Tool- Wire Stripper

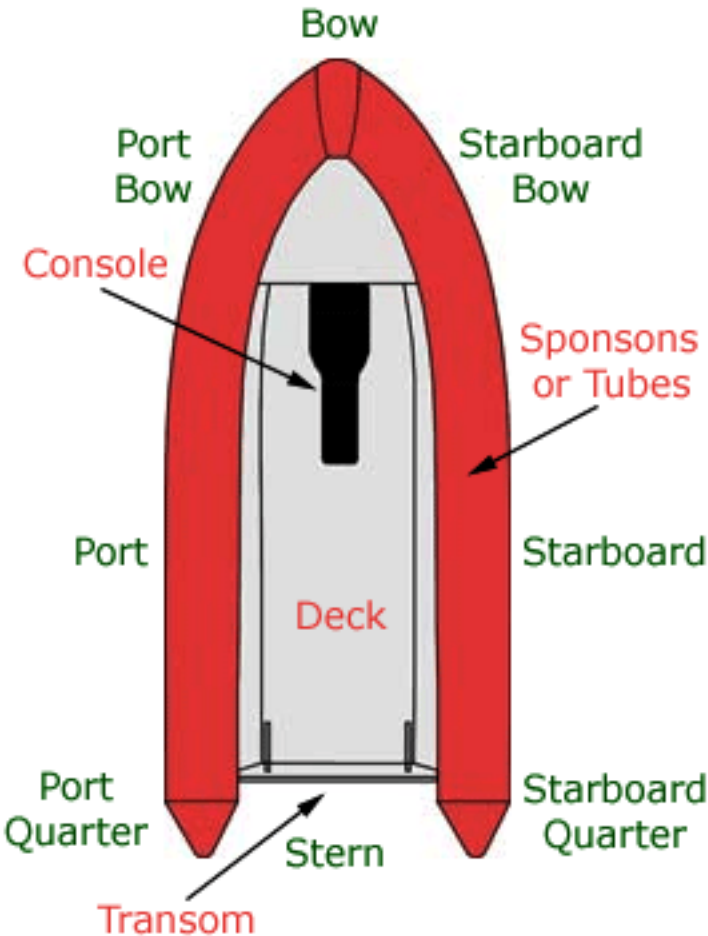
When using any type of wire stripper, hold the wire perpendicular to the cutting blades. Lightly grip the handles of the stripper in the closed position with wire inserted in correct indentation.

With the handles still closed, pull the wire out of the stripper. The handles will grip the insulation and the pulling action will strip it off.


Stripper
Stripper
Cutter
Cutter

Water friction- it is much more difficult to run through water than to run through air. That is because water is denser than air, and it is actually pushing back on you when you move. Moving through water creates a lot of friction, and submarines or boats are designed to minimize this force by having a hydrodynamic, bullet-like shape hulls

Have you ever tried running in a pool?


Bow
Port Bow
Starboard Bow
Console
Sponsons or Tubes
Port
Starboard
Deck
Port Quarter
Starboard Quarter
Stern
Transom

Do Now----- Copy This:

Pliers- The word pliers is a plural Name for a single tool. Pliers come in various sizes and shapes. Pliers are used for holding and gripping small articles in situations where hands cannot be used.

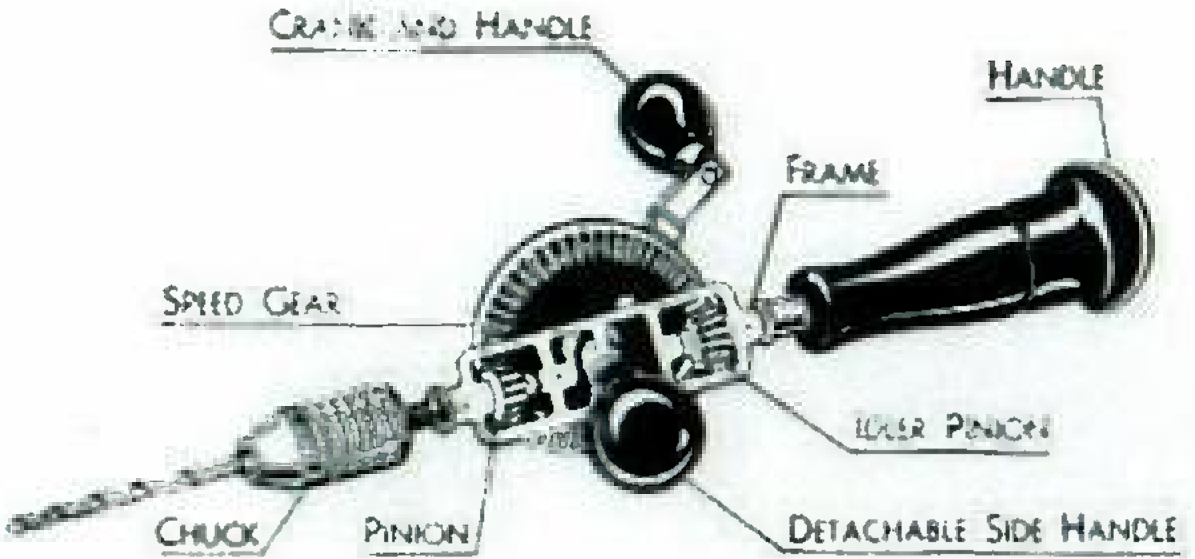
Slip-Joint pliers – are pliers with straight, serrated (grooved) jaws, and a pivot with the jaws are fastened can be moved to increase or decrease the size of objects able to be held.

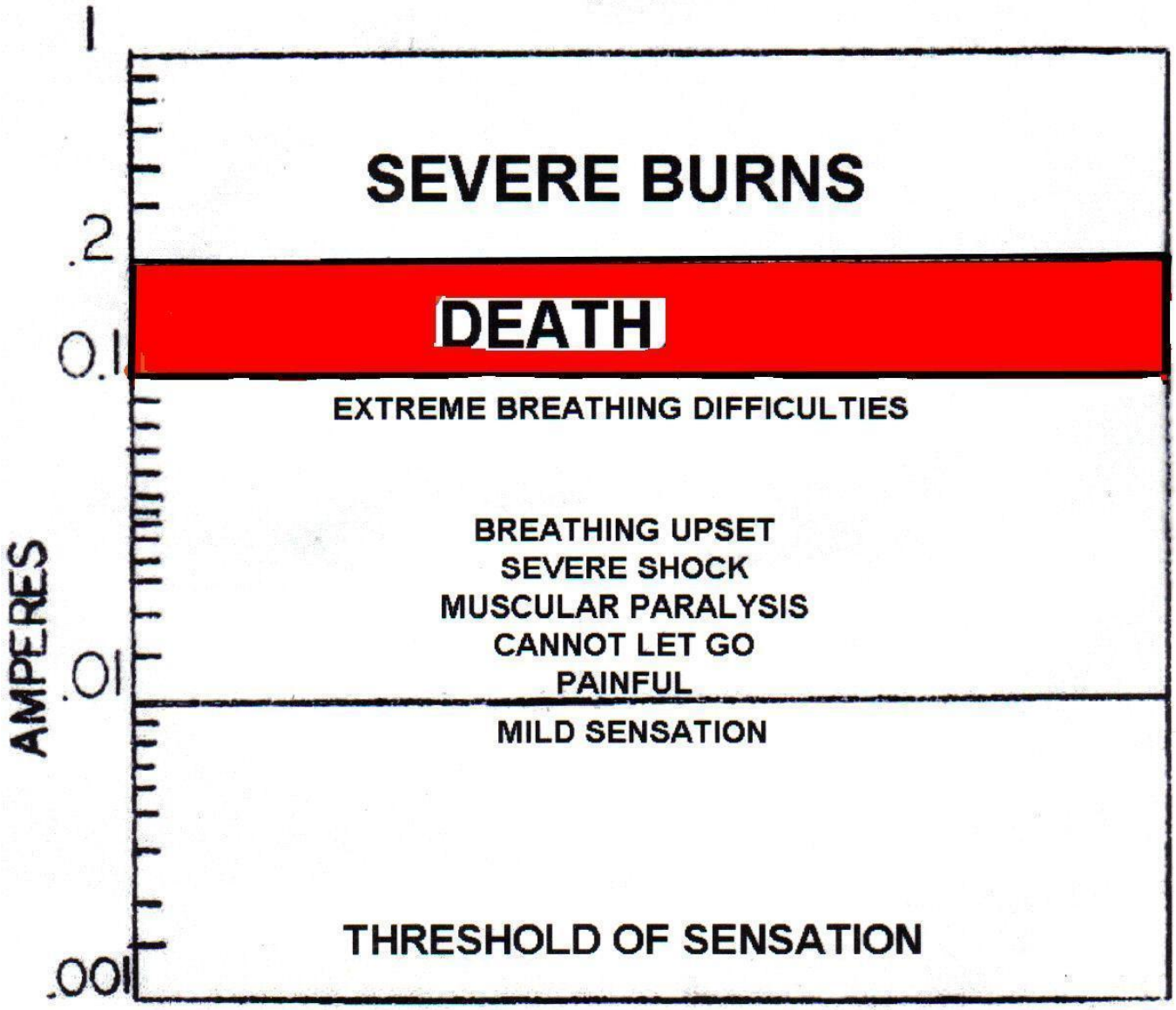
Long-Nose or Needle Nose pliers-
These are pliers with a long usually straight point. It has serrated grooves, which enables a very fine grip in small areas

Do Now Copy This

The hand drill is held vertically.
One hand holds the drill at the top while the second hand rotates the handle in a clockwise direction. ↻
This turns the chuck and drill bit.
Only light pressure should be used to push down on the hand drill, if a lot of pressure is needed the drill bit is probably dull and needs to be replaced or sharpened.

THE STANLEY HAND DRILL

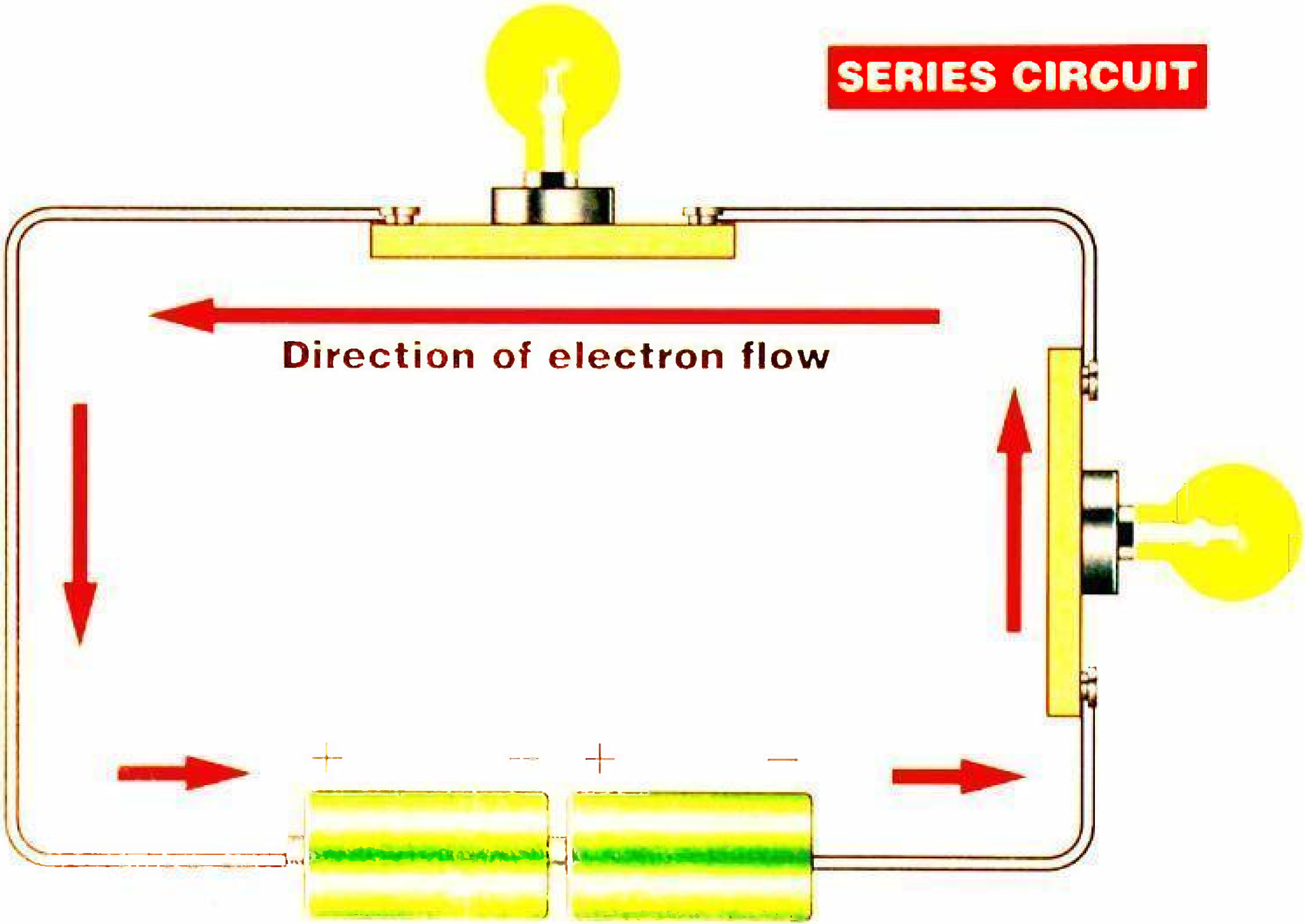




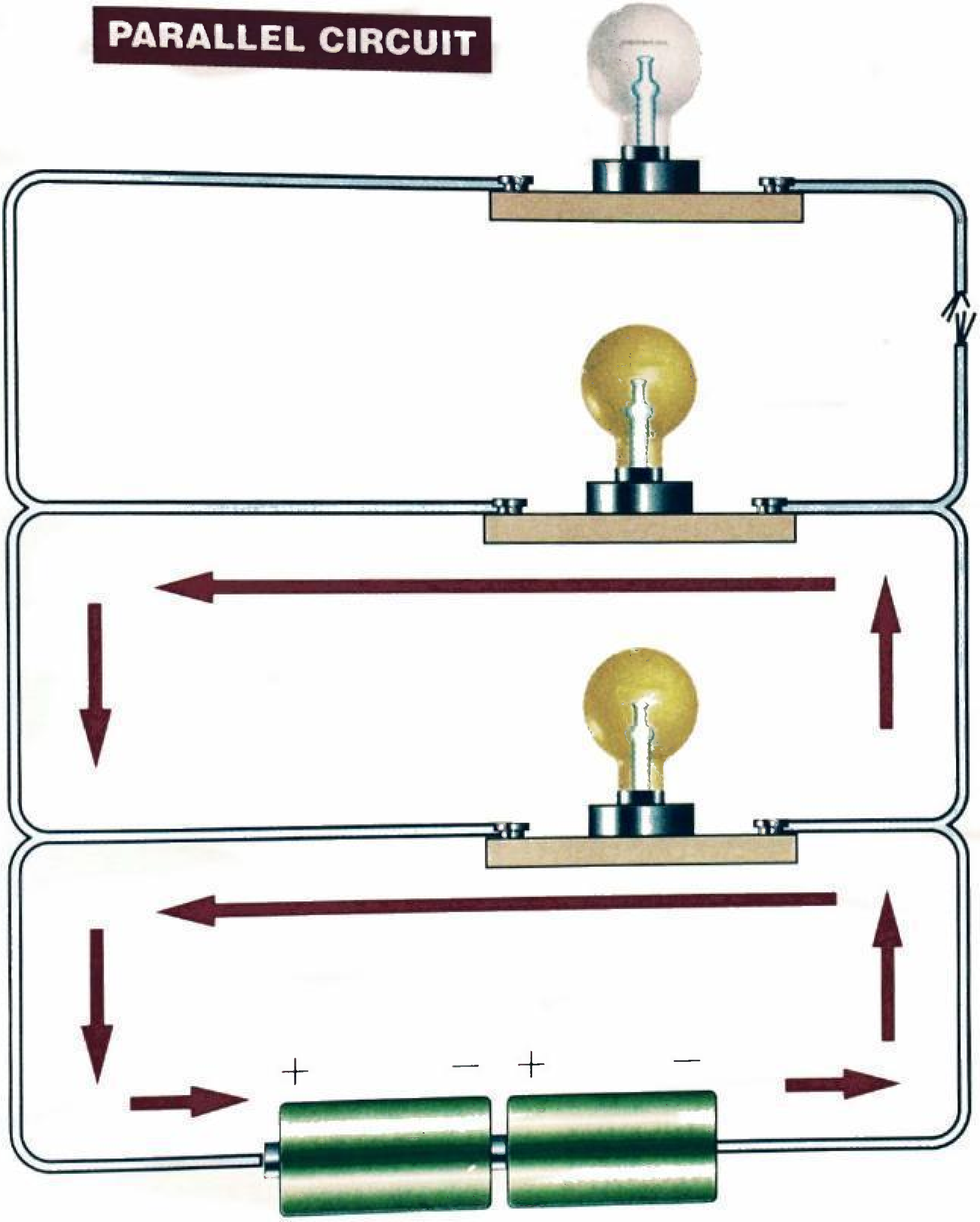
EFFECTS OF ELECTRIC CURRENT

S Grad

SERIES CIRCUIT

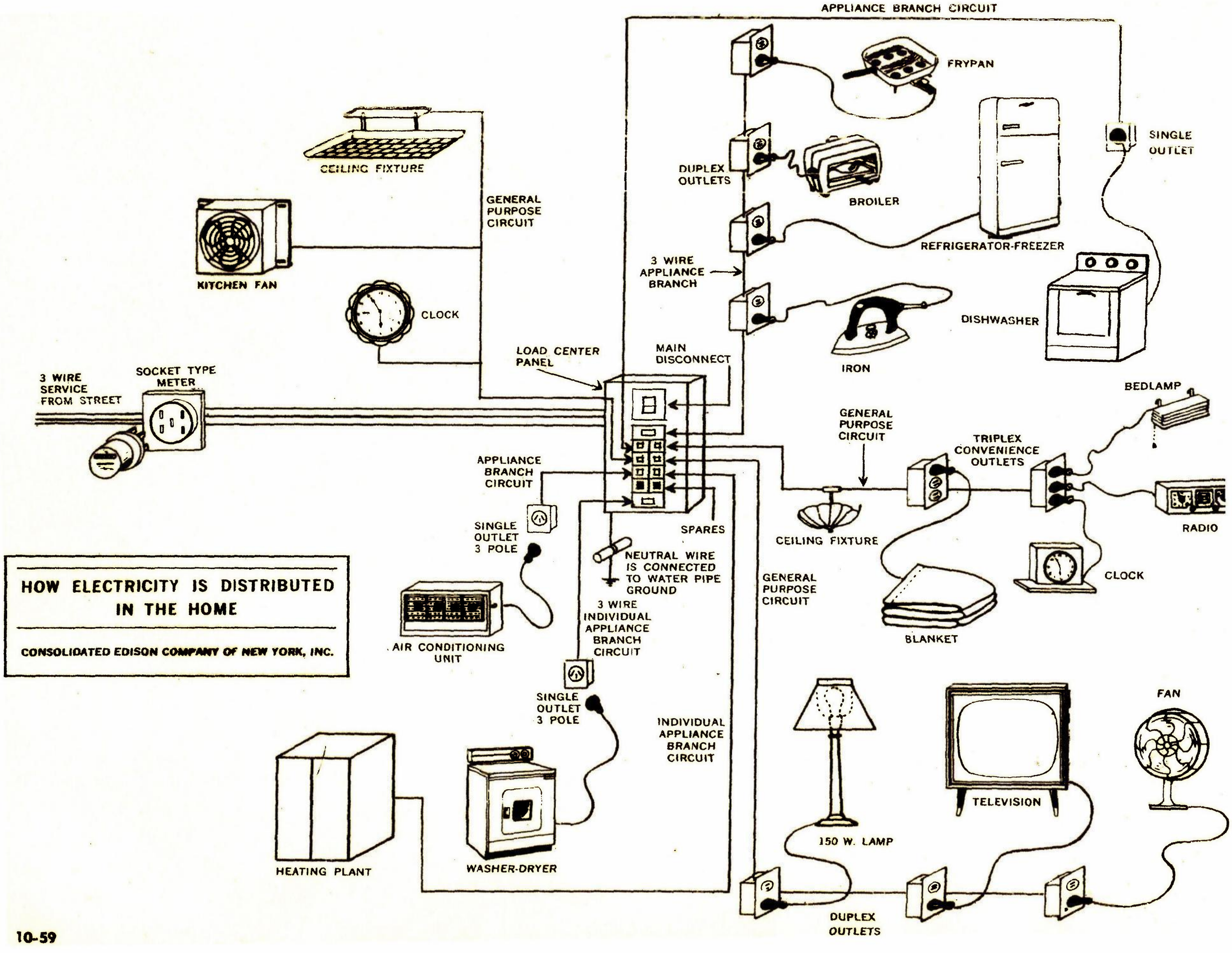


PARALLEL CIRCUIT



HOW ELECTRICITY IS DISTRIBUTED IN THE HOME

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.



Do Now –**Aviation Snips**

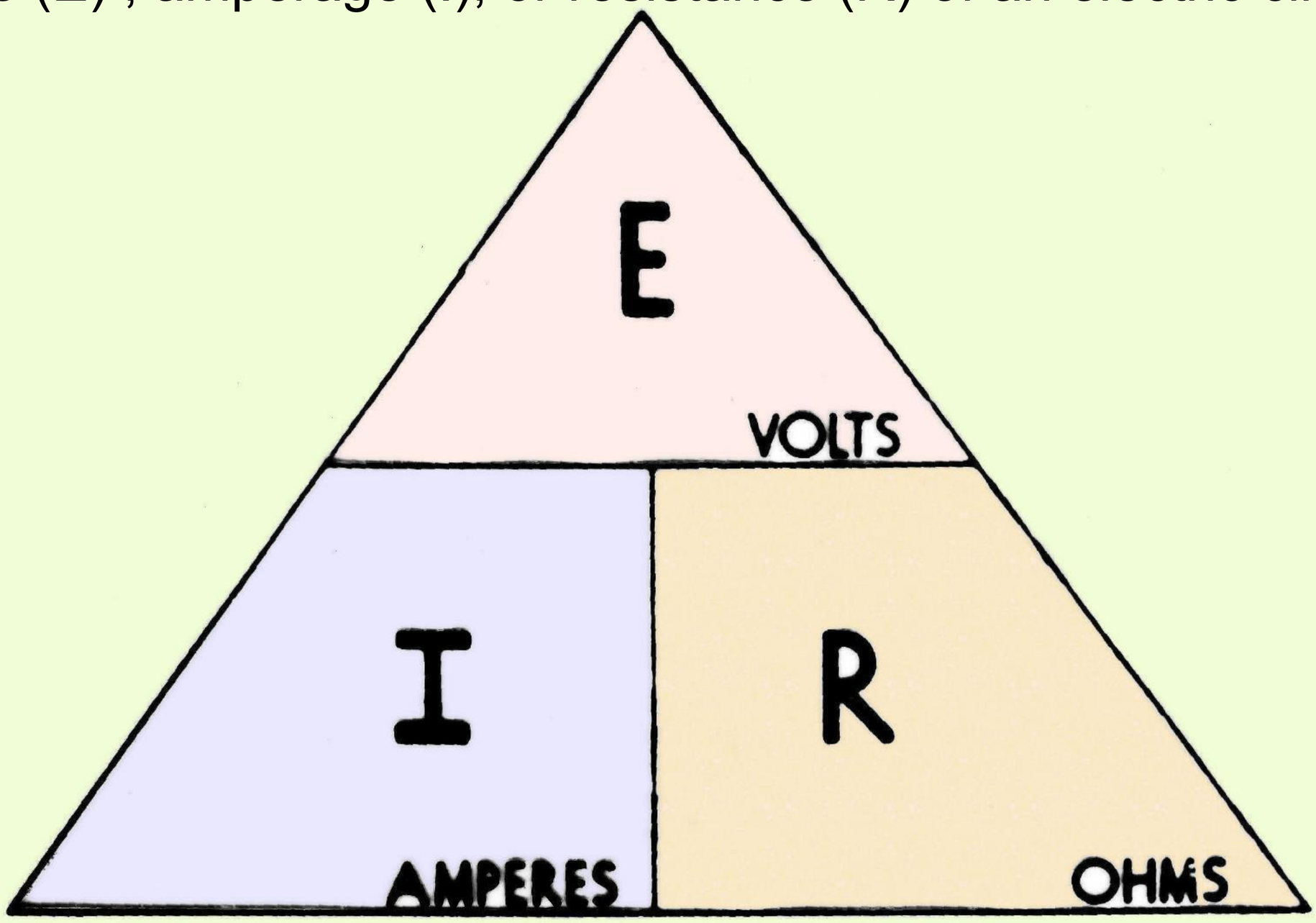
Also called compound leverage snips. They are available in right-handed, left-handed or straight models corresponding to the various directions of the cut. Cuts easier because of double fulcrum, compound leverage action. The handy snips feature serrated jaws that grip the work as they cut and an internal spring that opens the jaws after each cut to speed the work. Compound leverage multiplies the squeezing force of your hand for making clean cuts with minimal effort.

Safety

1. Never touch the edge of the metal before or after making cut.
2. Be careful of any burrs left after the cut.
3. Never hold the metal too close to your face or anyone else's' while cutting.
4. Smooth all cut surfaces with the proper material

OHM'S LAW

is a mathematical formula that is used to determine the voltage (E) , amperage (I), or resistance (R) of an electric circuit



E	VOLTAGE (EMF)	VOLTS
I	CURRENT	AMPERES
R	RESISTANCE	OHMS

$$E = I \cdot R$$

$$I = \frac{E}{R}$$

$$R = \frac{E}{I}$$

DO NOW – Copy This

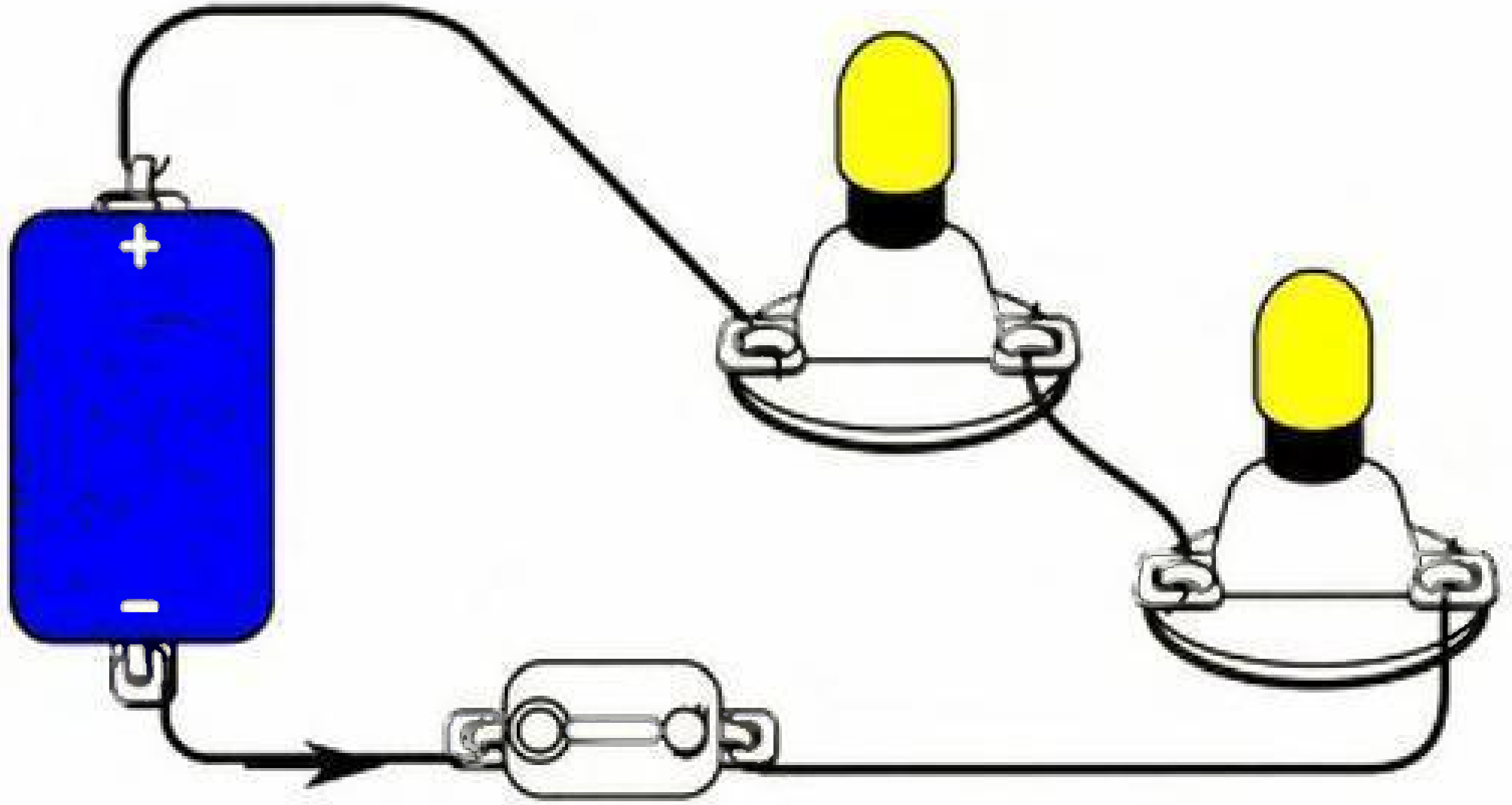
OHM

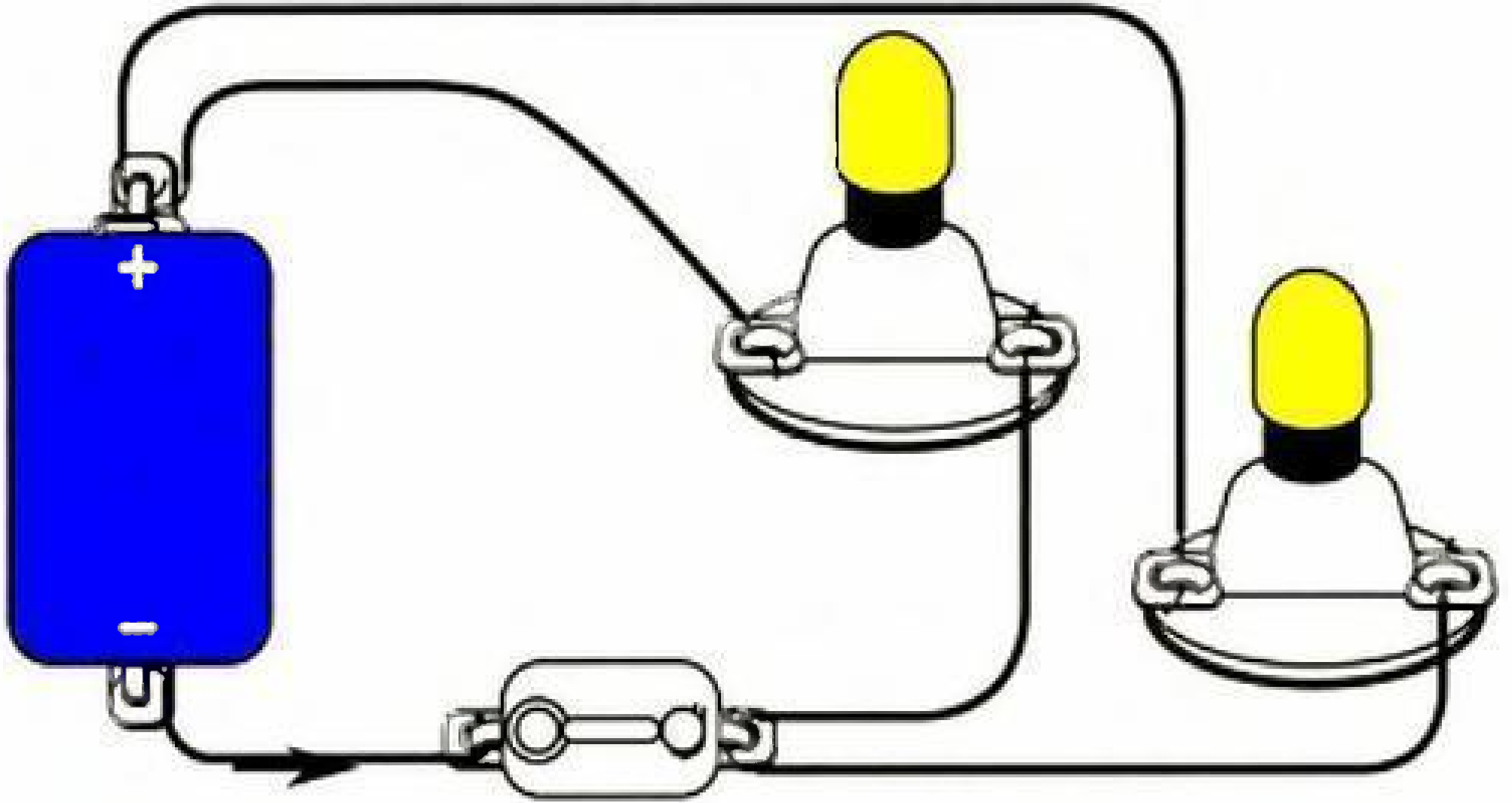
An ohm is the electrical resistance offered by a current-carrying element that produces a voltage drop of one volt when a current of one ampere is flowing through it.

