

Technology 8 Notebook

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Respect, Responsibility, Cooperation, Pride

Classroom Rules:

1. Follow directions the first time they are given.
2. Keep hands and objects to yourself.
3. Use appropriate language.

Classroom Procedures:

Students will come to class each day on time, prepared, and ready to work.

Students will remain seated in classroom area until given permission to work.

Students will be in their seats at dismissal time.

All book bags will be stored properly.

All food or drink will be consumed before entering the classroom.

All students will participate in total room clean up.

Students are responsible for making up any work missed when absent.

Everyone will be treated with respect.

Smile-your attitude affects our working environment.

HALL PASSES ARE DISCOURAGED and will not be provided for the first ten or last ten minutes of class.

Consequences of **Your** actions;

1. Warning
2. Being held in class after dismissal bell for conference
3. Phone call or letter home
4. Loss of work time/Alternative assignment
5. Referral

Grading

(Each Quarter)

20% Class Participation

60% Written Assignments, Projects & Tests

20% Benchmark Exam

Participation Grade

Students can earn points for participation each day they are in class.

Points are earned by:

1. Arriving on time.
2. Being prepared to work.
3. Listening attentively to lesson.
4. Actively participating in class.
5. Cleaning up as necessary.

SAFETY

Rules & Consequences-

Safety Equipment-

OSHA-

Power Cutoff Switches-

What types of safety equipment do we have here in our classroom?

How do we maintain a safe lab environment?

For the most part, safety is common sense!

ABC- Always Be Careful

1. I will enter the technology classroom only _____.
2. Before I touch any tools, machines or materials, I must receive _____
and _____ from my teacher.
3. I must dress safely. There should be no loose _____, _____ or
_____. Shoes should be appropriate. **No _____ in the lab area.**
4. I must carry and handle _____ in a safe manner. I will always cut
_____ from others or myself. Tools should be carried pointed _____
and slightly _____ you.
5. Conversations are _____ that may cause accidents.
6. I must _____ cuttings or scraps of material on the floor where they
may cause someone to slip or fall.
7. I will put all tools and materials away when finished using them. Objects left
on the edge of a workbench or in a vise may be dangerous.
8. _____, _____, _____ or _____ objects is
strictly prohibited.
9. I must report to my _____ immediately all shop hazards or
violations of the safety practices.
10. I must report all accidents to my _____ immediately, no matter how
slight.
11. Safety Glasses Must Be Worn _____ In The Shop Area.

My teacher has gone over these safety practices with me. These rules are to
protect _____ and the safety of my _____. I understand that
ultimately
_____ **am responsible for my own safety**
and to ensure it, I agree to follow these safety rules at all times.

Power Machine Safety Practices

1. Get instruction from teacher.
2. Always get permission to use any power equipment.
3. **Do Not** operate any machine while under the influence of drugs, alcohol, or medication.
4. Safety glasses **MUST** be worn at all times.
5. Remove watches, bracelets, and rings when using any power equipment.
6. Roll up sleeves and tuck in loose clothing.
7. Tie back long hair.
8. **Do NOT** adjust any knobs on any machine. Ask the teacher for assistance.

Drill Press

1. Guards should be in place and used at all times.
2. Clamp work to table if it is too short to contact the column.
3. Hold the material securely with a vise or clamps.
4. Clamp work when using hole saw or cutting tools that are larger than ½ inch diameter.
5. Do not exceed recommended speed for the drill, accessory, and work piece material.
6. Check that the table or depth stop is adjusted properly to avoid drilling into the table.
7. Be sure chuck key is removed from the chuck before starting drill press.
8. Make all adjustments with the power off.*
9. Disconnect drill from the power source when making the repairs.*

Belt Disc Sander

1. Do not apply excessive force towards the disc or belt.
2. **NEVER** start machine with the work against the belt or disc.
3. Hold the work piece firmly and feed the material slowly.
4. Material being processed **MUST** be resting on the table of the machine at all times.
5. Turn machine off and wait for the machine to come to a complete stop before leaving.
6. Report to the teacher if the belt / disc sander makes unfamiliar sounds or begins to overheat.
7. Never wear gloves or hold the work piece with a rag when sanding.

Band Saw

1. Hands and fingers must be 3” away from the blade at all times. (This is called the “margin of safety”)
2. Keep hands to the sides of the blade.
3. Keep table of band saw clear of all objects when using.
4. **NEVER** start machine with the piece against the blade.
5. Hold the work piece firmly and feed the material slowly.
6. **DO NOT** attempt to cut a work piece that does not have a flat surface against the table.
7. Turn the machine off to back out of an uncompleted or jammed cut.*
8. Make relief cuts before cutting inside curves.
9. Turn machine off and wait for machine to come to a complete stop before removing scraps off the table.
10. Never measure at the band saw. Do layout before approaching the machine.
11. Report to the teacher if the band saw makes unfamiliar sounds or smells.

Safety Notes

Technology is the use of knowledge to turn resources into goods or services that society needs or wants. Our needs sustain life; food, water, shelter and a feeling of security. Our wants are luxuries.

Services are work done for others as a business or occupation, performing a useful function.

Families of Technology

- **Physical** technologies satisfy our physical needs for shelter, clothing, transportation, etc.
 - **Manufacturing**
 - **Power and Energy**
 - **Construction**
 - **Transportation**
- **Biotechnologies** work to improve our quality of life.
 - **Agricultural**
 - **Healthcare**
 - **Waste Management**

Information technologies allow us to communicate ideas and process data.

You may have heard of these ages: The Classical Age, Dark Ages and The Renaissance. These are ways of classifying the history of humanity. Here are the names of a few of the ages used to classify the history of technology.

- **Stone Age**- the start of technology, stone tools and fire; 1,000,000BC to 3000BC
- **Bronze Age**- bronze (metal) tools; 3000BC to 1,200 BC
- **Iron Age**- 1,200BC-
- **Agricultural Age**- life centered around farms. Goods were hand crafted.
- **Industrial Age**- led to growth of cities as people moved closer to their work in factories. Goods were mass produced.
- **Information Age**- computers allow for the storage, retrieval, manipulation and communication of huge quantities of data.
- *Are we moving into the **Age of Biotechnology**? Recent advances in the understanding of genetics and DNA may lead to exciting and controversial new uses of technology.*
-
- **Innovation** is introducing a new idea, device or process.
Invention is the new idea, device or process.
- Emerging technologies

History Notes

Computers

Computer Hardware- refers to the physical parts or components of a **computer** such as the monitor, mouse, keyboard, **computer** data storage, hard drive disk (HDD), system unit (graphic cards, sound cards, memory, motherboard and chips), etc. all of which are physical objects that can be touched.

