

JSS1 Basic Tech Lesson Note (Third Term) [year]

BST-BASIC TECHNOLOGY JSS 1

SCHEME OF WORK

1. Understanding technology
2. Safety guidelines
3. Work safety
4. Workshop safety
5. Properties of material
6. Wood
7. Properties of metal
8. Metals
9. Properties of ceramics and glass
10. Rubber and plastics
11. Revision

Technology

From Wikipedia, the free encyclopedia

This article is about the use and knowledge of techniques and processes for producing goods and services. For other uses, see Technology (disambiguation).

A steam turbine with the case opened. Such turbines produce most of the electricity that people use. Electricity consumption and living standards are highly correlated.^[1] Electrification is believed to be the most important engineering achievement of the 20th century.

Technology ("science of craft", from Greek τέχνη, *techne*, "art, skill, cunning of hand"; and -λογία, *-logia*^[2]) is the collection of techniques, skills, methods, and processes used in the production of goods or services or in the accomplishment of objectives, such as scientific investigation. Technology can be the knowledge of techniques, processes, and the like, or it can be embedded in machines to allow for operation without detailed knowledge of their workings.

The simplest form of technology is the development and use of basic tools.

The prehistoric discovery of how to control fire and the later Neolithic Revolution increased the available sources of food, and the invention of the wheel helped humans to travel in and control their environment. Developments in historic times, including the printing press, the telephone, and the Internet, have lessened physical barriers to communication and allowed humans to interact freely on a global scale. The steady progress of military technology has brought weapons of ever-increasing destructive power, from clubs to nuclear weapons.

Technology has many effects. It has helped develop more advanced economies (including today's global economy) and has allowed the rise of a leisure class. Many technological processes produce unwanted by-products known as pollution and deplete natural resources to the detriment of Earth's environment. Innovations have always influenced the values of a society and raised new questions of the ethics of technology. Examples include the rise of the notion of efficiency in terms of human productivity, and the challenges of bioethics.

Philosophical debates have arisen over the use of technology, with disagreements over whether technology improves the human condition or worsens it. Neo-Luddism, anarcho-primitivism, and similar reactionary movements criticize the pervasiveness of technology, arguing that it harms the environment and alienates people; proponents of ideologies such as transhumanism and techno-progressivism view continued technological progress as beneficial to society and the human condition.

TECHNOLOGY RELATED PROFESSION

Aeronautical Engineering

Architecture

Chemical Engineering

Civil Engineering

Computer Science

Electrical Engineering

Mechanical Engineering

Biomedical Engineering

Environmental Engineering

Civil Engineering

Computer Science

It is evident that technology touches each and every facet of our lives. Be it management of employees and inventories, searching answers to complex problems, or facilitating the lives of the sick and disabled, technology has magnificently enhanced the quality of life and also boosted the economy of the world

importance of technology

1. Technology encourages learning in a positive manner
2. It improves students' skill sets
3. It helps prepare the future workforce.

Examples of technological use in the field of education include: use of spreadsheets for math and other topics, videoconferencing for distant learning, creation of web pages to display and share student work, Internet searches for exploring complex topics etc.

For technology to have positive impact in the field of education, teachers must ensure setting clear goals: else technology can be misused. Teachers also need to be trained and this education must be on-going. Technical support also needs to be provided in order to ensure correct handling of tools.

Importance of Technology in Business

Technology has also helped small businesses evolve and expand quickly. The use of social networking, video conferencing, virtual office tools and other such techniques have removed all boundaries, which, in the past, prevented growth. Thanks to technology; businesses, small and large, can reach a wider customer base and grow and expand.

Business technology has helped improve communication. Today, workers are not limited to phone calls alone; they can send emails and messages without the fear of interrupting the recipient. Mobile technology has also helped workers communicate 'on the go'. Information is not limited to one or two channels, but multiple and faster ones.

In general, the efficiency of the workforce has also increased. Employers are able to screen, recruit and hire potential candidates quickly; they are also able to inform about vacancies to larger number of applicants. Personality and IQ assessment tools have also been made available to employers and these make the screening process a lot smoother and streamlined. Digital filing has helped improve the organization and efficiency in the workplace. Printing costs, paper consumption and space can all be saved thanks to electronic filing systems.

Perhaps the greatest advantage of technology for businesses is the elimination of wastage of time and money. Thanks to videoconferencing and Internet, travel costs can be drastically cut down. A business can set up its presence across the Globe at a fraction of the cost required in the past.