Do Now

Wire- is a single strand of conductive material enclosed in protective insulation.

Wire Ampacity. You also must consider the wire's ampacity, of the current in amperes that a wire can carry continuously under conditions of use without exceeding its temperature rating.
If a wire is too small for the job, it will present a greater-than-normal resistance to the current flowing around it. This generates heat and can destroy insulation, which can cause a fire.





Tangent Table

Angle	Tan.	Angle	Tan.	Angle	Tan.	Angle	Tan.
1°	0.02	21	0.38	41	0.87	61	1.80
2	0.03	22	0.40	42	0.90	62	1.88
3	0.05	23	0.42	43	0.93	63	1.96
4	0.07	24	0.45	44	0.97	64	2.05
5	0.09	25	0.47	45	1.00	65	2.14
6	0.11	26	0.49	46	1.04	66	2.25
7	0.12	27	0.51	47	1.07	67	2.36
8	0.14	28	0.53	48	1.11	68	2.48
9	0.16	29	0.55	49	1.15	69	2.61
10	0.18	30	0.58	50	1.19	70	2.75
11	0.19	31	0.60	51	1.23	71	2.90
12	0.21	32	0.62	52	1.28	72	3.08
13	0.23	33	0.65	53	1.33	73	3.27
14	0.25	34	0.67	54	1.38	74	3.49
15	0.27	35	0.70	55	1.43	75	3.73
16	0.29	36	0.73	56	1.48	76	4.01
17	0.31	37	0.75	57	1.54	77	4.33
18	0.32	38	0.78	58	1.60	78	4.70
19	0.34	39	0.81	59	1.66	79	5.14
20	0.36	40	0.84	60	1.73	80	5.67

Do Now

Atom-is the smallest unit of material that still has the properties of material.

Atoms have a center portion called a **nucleus.** A nucleus is made up of tiny particles called protons and neutrons.

Proton- is a positively charged particle.

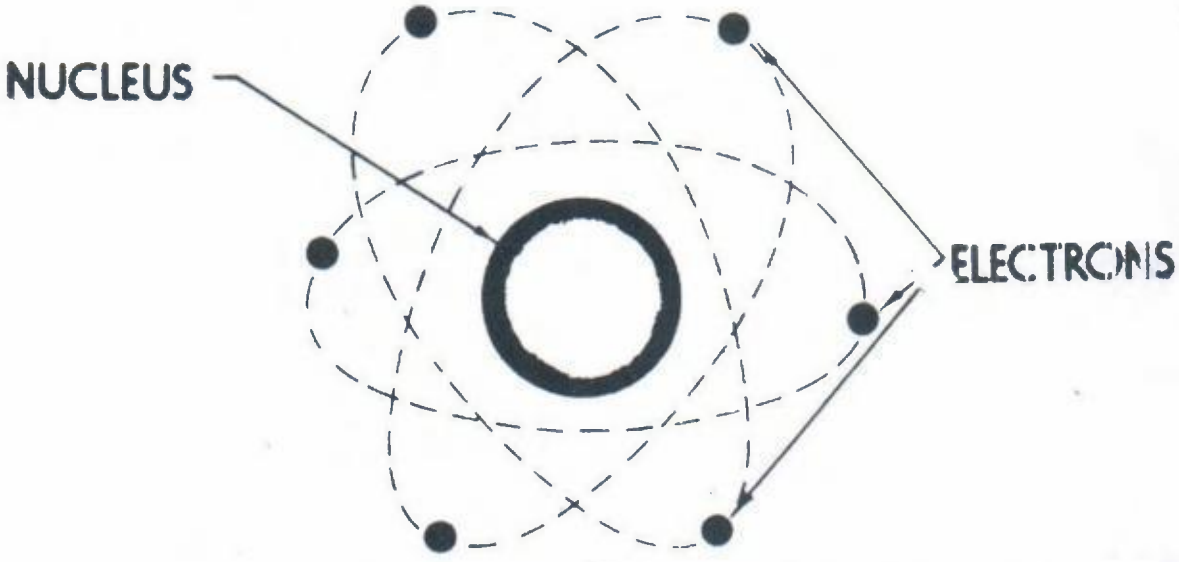
Neutron- has the same mass as a proton, does not carry any charge.

Electron-is a tiny particle that caries a negative charge.

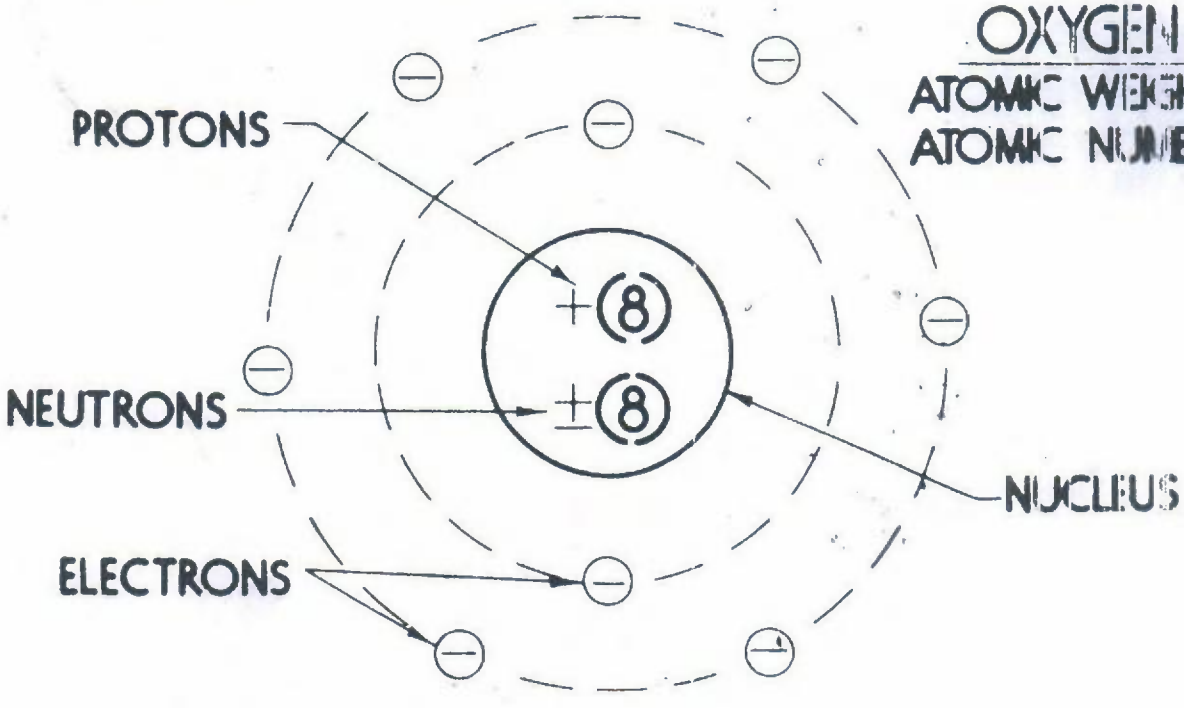
In an atom, electrons circle the nucleus very rapidly following a path called the **orbit.**

It is the movement of electrons that create electricity.

ATOMIC STRUCTURE



ATOM : PICTORIAL REPRESENTATION



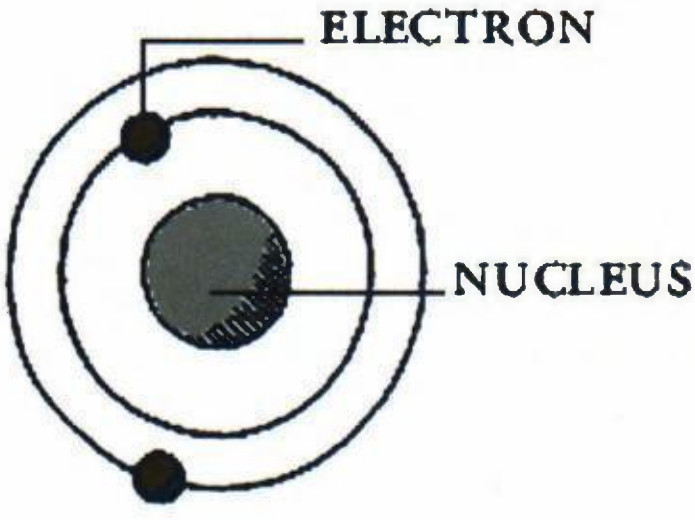
ATOM : SYMBOLIC REPRESENTATION

S.GRAD

GLOSSARY

ATOM

An atom is the smallest particle that can be identified as an element, such as hydrogen, sulfur, or gold. Every atom is composed of a positively-charged nucleus orbited by negative electrons.



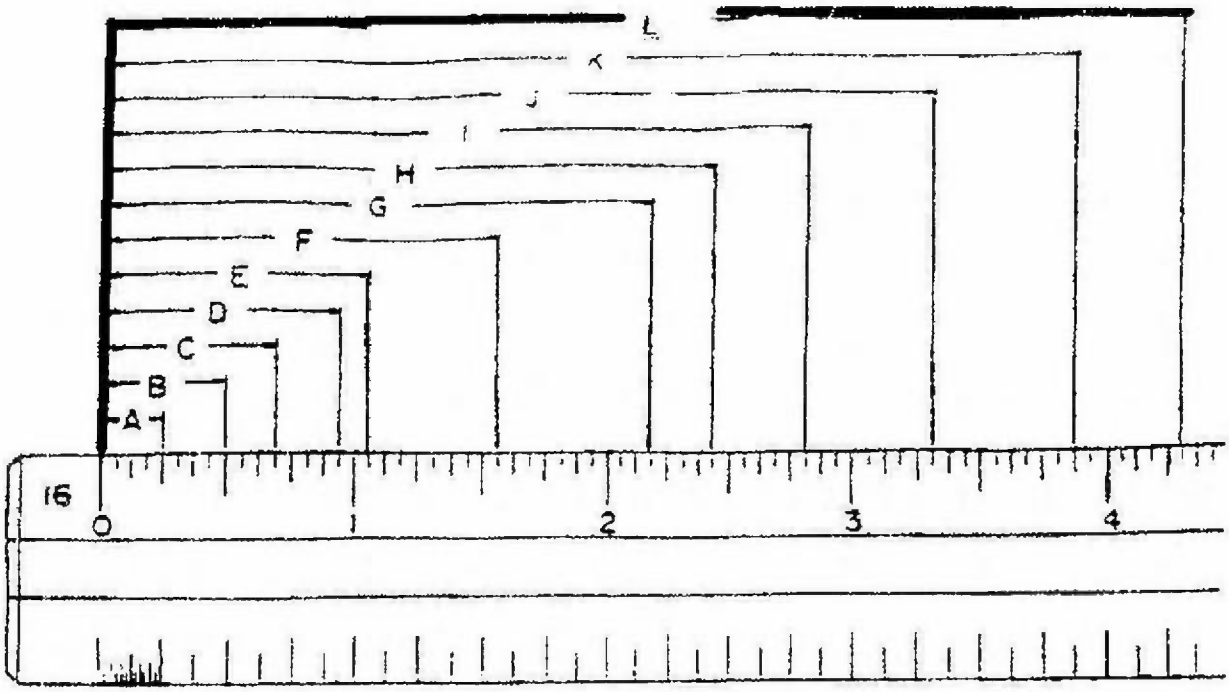
Electron Nucleus Neutron Proton

GATO000G.DIB

Name _____ Date _____

Period _____

MEASUREMENT EXERCISE



A. _____ G. _____

B. _____ H. _____

C. _____ I. _____

D. _____ J. _____

E. _____ K. _____

F. _____ L. _____

Do Now – Copy This

atom - smallest piece of an element that keeps its chemical properties

compound - substance that can be broken into elements by chemical reactions

electron - particle orbiting the nucleus of an atom with a negative charge. (mass = 9.10×10^{-28} grams)

element - substance that cannot be broken down by chemical reactions

ion - electrically charged atom (i.e., excess positive or negative charge)

molecule - smallest piece of a compound that keeps its chemical properties (made of two or more atoms)

neutron - particle in the nucleus of an atom with no charge (mass = 1.675×10^{-24} grams)

nucleus - dense, central core of an atom (made of protons and neutrons)

proton - particle in the nucleus of an atom with a positive charge (mass = 1.673×10^{-24} grams)

Do Now – Copy This

Fluid Friction- is the cause of the resistance an object meets as it moves through the air. The force of fluid friction is created when particles of air contact the moving object. The force of fluid friction reduces the speed of an object in flight known as **drag.**

Aerodynamics- deals with the force of air on an object moving through it. One goal of aerodynamics is to design objects so that fluid friction is reduced as the object moves through the air. For example, aircraft and rockets are designed with pointed noses and rounded, smooth surfaces to reduce fluid friction.

Do Now – Copy This

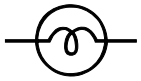
hot glue, **hot glue gun**, **hot-melt glue gun** –
A hot glue gun is a hand-held, pistol-like device that heats a round stick of solid adhesive, also known as "hot melt" adhesives, these adhesives are thermoplastics so that when it melts, and a user pulls the trigger, the melted glue can be squirted out of the nozzle at the gun's tip.
Hot glue is applied hot and simply allowed to harden. As they cool they adhere.
Caution MUST be taken not to touch the hot glue or the barrel of the glue gun to avoid injuries.

Do Now----- Copy This:

Conductor — Any material through which “Electrons” will flow easily.

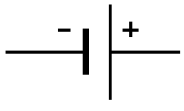
Insulator- Any material that will prevent “Electrons” from flowing through it.

Do Now----- Copy This:

Bulb Symbol -  Symbol for bulb in a schematic diagram. Can also be referred to as the load.

Battery- something which produces power by a chemical reaction

Battery Symbol -  Symbol for battery in a schematic diagram. (Notice which line has the + and which the -).

Each  represents one cell.

Do Now----- Copy This:

Closed Circuit- Any circuit which contains a power source; a load; a switch and current may flow when a voltage is applied.

Short Circuit- A circuit which has its current bypassing the load, causing a dangerous and unsafe condition.

Circuit Breaker/Fuse –An automatic device which, under abnormal conditions, will interrupt a current carrying circuit to prevent overheating and fire.

EAST MIDDLE SCHOOL TECHNOLOGY

Dear Parents of Guardian:

I am delighted that your son or daughter is in my technology class this year. The study of Technology is an extremely rewarding experience and we can all look forward to an exciting and productive year. Technology is a broad subject that incorporates many subject matters, science, math, history, and more. I hope this class will help expand your child's knowledge in these areas as well as prepare him/her for their life in the 21st century.

In order to guarantee your child and all the students in the class the excellent educational climate that they deserve, I expect both responsibility and commitment from them. I will not tolerate any student from stopping me from teaching, nor any student stopping another from learning.

Therefore, in my class I have established the following discipline plan:

1. Follow all directions, especially the safety rules.
2. Be on time. You are late if you are not in your seat when the bell rings.
3. Keep hands, feet and objects to yourself .
4. No cursing or put-downs. Respect the rights and property of others.
5. Be prepared. Bring pencils and notebooks to class *every* class period.
6. No eating, or drinking in class. No gum.
7. Students are to copy the "DO NOW's" as soon as they enter the room
8. No passes will be granted, except for medical emergencies.

If a student chooses to break a rule:

1st Time- name is recorded in discipline book- given a warning
2nd Time a zero placed next to name -call home
3rd Time a zero placed next to name-45 minute detention after school-call home
4th Time a zero placed next to name-student sent to principal-parent conference

It is in your child's interest that we work together with regard to his or her schooling. I will keep you informed about your child's progress in my class.

I have already discussed this plan with your child, but would appreciate it if you would review it with him or her**.** Please also review the safety rules with him/her, before signing and returning the Technology **Emergency Contact Card.**

Thank you for your support. Please don't hesitate to call me for any further information or help in any area of your child's schooling. The phone number at school is 434-2473. If I am unable to come to the phone please leave a message and I will call you back. Please leave information as to when and where to call. I don't mind calling during the evening.

Sincerely,

Mr. Grad- Technology Education Teacher

BRENTWOOD EAST MIDDLE SCHOOL - TECHNOLOGY EDUCATION

GENERAL SAFETY RULES

1. Upon entering the laboratory, go silently to your seat until further instructions are given.

2. Wear safety glasses at all times when participating in lab activities. Remind others to wear their glasses. (You are encouraged to bring in your own if you choose). Personal glasses must meet Z87 safety standards.

3. Careful attention must be given to your clothes while in the lab in order to avoid accidents. Dangling neckties, long sleeves, or exceptionally loose clothing must not be worn while working. Rings, bracelets and watches are added dangers when using tools, and also must not be worn.

4. Use tools, machines and materials only after asking permission and receiving proper instruction from the instructor.

5.Only use tools for their intended purpose, and only if they are in good conditions.
If in doubt, ask for further explanation.

6. Report all tools and machines that are not in good working order to your instructor immediately.

7. Combustible material should be stored in metal containers and used rags should be disposed of in appropriate containers to avoid spontaneous combustion.

8. When carrying tools to or from your bench, do so carefully and with all sharp edges pointed downwards. Never carry tools in your pockets. It can be very dangerous to you and those around you.

9. Aisles and bench tops should be kept clean and clear of all obstructions, use a brush or a broom never your hands..

10. Wipe up all spills immediately, to avoid slipping.

11. Long hair must be tied back.

12. When cleanup is called, it is absolutely required that all work be stopped. Laboratory cleanup begins immediately and <u>everyone participates</u>.

13. Heavy objects should be lifted only with the assistance of another, and in the proper manner. Always lift by straightening your legs, not with your back.

14. In the event that an accident occurs, to you or someone else, the instructor must be notified at once regardless of its seriousness.

15. Accidents when they do occur, usually are caused by horseplay, improper use of tools and machines or carelessness. Let these rules be a guide to your behavior in the laboratory.

16. Running, pushing or throwing objects is strictly forbidden in the laboratory, and MUST never be done..

17. Vises should always be closed, and always use a brush to clean off table tops, never your hands.

18. <u>No tool</u> is to be used before receiving proper instruction from the teacher on its use and safety procedures.

19. The **<u>storeroom & office</u>** are off limits, and should never be entered without specific direction from the instructor.

20. Spray paint & glues should only be used with proper ventilation and only when and where instructor tells you. Always point can away from you and never towards anyone else. Always hold can level and never pointed down.

One-quarter Inch

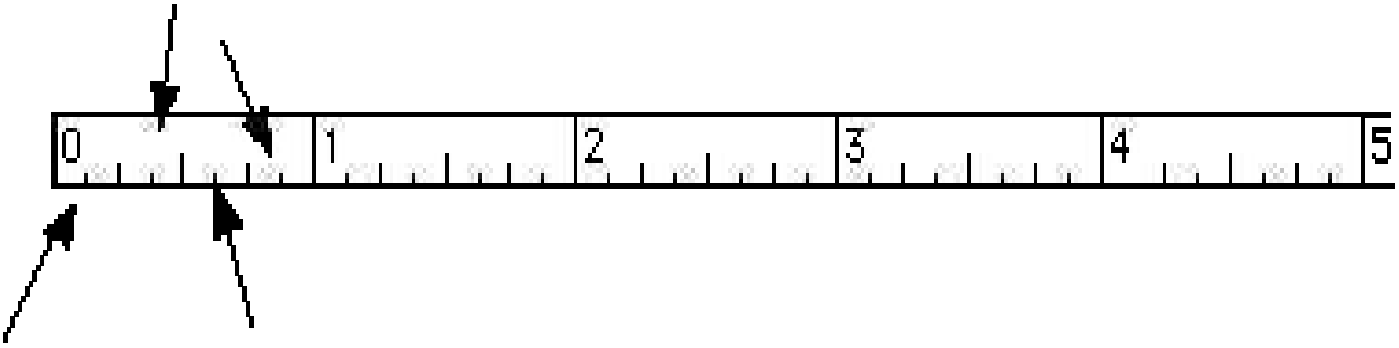
A quarter means one-fourth, also written as ¼. An inch can be separated into four equal parts, any one of those parts is a quarter.

Each quarter of an inch has a number and a name. In order, their numbers are 1/4, 2/4, 3/4, and 4/4. Their names are one-quarter, one-half, three-quarters, and one inch. You already know two of these from previous sections: the half-inch and the inch. That leaves only two new marks to learn: one-quarter of an inch (1/4") and three quarters of an inch (3/4"). It is still important to remember an inch is the same as four quarters, and a half inch is the same as two quarters.

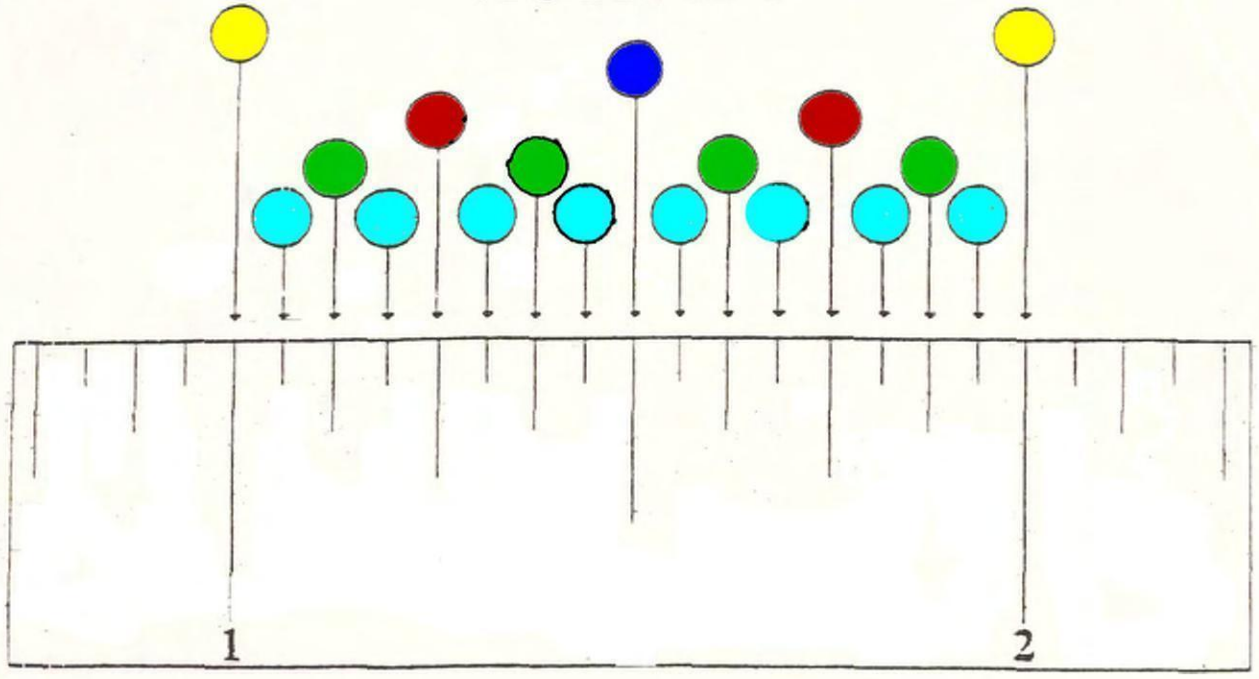
One-eighth of an Inch

The inch marks are the largest or longest lines. The half inch mark is exactly in the middle of the space between two inch marks and is a little shorter in length than the inch marks. The quarter-inch marks are half way between the half-inch mark and the inch marks at either end and they are a little shorter than the half-inch marks. Now it is time to meet the eighth-inch mark.

There are really only four new dimensions to learn: 1/8, 3/8, 5/8, and 7/8. The even-numbered eighths: 2/8, 4/8, 6/8, and 8/8, you already know by their other names: 1/4, 1/2, 3/4, and 1, so you are half way there before you even start.



THE BIG INCH
ACTIVITY



DIRECTIONS: Measure each of the following lines and place your answer in the space provided.

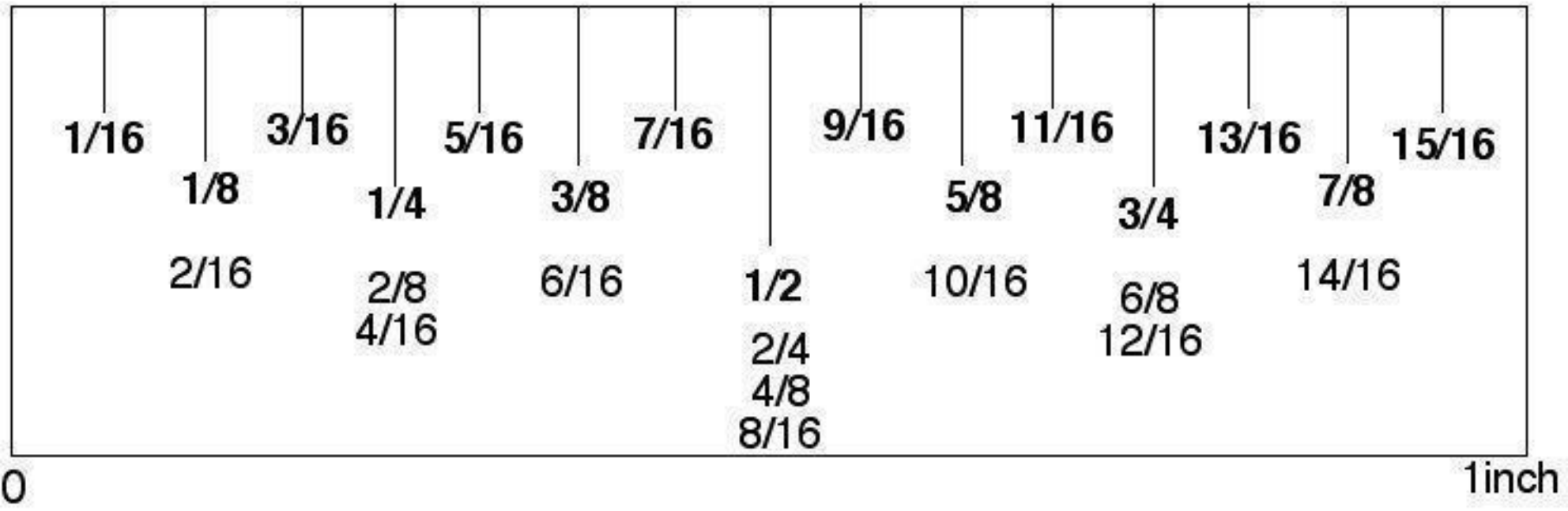
1. ____
2. ____
3. ____
4. ____
5. ____
6. ____
7. ____
8. ____
9. ____
10. ____
11. ____
12. ____
13. ____
14. ____
15. ____

Do Now----- Copy This:

A ruler is the most common measuring instrument most people use.