3 types of hardware- Input, Processing, output

Input devices- allow data to go into the computer.

Examples: keyboard, mouse, microphone, disk drives, scanner, digital camera, etc.

Processing devices- Location where instructions are carried out and activity is controlled. The Central processing unit (**CPU**) is the brain of the computer.

Output devices- send data out of the computer.

Examples: Monitor, speakers, printer, disk drives, cd burner, etc.

Computer **Software-** Are programs. Types of programs include:

- Word Processing- used to type, edit or store text documents.
 - Font : A collection of numbers and letters designed the same
 - Text: Words
 - Graphics: Pictures
 - Cursor: Flashing line that acts as a point of reference on the screen.
 - Drive: An input device that uploads information from a disk.
 - Icon: A graphic representation of a program or a shortcut function.
 - Menu: A list of items or commands.
 - Format: The way in which a page is arranged.
 - Alignment: The designated starting point for words going down the side of the page.
- Desktop Publishing- manipulates text and graphics easily.
- Spreadsheet- organizes and performs operations on numbers.
- Database- a structured set of data held in a computer, especially one that is accessible in various ways.
- Simulation Software- models real life experiences.
- Computer Aided Drafting (CAD)- Used for technical drawing and 3D simulations.
- Games

The **Internet** is a collection of networked computers throughout the world. The

World Wide Web (www) is just part of the internet. The **modem** is the piece of hardware that allows your computer to communicate with others on the internet.

Search Engines- a program that searches for and identifies items in a database that correspond to keywords or characters specified by the user, used especially for finding particular sites on the World Wide Web. (examples Google, Yahoo, Bing etc.)

Some tips for successful web searches

- spell correctly
- use quotations around groups of words you wish to search for together
example: "Seattle Mariners" if you wish to find the baseball team
- use several search engines, try different search terms
- read the search HELP, different protocols (rules) for searching are used by each search engine

Internet safety

Passwords

- **Hacker**-a person who uses computers to gain unauthorized access to data
- **Password Cracking software**-refers to various measures used to discover computer passwords. Password cracking is done by either repeatedly guessing the password, usually through a computer algorithm in which the computer tries numerous combinations until the password is successfully discovered.
- **Password generator**- Software designed to create strong passwords

Internet threats

- **Virus**- a piece of code that is capable of copying itself and typically has a detrimental effect, such as corrupting the system or destroying data.
- **Spyware**- software that enables a user to obtain covert information about another's computer activities by transmitting data covertly from their hard drive.
- **Firewall**- a part of a computer system or network that is designed to block unauthorized access while permitting outward communication.
- **Cookies**-A cookie is a small amount of data generated by a website and saved by your web browser. Its purpose is to remember information about you
- **Cache**-stores recently used information so that it can be quickly accessed at

a later time.

- **SSL Certificate-** acts like a **virtual passport** or **driver's license**. It means, "I am who I say I am". Second, it enables **encryption**
- **Encryption-**the process of encoding messages or information in such a way that only authorized parties can read it.
- **Phishing**

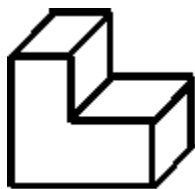
Social Networking

- **A legal issue-** What you share is considered legal documentation and can be traced back to you.
- **Cybercrime-** Openly sharing personal information (birthday, address etc.) with unknown individuals which can be used to harm you.
- **Behavior tracking-** websites track what sites you go to, where you buy, how long you stay and can sell that information to 3rd parties.
- **Geolocation-** Software that gives your specific location, common on smartphones and photo programs like instagram.
- **Protecting minors-** most instances require parental permission to post, however most minors overlook this when posting on their own sites.
- **Online reputation-** Photos, videos and posts are stored and cannot ever be deleted. Mistakes could follow you for the entire duration of your life.
- **Cyber-stalking/Cyber-harassment-** ongoing harassment, with cyber-stalkers often using multiple online resources to harass victims via emails, instant messages, and posts written on various message boards or social media sites.

Computer Notes

Measurement and Drafting

A **Pictorial** is a drawing of an object as it appears to the eye.



OBLIQUE pictorials show the front to be the true shape. Lines extending from the front to show the top and side are drawn at same angle.



ISOMETRIC pictorials present an edge at the front. The angle of the lines showing the right and left side is identical. (Iso means equal.)

All objects can be said to have **Three Dimensions**. They can be described using many terms. For example:

- Length is the measurement from end to end.
- Height is the measurement from top to bottom. Thickness.
- Depth or width is the measurement from edge to edge.

Technical Drawings use lines to describe an object. Each line or group of lines has a meaning. Some very basic lines can be said to be the “ABC’s” or the “alphabet of lines.” Technical drawings can be pictorials or drawings that show just one face (or side) of an object at a time.

Three primary drafting tools- Triangle, T-square, Ruler

Alphabet of Lines



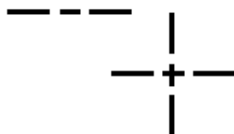
Border Lines are thick and heavy and frame a drawing.



Object Lines are medium weight.



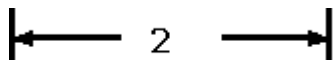
Construction Lines are very light and are used for planning.



Center Lines show the center of a hole. They use a long line, dash and long line. The “X” marks the exact center.

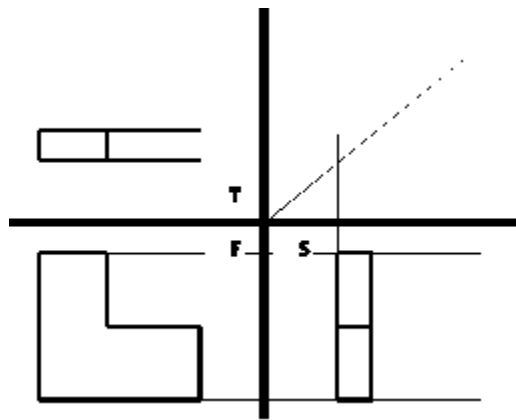


Hidden Lines tell us that there is something that we can’t see from this viewpoint.