Also the work place has become much more safe. The percentage of accidents has been growing down in recent year thanks to applying safe work boots, safe apparel for working conditions and applying strict safety rules.

Importance of Technology in Healthcare

The importance of technology in healthcare can be summarized with this single sentence: "Technology saves lives". Some of the objectives that healthcare information technology has fulfilled include:

1. creation of social support networks for patients
2. self management tools and resources that patients can use with ease
3. easy access to accurate and actionable health information for patients and families
4. quick communication and resolution of health risks and public health emergencies
5. provision of newer opportunities to culturally diverse and hard to access nations
6. improvement of quality and safety in health care
7. improved public health infrastructure
8. facilitation of clinical and consumer decision making
9. development of health skills and know-how
10. Creation of advanced fitness equipment that can help you exercise and improve your health considerably (like inversion tables (click here for more info) ; rowing machine; treadmills and more).
11. Creation of cosmetic services for looking better: fighting hair loss with shampoos; cosmetic surgery and electric razors.

Health technology has improved organization and efficiency. It has helped eliminate ambiguity and every record right from the billing to diagnostic and treatment can be maintained for easy access for healthcare providers. By using software and hardware tools, profiles of patients can be created so doctors can provide standardized treatment. This helps improve patient outcomes and thus reduces cost of health care. New Portable

refrigerators had been created to help people travel for long periods of time safely, without issues.

In conclusion

question

- 1. define technology**
- 2. mention 5 importance of technology**

week 2; safety guidelines

General guidance

1

Footways or footpaths (including any path along the side of a road) should be used if provided. Where possible, avoid being next to the kerb with your back to the traffic. If you have to step into the road, look both ways first. Always show due care and consideration for others.

2

If there is no footway or footpath, walk on the right-hand side of the road so you can see oncoming traffic. You should take extra care and:

- be prepared to walk in single file, especially on narrow roads or in poor light**
- keep close to the side of the road**

It may be safer to cross the road well before a sharp right-hand bend so that oncoming traffic has a better chance of seeing you. Cross back after the bend.

3

Help other road users to see you. Wear or carry something light-coloured, bright or fluorescent in poor daylight conditions. When it is dark, use reflective materials (example. armbands, sashes, waistcoats, jackets, footwear), which can be seen by drivers using headlights up to three times as far away as non-reflective materials.

4

Young children should not be out alone on the footway, footpath or road (see Rule 7). When taking children out, keep between them and the traffic and hold their hands firmly. Strap very young children into push-chairs or use reins. When pushing a young child in a buggy, do not push the buggy into the road when checking to see if it is clear to cross, particularly from between parked vehicles.

5 (organised walks)

Large groups of people walking together should use a footway or footpath if available; if one is not, they should keep to the left. Look-outs should be positioned at the front and back of the group and they should wear fluorescent clothes in daylight and reflective clothes in the dark. At night the look-out in front should show a white light and the one at the back a red light. People on the outside of large groups should also carry lights and wear reflective clothing.

6 (motorways)

Pedestrians must not be on motorways or slip roads except in an emergency (see rules 271 and 275).

Crossing the road

7 (The Green Cross Code)

The advice given below for crossing the road is for all pedestrians. Children should be taught the Code and should not be allowed out alone until they can understand and use it properly. The age when they can do this is different for each child. Many children cannot judge how fast vehicles are going or how far away they are. Children learn by example, so parents and carers should always use the Code in full when out with their children. They are responsible for deciding at what age children can use it safely by themselves.

A

First find a safe place to cross and where there is a space to reach the footway or footpath on the other side. Where there is a crossing nearby, use it. It is safer to cross using a subway, a footbridge, an island, a zebra, pelican, toucan or puffin crossing, or where there is a crossing point controlled by a police officer or school crossing patrol. Otherwise choose a place where you can see clearly in all directions. Try to avoid crossing between parked cars (see Rule 14), on a blind bend or close to the brow of a hill. Move to a space where drivers and riders can see you clearly. Do not cross the road diagonally.

B

Stop just before you get to the kerb, where you can see if anything is coming. Do not get too close to the traffic. If there's no footway or footpath keep back from the edge of the road but make sure you can still see approaching traffic.

C

Look all around for traffic and listen. Traffic could come from any direction. Listen as well, because you can sometimes hear traffic before you see it.

D

If traffic is coming, let it pass. Look all around again and listen. Do not cross until there is a safe gap in the traffic and you are certain that there is plenty of time. Remember, even if traffic is a long way off, it may be approaching very quickly.