- A ruler is 1 foot long. It is divided into 12 inches.
- Each inch ends at the long line to the right of the number. Each inch is divided into smaller parts.
- The half-inch mark is exactly halfway between each number. Half-inch marks are the next longest lines.
- The quarter inch marks show 1/4 of an inch and 3/4 of an inch. The quarter-inch marks are the next longest lines.
- Always begin measuring from the left end of the ruler.

Ruler -Fractions of an inch



One-half Inch

Other lengths indicated by this ruler are half inch. The half-inch lines are the second longest lines on the ruler. Each inch is made up of two half inches. There is another easy way to find the half-inch marks without trying to find the "second longest" lines on the ruler and that is the way most people who measure will do it. They pick the line that is half way between two inch marks. Almost everyone can visually divide a small thing like an inch into two equal parts.

If 16 pennies stacked equal 1 inch, then 8 stacked pennies is the same height as one-half inch. There are different ways to say "a half-inch."

1/2 inch

1/2 in.

1/2"

.5 inch

one half-inch

a half of an inch

one half of an inch

Do Now----- Copy This:

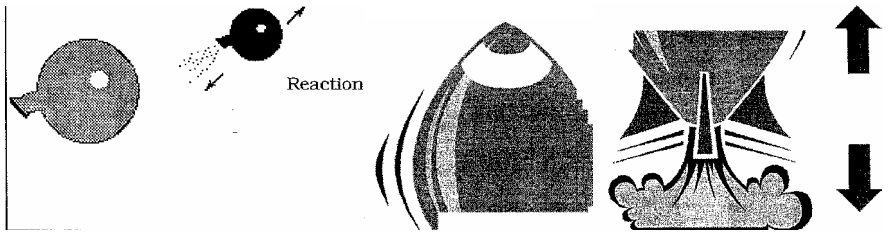
Combustible –
Capable of igniting and burning. A substance that ignites and burns readily, i.e. gas; oil; etc..

Spontaneous-unplanned; without premeditation

Spontaneous Combustion - Ignition of a substance, such as oily rags or hay, caused by a localized heat- and not involving addition of heat...

Compressed Air Rockets

The energy to make a pop bottle rocket fly comes from compressed air. A plastic pop bottle is filled with compressed air and water. There is a lot of pressure inside the bottle. When released, the action of the air and water rushing out through the neck of the bottle causes a reaction, and the bottle flies upward.

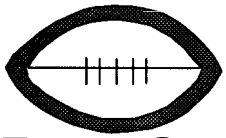


Do Now----- Copy This:
TECHNOLOGY SATISFIES

Our Need to Produce Food

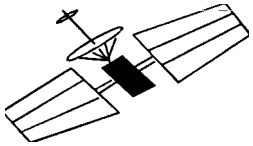
Our Medical Needs

Our Need for Manufactured Items

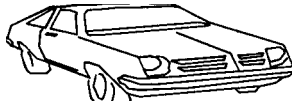


Our Need for Energy Sources

Our Need to Communicate



Our Transportation Needs



Do Now----- Copy This:

Template – a pattern, or mold, so that the format does not have to be recreated each time it is used

Pattern - A plan, diagram, or model to be followed in making things

Do Now----- Copy This:

TECHNOLOGY IN A CHANGING WORLD

1. **Technology affects our routines.**
2. **Science is the study of why natural things happen the way they do.**
3. **Technology is the use of knowledge to turn resources into goods and services that society needs.**
4. **Science and technology affect all people.**
5. **People create technological devices and systems to satisfy basic needs and wants.**
6. **Technology is responsible for a great deal of the progress of the human race.**
7. **Technology can create both positive and negative social outcomes.**
8. **Combining simple technologies can create newer and more powerful technologies.**
9. **Technology has existed since the beginning of the human race, but it is growing at a faster rate than ever before.**

Do Now----- Copy This:

Perpendicular - being at right angles to a given line or plane- vertical

Parallel - extending in the same direction, everywhere equidistant, and not meeting (parallel rows of trees)
everywhere equally distant (train tracks are parallel)

Friction - the force that resists relative motion between two bodies in contact

Do Now – Copy This
Summary of Newton's Laws

***Newton's First Law*:**

"An object in motion tends to stay in motion, and an object at rest tends to stay at rest, unless the object is acted upon by an outside force."

***Newton's Second Law*:**

The acceleration of an object is dependent upon the force acting on the object and the mass of the object."

Newton's Third Law:

"Every action has an equal and opposite reaction."

Do Now----- Copy This:

Acceleration- The rate of change of velocity with respect to time....

Velocity- Rapidity or speed of motion; swiftness

Mass- Size, or volume, especially when very large. A unified body of matter with no specific shape: a mass of clay.

Copy This -- _ Do Now

Stability- An aerodynamically stable object passes through the air in one direction without tumbling end over end. A gliding bird or a dart is aerodynamically stable, a football is not. To be aerodynamically stable, an object must travel so that its center of gravity is positioned towards the front of the object.

Balance- Equality in amount or weight value, equilibrium between two things or parts of a single thing.

Copy This -- _ Do Now

Fins- are a guidance system for your rocket. The use of fins can produce aerodynamically stable rocket which passes through the air in a straight line in a continuous direction.

How many fins do I need?

To ensure stability and safety, the minimum number of fins on a rocket is three (3). Many people choose 3 or 4 fin design. However, the more fins you have the more drag you will create and drag slows a rocket down.

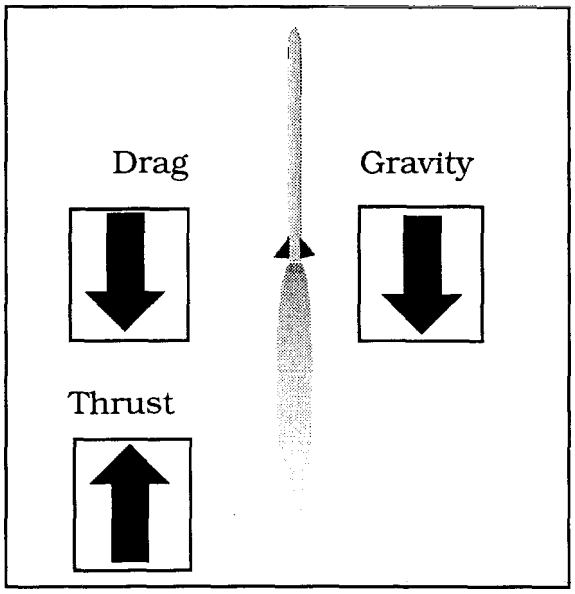
Do Now – Copy This

Friction— Microscopic bumps on surfaces cause friction. When two surfaces contact each other, tiny bumps on each of the surfaces tend to run into each other, preventing the surfaces from moving past each other smoothly.

Friction is a force that resists the movement of one object against another. It constantly affects people, objects, and the way things move through the world. Friction between shoes and the ground allows people to walk without slipping, and friction between tires and the road enables bicycles and cars to roll along the ground

Forces Affecting Flight

These three forces affect a rocket in flight: **thrust, gravity, and drag.**



Thrust

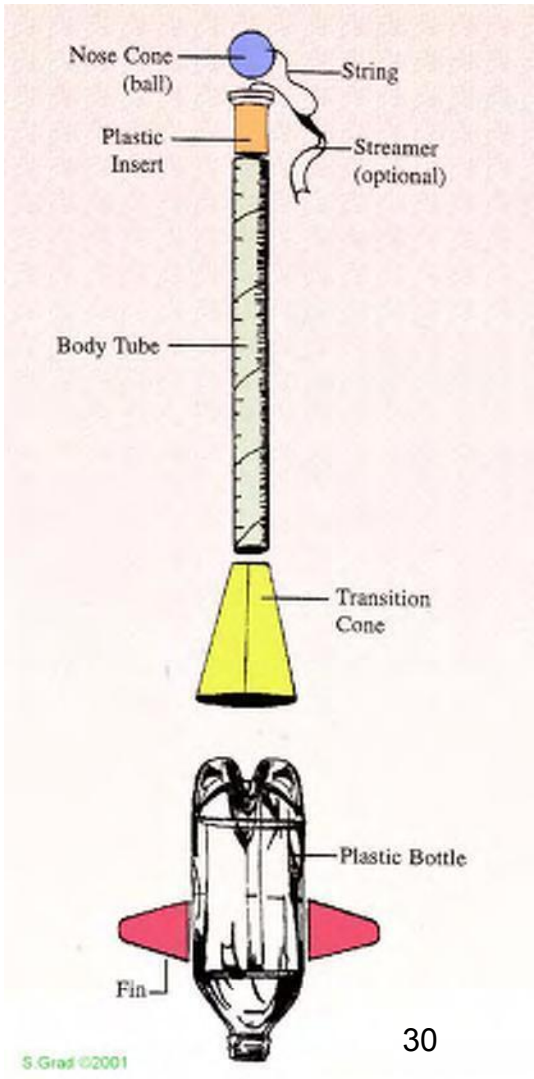
Thrust is the force generated by a rocket engine that propels the rocket. Thrust must be greater than the pull of gravity for a rocket to fly upwards.

Gravity

Gravity is the downward force applied to all objects on earth. More force is required to lift a heavy rocket than a light rocket. The heavier the rocket, the more thrust required to lift the rocket into space.

Drag

Drag is the amount of air resistance or friction on the rocket as it flies. Drag is minimized by reducing the frontal surface area of the rocket and by having a smooth exterior finish. If two rockets of similar size and weight were launched with the same force, the rocket with the lowest drag would fly farther.



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Do Now----- Copy This:

Template – a pattern, or mold, so that the format does not have to be recreated each time it is used

Pattern - A plan, diagram, or model to be followed in making things

Do Now

Newton's Third Law of Motion – If one object exerts a force on a second object, the second exerts a force on the first that is equal in magnitude and opposite in direction; also referred to as **action-reaction**

Do Now----- Copy This:
SEVEN-RESOURCES-OF-TECHNOLOGIES

PEOPLE

INFORMATION

TIME

MATERIALS

ENERGY

TOOLS/MACHINES

MONEY

Copy This -- _ Do Now

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Balance- Equality in amount or weight value, equilibrium between two things or parts of a single thing.

Do Now----- Copy This:

Newton's First Law of Motion –

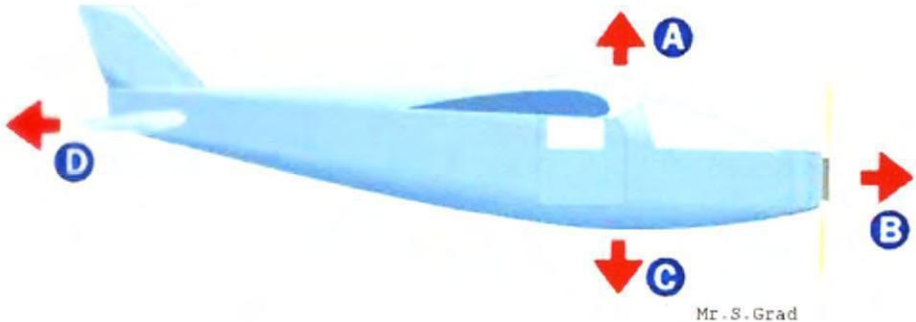
An object remains at rest or in a state of uniform motion unless acted upon by an unbalanced force (a **net force**); also called the **Law of Inertia**.

Newton's Second Law of Motion –

An unbalanced force (**net force**) acting on an object causes an **acceleration** which is directly proportional to the magnitude of the force, and which acts in the same direction as the force: $F = ma$.

Aerodynamic Forces

Before we dive into how wings keep airplanes up in the air, it's important that we take a look at four basic aerodynamic forces: lift, weight, thrust and drag.



A Lift
B Thrust
C Weight
D Drag

airplane-forces-3.jpg

Copy This -- _ Do Now

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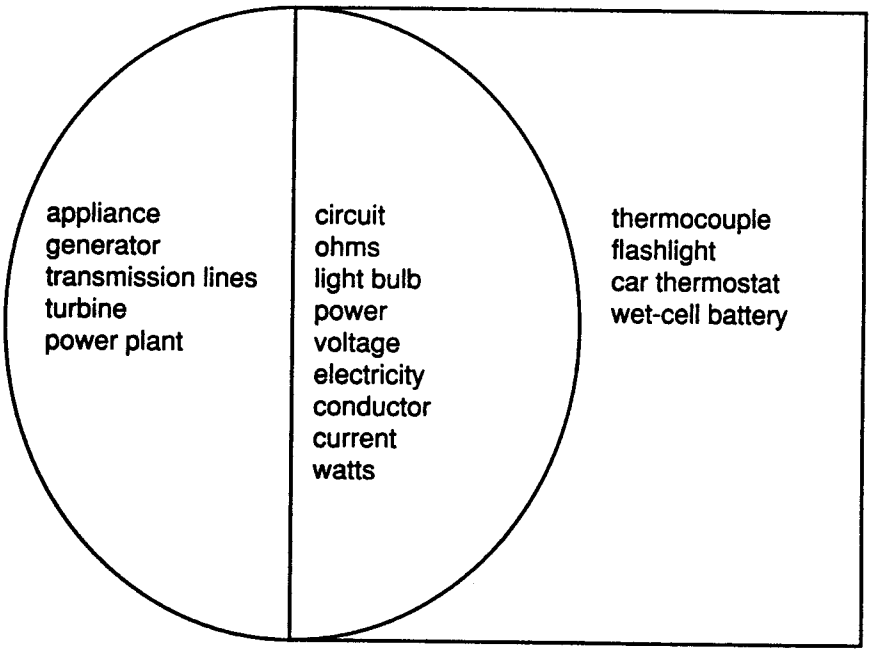
How many fins do I need?

To ensure stability and safety, the minimum number of fins on a rocket is three (3). Many people choose 3 or 4 fin design. However, the more fins you have the more drag you will create and drag slows a rocket down.

KEY
AC–DC


appliance
generator
transmission lines
turbine
power plant
circuit
ohms
light bulb
power
voltage
electricity
conductor
current
watts
thermocouple
flashlight
car thermostat
wet-cell battery

Do Now

Fluid Friction-
is the cause of the resistance an object meets as it moves through the air. The force of fluid friction is created when particles of air contact the moving object. The force of fluid friction reduces the speed of an object in flight known as **drag.**

Do Now – Copy This

Aerodynamics-

force of air on an object moving through it. One goal of aerodynamics is to design objects so that fluid friction (particles of air contact a moving object) is reduced as the object moves through the air.

Do Now --Copy This

Series circuit-

An electric circuit connected so that current passes through each circuit element in turn without branching.

Parallel circuit-

An electric current flowing through parallel branches of a circuit.

"MEANING OF VOLTAGE"

General Information:

1. The word volts; potential difference or electricial pressure (e.m.f.) is named after an early Italian experimenter by the name of Alessandra Volta
2. Alessandra Volta invented the voltaic pile which was the first electric battery. He did this in the year 1799. The "Volt" was named in his honor.
3. Voltage is the pressure of force that pushes electrons through and electrical circuit. (Electricity is a flow of electrons.)
4. Wherever electricity exists there is voltage making it move and thereby making it do work for us
   such as keeping our television sets and other appliances going.

Comparing Voltage To Water In A Pipe:

1. We all know that water will not flow through a pipe unless there is pressure. The same is true of electricity.
2. Electricity will not flow through a conductor unless there is a pressure or force which we call voltage.
3. Water flows because a pump or gravity is supplying the pressure. The voltage which forces electricity through wires from the power station to light our homes and do other work is made possible by large machines called generators. There are generators to produce Alternating (A.C.) & Direct (D.C.) current.

The Voltage of Dry Cells:

1. Dry cells of all sizes give the same voltage, which is about l.5 volts.
2. If we take two different size containers that have the same size opening at the bottom for water to flow out, the pressure at which the water flows out will be the same so long as the height of the water was the same from the start.
3. In the example above, the container that has less water will empty first since the pressure was the same for both.
4. The difference between a very small and a very large dry cell is that the large cell will give the same l.5 volts for a longer period of time.
5. The voltage of dry cells may be increased by connecting them in "series'.. Dry cells depend on chemical action for their operation. While dry cells are convenient, they are limited to low voltages and small outputs.

Safety Notes:

1. Practice good safety habits when handling low voltage equipment such as dry cells so that you will not get hurt when the time comes to handle high voltage equipment.
2. The voltage in our homes varies from 110 to 120 volts." Play It Safe Always" At a speed of 186,000 miles per second, you may never get another chance to correct the first mistake.

Do Now Copy This

Mechanical Advantage

lever

$$M.A. = \frac{\text{Length of effort arm}}{\text{Length of resistance arm}}$$

Inclined plane

$$M.A. = \frac{\text{length of slope}}{\text{height of slope}}$$

TECHNOLOGY

SERIES & PARALLEL CIRCUITS

All wiring circuits fall into three general types, Series, Parallel, or a combination of the two primary circuits. There are radical differences between series and parallel circuits: These are:

SERIES	PARALLEL
Each load shares a part of the total power the other loads.	Each load gets full power.
When one load goes out all the others go out	If one load goes out the others still function.
Each load is dependent upon the others.	Each load is completely independent of the others
Less power is used since all the available power is divided among all the loads.	More power is used since all loads are using full power.

The above descriptions are simplified for general purposes and identification.

Series circuits are used primarily in fusing circuits where a short or overload in any branch will cause the fuse to blow and cut the entire circuit out of the line. This circuit is installed in every home fuse panel. They are also used in circuits where the loads on the line are fixed and cannot be changed, such as voltage dividing circuits in radios and electronic units.

Parallel circuits are used in all house, building and factory units. Since the loads are variable (lights turned on, machines plugged in, etc) and we want each unit to operate under full power a Parallel circuit is the only method. One also would not want all the lights to go out id only one lamp were to burn out.

You will go more deeply into these applications in the various electric projects under construction.

Do Now – Copy This

Direct current- the one directional flow of electrons in an electrical circuit. (DC)

Alternating current - electrical flow that constantly changes direction. (AC)

Do Now

Current –

The amount or strength of the electric charge (electrons) flowing past a specified circuit point per second.
Measured in Amperes - amps

Voltage – emf (electromotive force)
The force, or pressure that pushes electricity through an electric circuit. Also known as "potential energy."

"Voltage drop" is the difference in voltage from one end of an electrical circuit to the other.

DO NOW - COPY THIS

Resistance -

is anything that opposes or slows the flow of electricity. It is measures in OHMS. The resisitance in an electric circuit is determined by the electric wire's diameter, length, and temperature.

TECHNOLOGY

Simple Circuits

What is a circuit? A circuit is defined as a course of electricity or a flow of current. These circuits can be in one of three conditions:

- A complete or closed circuit.
- An open or broken circuit.
- A short circuit.

A complete circuit is possible only when there is a flow of current from a source of power (generator or battery) thru a conductor (wire etc,) to a load (motor, lamp, etc.,) and back to the source of current. Other units may be incorporated into the circuit to control it.

An open or broken circuit is one where a switch is open or a conductor broken which prevents the flow of current.

A short circuit occurs when the current bypasses the load. THIS MEANS THAT THE CURRENT WILL FLOW IN GREAT AMOUNTS THRU THE CONDUCTOR. Since there is no control of current by the load Great amounts of heat will result with the possibility of fire.

A method of controlling or breaking the circuit is by the use of a fuse placed into the circuit. The fuse will prevent the wires from carrying too much current (in case of a short) and will melt (trip) before the wires overheat and cause a fire. They are also used to control the maximum amount of current you want a circuit tot carry.

Vocabulary

1. Circuit… A complete course of electricity. From source of power to aload back to the source of power.

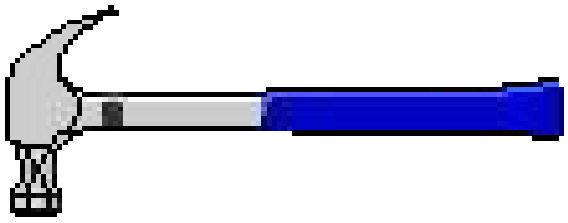
2. Short circuit… When the load is bypassed causing a great deal of heat in the conductor and blowing the fuse.

3. Conductor… A path for current to flow. Usually a wire.

4. Insulation… A coating over a conductor to prevent the electricity from leaving the path.

5. Fuse… A device which prevent short circuits or overload heating of the circuit. It does this by melting or Tripping.

Lever



Lever: A lever is a simple machine. A lever is a board or bar that rests on a turning point. This turning point is called the **fulcrum**. An object that a lever moves is called the load. The closer the object is to the fulcrum, the easier it is to move.

Inclined Plane 

Inclined Plane:

An inclined plane is a simple machine. It is a flat surface that is higher on one end. You can use this machine to move an object to a lower or higher place. Inclined planes make the work of moving things easier. You would need less energy and force to move objects with an inclined plane.

Examples of Inclined Planes:

- Ramp
- Slanted Road
- Path up a Hill
- Slide

Fluid Friction- is the cause of the resistance an object meets as it moves through the air. The force of fluid friction is created when particles of air contact the moving object. The force of fluid friction reduces the speed of an object in flight known as **drag.**

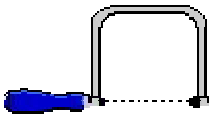
Aerodynamics- deals with the force of air on an object moving through it. One goal of aerodynamics is to design objects so that fluid friction is reduced as the object moves through the air. For example, aircraft and rockets are designed with pointed noses and rounded, smooth surfaces to reduce fluid friction.

Wheel and Axle

<u>Wheel and Axle</u>: The wheel and axle is another simple machine. The axle is a rod that goes through the wheel. This lets the wheel turn. It is easy to move things from place to place with wheels and axles.

Examples of Wheels and Axles:

- Cars
- Roller Skates
- Wagons
- Door Knobs
- Gears in Watches, Clocks, and Bicycles

Wedge 

Wedge: A wedge is a simple machine used to push two objects apart. A wedge is made up of two inclined planes. These planes meet and form a sharp edge. This edge can split things apart.

Examples of wedges:

- Knives
- Axes
- Forks
- Nails

Screw 

Screw: A screw is a simple machine that is made from another simple machine. It is actually an <u>inclined plane</u> that winds around itself. A screw has ridges and is not smooth like a nail. Some screws are used to lower and raise things. They are also used to hold objects together.

*<u>Where would I find an example of a screw</u>***?**

- Jar Lids
- Light Bulbs
- Stools
- Clamps
- Jacks
- Wrenches
- Key Rings
- Spiral Staircase

Pulley

Pulley: This simple machine is made up of a wheel and a rope. The rope fits on the groove of the wheel. One part of the rope is attached to the load. When you pull on one side of the pulley, the wheel turns and the load will move. Pulleys let you move loads up, down, or sideways. Pulleys are good for moving objects to hard to reach places. It also makes the work of moving heavy loads a lot easier.

Examples of where pulleys can be used:

- Flag Poles
- Clothes Lines
- Sailboat
- Blinds
- Crane

Do Now----- Copy This:

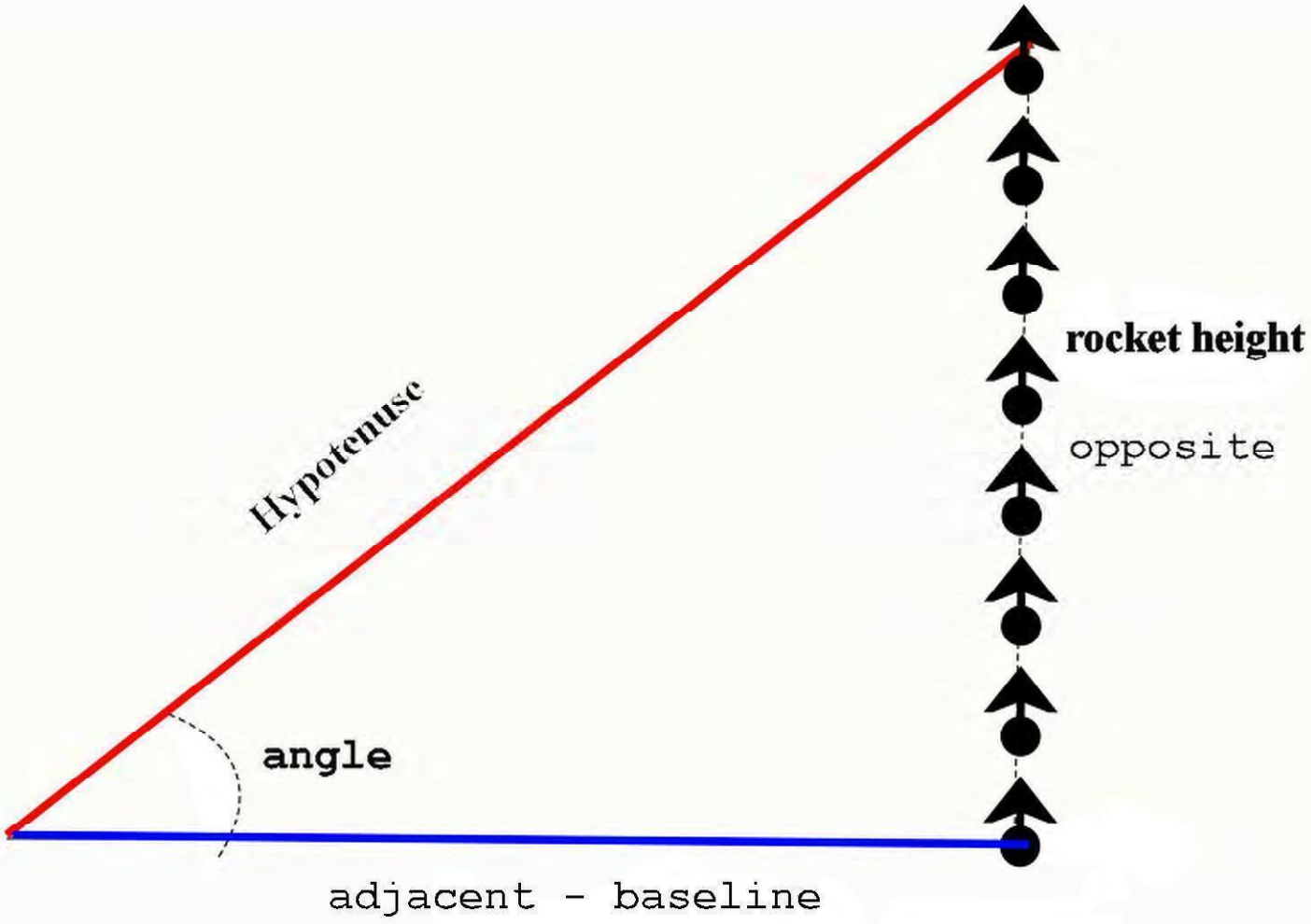
Pulley –

A simple machine consisting of a cord or rope wrapped around a grooved wheel that can turn to reverse the direction of a force. Pulleys are used in combination to increase applied force in order to make work easier.

Work –

Motion of an object that results from the use of force over a distance. The formula to calculate work is:

WORK = FORCE X DISTANCE



$$\text{Tangent Angle} = \frac{\text{side opposite (rocket height)}}{\text{side adjacent (baseline)}}$$

$$\text{angle x baseline} = \text{rocket height}$$

Water Rocket Safety Rules

1. Safety goggles must be worn within 30 feet of a pressurized rocket.
2. Be sure the launch pad is secured to the ground before launch.
3. Rockets can be pressurized at various air pressures, but never above 90 psi under any circumstances.
4. Never go near or over a pressurized bottle.
5. Never lean over the top of a pressurized bottle.
6. All persons should face the bottle during launch. During flight, the rocket should be carefully tracked by all personal and avoided as the rocket returns to earth.
7. Never attempt to catch a spent rocket.
8. If the rocket fails to release after the pin is pulled, inform the teacher immediately.
9. All observers must stay on the grass during each launch.

Launch site safety

1. Pad is inspected and appears to be functional.
2. The pad is firmly anchored.
3. The size of the area adequate for the launch experiment.
4. All electrical cords are well away from the launch area and a water source.
5. The launch pin is properly placed over the lip of the bottle.
6. All personal in the area of 30 feet is wearing safety glasses.
7. All personal are paying attention to the launch.

Name _____ Date _____

Weather

Celsius = (f -32)5/9 Fahrenheit = (c x 9/5) + 32

Show all work – use back of paper if necessary!