Extension and Dimension lines are the “so big” lines. Extension lines extend from the object. Dimension lines point to the extension lines and have a number showing measurement (size).

Multi view Drawings show more than one view or face of an object.



Orthographic Projection is a method of projecting (copying) the dimensions from one view to another. The three faces usually draw are front, top and side.

This drawing shows the height being projected from the front to the side view.

The depth is projected from the side up to a line drawn at 45 degrees and then over to the top.

Border and Title Block- Outlines your drawing area and gives you a place to write

Memorial University	Title: _____	Drawn by: _____	Date: _____
		Checked by: _____	Date: _____

Fractions- *A fraction is a part of a whole*

Slice a pizza, and you will have fractions:



$$\frac{1}{2}$$

(One-Half)



$$\frac{1}{4}$$

(One-Quarter)



$$\frac{3}{8}$$

(Three-Eighths)

The top number
tells how many
slices you **have**
The bottom
number tells how
many slices the
pizza was **cut**
into.

To reduce to Lowest Terms
follow this:

3-Step Check to Reducing

1. Does the 'smaller' number go into the 'larger' number evenly?
Yes-- then go ahead and do it,
then go through the 3-step Check again.
No-- Go to next step.
2. Are both numbers (numerator and denominator) even?
Yes-- then divide each by 2,
then go through the 3-step Check again.
No-- Go to next step.
3. Is there a number that will go into
the numerator and denominator evenly
(known as the Common Factor)?
Yes-- then divide both
numerator and denominator by that number.
No-- If you have said "No" to all 3 steps,
then the fraction is at lowest terms.

"1. No, 2. No, 3. No" means fraction is at Lowest Terms

Try it with these fractions!

4/8

6/24

4/16

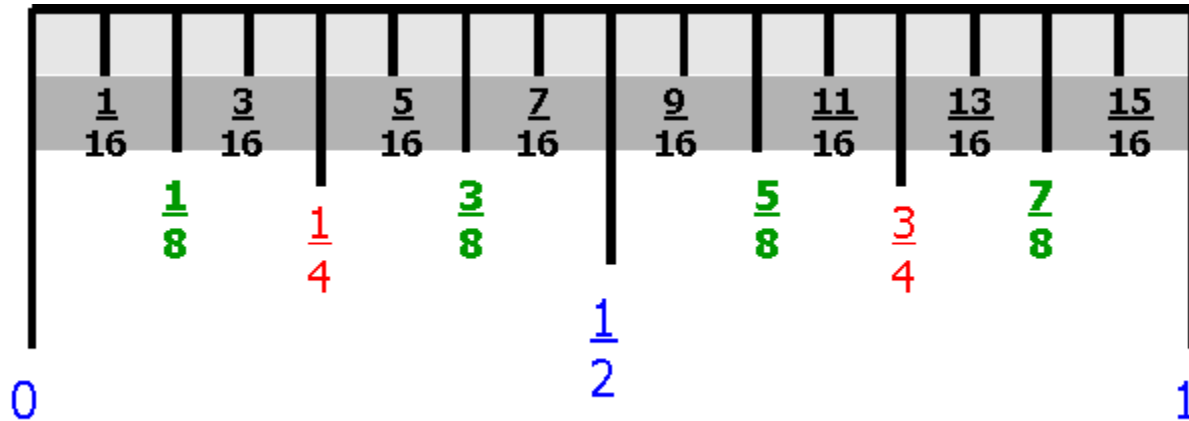
6/16

1/2

Measurement

Metric System is a system of measurement based on 10. It is also known as International Standard or SI.

English System or “customary system of measurement” uses fractions.



Scale is the ratio that describes the relationship between a drawing and the actual object. Maps are usually drawn “to scale.” Full Scale is actual size, the ratio is 1 to 1.

Measurement and Drafting Notes

Seven Resources of Technology

Resources are the items needed to reach a **goal**, produce a product or **solve a problem**. Resources can be divided into seven categories, remember **PIMTECT**.

People

Information

Materials

Tools and Machines

Energy

Capital

Time

People control technology. They research, design, **create**, manage and manufacture new products or systems.

- An **entrepreneur** is a person who organizes and manages the risks for a business venture.

Information can be obtained from people, **books**, magazines, videos or television, the Internet...

Information processing involves collecting; recording; sorting, manipulating or classifying **data**; storing and retrieving information; and communicating.

Materials can be transformed using resources into products we need.

Materials can be classified as metal, wood, fibers, polymer (plastic), ceramics and glass, minerals, biological...

Choose and select resources based on their properties and **appropriateness** due to **cost, availability, safety**, culture.

- **Natural** materials are found in **nature**. Examples: wood, diamonds, clay.
- **Synthetic** materials are manmade. Examples: polyester, zircons (artificial diamonds), steel.
- **Renewable** materials may be renewed by nature within the time span of human history. Examples: Wood and paper (trees), beef, cotton. **GROWS BACK**
- **Nonrenewable** materials may be used up. Example: Fossil fuels. Some materials might be considered nonrenewable, such as rare woods from the rain forest, because they may be overused and in danger of extinction.

Materials have strength, which is the ability to withstand:

Torsion is a twisting force.

Tension is a pulling force.

Compression is a pressing force.

Shearing is a force that cuts.

Tools and Machines increase the capability of people.

Energy is the capacity for work. Energy comes from

- Muscle- human or animal **Physical**
- Solar- the sun
- Geothermal- the heat of the Earth, volcanoes, hot springs.
- Gravitational- the pull of gravity, hydroelectricity produced by waterfalls, rivers, tides.
- Chemical- fossil fuels or coal or wood. **Batteries**
- Nuclear- fission or fusion.

Energy processing is changing energy into forms we can use. A cars engine burns gasoline to power the wheels. Electricity is produced by the force of water spinning turbines in dams. The resistance of the filament in a light bulb generates light from electricity.

Capital is money or other forms of wealth used to pay for resources. These can be cash, stock, bonds, building, equipment and land. **Goods on hand.**

Time is a resource that must be managed wisely. All things take time and generally time is limited.

