaries** are found where the freshwater rivers meet the oceans. They are saltier than a river, but not as salty as the ocean. The amount of salt (salinity) changes as the tides come in and out. Estuaries contain *salt marshes* with grasses and marsh plants adapted to this changing water. Some examples of animals that live in the estuaries/salt marshes may be crabs, shrimp, birds such as blue heron and egrets, and muskrats.

**All organisms need energy to live and grow. This energy is obtained from food. The role an organism serves in an ecosystem can be described by the way it gets its energy.**

### Producers

Plants are called producers because they are able to use light energy from the Sun to produce food (sugar) from carbon dioxide in the air and water.

### Consumers

Animals cannot make their own food so they must eat plants and/or other animals. They are called consumers.

- There are three main groups of consumers.
  - Animals that eat only plants are called **herbivores**.
  - Animals that eat only animals are called **carnivores**.
  - Animals that eat both animals and plants are called **omnivores**.

### Decomposers

Consumers (including microorganisms, termites, worms, and fungi) that get the energy they need by breaking down dead or decaying matter.

These decomposers speed up the decaying process that releases nutrients back into the food chain for use by plants.

### **Energy can be passed through an ecosystem by a food chain.**

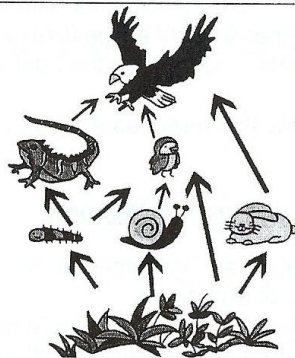
A **food chain** is a series of plants and animals in which each organism is a source of food (energy) for the next in the series.

In a typical food chain, plants use the Sun's energy to make their own food and then are eaten by one kind of animal which in turn is eaten by another kind of animal.

Most organisms are part of more than one food chain and eat more than one kind of food in order to meet their energy requirements.

### Interconnected food chains form a **food web**.

- Most food chains have no more than six organisms.
- There cannot be too many links in a single food chain because the animals at the end of the chain would not get enough food (energy) to stay alive.



- The grass is the producer
- The worm, snail, and rabbit are all herbivores because they eat only the grass
- The bird is an omnivore because it eats the grass, snail, and worm
- In this food chain the lizard only eats the worm
- The eagle is a carnivore that eats the lizard, bird, and rabbit



## Organisms can be identified based on how they interact with other organisms.

- **Predators** are animals that hunt and kill other animals for food.
- **Prey** are animals that are hunted and killed as food for other animals.
- A **parasite** is an organism that spends a significant portion of its life in or on a living host organism usually causing harm to the host without immediately killing it.
- **Hosts** are organisms or cells that serve as a home or a source of food for a parasite.

## An ecosystem can change

An ecosystem only has a certain amount of food, water, space, and shelter to support organisms.

- The relationship between numbers of organisms and the resources available in an ecosystem can be called the **balance of nature** .
- A condition or resource that keeps a population at a certain size is known as a **limiting factor**.
- If any of the limiting factors change, animal and plant populations may also change.
- Some changes may cause a population to increase; others may cause a population to decrease.

## Some examples that may cause a population to change:

- If there are more plants than usual in an area, populations of animals that eat those plants may increase.
- If the population of predators increases, the population of prey will decrease.
- If the population of prey increases, the population of predators will also increase.