E

When it is safe go straight across the road – do not run. Keep looking and listening for traffic while you cross, in case there is any traffic you did not see, or in case other traffic appears suddenly. Look out for cyclists and motorcyclists travelling between lanes of traffic. Do not walk diagonally across the road.

8 (at a junction)

When crossing the road, look out for traffic turning into the road, especially from behind you. If you have started and traffic wants to turn into the road, you have priority and they should give way (see rule 170).

- Highway Code rules 159 to 203

9 (pedestrian safety barriers)

Where there are barriers, cross the road only at the gaps provided for pedestrians. Do not climb over the barriers or walk between them and the road.

10 (tactile paving)

Raised surfaces that can be felt underfoot provide warning and guidance to blind or partially sighted people. The most common surfaces are a series of raised studs, which are used at crossing points with a dropped kerb, or a series of rounded raised bars which are used at level crossings, at the top and bottom of steps and at some other hazards.

safety for motorist

1. Different but Equal

In all states, cyclists are deemed by law to be drivers of vehicles and are entitled to the same rights on the road as motorists. Expect cyclists on the road. Watch for cyclists on the road. Treat them as you would any slow-moving vehicle.

2. Patience, not Patients

Patience, especially on the road, is a virtue, and can save lives.

Your patience may involve:

- Waiting until it is safe to pass a bicycle and refraining from tailgating.
- Giving cyclists the right of way when the situation calls for it.
- Allowing extra time for cyclists to go through intersections.
- Recognizing road hazards that may be dangerous for cyclists and giving cyclists the necessary space to deal with them. In conditions where there is not enough room for a cyclist to ride to the right, they are allowed to ride closer to the lane of traffic, and sometimes even in the lane of traffic.

Never engage in conduct that harasses or endangers a cyclist. Above all: Be tolerant. Be understanding. Be careful.

3. A Passing Grade

Do not pass a cyclist until you can see that you can safely do so. You should allow ample space between your vehicle and the bicycle and make sure you do not place the cyclist in danger. If you pass too closely the drag from your car can pull a cyclist off course and cause the rider to swerve out of control.

4. The Right Behavior

Watch out for cyclists when you are turning right. A bicyclist may well be to the right of you and planning to go straight at the same intersection. Do not speed ahead of the bicyclist thinking you can negotiate the turn before they reach your car. The cyclist may be going faster than you think and, as you slow to make the turn, the cyclist may not be able to avoid crashing into the passenger side of your vehicle.

5. To The Left, to The Left

Also look for cyclists when making a left-hand turn. Cyclists who are crossing straight through the same intersection in the opposite direction may be going faster than you realize. It is particularly dangerous on a descending slope, when cyclists pick up more speed.

6. A Back-up Plan:

Bicycles, and the people who drive them, come in all shapes and sizes. When backing out of your driveway always look to see if someone is riding in your path. Children on small bikes might be hard to see. Drive slowly and look carefully.

7. Egress Etiquette

After parallel parking, make sure the coast is clear for opening the car door to exit. Make sure there are no cyclists riding alongside your car or fast approaching. By using the rear view mirrors and by turning around, a driver can spot an approaching cyclist and circumvent a disaster. A cyclist cannot anticipate when a driver will open a door, but a driver can easily detect a cyclist who may be in the line of danger.

8. Respect

Cyclists have a rightful spot on the road. Cyclists also positively impact the environment with each revolution of their wheels by opting to ride rather than drive. Do not resent cyclists. Replace frustration with a smile every time to see a cyclist.

9. Honing Your Honking Habit

Do not to honk unnecessarily at cyclists. If the need does arise to honk your horn to alert a cyclist that you are about pass, do so at a respectable distance. If you are too close, the noise itself can cause a cyclist to lose his or her bearings and create a hazardous situation for both you and the cyclist.

10. Try it, You'll Like it

If you can't beat them, join them. Ride a bike. It may just change your life. Riding is good for you and good for your environment. At the very least, it will give you a better appreciation for the problems cyclists face everyday on the road with respect to motorists.

safety for cyclist

1. Cycling Citizenship

Along with the right to cycle come responsibilities. Familiarize yourself with all applicable traffic laws and cycling rules. Each state has its own set; be aware of them. Motorists will be much more willing to accept cyclist's rightful place on the road if cyclists act lawfully and respectfully. Do not run stop signs or red lights or use the wrong side of the street. It is best and safest to ride single file. If you are not blocking traffic and if the laws in your state permit it, there are times it is safe to ride two abreast. However, on narrow curvy canyon roads it is

always best to ride single file. Riding responsibly will do wonders towards easing tensions and fostering a more harmonious environment between motorists and cyclists.