Time cannot be processed, sped up or slowed down.

Time marches on and stops for no man.

Seven Resources Notes

Engineering Design and Structures

Compression: A pressing force

Tension: A pulling force

Shearing: A cutting force

Torsion: A twisting motion

Roadbed: What the cars and people walk over

Truss: Strongest structural shape “triangle”

Live Load: Objects moving over the roadbed such as cars and people

Dead Load: What the structure is made of such as cement and steel

Super Structure: A structure built above the road bed

Sub Structure: A structure built below the road bed

Span: The distance between two piers

Pier: vertical structural support

Types of Bridges-

Beam Bridge- A rigid horizontal structure that is resting on two piers

Truss Bridge- A structure using triangles to distribute a load through compression and tension to the end of the truss

Suspension Bridge- Towers support the majority of the weight as compression pushes down on the suspension bridge's deck and then travels up the cables, ropes or chains to transfer compression to the towers. The towers then dissipate the compression directly into the earth.

Problem Solving Steps

1. State the problem.

2. Identify the criteria and constraints in a design brief.

- A **Design Brief** is a short statement describing the criteria and constraints that a solution to a problem must meet.
- **Criteria/Constraints** are “do’s” and “don’ts”. The criteria are specifications or needs that must be met. Constraints are limits or restraints on size.
- **Specifications** is another word for criteria and constraints; the details such as size or dimensions, materials, cost, color, quality, etc.

3. Research.

4. Look for alternative solutions.

- **Brainstorming**-usually a group activity where many ideas are presented and nothing is discounted as “wacky” or “wrong” because those ideas can lead to other workable solutions. Brainstorming can be done verbally, written or pictorially. **Thumbnails** are small sketches trying out ideas- brainstorming in pictures.

- **Trial and Error**- try again and again.
- **Insight**- Eureka! A light bulb goes turns on in your head.
- **Past experience** can be very helpful.
- **Accident**- sometimes you can solve a problem by accident.

5. Choose the best solution.

- **Trade-offs** are the exchange of the one thing in return for another. Making tradeoffs is similar to weighing the pros and cons when choosing a solution.

6. Build a prototype.

- A **Prototype** is the (first) model of a solution. It can be used to test ideas and evaluate the solution or as a reference for manufacturing. Designers may build and modify several prototypes before choosing the one to manufacture.

7. Evaluate and make necessary changes.

- **Optimization** is the procedure used to make a design or system the best possible. The best solutions are those that work well are economical and cause the least harm to people and the environment.

Engineering Design and Structures Notes

Transportation Systems

Transportation: The process of moving people or materials from one place to another.

Modes of transportation: There are 3 major Modes of transportation, land, water and air. These systems form a network that may overlap. Overlapping methods of transportation is called Intermodal. Give examples of intermodal transportation.

Engines and Motors

Most forms of transportation need engines to make them move.

Engines convert energy into work. When energy such as gasoline is burned inside the engine, it is called an internal combustion engine. Name another common fuel used in cars and trucks.

An external combustion engine burns the fuel outside the engine. One example is a steam engine on an old train, can you name some more?

Turbines

The term turbine originally described machines that spun. Originally driven by falling water, such as the waterwheel. Later, the term steam turbine was given to heat engines powered by steam. The steam is made by burning fuel or by a nuclear reactor outside the turbine. The term turbine is also used with windmill generators; the blades are sometimes called the turbines.

Jet engines

Newton's 3rd Law... for every force in one direction, there is always an equal force in the opposite direction. All jets work on this principal. The reaction to the rush of gasses out of a jet engine is a thrust that drives the airplane forward. Turbo fan and turbo shaft engines are the most common jet engines.

Alternative Motors and Engines

Electric and Hybrid Vehicles

Electric vehicles have been in use for 100 years. Electric motors change electrical energy into mechanical energy. Name some advantages and disadvantages of the electric vehicles.

Solar vehicles use the sun's energy not only to power the car's motor, but it also charges a battery that can supply the energy needed when the sun is hidden behind clouds. Name some advantages and disadvantages of Solar vehicles.

Fuel Cell Vehicles create power by combining oxygen from the air with hydrogen from an on-board tank. The power is used to turn electric motors that drive the wheels. Name some advantages and disadvantages.

Like other types of systems, transportation systems include inputs, processes, outputs, and feedback. Transportation systems play a large role in all of today's industries.

Magnetic Levitation

There are two poles to each magnet which are North and South

Like poles attract while opposite poles repel

Repel- To push apart

Attract-To pull together

FOM- Figure of Merit

$$\text{FOM} = (P \times D) / (C \times T)$$

P= Passengers

D= Distance

C= Cost (magnets)

T= Time

Propulsion- pushing and/or pulling force

Aerodynamics-Forces of air on an object moving through it

Drag-Force that holds a vehicle or object back.

Transportation Systems Notes

Alternative Energy

Renewable energy is energy that can be replaced rapidly with natural processes. In the past, most energy has been obtained from burning nonrenewable fossil fuels. But as the nonrenewable sources become scarce, alternative sources (solar, wind, tidal, geothermal, and biomass) are being developed.

Solar Energy; There are 3 basic methods of collecting the sun's energy. A simple solar panel collects the heat of the sun and transfers its energy in to water, which can be used to heat domestic water. The second type is better known and is called Photovoltaic Cells. These convert the sun's energy directly into electrical energy. An electrical power storage system with rechargeable batteries can be used during time without sun. The 3rd type is known as Concentrating Solar Power systems (CSP). CSP systems use mirrors to capture and focus the sun's rays on a single point. A fluid, such as water, is heated to high temperatures, which drives a turbine.

Wind Energy; Wind energy is one of the oldest sources of energy. It has been used to turn wheels to grind grain and pump water. Today, wind is increasingly used to generate electricity. Wind power costs half as much as power from a dam and a large windmill can be erected and running in one week. Wind can spin wind turbines that are on top of a high tower. The blades can be up to 100ft. long and there may be hundreds of turbines in one wind farm.

Hydroelectricity; is electricity generated from moving water over turbines.

Tidal Energy; Force generated from tidal action spin turbines.