1. Kaylee's weather station recorded a high temperature of sixty-six degrees Fahrenheit. Jasmine's weather station recorded a high temperature that was eight degrees warmer than Kaylee's. What did Jasmine's weather station record as the high temperature in celsius?	2. Steven's weather station recorded a high temperature of fifty-one degrees Fahrenheit. Amanda's weather station recorded a high temperature that was five degrees colder than Steven's. What did Amanda's weather station record as the high temperature in celsius?
3. In the morning, the wind was blowing fourteen miles per hour southeast and the temperature was 18.33ºc . By the afternoon, the wind was blowing eight miles per hour stronger, but the temperature was 21.11ºc. What was the afternoon temperature in Fahrenheit.	4. Last week, there were two cloudy days, three rainy days, and the rest of the week was sunny. It was 65ºf on the cloudy days; it was 55ºf on the rainy days ; and it was 26.67ºc on the sunny days. What was the temperature in Celsius on the cloudy days?
5. The current temperature is eighty-four degrees Fahrenheit. On the same day in 1978 the record high temperature was set at ninety-seven degrees Fahrenheit. How much warmer must it get for the temperature to break the record set in 1978?	6. It snowed twelve inches on Sunday, four inches on Monday, and eleven inches on Tuesday. On Wednesday two inches of snow melted. How much snow is left?
7. On Friday, sunrise was at 6:58 a.m.. and 12.78ºc. Five days earlier on Sunday, sunrise was three minutes earlier and 65ºf. Which was the warmer day?	8. Yesterday's high temperature was twenty-five degrees Fahrenheit warmer than yesterday's low temperature. If yesterday's high temperature was eighty-one degrees Fahrenheit, what was yesterday's low temperature in Celsius?


VERY HOT!
NEVER TOUCH!
Weller
UNIVERSAL

Introduction to Soldering

The idea is simple: to join electrical parts together to form an electrical connection, using a molten mixture of lead and tin (solder) with a soldering iron. A standard 60% tin, 40% lead alloy solder with cores of non-corrosive flux will be found easiest to use.

Soldering is the process of a making a sound electrical and mechanical joint between certain metals.

The joint is heated to the correct temperature by the **soldering iron**. For most electronic work miniature AC powered soldering irons are used. Solder melts at around 190 degrees Centigrade, (374°)fahrenheit and the tip reaches a temperature of over 250 degrees Centigrade. (482°) fahrenheit.

Good Soldering Requires:

1) clean surfaces,

2) a good physical bond

3) flux,

4) solder,

5) a proper heat source. (soldering gun; soldering pencil; torch;)

Solder is an alloy of 60% tin & 40% lead.

DO NOW COPY THIS

Numerator is the top part of a fraction that tells the number of equal parts. In the fraction 3/4", 3 is the **numerator**, and the fraction represents three equal parts of a whole, each part being one fourth of the whole. (Note that 4 is the denominator in this example.)

Denominator is the name for the bottom part of a fraction. It tells you how many equal parts make up a whole, and is also used in the name of the fraction: "halves", "thirds", "quarters", "fifths", "sixths" and so on.

DO NOW – Copy This

OHM

An ohm is the electrical resistance offered by a current-carrying element that produces a voltage drop of one volt when a current of one ampere is flowing through it.

Do Now – Copy This

hot glue, **hot glue gun**, **hot-melt glue gun** –
A hot glue gun is a hand-held, pistol-like device that heats a round stick of solid adhesive, also known as "hot melt" adhesives, these adhesives are thermoplastics so that when it melts, and a user pulls the trigger, the melted glue can be squirted out of the nozzle at the gun's tip.
Hot glue is applied hot and simply allowed to harden. As they cool they adhere.
Caution MUST be taken not to touch the hot glue or the barrel of the glue gun to avoid injuries.

Hot Glue Advice

1. Work near cold water. If you burn your skin, immediately get it into the water to decrease pain and damage.

2. Before use, allow the glue gun to warm up about 5 minutes.

3. Never lay the glue gun on its side.

4. Use the gun stand when putting the glue gun down.

5. Unplug the glue gun if it is not to be used for 20 minutes or more.

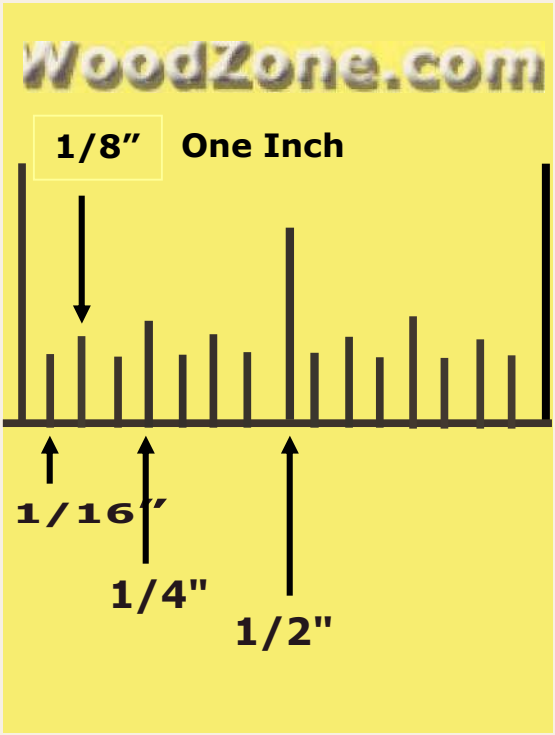
Do Now – Copy This

Newton's Second Law of Motion

An unbalanced force (net force) acting on an object causes an acceleration which is directly proportional to the magnitude of the force, and which acts in the same direction as the force: F = ma. or (as the force acting upon an object is increased, the acceleration of the object is increased. As the mass of an object is increased, the acceleration of the object is decreased.)

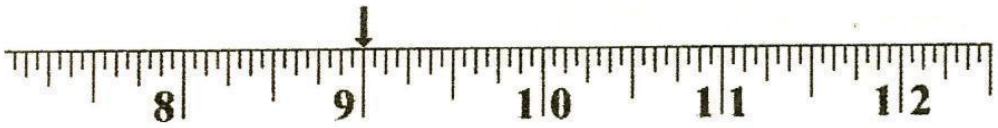
DO NOW- COPY THIS

A standard tape measure (or ruler) in the United States is divided up into feet and inches. Each foot is divided into 12 inches. The problem starts with the subdivision of the inches. In each inch there are a number of lines of different length. The longer the length of these lines, the larger the unit of measurement.



For example. 1. The longest line in the inch is in the middle. This is the half-inch mark and there is only one. 2. The next shortest line is the 1/4" (one quarter of an inch) inch mark and there are only two of these. 3. The third shortest line is the 1/8" (one eighth of an inch) mark and there are four of these. 4. The fourth shortest is the 1/16" (one sixteenth of an inch) mark and there are eight of these

Name_____ Date_____

1 

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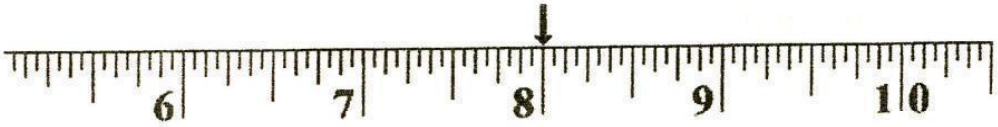
6 

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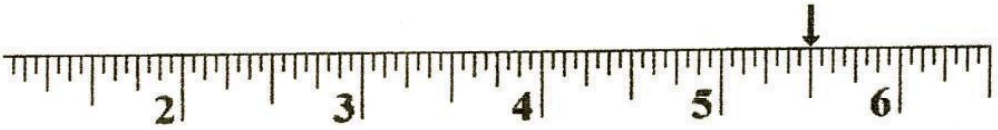
7 

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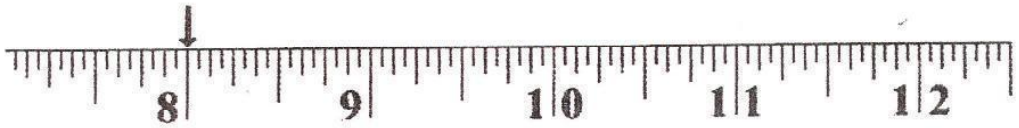
Name_____ Date_____

9 

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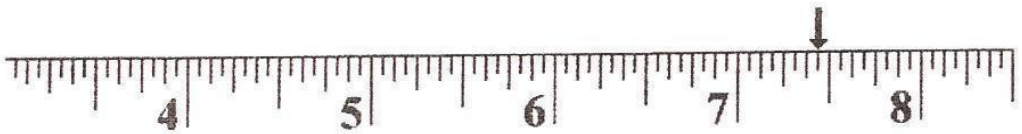
11 

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12 

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13 

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16 

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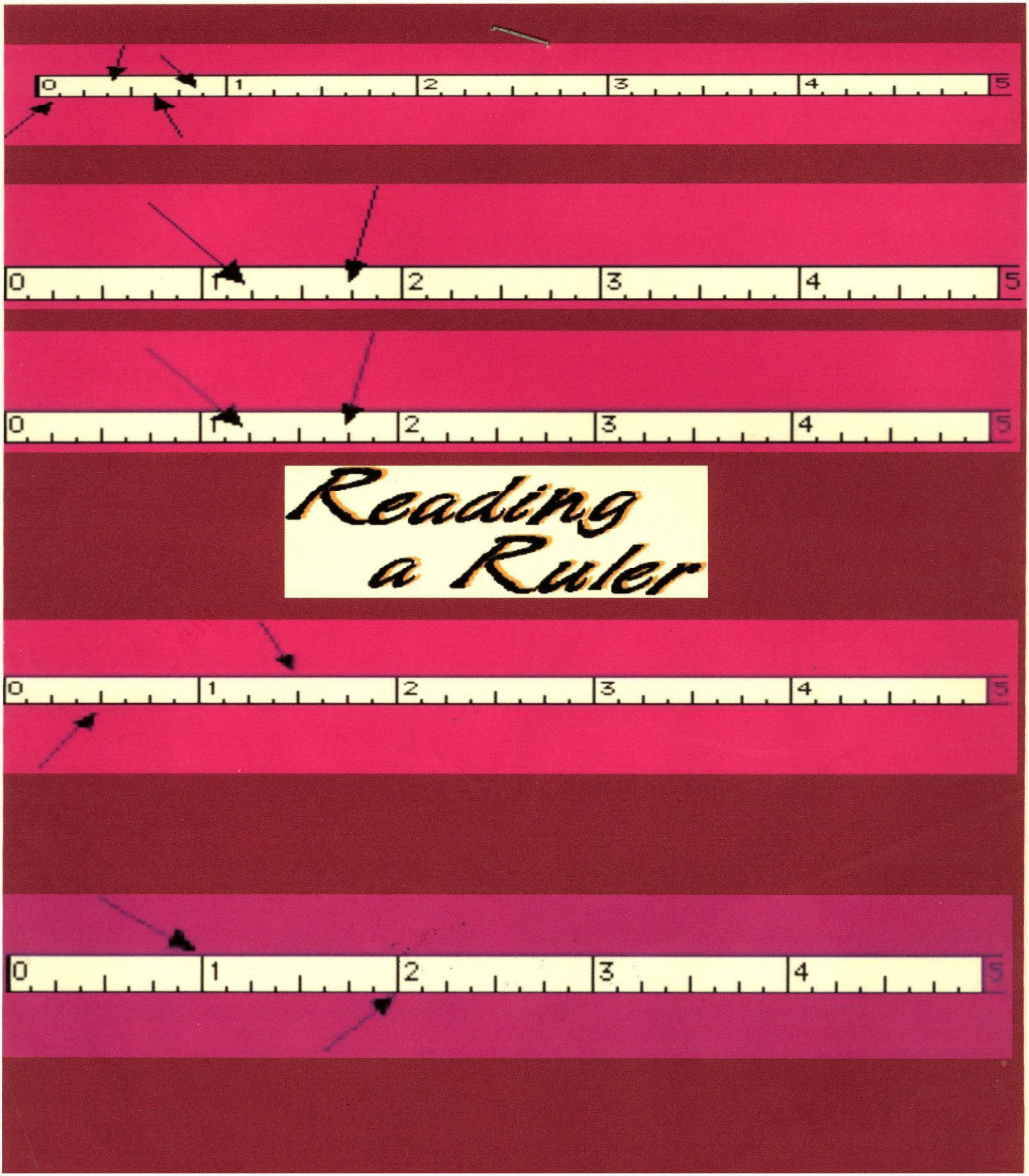
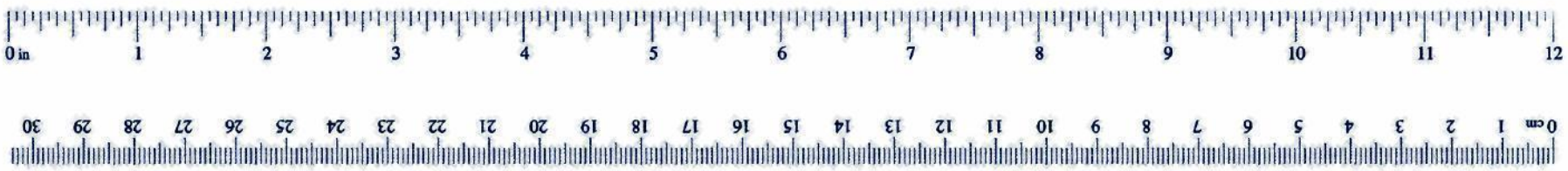

0 1 2 3 4 5
0 1 2 3 4 5
0 1 2 3 4 5
Reading a Ruler
0 1 2 3 4 5
0 1 2 3 4 5

12" ruler


0 in 1 2 3 4 5 6 7 8 9 10 11 12
0 cm 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Directions: Use your rulers to measure each of the following segments to the nearest 1/16 of an inch. Make your measurements as accurately as you can. After all measurements are made, compare your answer to other students in your group. A class discussion of the findings will follow.

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

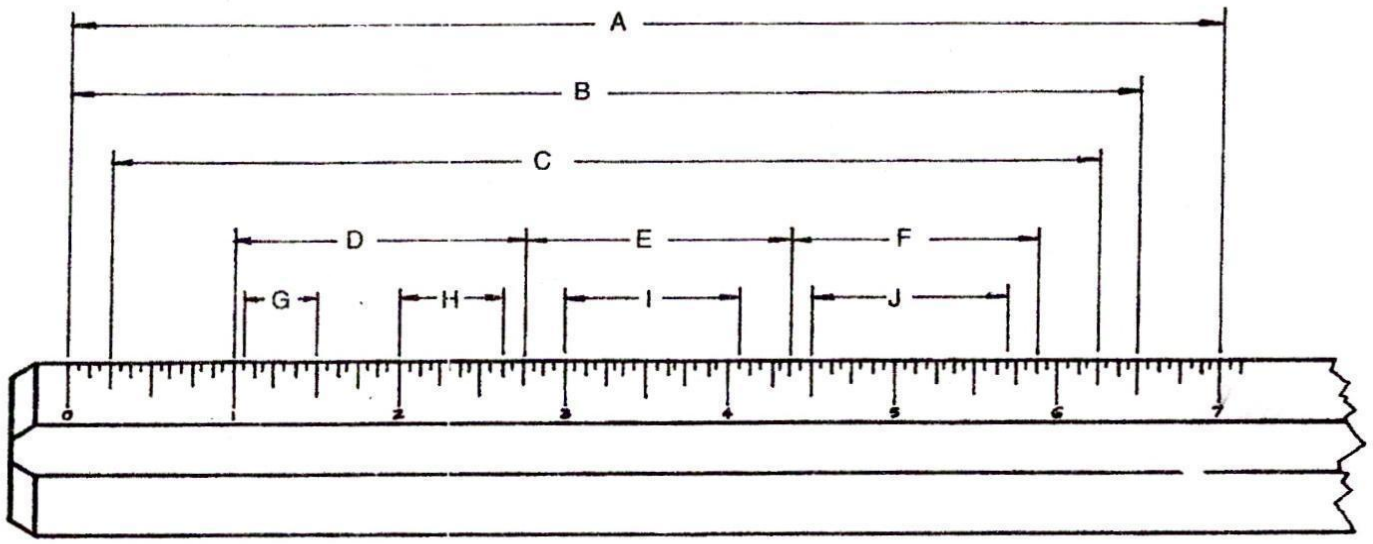
9. _____

10. _____ ↘

Reading a Conventional Ruler

Objective: To practice measuring using the conventional system.

Read from the ruler each of the dimensions labeled A to J. Write your answers in inches and fractions in the spaces provided.



A _____ F _____

B _____ G _____

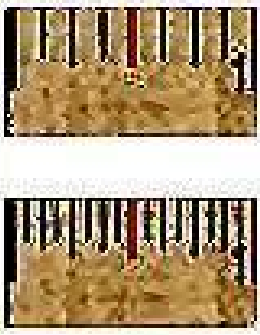
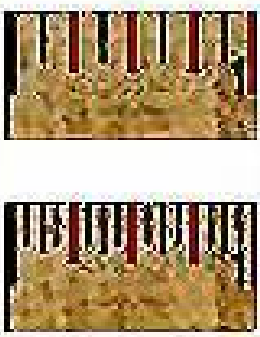
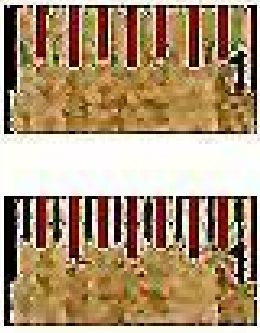
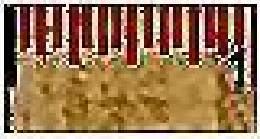
C _____ H _____

D _____ I _____

E _____ J _____

A ruler marked in 8ths. Every mark is 1/8th of an inch.

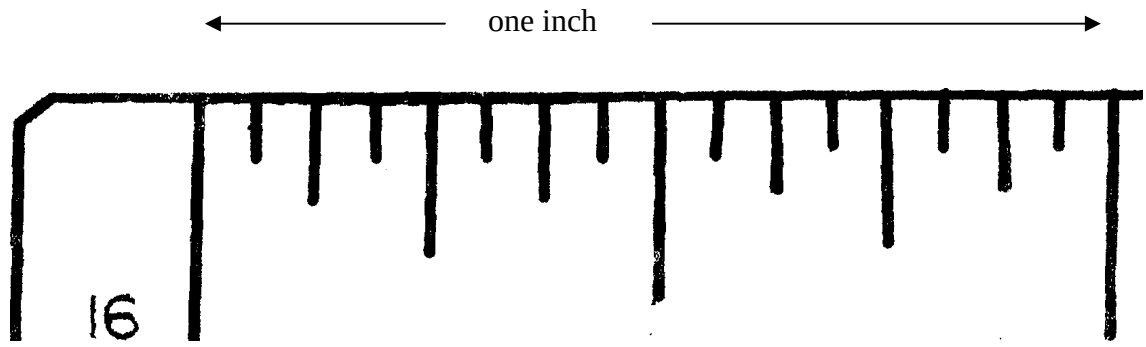
A ruler marked in 16ths. Every mark is 1/16th of an inch.

The center mark between numbers is 1/2. The red lines on these rulers are marked at 1/2, and 1.	
The next smallest marks on a ruler are 1/4ths. The red marks on these rulers are at 1/4, 1/2, 3/4, and 1. (1/2 is the same as 2/4)	
The next smallest marks on a ruler are 1/8ths. The red marks on these rulers are at 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, and 1.	
The next smallest mark, if there are any, are 1/16ths. The red marks on this ruler are at 1/16, 1/8, 3/16, 1/4, 5/16, 3/8, 7/16, 1/2, 9/16, 5/8, 11/16, 3/4, 13/16, 7/8, 15/16, and 1.	

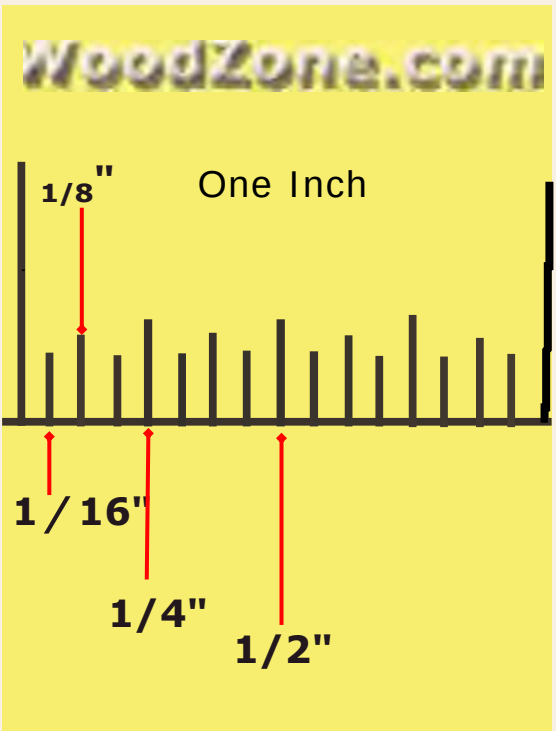
When marking down a distance from a ruler, mark the whole inch, followed by a space, then the fraction of an inch.

MEASUREMENT EXERCISE

Directions: Fill in the appropriate measurement for this one inch increment.



A standard tape measure (or ruler) in the United States is divided up into feet and inches. Each foot is divided into 12 inches. The problem starts with the subdivision of the inches. In each inch there are a number of lines of different length. The longer the length of these lines, the larger the unit of measurement.

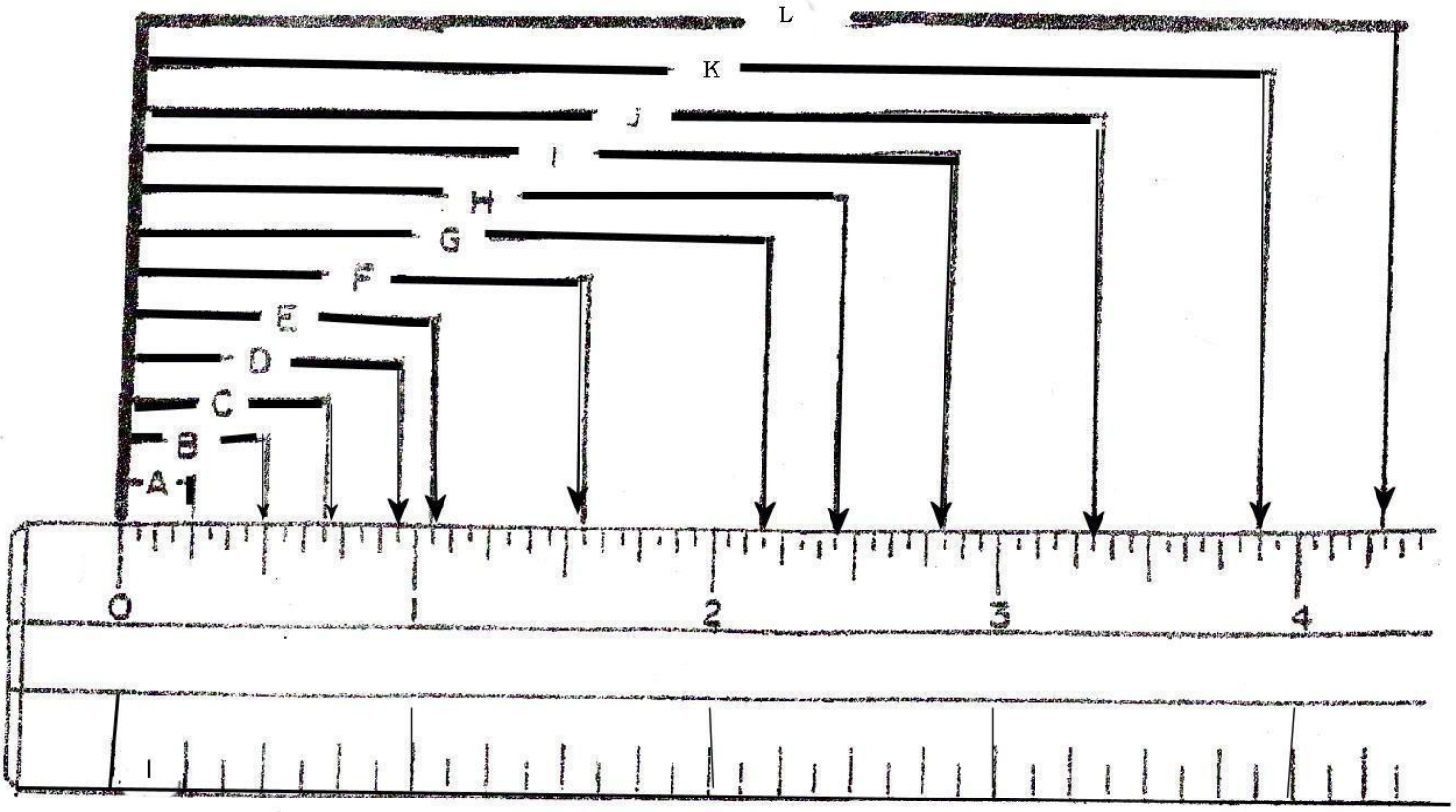


For example. 1. The longest line in the inch is in the middle. This is the half-inch mark and there is only one. 2. The next shortest line is the 1/4" (one quarter of an inch) inch mark and there are only two of these. 3. The third shortest line is the 1/8" (one eighth of an inch) mark and there are four of these. 4. The fourth shortest is the 1/16" (one sixteenth of an inch) mark and there are eight of these

Name _____ Date _____

Period _____

MEASUREMENT EXERCISE



A. _____ G. _____

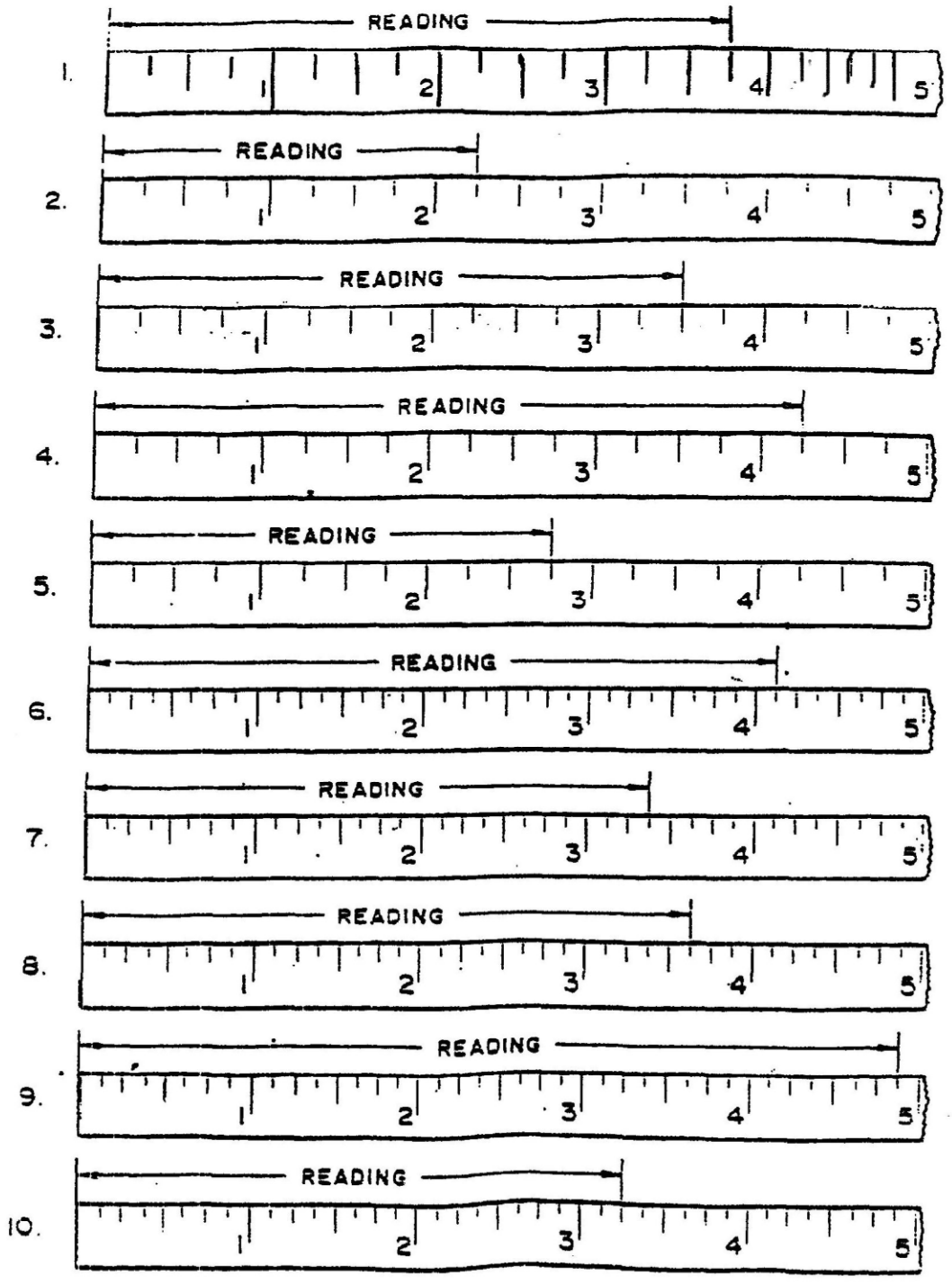
B. _____ H. _____

C. _____ I. _____

D. _____ J. _____

E. _____ K. _____

F. _____ L. _____


READING
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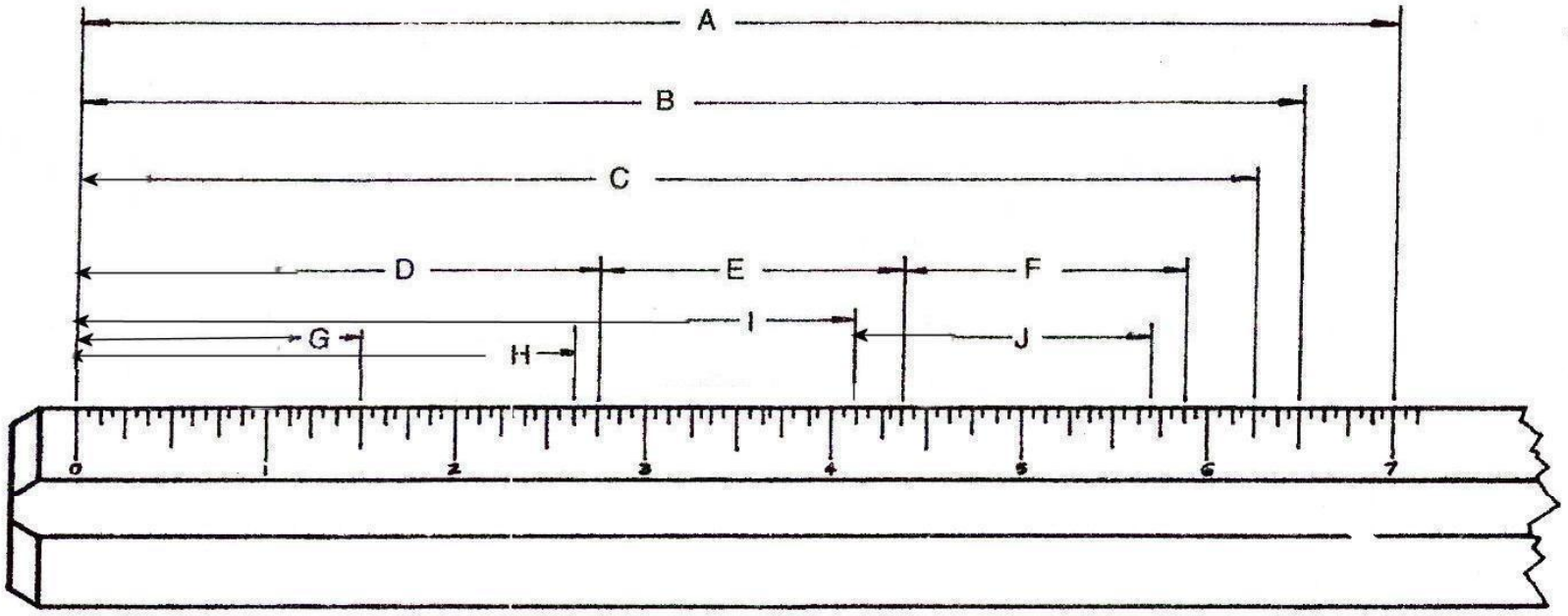
Reading a Conventional Ruler

Name_____ Date _____

Objective: To practice measuring using the conventional system.

Read from the ruler each of the dimensions labeled A to J. Write your answers in inches and fractions in the spaces provided.



A _____ F _____

B _____ G _____

C _____ H _____

D _____ I _____

E _____ J _____

Do Now----- Copy This:

Electricity- is the flow of electrons through material

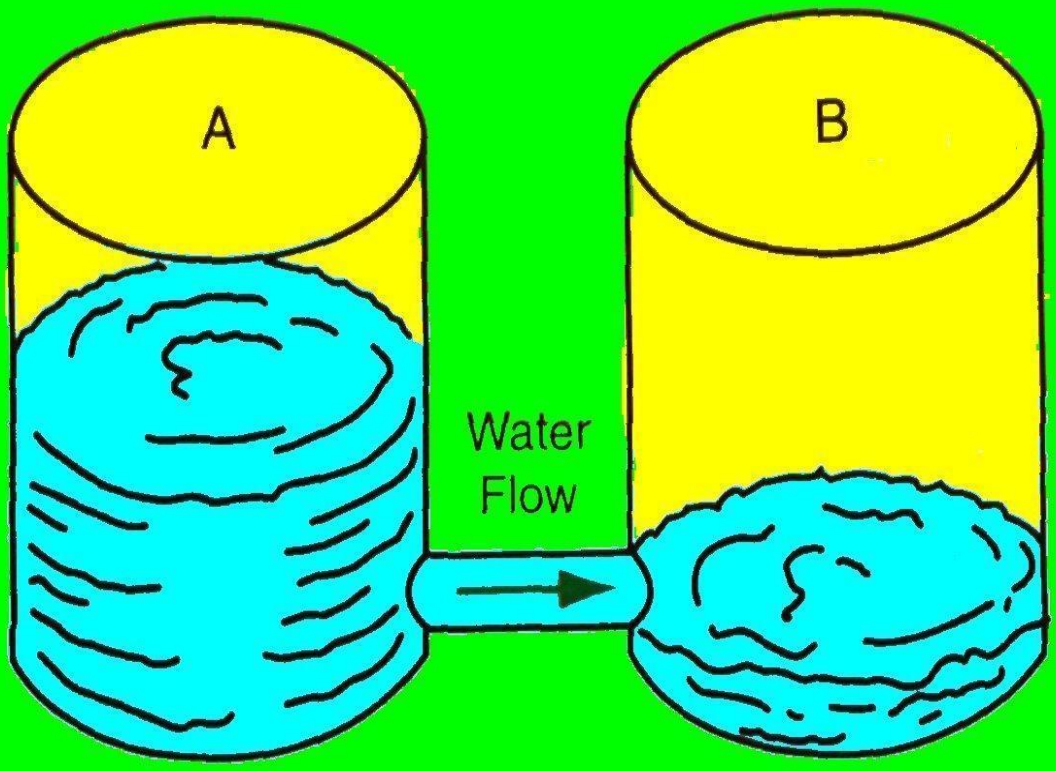
Electrons – are small, negatively charged parts of an atom.

Molecule – is a combination of atoms.

If a baseball were enlarged to the size of the earth its atoms would be the size of marbles.

If a single atom were enlarged to the size of a fourteen story building (140 feet tall) the nucleus would be the size of a grain of salt.

Electricity



Water will flow until the levels in the two containers become equal.

Technology Satisfies Our Needs

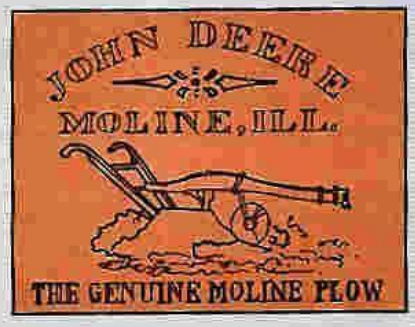
TECHNOLOGY SATISFIES OUR NEED TO PRODUCE FOOD

Agricultural Technology Now

(Courtesy of Sperry Corp.)

Farm machines can harvest enough wheat in nine seconds to make seventy loaves of bread.

Agricultural Technology Then



Years ago, farmers had to use human or animal muscle power to plow their fields.

TECHNOLOGY SATISIFIES OUR MEDICAL NEEDS

Medical Technology Now

(Courtesy of Glenbrook Laboratories of Sterling Drug Inc.)

Many medicines are available for headache relief.

Medical Technology Then

(Courtesy of Science Museum Library, London)

Early people thought headaches were caused by evil spirits in the head. To get rid of the spirits, holes were drilled in the skull with drills made of shark's tooth or flint. This is known as trepanation. Surprisingly, some patients survived more than one of these drillings.

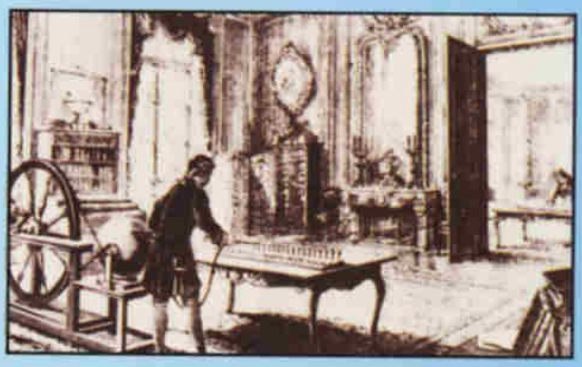
TECHNOLOGY SATISFIES OUR NEED TO COMMUNICATE IDEAS

Communications Now

(Courtesy of NASA)

Today, satellites bring television signals from other countries into our homes. The signals are sent from ground stations to the satellites, which rebroadcast them throughout the world.

Communications Then



In 1774, in Geneva, Switzerland, George Lesage set up a telegraph using one wire for each letter of the alphabet. The telegraph sent a message along wires to another room.

TECHNOLOGY SATISIFIES OUR TRANSPORTATION NEEDS

Transportation Now

(Courtesy of NASA)

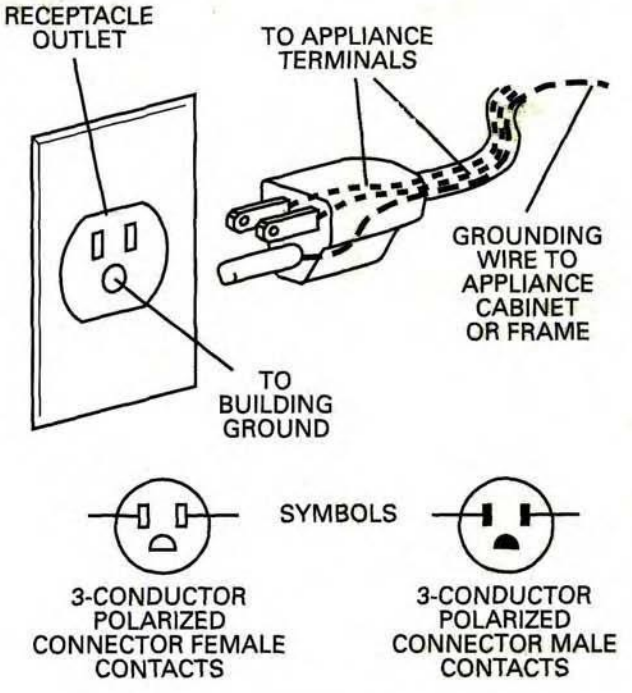
Today the space shuttle and rockets make it possible to move objects and people between the earth and space.

Transportation Then

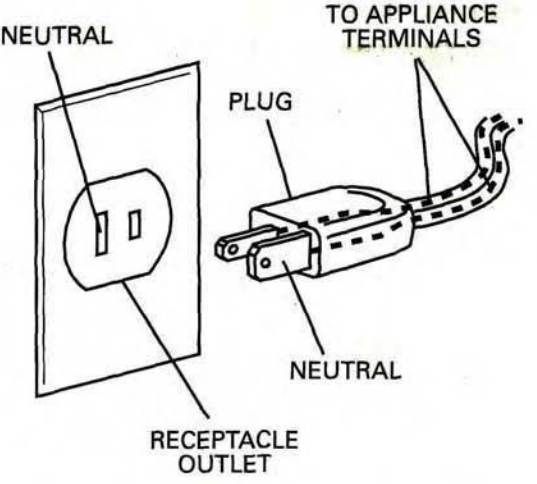
(Courtesy of Smithsonian Institution—National Air and Space Museum)

In 1903 at Kitty Hawk, North Carolina, Wilbur and Orville Wright's biplane flew 852 feet and stayed up for 59 seconds.

Polarized Plugs



THREE-WIRE



WIDE NEUTRAL

Do Now----- Copy This:

Splice - to unite (as two ropes, or wires) weaving the strands together. or by lapping two ends together.

Stranded Wire- A conductor made up of a series of strands of wire to create a flexible conductor, such as an appliance cord.

Tinning- The process of coating the ends of a stranded wire with solder.

Do Now----- Copy This:

Pliers- The word pliers is a plural Name for a single tool. Pliers come in various sizes and shapes. Pliers are used for holding and gripping small articles in situations where hands cannot be used.

Slip-Joint pliers – are pliers with straight, serrated (grooved) jaws, and a pivot with the jaws are fastened can be moved to increase or decrease the size of objects able to be held.

Long-Nose or Needle Nose pliers-
These are pliers with a long usually straight point. It has serrated grooves, which enables a very fine grip in small areas

Do Now

Emery Cloth

Abrasive coated cloth used for light polishing of metal. Cloth covered with powdered emery. A substance that abrades or wears down.
Also used for smoothing of surfaces.

Terminology of a Boat

Bow is the frontmost part of the hull

Stern is the rear-most part of the hull

Port is the left side of the boat when facing the Bow

Starboard is the right side of the boat when facing the Bow

Waterline is an imaginary line circumscribing the hull that matches the surface of the water when the hull is not moving.

Midships is the midpoint of the LWL (see below). It is half-way from the forwardmost point on the waterline to the rear-most point on the waterline.

Baseline an imaginary reference line used to measure vertical distances from. It is usually located at the bottom of the hull.

What is "buoyancy"?

Buoyancy is a term that is used to describe what happens to an object in water. It has to do with ***weight, force and gravity***. When a boat is launched into a body of water, for example, much of the water in its path is pushed aside. You see evidence of this by the waves or even the wake. After the boat is afloat, the wake diminishes, but there are still forces at work. Under this circumstance, a certain amount of water is displaced by the boat. It gets pushed aside. What this means in terms of buoyancy is that the amount of water that is displaced, or pushed aside, will determine how well or poorly the boat will float. Simply, the amount of water displaced by the boat's volume. Between the nooks and crannies--any three dimensional object has volume.

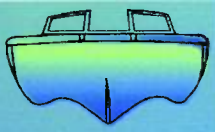
HULL

A **hull** is the body of a ship or boat. It is a central concept in floating vessels as it provides the buoyancy that keeps the vessel from sinking.

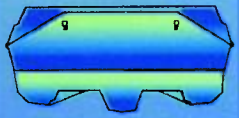
Propulsion

The most common means are:

- Human power (rowing, paddling, setting pole etc.)
- Wind power (sailing)
- Motor powered screws
  - Inboard
    - Internal Combustion (gasoline, diesel, heavy fuel oil)
    - Steam (Coal, fuel oil)
    - Nuclear (for submarines and large naval ships)
  - Inboard/Outboard
    - Gasoline
    - Diesel
  - Outboard
    - Gasoline
    - Electric
  - Paddle Wheel
  - Water Jet (Personal water craft, Jetboat)
  - Air Fans (Hovercraft, Air boat)

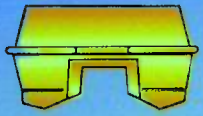


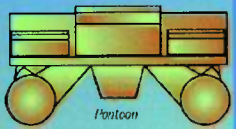
Tunnel vee



Tunnel bottom

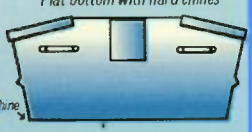
Catamaran



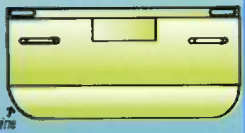


Pontoon

Flat bottom with hard chines



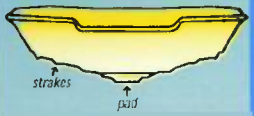
Flat bottom with soft chines



Vee bottom

Vee bottom with strakes

Vee bottom with pad and strakes



TRANSPORTATION

Mode of Transportation	Advantages	Disadvantages
Bicycle	• cheap to operate • flexible • nonpolluting	• transports only one person or small articles. • limited to short travel distances
Car	• flexible and convenient • provides privacy	• transports no more than six passengers • causes high levels of pollution • road networks use arable land
Truck	• flexible means of moving freight short and medium distances •goes directly from point of origin to destination	• not suitable for very long distances • causes high levels of pollution
Bus	• relatively flexible and convenient • carries at least 50 people • cheap form of urban mass transit	• causes pollution • not suitable for very long distances
Train	• economical and efficient for large loads of freight over long distances • can carry hundreds of passengers • creates little traffic congestion •very safe •causes very little air pollution	• not as convenient as cars • requires a track system that is expensive to build and maintain
Subway train	• can carry hundreds of passengers • does not cause congestion or pollution	• expensive to build
Ship	• can carry huge loads of freight or large numbers of passengers over long distances	• special facilities needed for loading and unloading • can only be operated on water
Airplane	• can carry passengers and freight over long distances quickly • can pass over all types of terrain	• expensive to operate • airport located away from urban centers; needs support of other modes of transportation
Space shuttle	• reusable form of space travel	• extremely expensive • only used for scientific and technological experiments in space

Step 6: Towards the back of the boat, draw one line across both body pieces where you want to put the paddle posts. Drill out holes for the paddle posts. Put a drop of glue in the hole and place posts in hole, rounded side up.

Step 7: Take one piece of paddle support material, **measure** in half and then cut in half. Round off both ends of both pieces.

Step 8: Mark off across both haves of the boat where both supports are to be placed.

Step 9: After marks are approved, get 4 nails from teacher. Pre-nail the supports as shown. Place a drop of glue on the bottom of each support end and nail into place.

Step 10: Ask for 2 pieces of paddle material. Measure in both directions the half way point. You should have a large "+" in the middle of **both** paddle materials.

Step 11: Using the backsaw or dovetail saw cut both paddles **together.** Remember to cut just inside the lines.

Step 12: Construct paddle. Paddle should fit together tight.

Step 13: Use rubber band for final construction.

Step 14: Find out *if* and *how well* your boat works.

PADDLE BOAT – INSTRUCTIONS

Tools:

- Coping Saw
- Rasp
- BackSaw or Dovetail Saw
- Sandpaper

Materials:

- Two pieces of body wood (2" x 11")
- One dowel rod for paddle posts
- One piece of wood for supports
- Two pieces of paddle material

Step 1: Each student will begin by constructing **3 designs** concepts for the shape of their boat. Using graph paper students will divide the paper into 3 sections that measure 2" x 11".

Step 2: Get design approved and redraw on to **both** halves of the body material.

Step 3: Cut out the body of the boat using the **coping saw**.
Cut **one** piece of the boat body at a time.

Step 4: Using the **rasp**, shape the body pieces.

Step 5: Take one dowel, **measure** in half and then cut it in half. Round **one** end of each piece, as shown.

Step 6: Towards the back of the boat, draw one line across both body pieces where you want to put the paddle posts. Call over teacher to drill out holes for the paddle posts. Put a drop of glue in the hole and place posts in hole, rounded side up. (demo)

Step 7: Take one piece of paddle support material, **measure** in half and then cut in half. Round off both ends of both pieces.

Step 8: Mark off across both haves of the boat where both supports are to be placed. (demo)

Step 9: After marks are approved, get 4 nails from teacher. Pre-nail the supports as shown. Place a drop of glue on the bottom of each support end and nail into place.

Step 10: Ask for 2 pieces of paddle material. Measure in both directions the half way point. You should have a large "+" in the middle of **both** paddle materials.

Step 11: SEEK TEACHER INSTRUCTION

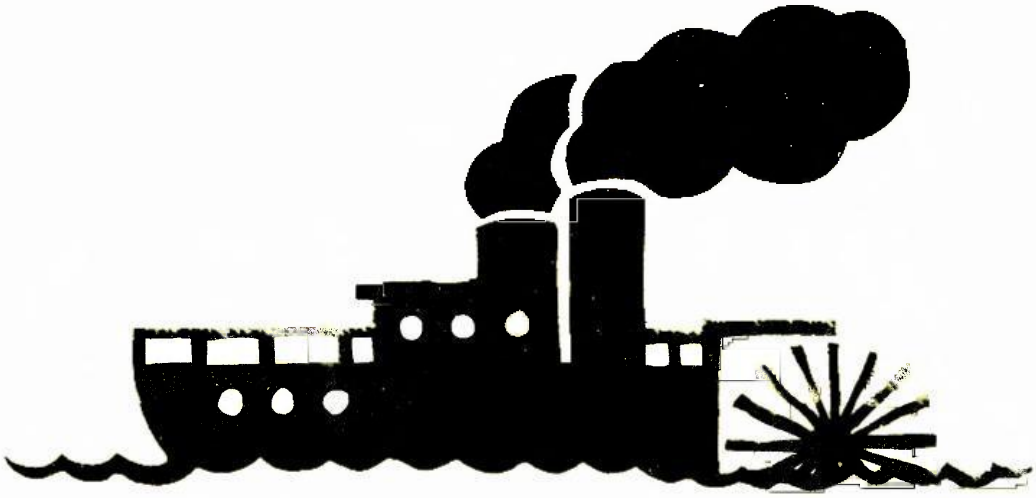
Step 12: Using the dovetail saw cut both paddles **together.** Remember to cut just inside the lines.

Step 13: Construct paddle. Paddle should fit together tight.

Step 14: Use rubber band for final construction.

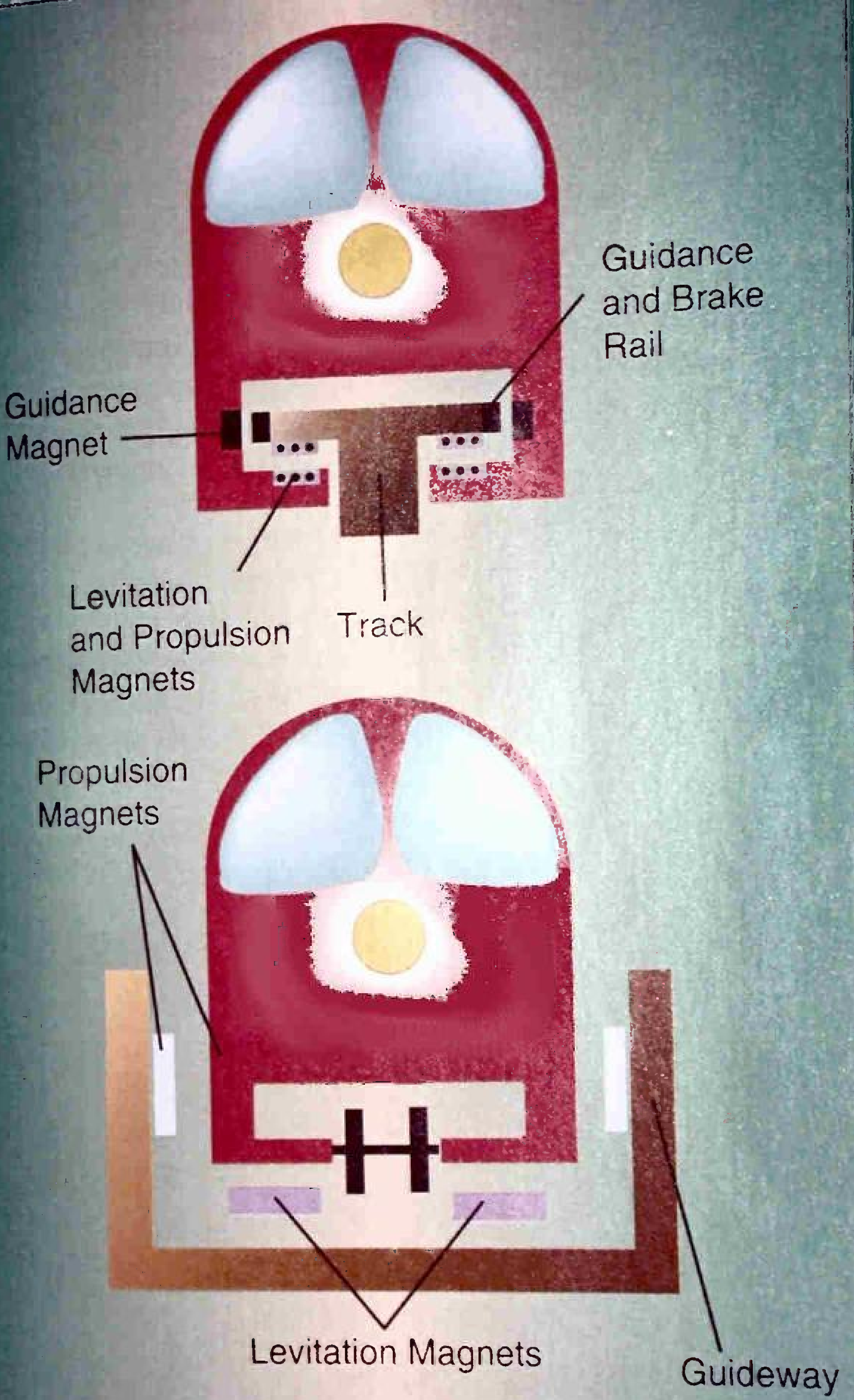
Step 15: Find out if and how well your boat works.

PADDLE BOAT

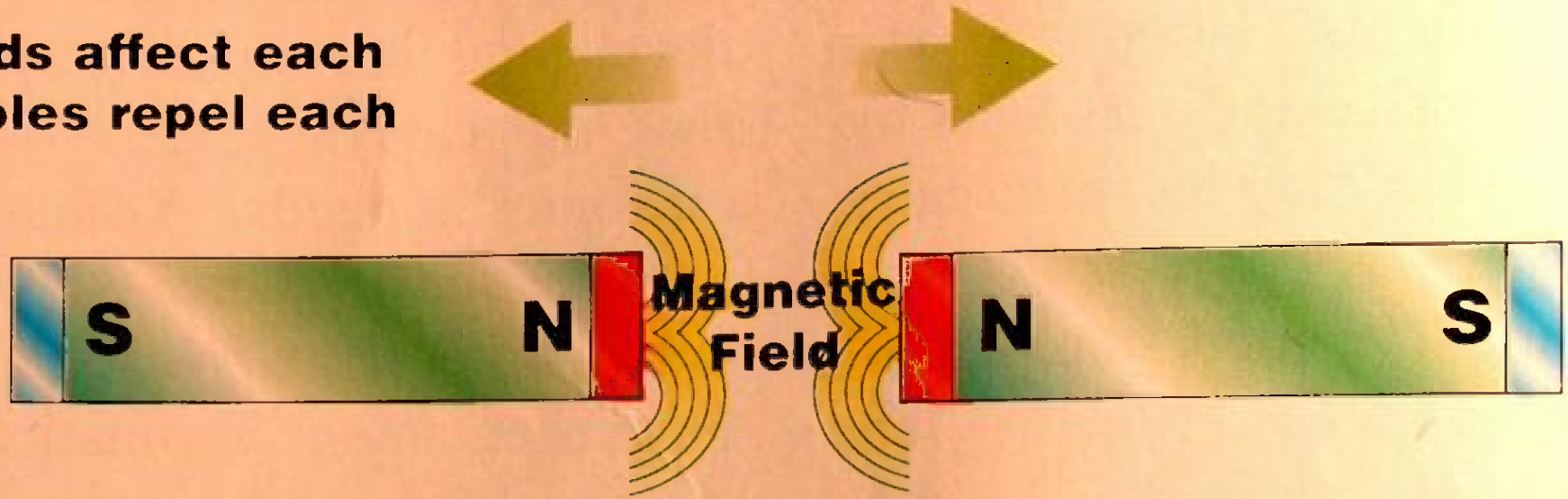


Objective: During this project you will construct a paddle boat using hand tools, information provided to you, and your own understanding of technology. In addition to constructing a paddle boat, you will also be required to measure certain aspects about your finished project.

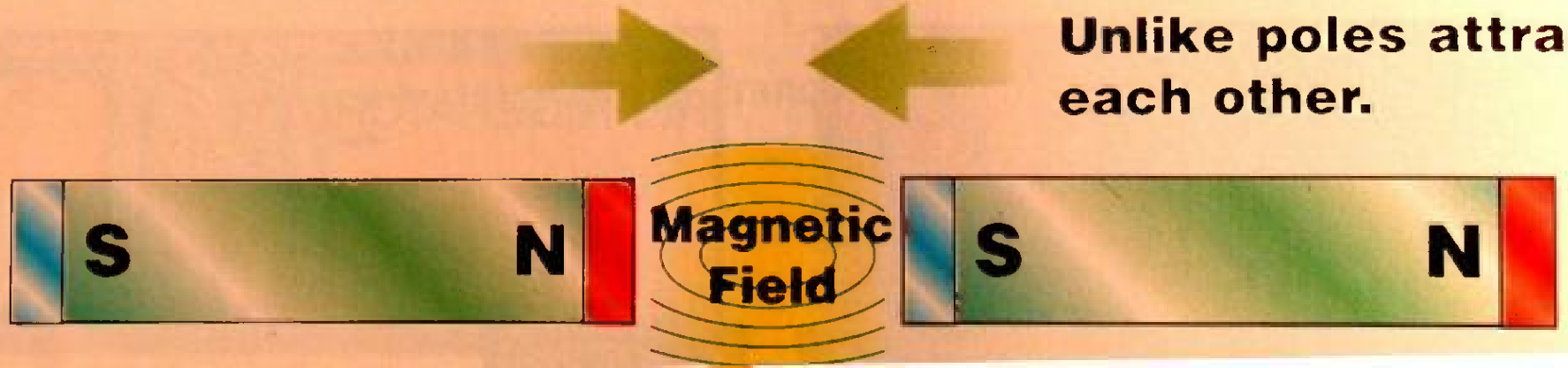
You will race your paddle boat, to see who has the fastest boat.


Guidance and Brake Rail
Guidance Magnet
Levitation and Propulsion Magnets
Track
Propulsion Magnets
Levitation Magnets
Guideway

Magnetic fields affect each other. Like poles repel each other.



Unlike poles attract each other.