Geothermal Energy- Energy released from the heat of the earth's core

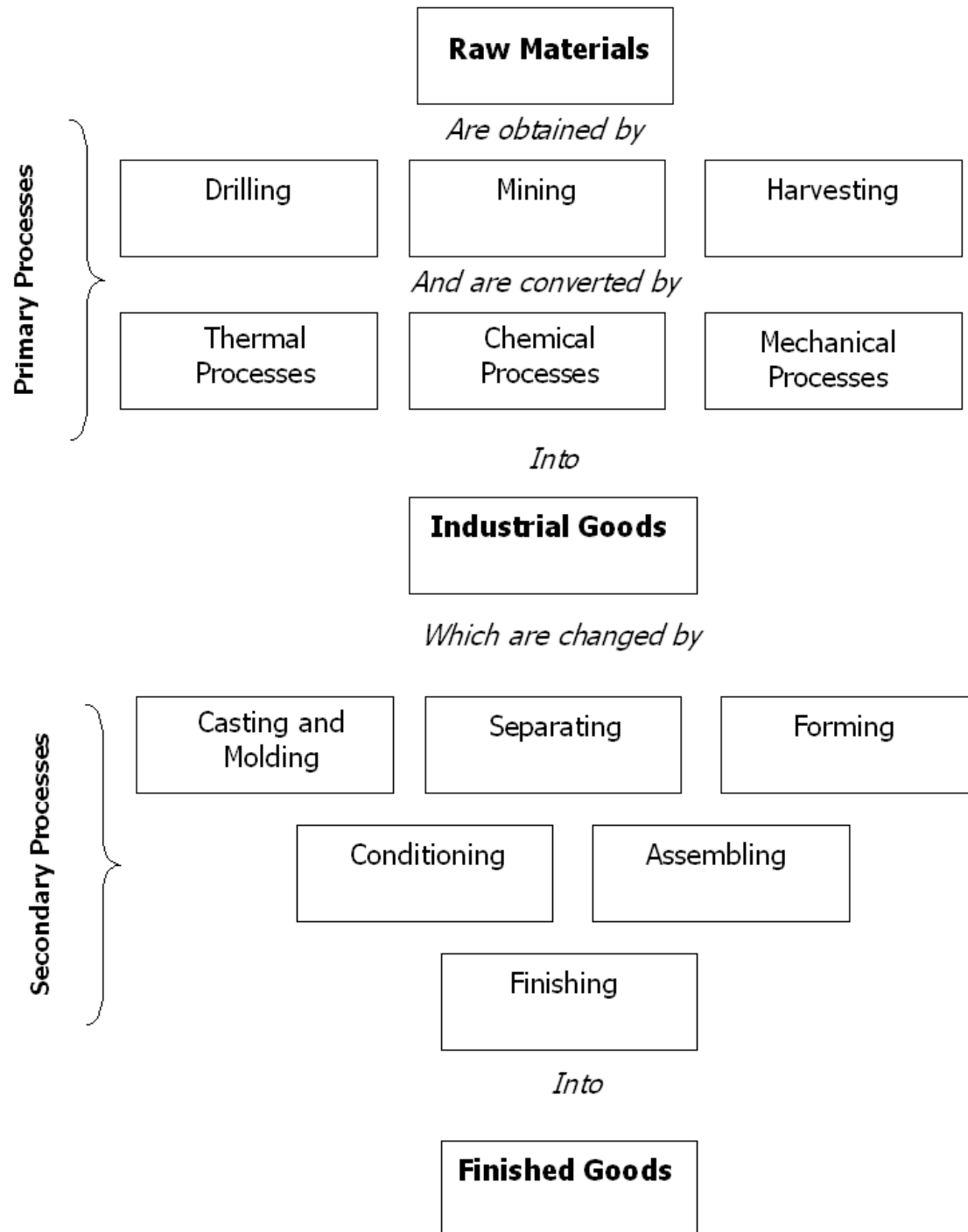
Biomass- Energy from plants, energy released from decomposing organic matter.

Hydrogen- Chemical energy

Other Renewable Sources of energy?

Alternative Energy Notes

Systems and Mass Production



Processing Materials is the way material resources are changed into products.

Primary material processing is mining, harvesting, drilling, etc. to convert raw materials into that can be used by industries.

Secondary material processing includes combining, forming, separating and conditioning materials.

Combining is putting materials together. Methods include:

- **Adhesives**- glue, tape, hot glue
- **Mechanical Fasteners**- staples, nails, screws, paper clips, rivets
- **Using Heat**- welding, soldering

Separating is removing material. Methods include:

- **Shearing**- cutting with scissors, knives
- **Sawing**- using saws
- **Drilling**- using a drill removes material from the hole
- **Shaping**- using chisels and planes to shape a surface
- **Abrasives** wear down or rub away to remove small bits of material

System- A set of principles or procedures according to which something is done; an organized scheme or method.

System Components

Input is the command we give a system, what we expect out of the system.

Process is the action part of the system; this is where the work gets done.

Resource inputs are the resources that we need to operate the system.

Output is the actual result, what comes out of the system. If the system is working correctly the output matches the input.

Kinds of Output

- Expected
- Unexpected
- Desired
- Undesired

Monitor is to watch the system.

The **comparator** compares the output with the input.

To **adjust** means to make changes to the system.

Feedback is the information we get from a system.

The **feedback loop** includes monitor, comparator, adjust and feedback. In the feedback loop, you look (monitor) at the information (feedback) that you are getting from a system, you compare the output with the input and make adjustments.

System Types

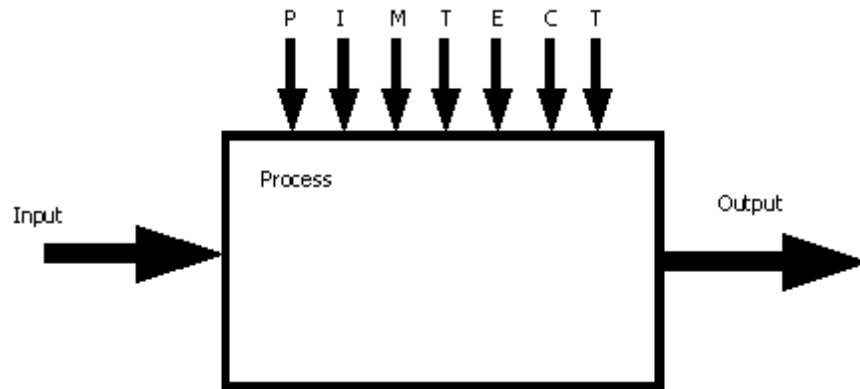
Open loop systems have just input, process and output.