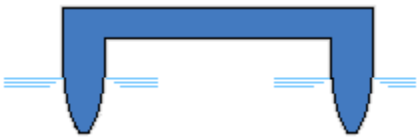


TRANSPORTATION

MAJOR CONCEPTS

- **A transportation system is used to move people or goods from one location to another.**
- **Modern transportation systems have helped to make countries interdependent.**
- **The availability of rapid, efficient transportation systems has changed the way we live.**
- **Transportation systems convert energy into motion.**
- **Steam was the first important source of mechanical power for transportation systems.**
- **Modern transportation systems often use internal combustion engines or electric motors.**
- **Intermodal transportation systems make optimum use of each type of transportation used in the system.**
- **Most transportation systems use vehicles to carry people or goods, but some systems do not use any vehicles.**

catamaran - is a type of multihulled boat or ship consisting of two hulls joined by some structure, the most basic being a frame, formed of akas. Catamarans can be sail- or engine-powered.



Underwater hull or *underwater ship* – The underwater section of a vessel beneath the waterline, normally not visible except when in drydock.

V-hull – The shape of a boat or ship which the shape of the hull comes to a straight line to the keel.

Wake – Turbulence behind a vessel. Not to be confused with *wash*.

Do Now – Copy This

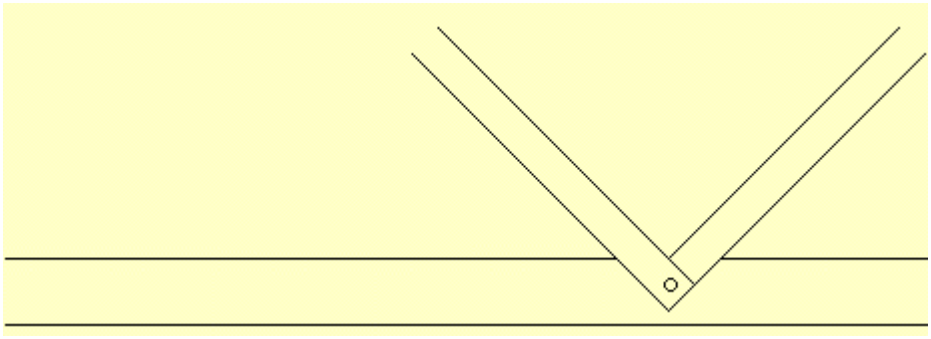
Abutment -
the outermost end supports on a bridge, which carry the load from the deck

Beam -
a rigid, usually horizontal, structural element

Rigid -
(adj.) ability to resist deformation when subjected to a load;

Rigidity (n.) the measure of a structure's ability not to change shape when subjected to a load

The picture below represents a part of a truss with a simple pinned joint.



From this simple example we see that the design and construction of joints and other attachments is a crucial factor in structures.

Do Now - Copy This

Bridges -There are six basic modern bridge forms: the **beam, the truss, the arch, the cantilever, the cable-stay, and the suspension**.

A **beam bridge** is made of long timber, metal, or concrete beams anchored at each end. If the beams are arranged in a lattice, such as a triangle, so that each shares only a portion of the weight on any part of the structure, the result is a **truss bridge**.

An **arch bridge** has a bowed shape causing the vertical force of the weight it carries to produce a horizontal outward force at its ends. It may be constructed of steel, concrete, or masonry.

A **cantilever bridge** is formed by self-supporting arms anchored at and projecting toward one another from the ends; they meet in the middle of the span where they are connected together or support a third member.

In a **cable-stayed bridge**, the roadway is supported by cables attached directly to the supporting tower or towers. This differs from a **suspension bridge**, where the roadway is suspended from vertical cables that are in turn attached to two or more main cables. These main cables hang from two towers and have their ends anchored in bedrock or concrete.

Types of Stress

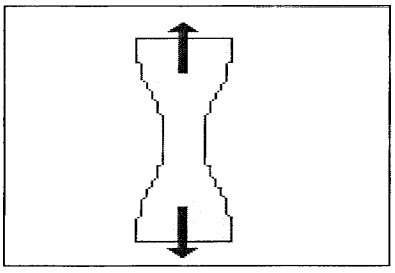
Forces always push or pull and produce five types of stress: compression, tension, shear, torsion, and bending.

Compression

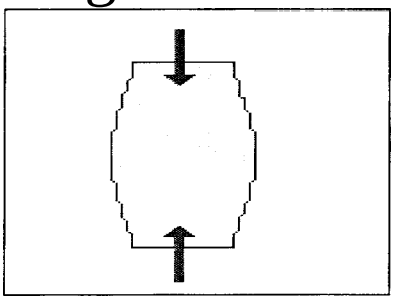
Compression is the tendency to push or squash a material. A material under compression is always shorter.

Tension

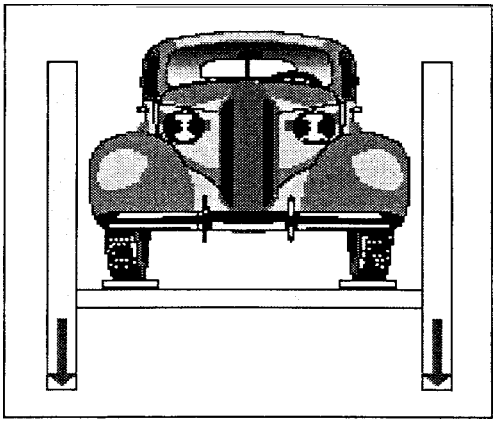
Tension is the tendency of a material to be pulled apart. It makes a material longer.



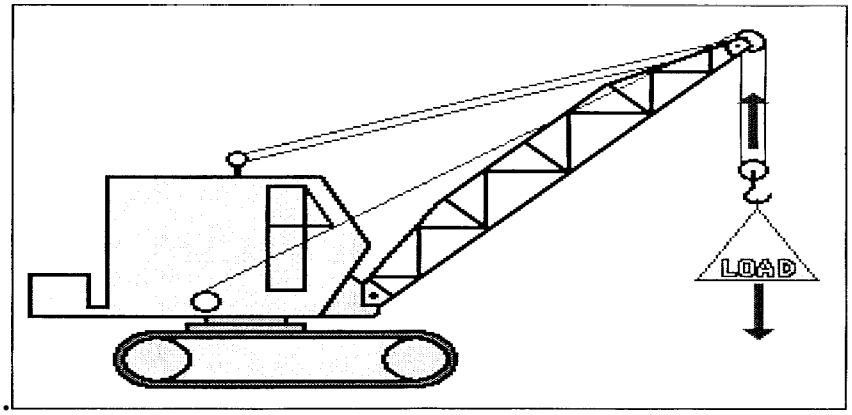
←Tension is pulling.



← Compression is pushing



A hoist is compressed by the weight of a car



The cables of a crane are in tension.

Do Now – Copy This

Dead Load - The fixed weight of a structure or piece of equipment, such as a bridge on its supports.

Live Load - A moving, variable weight added to the dead load or intrinsic weight of a structure.

Criteria - A degree or level of requirement, excellence, or attainment. Specified as measurements, quantity, or rules.

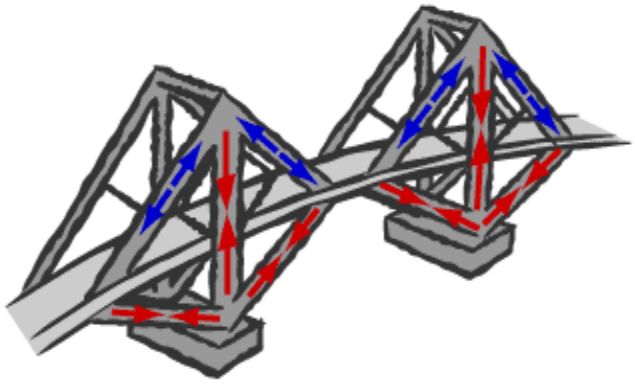
DO Now

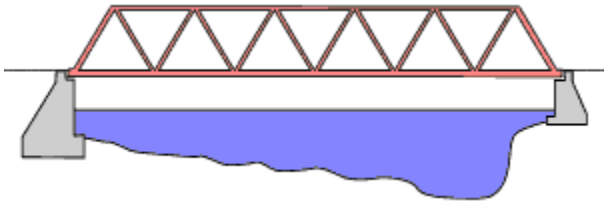
Transportation- provides ways to move people and things. Transportation technology includes all the means we uses to help us travel through the air, in water, or over land.

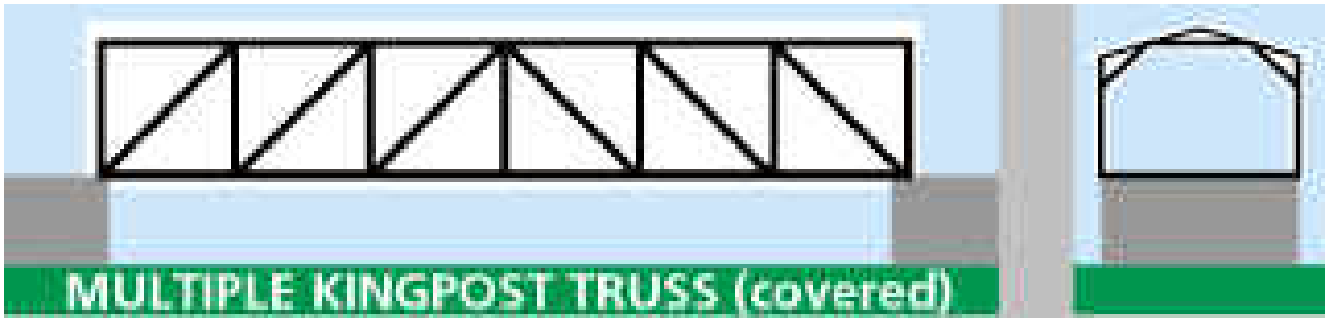
Bridges- are structures built to allow people and vehicles to pass over something else. The types of bridges are beam, arch, truss, suspension, cable-stayed and, movable bridge.

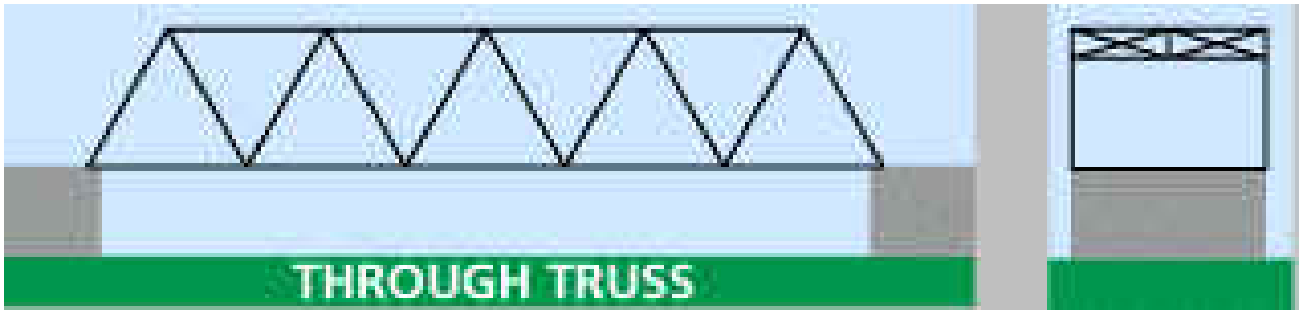
The Truss Bridge- Consists of an assembly of triangles. Trust bridges are commonly made from a series of straight bars.

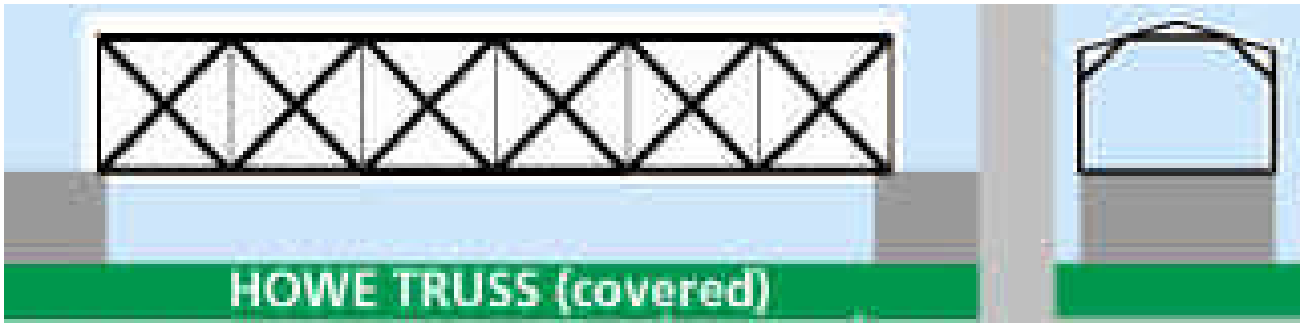
Every bar in a truss bridge experiences either a pushing or pulling force











Truss - Pratt variations

Most truss bridges possess two trusses, one each side of the deck, though a few have only one, on the centre line, and some have three, one at each side and one in the middle.

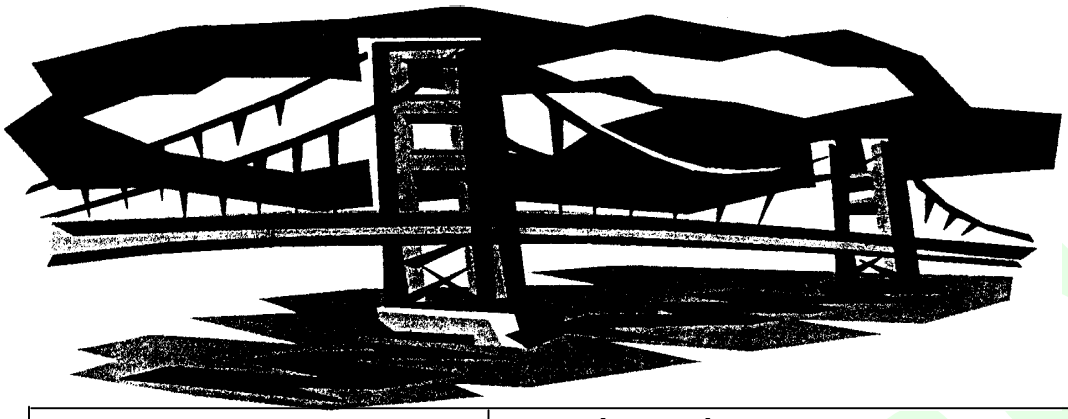
Name: _____

Technology Education

Date:
Mr. Grad

Problem Solving -

Bridge Building



Grading	Background
Design Sketches:_____/25 Strength-Factor:_____/100 Design/Construction:_____/50 Activity Summary:_____ / 25	**Background** Probably one of the first bridges was a large tree that fell down, crossing a stream or river. This gave early man the idea to create better bridge designs. Bridges are structures built over some obstruction (such as a river or roadway) so that people and other types of traffic can cross over it. Bridges come in many shapes and sizes. Bridges are usually classified by their basic geometry. Different types of bridges include arches, trusses, beams, girder, suspension and cable-stayed bridges.
TOTAL: _____=_____ Letter Grade	

Vocabulary:

Capital	dead load
compression	live load
criteria	tension
efficiency	truss
design	force

Objective:

The object of this activity is to build a model bridge that is as structurally efficient as possible while meeting the given criteria. The main goal when constructing your bridge is to build it as light as possible and also as strong as possible.

Each student or group of students (up to two people in a group) will design, construct, and test their own model bridge. Students will then figure out how efficient their bridge was from a structural point of view.

Tools Needed	Materials Needed
scroll saw/coping saw	popsicle sticks
scissors	string
clothes pins	glue
hand drill with 5/32" bit	3x5 index cards ruler

Criteria:

You will be building a bridge that must satisfy the following requirements...

- Your bridge must be 14-inches long
- You will be limited to 40 popsicle sticks, 6 feet of string, 10 index cards, and white glue (used appropriately)
- Your bridge must have a full-length road surface (use index cards) that will allow *a Hot Whee/s* monster-truck to pass through
- Your bridge must accommodate a weight hanger for strength testing purposes (rods are 4-inches apart)

Forces that act upon a bridge:

Bridges work best when they are designed to resist all of the forces that act upon them as efficiently as possible. A real bridge has to deal with many forces such as the load placed upon it (automobile or people traffic in most cases), wind, weather loads (such as snow or rain, which add weight), and the effects of temperature on the different materials that the bridge is made out of.

Points: ____ / 25

Design Sketches

In the space provided below, sketch two designs that you would like to try for your bridge project. Draw two side profiles (looking at the bridge from the side). Try to make these drawings as large as the spaces provided for the drawings. If you would like, you may also sketch of the bottom of each bridge design on a separate sheet of paper. Refer to these designs when building your bridge.

#1.

#2.

Points: ____ /100

Strength-Factor

The strength-factor of your bridge is determined using the following equation:

Strength-Factor =Live Load (in pounds) Dead Load (in ounces)

The strength-factor that you determine should be represented in pounds per ounce. This means that for every ounce of structure you have, it can support the given number of pounds. The higher the number, the better your strength-factor results.

What was your strength-factor? Use a calculator to determine your results. If you have the time to improve upon your design and test your bridge several times, circle your best strength-factor.

Test #1: **Strength-Factor =_____(in pounds) _ _____ (in ounces)**

Test #2: **Strength-Factor = _____ (in pounds) _ _____ (in ounces)**

Test #3: **Strength-Factor =_____(in pounds) _ _____ (in ounces)**

Points: _/ 25 Activity Summary

Think!!! Answer each of the following questions the best that you can.

1. What are the seven problem-solving steps?

_____
_____
_____
_____
_____
_____
_____

2. What are some things we would have to think about before building a real bridge. List at least two examples.

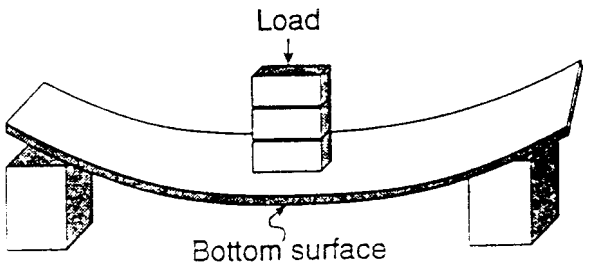
_____
_____
_____
_____
_____

Multiple Choice Questions - choose the best answer.

3. Which type of bridge was used to make the aqueducts in Rome?
   a) suspension b) beam
   c) arch
   d) pontoon

4. The diagram below shows a beam with a deflection due to the load applied to the middle of the beam.

   Which force is being applied to the bottom of the beam? a) compression b) tension
   c) torque
   d) shear



Points: _/ 25 Activity Summary

Think!!! Answer each of the following questions the best that you can.

1. What are the seven problem-solving steps?

_____
_____
_____
_____
_____
_____
_____

2. What are some things we would have to think about before building a real bridge. List at least two examples.

_____
_____
_____
_____
_____

Multiple Choice Questions - choose the best answer.

3. Which type of bridge was used to make the aqueducts in Rome?
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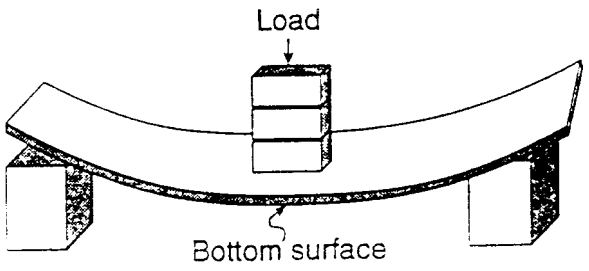
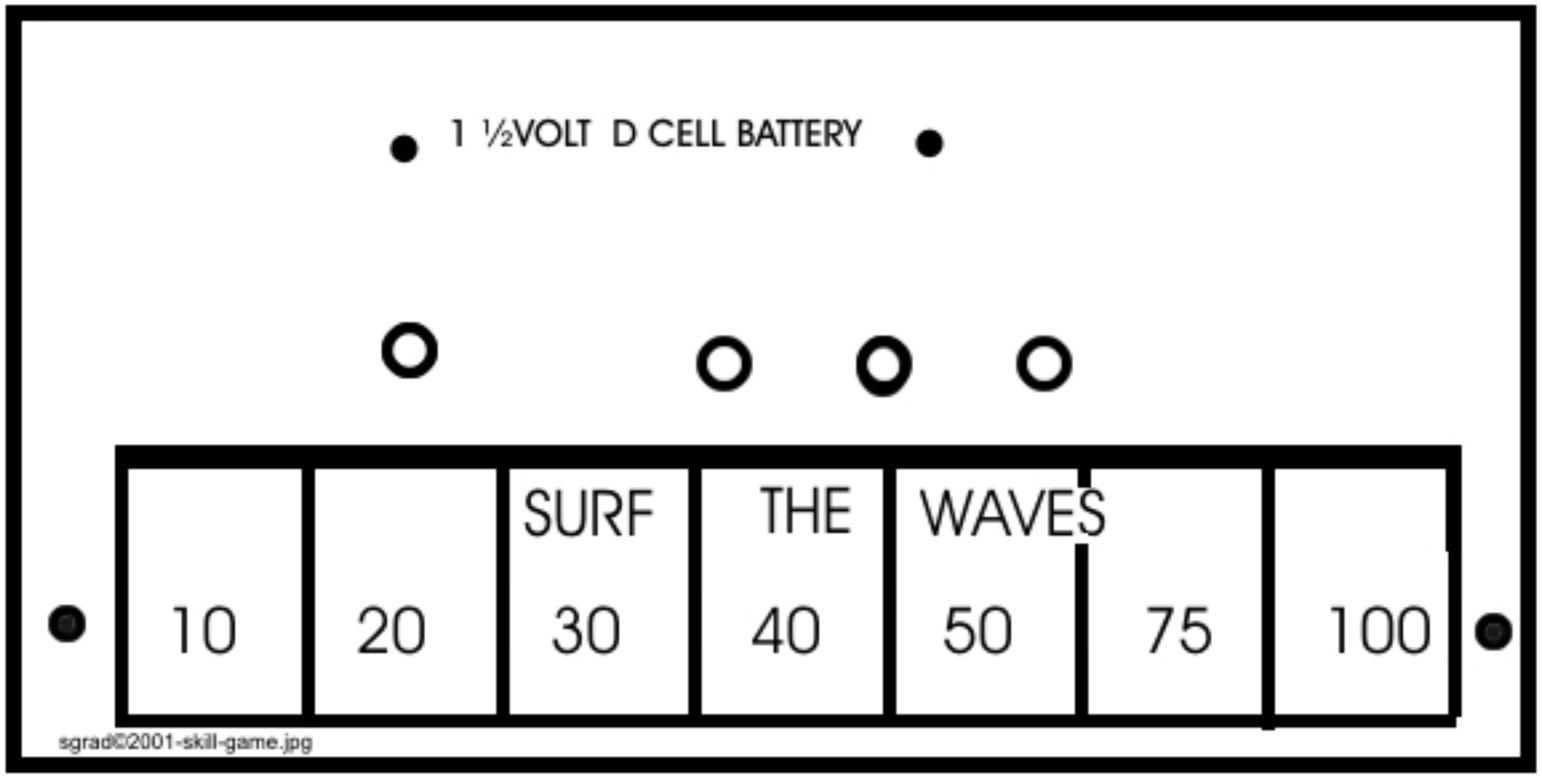
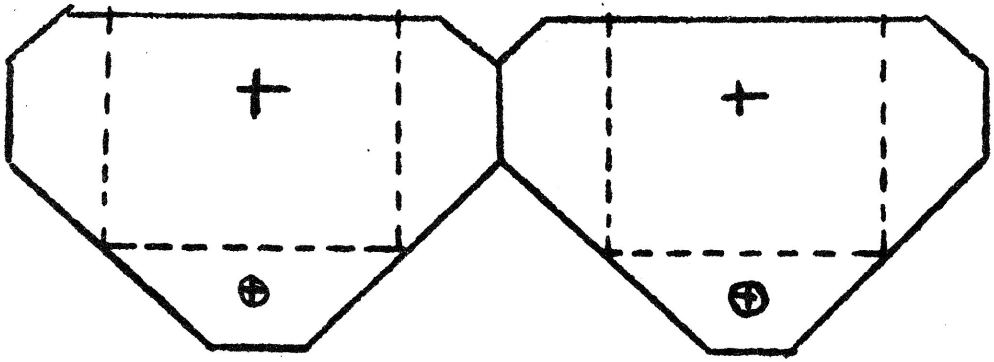
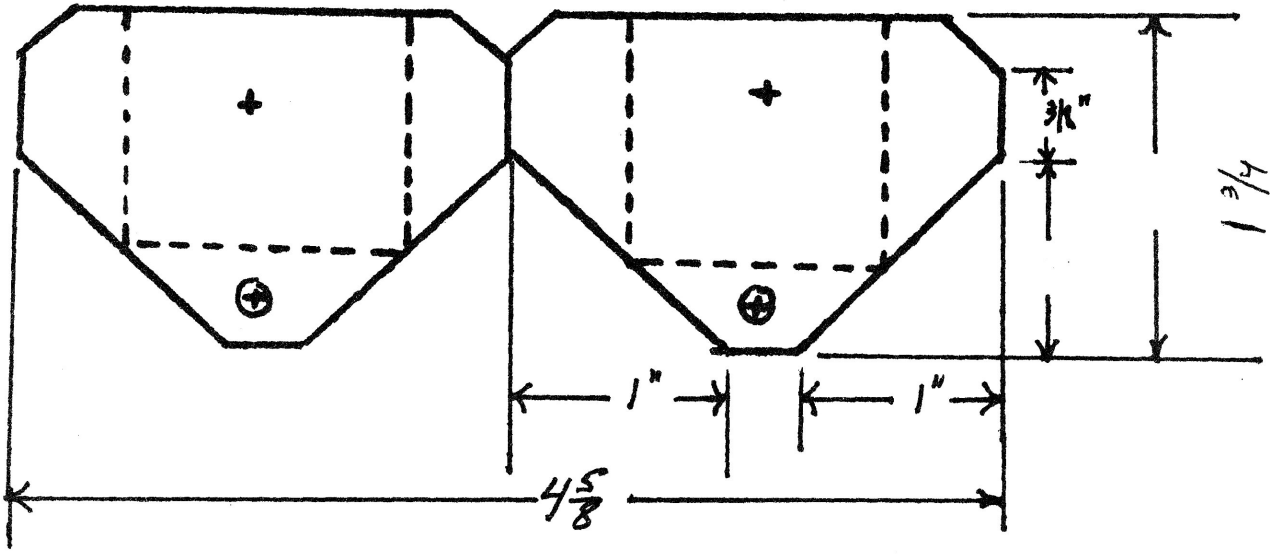
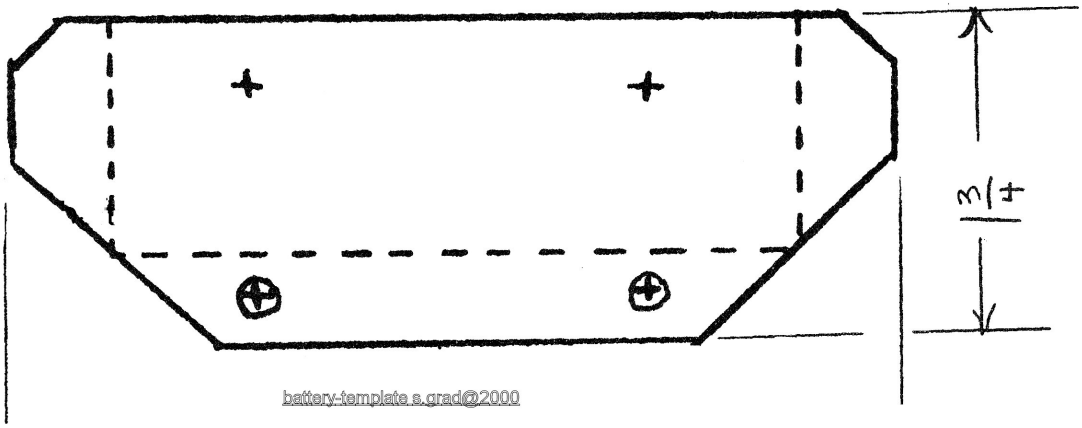


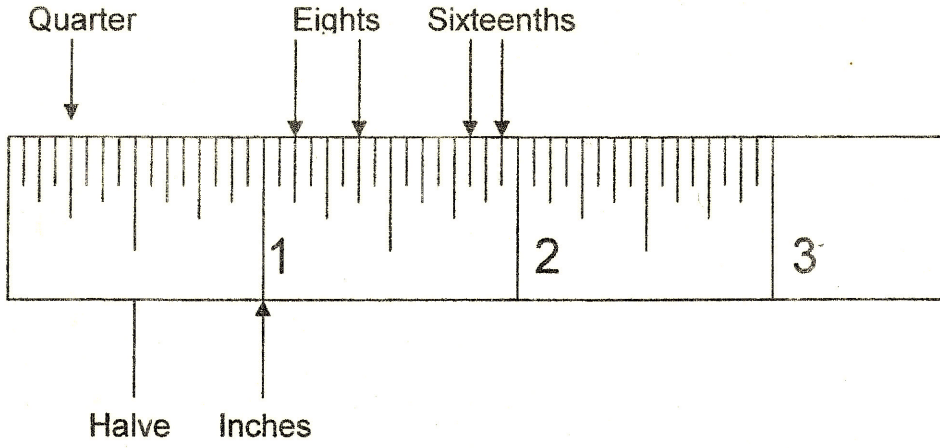

1 ½VOLT D CELL BATTERY
SURF
THE
WAVES
10
20
30
40
50
75
100
sgrad©2001-skill-game.jpg