Closed loop systems have input, process, output, monitor, feedback, compare and adjust.

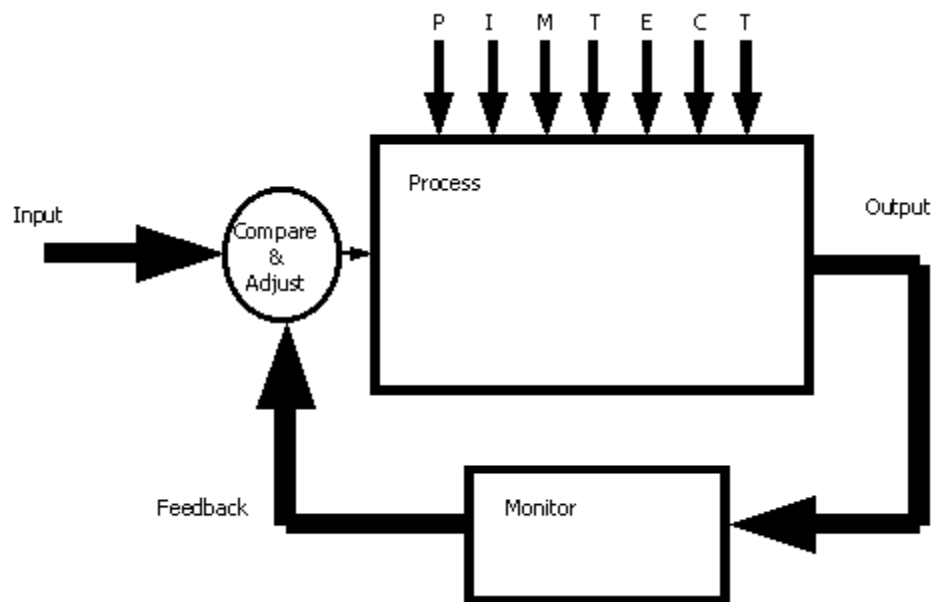
A **subsystem** is a smaller system operating as part of a much larger system.

Systems Diagrams are a way of drawing how a system works. There are many versions of systems diagrams. Below is one method of drawing an open loop and a closed loop system.

An Open Loop Systems Diagram



A Closed Loop Systems Diagram



Corporate Structure or Hierarchy is the organization of people at different ranks within a system

Planning for production requires:

- Preparing flow charts – graphic organizers showing how the material is processed from raw material to finished products.

- Creating Material Lists
- Selecting Processes
- Quality Control/Assurance

Types of Manufacturing

- **Mass Production**
- **Custom Manufacturing**
- **CAM (Computer Aided Manufacturing)**
- **Automation**

Systems and Mass Production Notes

Simple Machines

Simple Machines: A simple device, such as a lever, a pulley, or an inclined plane, that alters the magnitude or direction, or both, of an applied force; a simple machine

Six Simple Machines:

- Lever
- Wheel and Axel
- Incline Plane
- Pulley
- Wedge
- Screw

Types of Catapults:

Ballista- It resembled a bow and arrow but was much more powerful. Very accurate at short distances.

Trebuchet- Used to throw enormous objects at or over castle walls. Difficult to aim, produces a lot of force and throws long distances.

Onager – Siege engine that is a type of ballista that uses a torsional force, generally from twisted rope, to store energy for the shot.

Sinew- This power came from twisted bundles of rope called sinew. These ropes were made out of animal tendons and could be twisted very tight to produce tremendous power.

Sling- Increases throwing distance by extending the throwing arm. As the arm travels, centrifugal force holds the sling out

Newton's Laws of Motion

1st Law – An object at rest will stay at rest, and an object in motion will stay in motion at constant velocity, unless acted upon by an unbalanced force.

2nd Law – Force equals mass times acceleration.

3rd Law – For every action there is an equal and opposite reaction.

Simple Machines Notes

Aerodynamics

Aerodynamics- studying the motion of air, particularly when it interacts with a solid object, such as an airplane wing.

4 Forces of aerodynamics

- o Lift
- o Weight
- o Drag
- o Thrust

Opposing forces- Forces moving in opposite directions.

- o Lift vs. Weight
- o Thrust vs. Drag

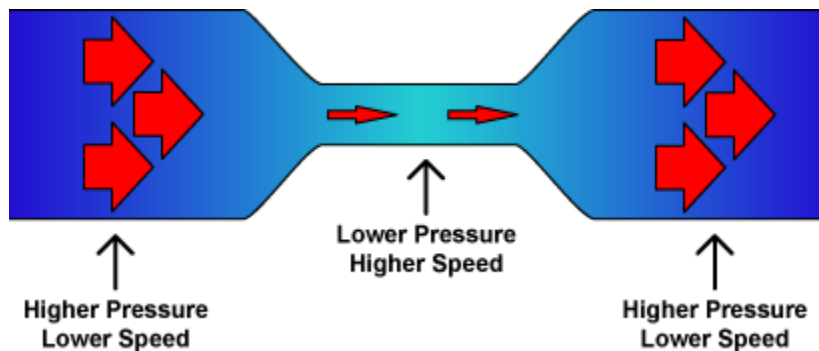
Different types of drag

Induced drag- Drag created by the production of lift, always present when you create lift.

Parasite drag- Drag caused by skin friction, protrusions, and pressure. Can be reduced and changed based upon design.

Two forces that are crucial for lift:

- Bernoulli's Principle- the pressure in a stream of fluid is reduced as the speed of the flow is increased. (80% of lift)
- Newton's 3rd law- Every action has an opposite and equal reaction. (20% of lift)



Aerodynamics Notes

Glossary of Terms

acceleration	a change in the speed or direction of a moving object
actuator	a mechanism that puts something into automatic action
adhesives	materials used for combining materials: glue, tape, hot glue
adjust	to change so as to match or fit; this is a part of a closed loop system
advances	to aid in the growth or progress; every technological innovation can lead to more advances of technology
aerodynamics	the study of the effects of moving air or other fluids on a object
aesthetics	how something looks from an artistic point of view; aesthetics is a design criteria
agricultural age	during this age, life centered around farms and goods were hand crafted.
alignment	arrangement or position
alternative	another word for different, other
amperage	measure of electron flow(current)
arch bridge	a type of bridge that is known for its keystone
automation	automatic, (as opposed to human), operation or control of a process, equipment or a system; or the techniques and equipment used to achieve this.
beam bridge	the most simple bridge; a log laying on a stream
best solutions	are those that work well are economical and cause the least harm to people and the environment.
biotechnology	this family of technology works to improve our quality of life through health care, waste management, agriculture, etc.
blow molding	a material processing method using forming: air blown into a soft plastic tube presses it into a mold (plastic bottles)
border lines	lines that frame a drawing
brainstorming	group activity encouraging thinking of new ideas; these ideas can be verbal, written or pictorial
brittleness	a property of material that cause materials to break or shatter easily, they are often very hard
CAD	computer aided drafting
CAM	computer aided manufacturing
capital	cash, stocks, buildings, land, machines or money
casting	a material processing method using forming: pouring liquid into a mold
circuit	a closed path for electricity, includes a power source, a load and a conductor
closed loop system	this system monitors the feedback from the output of a system to make changes if necessary

combining	form of processing that involves putting materials together. Coating uses paint, silver plating, et.
composite	a mix of materials like plywood, cement or fiberglass
compression	pressing force
computer	a machine that inputs data in the forms of words, numbers or symbols and performs operations according to directions
conditioning	a form of processing that changes the internal properties of a material. Chemical conditioning include developing film, plaster hardening. Heat treating hardens or softens materials. Magnetizing aligns the molecules causing a material to become magnetic.
conductor	transmits heat or electricity
constraints	size requirements or limits
construction lines	light lines used for planning a drawing
CPU	central processing unit; the heart of the computer where instructions are carried out and activity is controlled
criteria	are specifications or needs that must be met when solving a problem.
current	electricity, flow of electrons
cursor	the flashing line or icon that indicates where on the computer desktop you are working
custom	made to meet the needs of a single customer
customary	another term for the English system of measurement
database	a program that organizes and manipulates data; in the library you use this kind of program to search for a book by title, author or subject
design brief	short statement describing the criteria and constraints that a solution to a problem must meet.
dimension	the measure of an object, can include length, height or width/depth.
dimension lines	lines that show size and location
drag	the force that holds a moving object back; one of the four forces (gravity, lift, thrust and drag) acting on objects in motion
drive	a device that reads and writes (stores) data on a computer
durability	the property that makes a material capable of withstanding wear and tear or decay, lasting, stable.
efficiency	a ratio that determines the best performance when there is more than one variable
elasticity	the property that allows a material to stretch and regain its shape, as in a rubber band
electron	a negatively charged particle orbiting an atom
emerging	to come into existence; new or emerging technologies can cause changes in work environments, family life and/or society

energy	the capacity for work; chemical energy is derived from fossil fuels from fossil fuels, coal, wood; gravitational. includes hydroelectricity; nuclear energy splits or combines atoms; muscle power comes from people and animals
energy processing	changing energy into forms we can use.
engineering	is the art of applying scientific and mathematical principles, experience, judgment, and common sense to make things that benefit people.
English Ruler	this system of measurement is based on fractions
entrepreneur	this is the name for a person who organizes and manages the risks for a business venture
ergonomics	the study of the human shape and building products that are safe and comfortable to use, a design criteria
extruding	squeezing a material through a small opening to change its shape (spaghetti, straws)
feedback	information from the system
figure of merit	a calculation for efficiency
flow chart	a graphical organizer for the movement of resources in production
font	a collection of letters, numbers and punctuation all designed the same
force	causing physical change; forces that stress a structure are torsion, tension, compression and shear
forging	heating metals and hammering them into shape (horseshoes)
format	a plan for organization and layout; on the computer this may include size, style and color or font, margins, alignment, organization of data
forming	a method of processing a material that involves changing shape without removing any material; includes extruding, injection molding, casting, bending, blow molding
foundation	the base of a structure, the part that supports the weight is called this
friction	a force that opposes motion
fuel cells	a cell that produces energy through the reaction of fuels, such as hydrogen and oxygen
function	the purpose of an object; what it is supposed to do, a design criteria
fuselage	the body of a rocket or airplane
futuring	is trying to predict what future trends in technology may be
gear	a toothed machine part, such as a wheel or cylinder, that meshes with another toothed part to transmit motion or to change speed or direction.
geothermal	energy from the heat of the Earth; volcanoes, hot springs, geysers
grain	how the fibers or crystals of a material align, as in wood
graphics	pictures or drawings

gravitational energy	from the pull of gravity; hydroelectricity produced by waterfalls, rivers, tides
gravity	the force that holds things down on earth: one of the four forces (gravity, lift, thrust and drag) acting on objects in motion. (9.8 m/s^2)
grinding	separating by using sandpaper or a grind stone
hardness	a material property that measures the resistance to scratching
hardware	the machine parts of a computer, or nuts and bolts
heat treating	conditioning by hardening or softening metals; hardening clay in a kiln
hidden lines	these dashed lines indicate that there is something that we can not see from this view
hierarchy	the organization of people at different ranks within a system
hydraulics	uses pressurized oil or other liquids to transmit, amplify or control power
hydroelectricity	energy produced by moving water
hydroponics	growing plants without soil
icon	a symbol or picture representing a tool or program on a computer
ideation	a word describing the technique of thinking up new ideas.
impact	means to have an effect
inclined plane	this simple machine makes it easier to lift heavy loads, you can see it on the back of delivery trucks
industrial age	this age of technology led to the growth of cities as people moved closer to their work in factories. Goods were mass-produced.
information	this resource can be obtained from people, books, magazines, videos, television, the Internet....
information age	In this age of technology, computers allow for the storage, retrieval, manipulation and communication of huge quantities of data
information technology	this family of technology involves collecting, recording, sorting, manipulating or classifying data; storing and retrieving information; and communicating
injection molding	squeezing a material through a small opening into a mold (plastic toys)
innovation	building upon an invention with a new idea, device or process
input	the command we give a system
insulation	stops the flow of heat or electricity
Internet	a collection of networked computers throughout the world
invention	a new idea, device or process