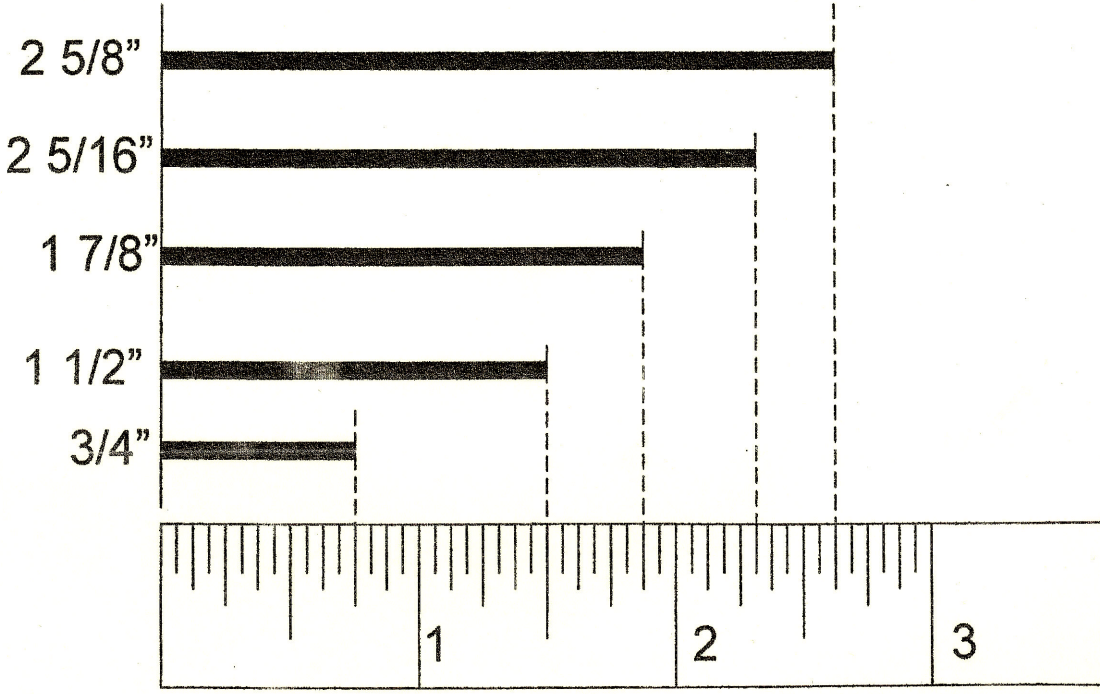




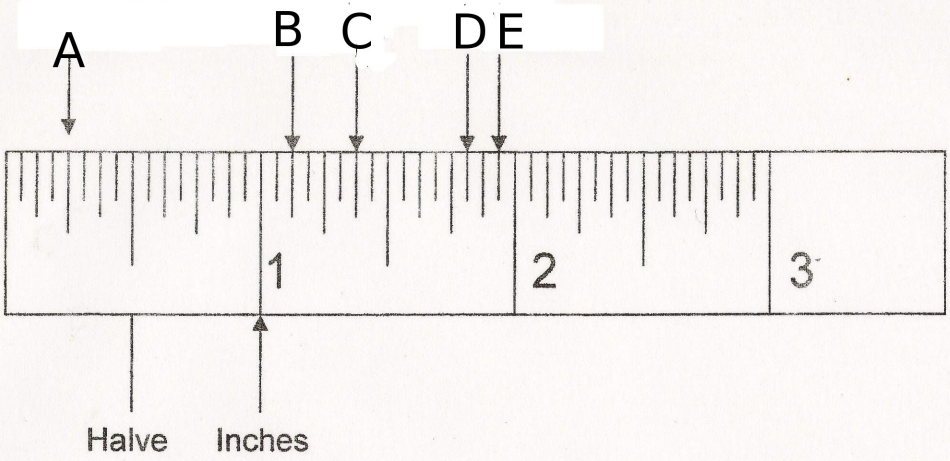


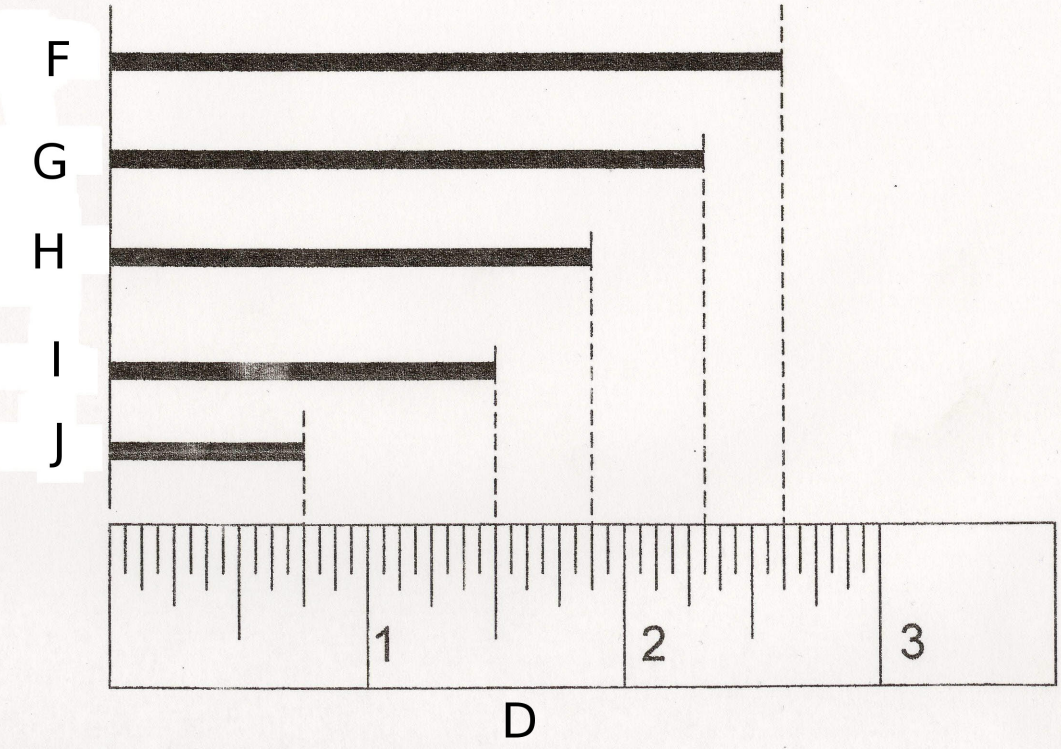
The Ruler


Quarter
Eights
Sixteenths
1
2
3
Halve
Inches


2 5/8”
2 5/16”
1 7/8”
1 1/2”
3/4”
1
2
3

The Ruler





East Middle School Technology

Dear Parents or Guardian:

I am delighted to have your son/daughter in my technology class this year. The study of Technology is an extremely rewarding experience. This class will incorporate science, math, & history, with technology. Through the use of a hands-on approach your child will develop a better understanding and appreciation of his world. We will examine the history of technology, and identify changes throughout the ages, and how it impacts our daily lives.
He will develop the crucial skill of teamwork, the sharing of tools, machinery, and the use of computers to solve problems, performs tasks, and build projects. He will develop a better understanding between science and technology.

In order to guarantee your child and all the students in the class the excellent educational climate that they deserve, I expect both responsibility and commitment from them.
Therefore, I have established the following rules:

1. Follow all directions, especially the safety rules.
2. Be on time. You are late if you are not in your seat when the bell rings.
3. Respect the rights and property of others. No Bullying.
4. Be prepared. Bring pencils and notebook to class *every* period.
5. No eating or drinking in class, especially gum.
6. Students are to copy the "DO NOW's" into their notebooks as soon as they enter the room.
7. No passes will be granted, except for medical emergencies.

If a student chooses to break a rule:

1st Time- given a warning
2nd Time a call to the home
3rd Time after school detention - and a call home

Grades are based on the following criteria:
Class participation; notebook ; projects completed; tests/quizzes; special projects; assignments; homework ;participation in clean up; teamwork

To be successful in my class, requires:

- being *on time to class*
  Supplies needed
- Having *a PEN , PENCIL & ERASER*; every class period
- Having a notebook (" 1" white looseleaf) kept neat and up-to -date
- Having the AGENDA BOOK

Please remember that your involvement and encouragement at home are crucial to your child's achievement.If you have any questions or concerns, please call the school at 434-2473.
Thank You
Sincerely,
Mr. S. Grad
Detach here

I have read and reviewed the course requirements, and discipline rules, with my child.
Please print Parent/Guardian's name_____ Students name: _____

Class Period_____ Day_____ Grade_____

STUDENT: PARENTS:
Signature _____ Signature_____

Home phone _____ Work phone_____

Name: Date:

Measuring Lines (Inches)

www.atozteacherstuff.com

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

Score:

Do Now

Technology- the use of knowledge, tools, and systems to turn resources into goods and services that society needs. These products and systems can help do things that could not be done without the help of technology.

Technology can improve personal lives by providing efficient transportation, rapid communications, comfortable housing, and plentiful food.

Technologist- a specialist in manufacturing enterprise or some other enterprise. He or she works under an engineer or scientist.

Technologists work closely with engineers to implement their work. Technologists are the major link between engineers and the factory floor or construction site.

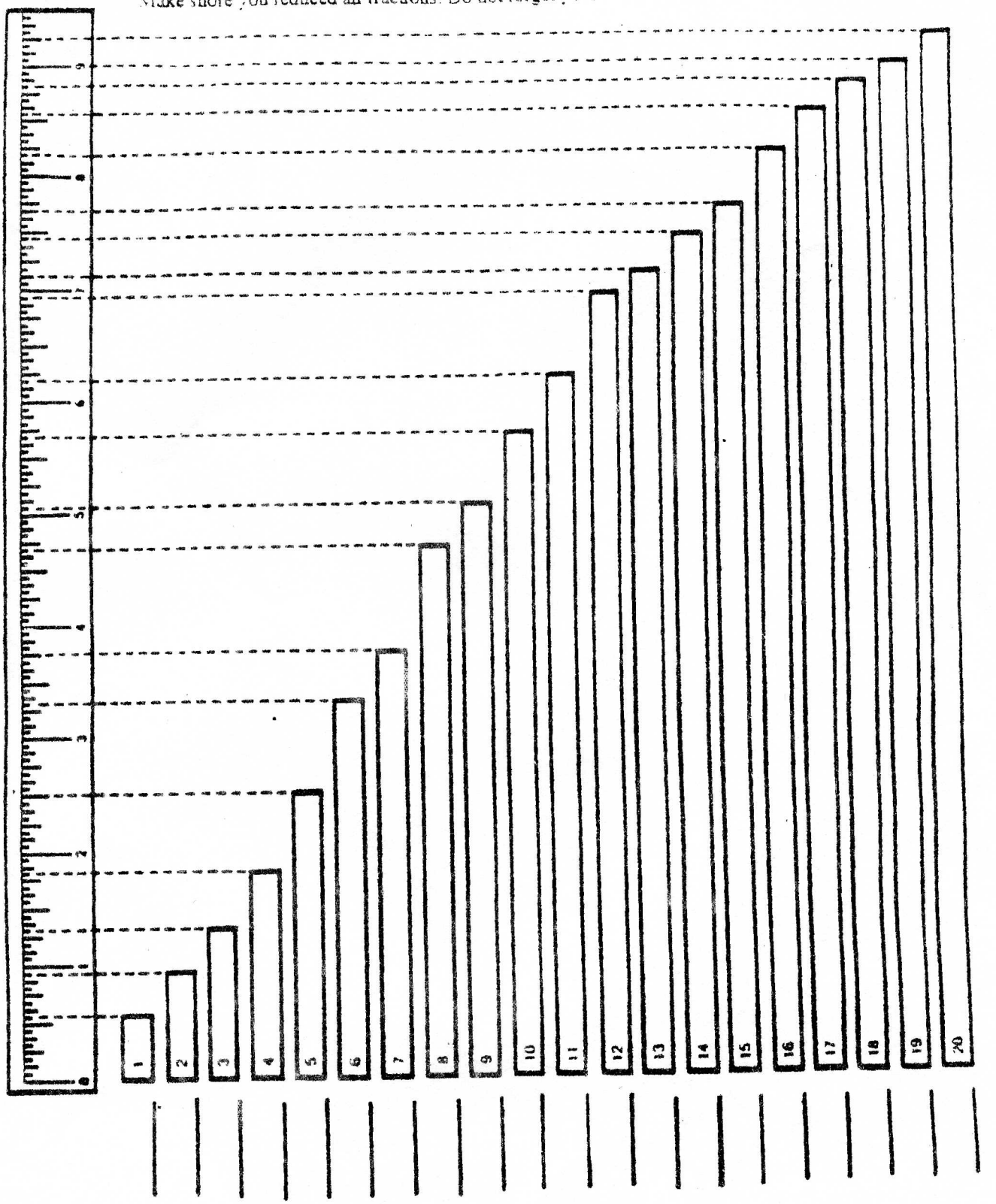
TECHNOLOGY EDUCATION

RULER TEST

TEST GRADE:

NAME _____ PERIOD _____ DATE _____

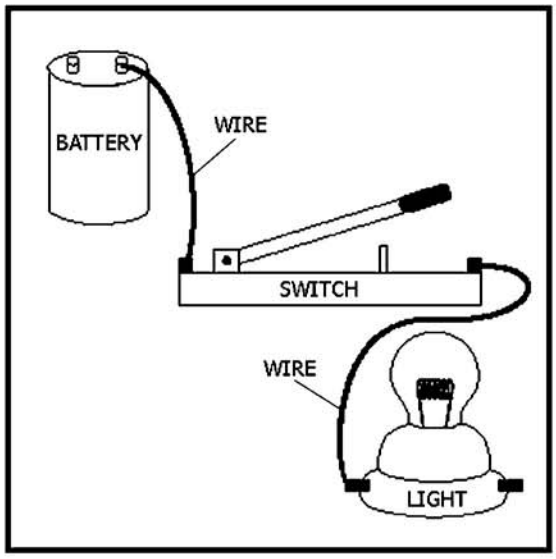
Directions Follow the dotted line up from the block that you are measuring. Place your answer in the space provided. Make shore you reduced all fractions. Do not forget your whole numbers.



When electricity is flowing in a wire made of copper, what inside the wire is actually moving?

(1) heat particles **(2) electrons** (3) copper atoms (4) a charged fluid

The light will not turn on when the switch is closed until



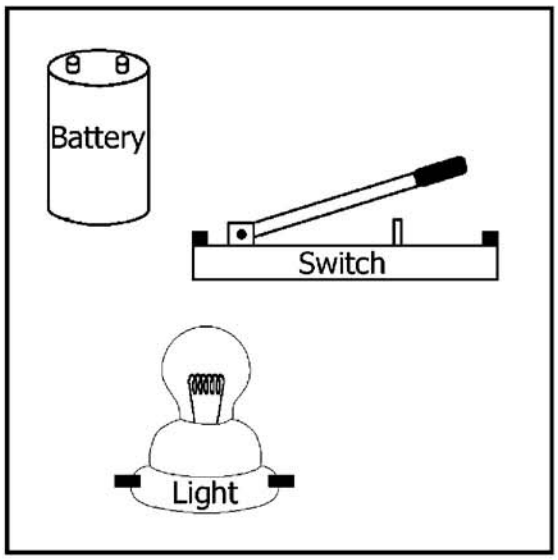
(1) a wire is connected from the battery to the light

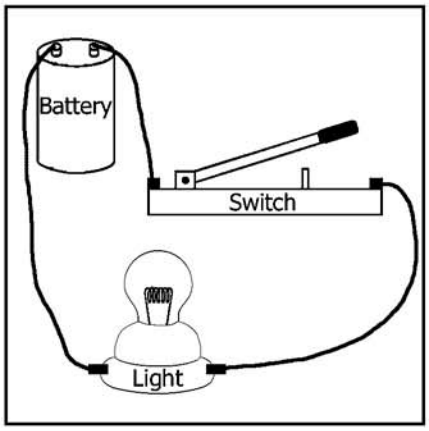
(2) a second wire is connected from the switch to the light

(3) a second wire is connected from the battery to the switch

(4) a second battery is connected to the switch

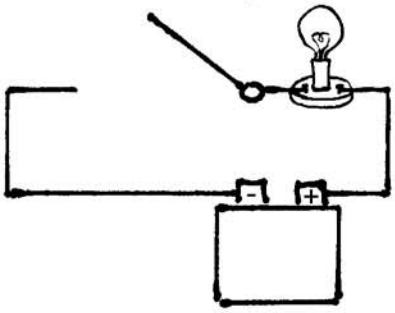
On the diagram below, draw wires connecting the battery, switch, and light together so that when the switch is closed the light will light.



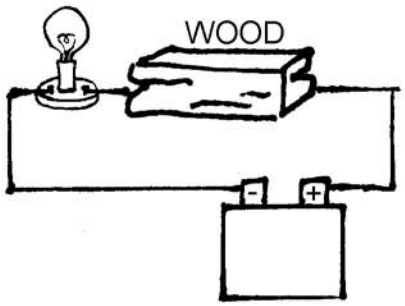


In which of the following circuits is the light bulb shining?

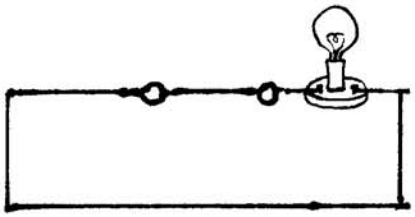
(1)



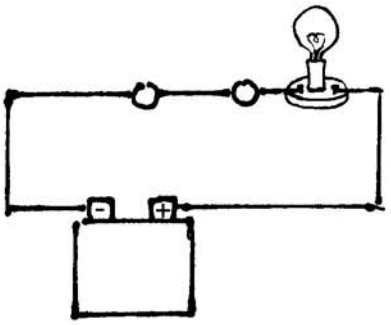
(3)



(2)



(4)



An electric current in a metal consists of moving

(1) nuclei (2) protons (3) neutrons **(4) electrons**

An experiment is conducted in which an electric circuit was used to light a light bulb. Different materials are used to complete the circuit. The table below shows the results.

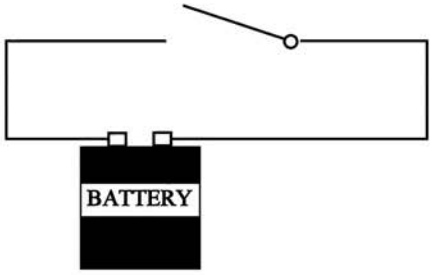
Object	Bulb Lights
Plastic Spoon	No
Paper Clip	No
Bottle Cap	Yes
Wooden Toothpick	No

Which of the following statements is a reasonable conclusion based on this data.

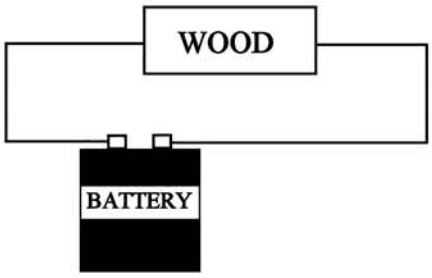
(1) The plastic spoon was a conductor.
(3) The bottle cap was solid plastic.
(2) The paper clip was not solid metal.
(4) The wooden toothpick was broken

Which circuit below would have a current of electricity?

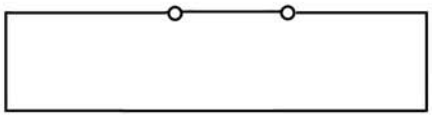
(1)



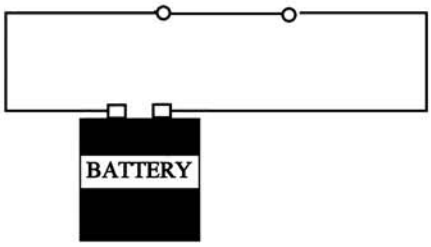
(3)



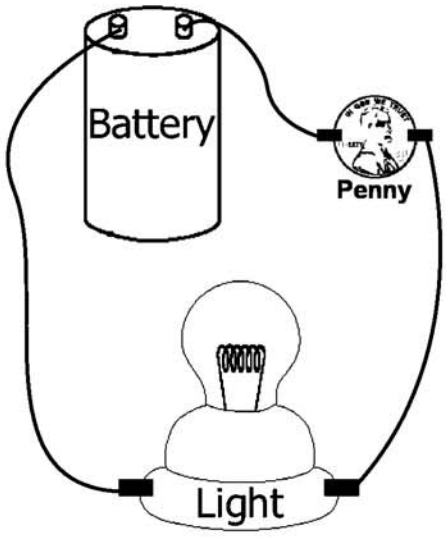
(2)



(4)



Use the picture below to answer the following question.

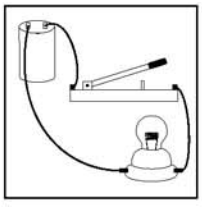


When both wires are touching the penny, the lightbulb will light. This is because the penny

(1) is a good conductor
(2) is made of a hard substance
(3) is not attracted to a magnet
(4) can be melted

When the switch is closed, which circuit below would cause the bulb to light up?

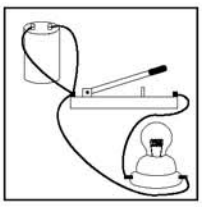
(1)



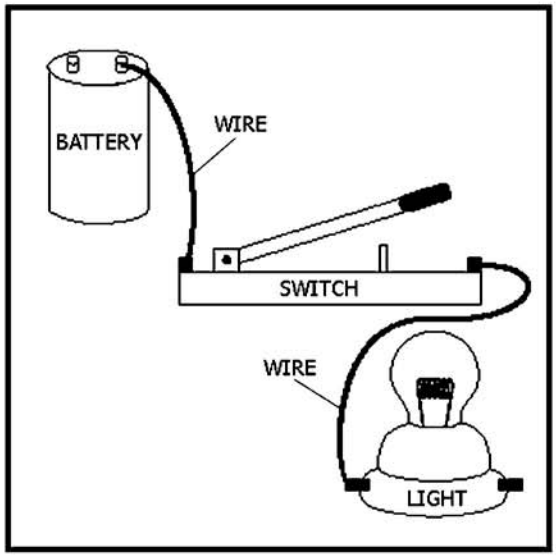
(2)

(3)

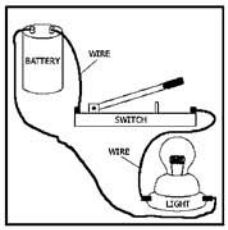
(4)



Consider the drawing of an incomplete circuit below.



On the picture above draw where you would connect another wire so that the light would opperate when the switch was closed.



What object below would be a poor conductor of electricity?

(1) 
Nail

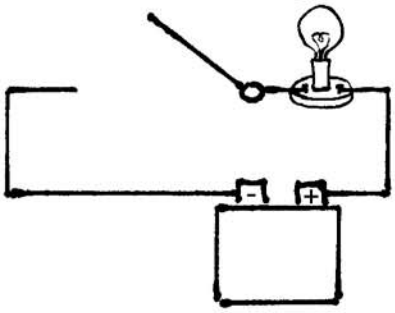
(2) 
Paperclip

(3) 
Penny

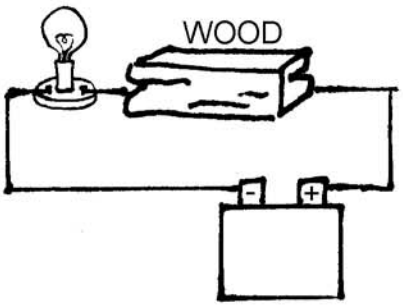
(4) 
Rubber Band

In which circuit would the light bulb glow?

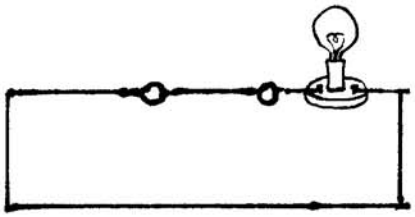
(1)



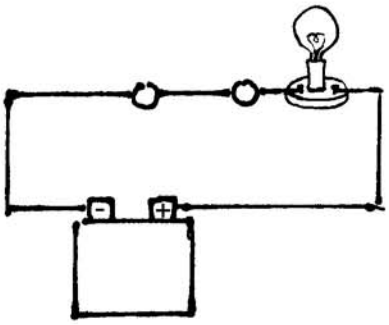
(3)



(2)



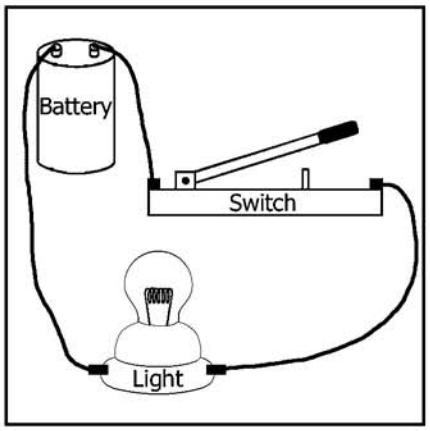
(4)



Answer Key

1. 2

2. 1

3. 

4. 4

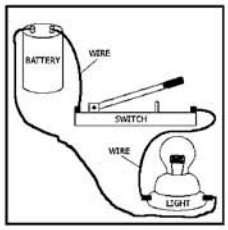
5. 4

6. 2

7. 4

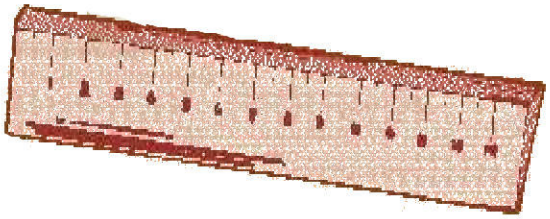
8. 1

9. 1

10. 

11. 4

12. 4



One Inch

The inch is the basic unit of measurein the United States. One inch is about the width of a man's thumb. If you stack 16 pennies, it would be one inch high. To put it in visual perspective, a quarter is a little smaller than one inch; a half-dollar is a little larger. These clues will help you estimate distances.

There are different ways to say "an inch." Below are several ways to indicate one inch:

1 inch

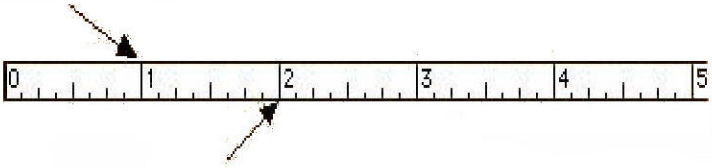
1 in. (used with an abbreviation)

1 " (used with a symbol)

1.0 inch (zeros to the right of the decimal point have no effect upon the basic measurement)

an inch

one inch



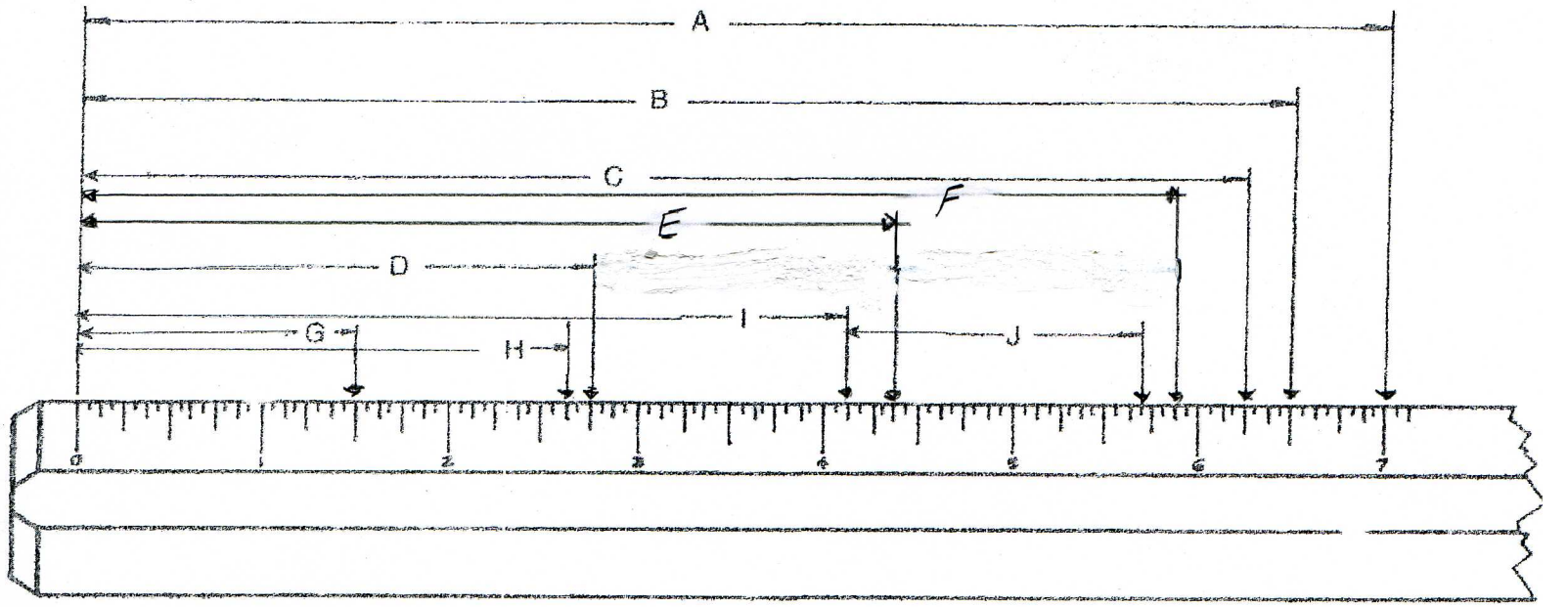
Reading a ruler is a skill that is needed when measuring the smaller units of length. On the example ruler, notice that the full inch measures extend the full distance from top to bottom. This isn't always the case, but the line indicating the inch is always the longest.

Reading a Conventional Ruler

Name _____ Date _____

Objective: To practice measuring using the conventional system.

Read from the ruler each of the dimensions labeled A to J. Write your answers in inches and fractions in the spaces provided.



A _____ F _____

B _____ G _____

C _____ H _____

D _____ I _____

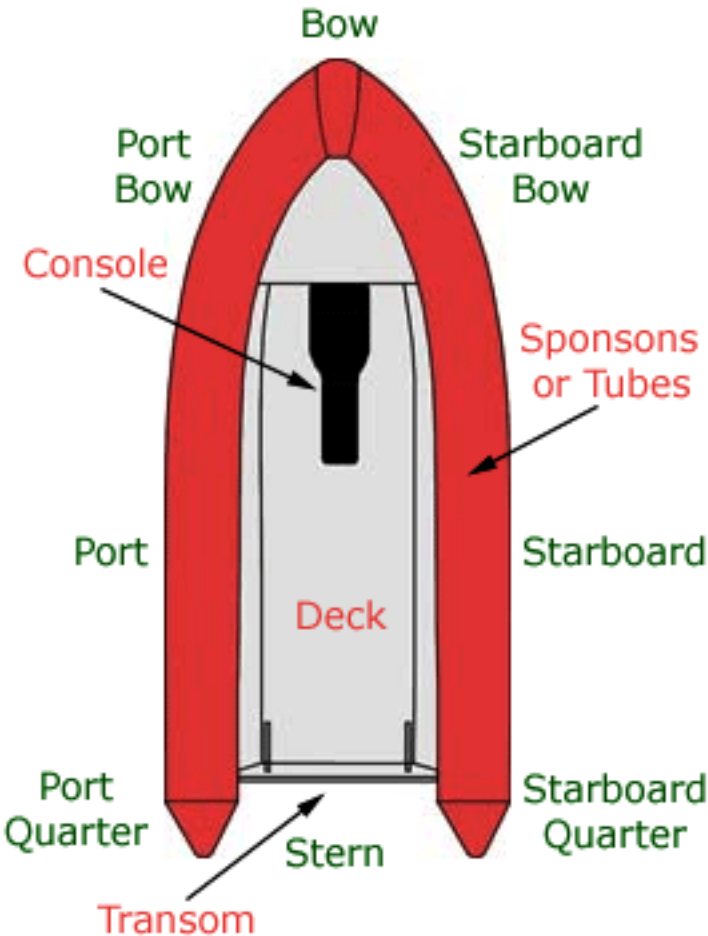
E _____ J _____

Do now copy this.

Carbon paper (originally **carbonic paper**) is paper coated on one side with a layer of a loosely bound dry ink or pigmented coating, usually bound with wax. It is used for making one or more copies simultaneous.

Carbon paper is placed between the original and a blank sheet to be copied onto. As the user writes, draws or types on the original, the pressure from the pen or typeface deposits the ink on the blank sheet, thus creating a "carbon copy" of the original document. This technique is generally limited to four or five copies.

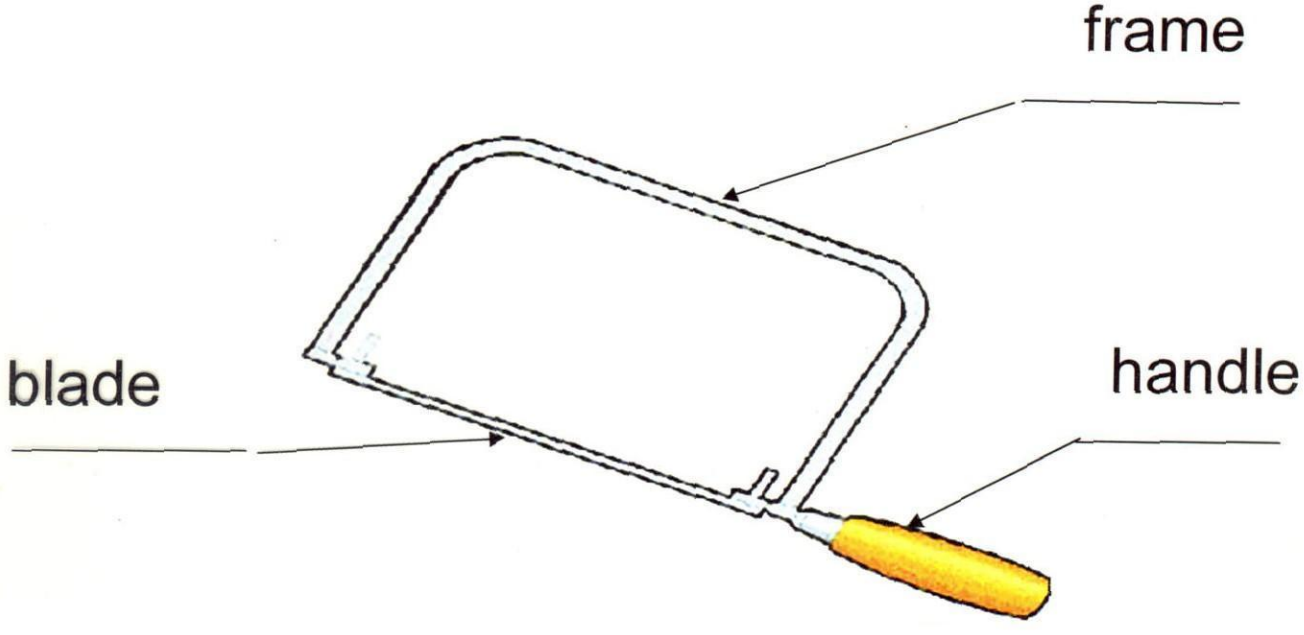
A single piece of carbon paper can be repeatedly reused until the impression grows too light.


Bow
Port Bow
Starboard Bow
Console
Sponsons or Tubes
Port
Starboard
Deck
Port Quarter
Starboard Quarter
Stern
Transom

Do Now Copy This!

A Coping Saw

A saw used to cut curves in thin wood and plastic. It may also be used to remove waste from joints. The teeth point towards the handle to cut as saw is pulled. The lever pins turn to change the position of the blade. The handle is normally made of beech wood and when turned creates more tension on the blade. The frame of the coping saw is made from sprung steel.



Water friction- it is much more difficult to run through water than to run through air. That is because water is denser than air, and it is actually pushing back on you when you move. Moving through water creates a lot of friction, and submarines or boats are designed to minimize this force by having a hydrodynamic, bullet-like shape hulls

Have you ever tried running in a pool?

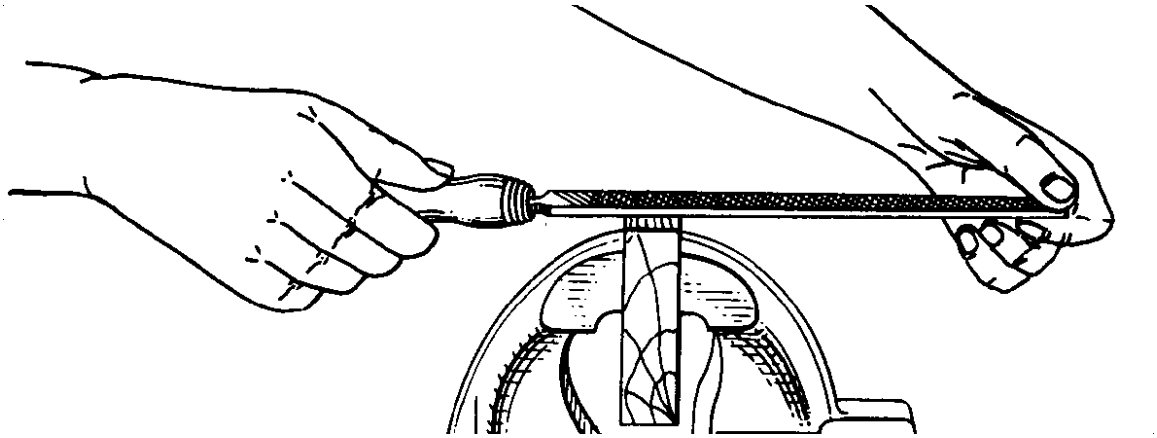
A rasp is a tool used for shaping wood or other material. It consists of a point or the tip, then a long steel bar or the belly, then the heel or bottom. A rasp comes in several shapes and sizes including round half round and flat.

You will find it helpful if you hold the tip of the rasp with your other hand to help guide the rasp and control the amount of pressure.

How To Use Files (Wood)

Your tool kit should always include a variety of files and handles to match. They are used for smoothing, cutting, or removing small amounts of wood. They come in a variety of shapes and sizes, and each one is designed to perform a specific type of work.

1) Insert block of wood in vise



2) Grasp the handle of the file in one hand.

3) Grasp the point of the file in the other hand.

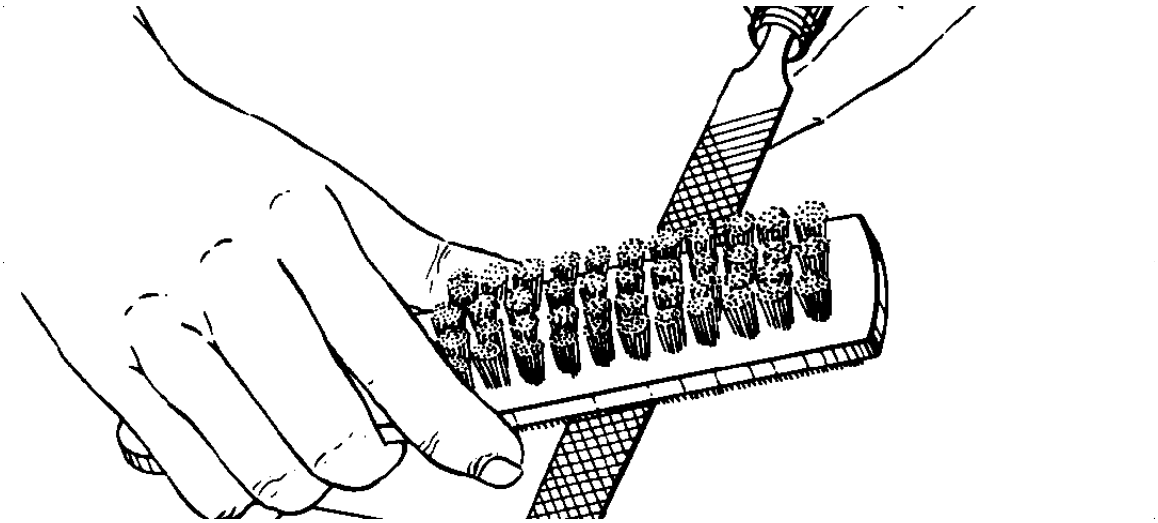
4) Place the middle of the face of the file on the wood. The first stroke should be started with light pressure near the point of the file.

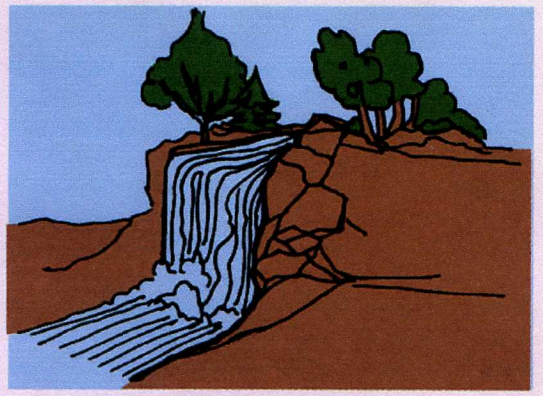
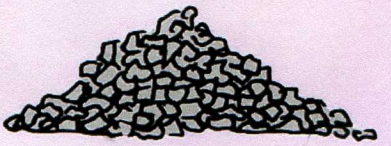
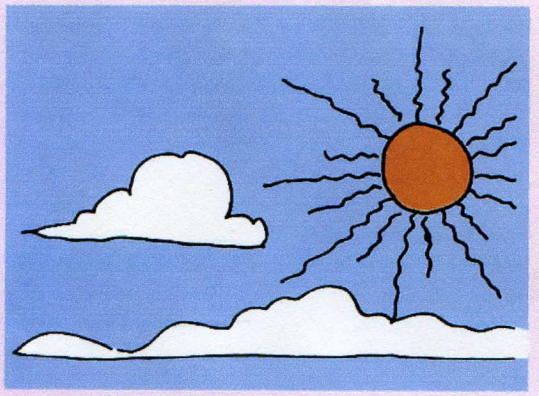
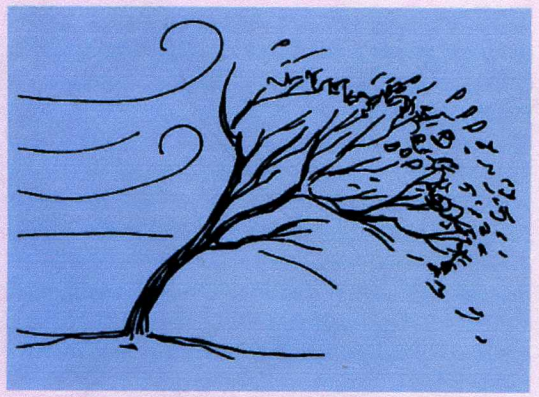
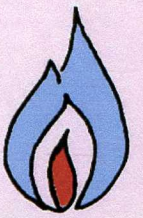
5) Push file across wood and increase pressure as you go, so that each file tooth will do its share of the job. When the file is pushed all the way across the surface of the wood, raise file and start all over. Never use pressure on return stroke.

6) Make sure your strokes are slow and steady. Too much speed will cause your file to "rock," and that will round off the edges of your wood.

7)As you file, the teeth of the file will clog up with some of the wood shavings and prevent efficient filing. This is known as "pinning." Rubbing chalk between the teeth of the file can help to prevent this condition. But, better clean the file frequently with a brush.

8)Brush with a pulling motion parallel to the rows of teeth, diagonally across the file, not up-and-down the length of the file. Clean the file after fifteen strokes and alter your angle of filing at the same time



Renewable	Nonrenewable
 Moving Water	 Coal
 The Sun	 Oil
 The Wind	 Natural Gas

Primary Material- is a substance produced naturally on the earth. Primary materials may be renewable, such as wood, or nonrenewable, such as metal.

- Primary materials can be used as is, but usually they are the basis for other types of materials called, **Industrial Materials.**

Industrial Materials- is a substance that has been processed. For example, the wood from trees- a primary material- is cut into wood boards- an industrial material.

Renewable Resource

A substance of economic value that can be replaced or replenished in the same amount or less time as it takes to draw the supply down. Some renewable resources have essentially an endless supply, such as **solar energy** and **wind energy**.

Other resources are considered renewable even though some time or effort must go into their renewal, such as **wood, leather and fi**sh.

Most **precious metals** are considered renewable as well; even though they are not naturally replaced, they can be recycled because they are not destroyed during their extraction and use.

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A **non-renewable resource** is a natural resource which cannot be produced, re-grown, regenerated, or reused on a scale which can sustain its consumption rate. These resources often exist in a fixed amount, or are consumed much faster than nature can recreate them.

For example, fossil fuel (such as coal, petroleum and natural gas) and nuclear power are examples. In contrast, resources such as timber (when harvested sustainable) or metals (which can be recycled) are considered **renewable resources.**

Nails

In engineering, woodworking and construction, a nail is a pin-shaped, sharp object of hard metal or alloy used as a fastener. Today's nails are typically of an alloy of steel, often dipped or coated to prevent corrosion in harsh conditions or improve adhesion.

Nails are typically driven into the work piece by a hammer, or a nail gun and holds the materials together by friction.

Nails are made in a great variety of forms for specialized purposes. The most common is a wire nail. Other types of nails include pins, tacks, brads, and spikes.

Wood finishing refers to the process of embellishing and/or protecting the surface of a wooden material. The process starts with surface preparation, either by sanding by hand (typically using a sanding block or power sander). Once the wood surface is prepared and a number of coats of finish may be applied, often sanding between coats. Commonly used wood finishes include wax, shellac, drying oils (such as linseed oil or tung oil), lacquer, varnish, or paint.

Water-based finishes can cause what is called "raising the grain" where surface fuzz merges and requires sanding down Finishes can be classified into several basic types: varnish, penetrating resin, shellac, lacquer, wax, oil, and paint. All these finishes are designed to protect the wood and to bring out its natural beauty.

Alloy

An alloy is a solution composed of two or more metal elements or metal and non-metal elements.

Examples are:

Steel contains iron , carbon and others

Brass is an alloy of copper and zinc

Bronze is combination of copper and tin

BACK

"Conductors and Insulators"

Definitions:

1 **Conductor** — Any material through which "Electrons" will flow easily.

2 **Insulator**-Any material that will prevent "Electrons" from flowing through it.

General Information:

1 **Silver**, **gold**, and **platinum** are three of the best conductors known to man but due to their scarcity and consequently high price, we cannot use them for general purpose wiring.

2 **Copper** is the best known conductor due to its abundance, low price, and willingness to allow electrons to flow with relative ease.

3 **Rubber** is probably the best known insulator and is used extensively for the covering of many types of wires. The use of plastic for this purpose has been increasing steadily over the years.

Gases As Conductors:

1 The use of gases as conductors has value in many instances.

2 As an example, in a fluorescent lamp, electrons flow readily through a combination of mercury and argon gas to produce light.

3 As another example, in neon signs electrons flow through neon gas or a mixture of neon and other gases to produce light of various colors.

How Extremely "Poor" Conductors serve mankind:

1 **Tungsten**- This rare and relatively expensive metal is such a poor conductor and has such high resistance to the flow of electrons that when placed in a glass envelope (bulb) from which most of the air has been evacuated, it reacts to the pressure of electrons being forced through it with enormous friction. This friction is visible to us in the form of heat and and light. The above explains the Incandescent Lamp or household light bulb that we take for granted.

2 **Nichrome**— This metal is an Alloy, that is it is composed of a mixture of **nickel and chromium**. The combination produces a metal of high resistance that we use in toasters, electric irons, electric heaters, electric stoves, etc. Since the resistance of Nichrome is not as great as Tungsten, it can be used in air and does not have to be placed in a vacuum as is the case with Tungsten.

Important Points To Remember:

1 Some materials that are normally good insulators will become conductors under certain conditions. As an example, take Air. It is usually a good insulator, however during a lightning storm the high voltages present between clouds and earth will make the air a good conductor. Whenever voltages are very high, there is danger of insulation on wires and other electrical devices being broken down with the result that current can then flow through material that under normal circumstances is an **insulator.**

2 As a further example, high voltages can find and flow through the tiniest pinhole in an insulator. Lineman working on high voltage lines blow up their rubber gloves with air hoses and listen for air leaks to guard against this danger before they climb the poles to the high voltage lines.

3 Allowing any insulator to become wet present s a hazard as current can "Leak" along moisture paths to humans nearby.

4 Cooper wires are used in the "Annealed" form. Annealing or softening of the metal makes it more flexible and a better conductor.

5. Aluminum wire is often used for long distance transmission lines due to its light weight. Since the resistance of aluminum is **greater** than copper the diameter of a given line is greater than a copper line. This has disadvantages in that the larger diameter offers more wind resistance and tends to gather a greater weight of ice or snow per foot.

Do Now

Tin plate

tinplate (a thin sheet of metal (iron or steel) coated with tin to prevent rusting; used especially for cans, pots, and tins).

It is cut using Shears, Snips, or Aviation snips.

The edges can be sharp, and should be handled very carefully. It is smoothed with Emery cloth.

File Card & Brush

A file card, is a wood handled file cleaner that has steel wire bristles for cleaning particles clogging the teeth of files. Files and rasps can get clogged very quickly, causing a loss of cutting speed and effectiveness.

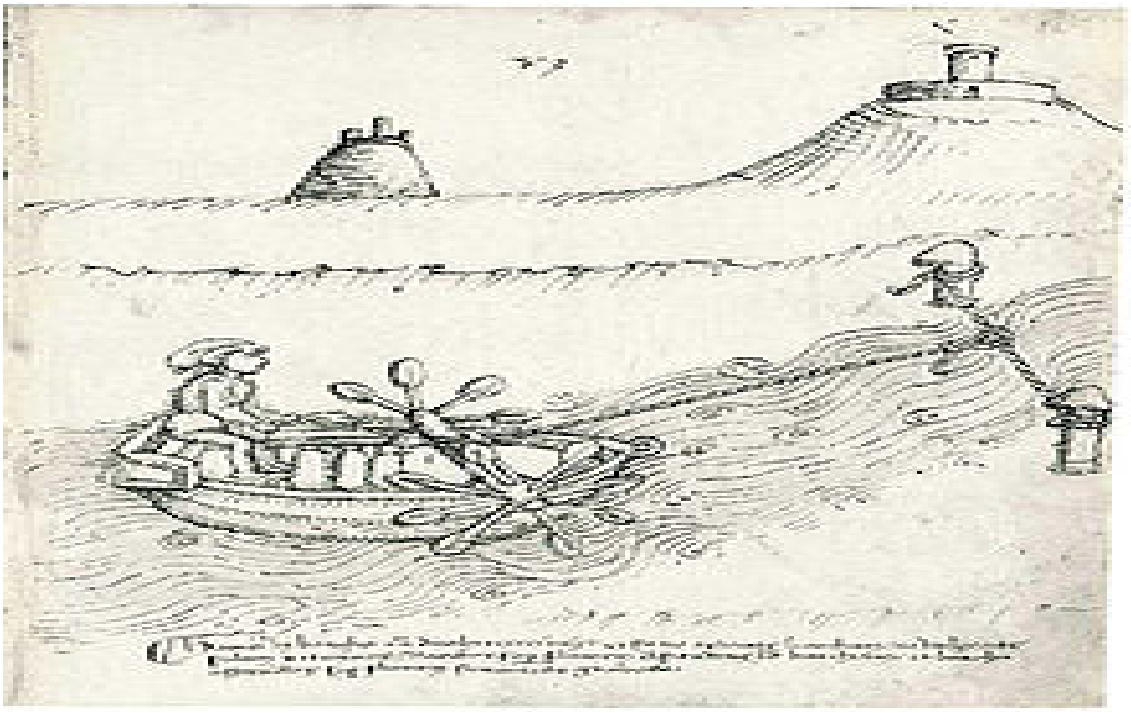
The wire side of the file card digs out the tough imbedded filings, while the stiff brush side easily removes dirt, oxidation, and looser debris.

Keeps you filing away at peak efficiency. A big time and energy saver!

Paddle wheels

The paddle wheel is a large wheel, generally built of a steel framework, upon the outer edge of which are fitted numerous paddle blades (called *floats* or *buckets*). The bottom part of the wheel travels underwater. Rotation of the paddle wheel produces thrust, forward or backward as required. The upper part of a paddle wheel is normally enclosed in a paddle box to minimize splashing.

After the pole and oar, the paddle wheel was the first practical form of cyclical mechanical propulsion applied to watercraft, and the first practical means lending itself to using an engine as prime mover.



In **marine propulsion**, propulsion systems for ships and boats vary from the simple paddle to the largest diesel engines in the world - or even nuclear propulsion. These systems fall into three categories: human propulsion, sailing, and mechanical propulsion. Human propulsion includes the pole, still widely used in marshy areas, rowing which was used even on large boats and the pedals. In modern times, human propulsion is found mainly on small boats or as auxiliary propulsion on sailboats.

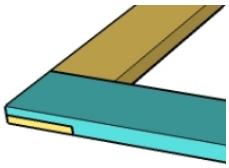
A view of a ship's engine room

A watercraft is a boat, vessel, or craft designed to move across or through water. The name is derived from the term "craft" which was used to describe all types of water going vessels. The term craft has since been expanded to include all types of vessels which travel on water (watercraft), in air (aircraft) and in space (spacecraft).

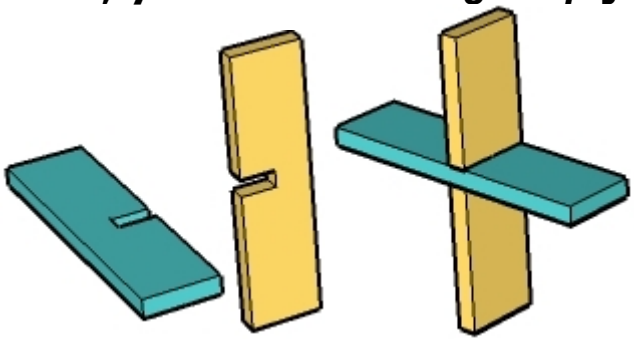
Ships typically are large ocean-going vessels. Boats are smaller and travel most often on inland or coastal waters.

Lap Joint

A lap joint is one is which one member laps over the other. Normally the thickness of each piece is reduced, usually by one-half. When this is done with a rabbet at the end of each piece the result is the *corner lap* joint. If the rabbet on one piece is replaced with a dado, the result is the *T lap* joint, sometimes called a *mid lap*, or *middle lap.* Dadoes on both pieces produce the cross lap joint.



Dadoes are cut on the edges of the pieces rather than on the face, you have the *edge lap* joint



Plywood is a type of manufactured timber made from thin sheets of wood veneer. It is one of the most widely used wood products. It is flexible, cheap, workable, recyclable, and can usually be locally manufactured. Plywood is used instead of plain wood because of its resistance to cracking, shrinkage, and twisting/warping, and its general high degree of strength.

Plywood layers (called veneers) are glued together with adjacent plies having their grain at right angles to each other for greater strength. There is usually an odd number of plies so that the sheet is balanced—this reduces warping. Because of the way plywood is bonded (with grains running against one another and with an odd number of composite parts) it is very hard to bend it perpendicular to the grain direction.

Luan Veneer

Luan is made from trees in the "Shorea" family of trees. Manufacturers create veneer from these trees, which are typically either White Lauan or Red Lauan a nd this veneer is glued together in layers to make the plywood.
Because of the softness of the wood, it is difficult to make Luan veneer completely free of voids and flaws. The surface layer is usually completely free of voids, but may have fills and patches. This means you may want to paint your Luan pieces. However, these flaws tend to be miniscule and they do not detract from the chief quality of the veneer, which is its excellent cutting properties.

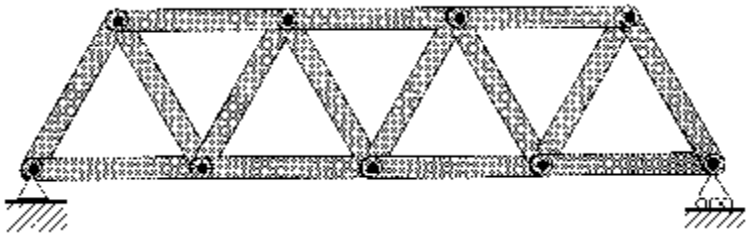
What is a Water Rocket?

A water rocket is a type of model rocket using water as its reaction mass. The pressure vessel—the engine of the rocket—is plastic soft drink bottle. The water is forced out by a pressurized gas, typically compressed air. The term Water rocket engines are most commonly used to drive model rockets, but have also been used in model boats, cars, and rocket-assisted gliders.

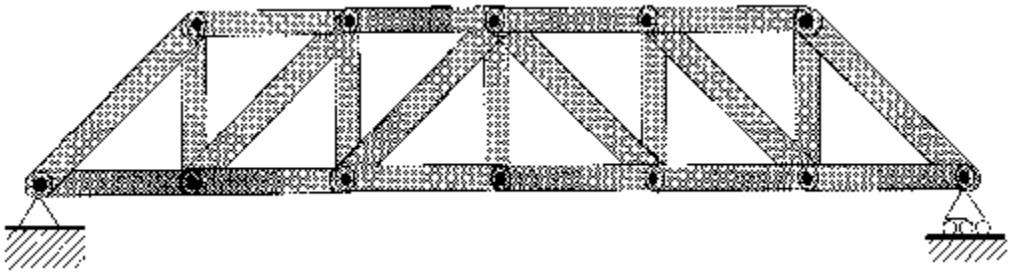
Water and gas are used in combination, with the gas providing a means to store potential energy, as it is compressible, and the water increasing the mass fraction and providing greater force of gasses when ejected from the rocket's nozzle.

Sample trusses

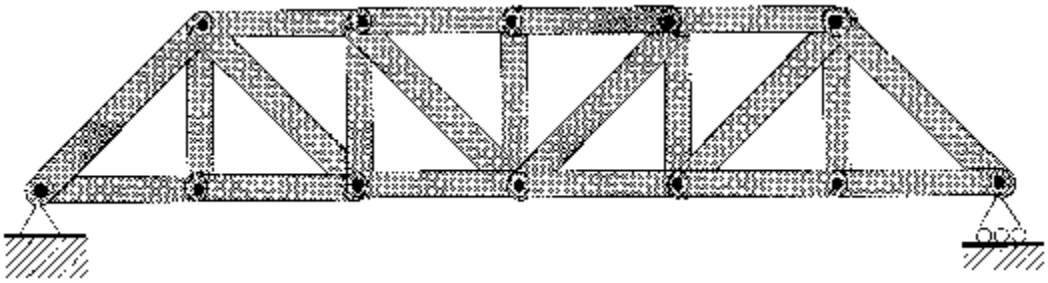
Below are some samples of common trusses used in bridge construction. These are generally built by paid professionals from steel rather than a limited number of craft sticks and bolts. These are provided to give you an idea of how other designers approached this problem historically, and these are not the only designs possible.



Warren Truss



Howe Truss



Pratt Truss