isometric	a pictorial which has an edge at the front, the sides are drawn at 30° angles from the front edge
kinetic energy	energy of motion
labor	physical or mental exertion, a form of work
laws	society can try to control technology through governmental agencies and policies
lever	this simple machine is seen in a see saw, crow bar or when pulling a nail out with a hammer
lift	the force that generates upward movement: one of the four forces (gravity, lift, thrust and drag) acting on objects in motion
maglev	a form of transportation that uses magnets to both levitate and propel a vehicle
magnetizing	a form of conditioning that aligns molecules causing the materials to be magnetic
malleability	capable of being shaped or formed, as by hammering or pressure
management	is essential to ensure that technological products are profitable, safe and built of high quality, on schedule and within budget
mass production	the manufacture of many goods of the same type at one time, frequently involving interchangeable parts and the use of an assembly line
materials	resources can be transformed by technology into products that we need. Examples: wood, cotton, plastic, glass materials should be chosen for their availability, appropriateness, cost, etc.
mechanical conditioning	conditioning by hammering to harden metals
mechanical fasteners	combining with staples, nails, glues, screws, paperclips, rivets
menu	a list of items or commands on the computer
metric	this system of measurement is based on 10's
modeling	is studying and testing the solution to a problem using scale models and/or computer programs, mathematical calculations, etc
monitor	to watch, observe the output in a closed loop system
multiview	these drawings show more than one view or face of an object. Orthographic projection is a form of this drawing.
nanotechnology	the design or building of an object on the molecular scale; or where one dimension of an object can be measured in nanometers (an nanometer is one billionth of a meter)
natural materials	are found in nature
non renewable	materials that can be used up or are in danger of extinction
nuclear energy	energy from fusion or fission

oblique	pictorial that shows front as true shape and has most lines parallel to each other
ohm	measure of electrical resistance; voltage/amperage
open loop	a system that only has input, process and output
optical	properties of sight: reflectivity (mirror), translucent (transmits light, but can not see clearly through), opacity (can not see through), transparent (can see through - a window).
optimize	procedure used to make a design or system the best possible
output	what comes out of the system, the actual result; ideally this should match the input; can be desired, undesired, expected and unexpected.
people	this resource is in control of technology- they research, design, create, manage and manufacture new products.
perspective	pictorial with diagonal lines converging to a point
physical	this family of technology satisfies our physical needs for shelter, clothing, transportation, etc.
pictorial	drawing of an object as it appears to the eye
piston	a solid cylinder or disk that fits snugly into a larger cylinder and moves under fluid pressure
plastic	a material capable of being shaped or formed, like clay
pneumatics	uses pressurized air or other gasses to transmit, amplify or control power
porous	allowing the passage of gas or liquid through pores, able to absorb
potential energy	energy that is derived from position or condition; stored energy
pressing	forming by pushing material into a mold
primary processing	material processing that includes mining, harvesting, drilling, etc. to convert raw materials into materials that can be used by industries
process	action part of a system, where the resources come together and the work gets done
processing	the way material resources are changed into products
prototype	is the (first) model of a solution. It can be used to test ideas and evaluate a solution.
psi	a measurement of pounds per square inch
pulley	this simple machine uses a rope with a wheel
quality	measures how well something is made and can determine how long it will last; a design criteria
quality control/ quality assurance	ensures that each product is built to the same standard

renewable resource	a resource that is replaced by nature within the time span of human history
research	searching for previous solutions and ideas that others have tried
resources	are the items needed to reach a goal, produce a product or solve a problem; includes people, information, materials, tools and machines, energy, capital and time
robot	a machine that can be programmed to do a variety of tasks
S.I.	International Standard- the metric system of measurement
sawing	separating by cutting with scissors or knives
scale	the word that describes that describes the ratio between a drawing and the actual object
screw	this simple machine is seen in a drill bit or common fastener
search engine	a program or website that searches a database (or the Internet) for specific terms
secondary processes	material processing includes combining, forming, separating, conditioning, finishing and assembling materials into finished goods
sensor	device that monitor the output of a system; a photocell or float
separating	this method of processing involves removing materials, example: drilling, sawing, etc.
service	work done for others as a business or occupation, performing a useful function
shaping	separating process using chisels and planes to shape a surface
shearing	cutting force
simulation	this software models real life experiences
site plan	a drawing showing how structures are situated in their location
software	the programs a computer uses
solar energy	from the sun
soldering	combining by using heat
solutions	answers to problems; the best solutions are those that work well, are economical and cause the least harm to people or the environment
speed	a measurement of distance over time
spreadsheet	this program allows you to organize and perform operations on numbers; stores and banks use this kind of program
static electricity	electricity at rest
stone age	the start of technology with stone tools and fire
structure	the way parts are put together to make a whole; bridges, buildings
subsystem	this system is a small system within a system
suspension bridge	this bridge uses ropes or cables to help support the weight
synthetic	manmade materials

systems	a means of getting things done
technology	the use of knowledge to turn resources into goods or services that society needs or wants
template	a pattern ready to use
tension	pulling force
text	words in print
thermoplastic	a material that becomes soft when heated and hard when cooled.
thermosetting	a material that is permanently hardened when heated and cured
thrust	the force that pushes an object forward: one of the four forces (gravity, lift, thrust and drag) acting on objects in motion
thumbnails	small sketches trying out ideas, brainstorming in pictures
torsion	twisting force
toughness	a material that can withstand a lot of strain without ripping or tearing
tradeoffs	the exchange of one thing for another; used in problem solving
trends	follow particular lines of technological development; current style, vogue
turning	a separating process using tools to shape a material that is spinning on a lathe (baseball bat)
vacuum forming	a forming process in which a vacuum draws a heated sheet of thermoplastic material onto a mold (bubble packaging)
virus	an undesired program that you may acquire while downloading files from the internet; it may damage your files
voltage	measure of force used to move electrons
wedge	this simple machine is seen in a saw or knife
wheel and axle	this simple machine is seen in a door knob or bicycle wheel

Notes