2. Right On

It is generally either illegal or unsafe to ride on a sidewalk or on the road towards oncoming traffic. As a rule, it is best to ride in the direction of traffic, staying as far to the right as is practical. However, make sure there is room to handle emergencies and that you do not ride so close to the right that you run the risk of hitting the curb and being thrown into traffic. There are times when you simply cannot stay to the far right—whether it's to overtake another cyclist or vehicle, to make a left turn, or to avoid a hazard. Be sure to wait for a safe opportunity and use the proper hand signals when you take a lane.

3. Join In

If you are traveling at the same speed as other traffic, it may be safer to jump in and ride with traffic; because, this may make you more visible to motorists. Joining traffic is sometimes necessary because the road is simply too narrow for both a bike and a car. It is a particularly good idea to take a lane and join traffic before an intersection to make your presence known—especially for right-turning drivers who may not see you as they start their turn.

When you do join traffic, make sure you never pass on the right. This is always dangerous, but particularly so in an intersection. By waiting directly behind a vehicle, you can see a car's signals; otherwise, you never know if the motorist is about to make a right turn and hit you.

4. Use Your Head

Regardless if you're going to the corner store or heading out on a marathon ride, always wear a helmet. Make sure it is properly fastened and fitted. (The helmet should fit snugly and not move when you shake your head.)

5. Seeing Eye to Eye

Make eye contact with drivers whenever possible. This ensures that the motorists see you and helps you assert your rightful place on the road. This "personal connection" reminds motorists that you are indeed real LIFE in need of attention and protection. Once you make that connection, motorists may give you more respect on the road.

6. The Road Straightly Traveled

Try to ride consistently and predictably. For instance, at an intersection, do not veer into the crosswalk and then suddenly reappear on the road again. Don't thread through parked cars. With such erratic behavior, motorists will not be aware of your presence when you try to re-

emerge into traffic. (Inconsistent conduct increases your chances of being squeezed out of traffic or, worse, getting hit.)

7. Playing Defense

Make sure you are always aware of your surroundings. Know what is behind you and watch out for what is in front of you. Always be on the lookout for road hazards; sand and gravel, glass, railroad tracks, parked cars, snow and slush can wreak havoc on you and your bike. Sewer grates and cracks in the road can catch your wheel and cause you to be thrown from the bike. Watch for parked cars where people may be opening doors on the driver side of the vehicle without looking. Always wait until you have ample time to make your move, whether you are changing a lane or turning a corner. Do not expect to be granted the right of way in any instance.

8. Flaunt It

Make your presence felt. Wear bright color clothing. At night or in inclement weather, it is important to use reflective lights in the front, side and rear that make you visible from all directions.

9. Helping Hands

Emergencies happen. Be prepared. Always make sure you have at least one hand on your handlebars, no matter what. Know and use your hand signals whenever you are changing lanes or making a turn.

10. Brake Away

Make sure your brakes are always in top-notch condition. Be aware of how weather and road conditions can effect your ability to brake.

question

1. list 2 safety guidelines for pedestrians
2. list 2 safety guidelines for motorist

week 3; work shop safety

Workshop rules and safety considerations

Workshop safety is everyone's responsibility, the following rules have been put in place to ensure the safety of all students and staff. Please read the safety rules carefully before entering the workshop.

Workshop rules

- Student affected by drugs or alcohol are not permitted in the workshop
- Students with any health problems that may affect workplace safety (e.g. medication, epileptic fits) must report these conditions to the workshop staff
- Notify the workshop staff of your arrival
- No food or drink in the workshop
- Wear the correct protective equipment for the tools you are using – ask if in doubt
- All chemicals (e.g. glues and paints) must be checked through Chemwatch and with workshop staff before use
- Immediately notify the workshop supervisor of any faulty or broken equipment
- Ask how to use the tools safely
- Make sure your work piece is fixed securely before work commences
- Keep leads up off the floor
- Keep clear of any person operating tools and machinery (bumping an operator or get tangled in the lead could cause serious injury to you or the operator)
- Do not talk to anyone operating electrical equipment and machinery
- Keep your work area tidy
- Clean up any spills immediately
- Wash hands after using equipment and materials

causes of workshop accident

Most Common Causes of Workplace Accidents

RSSS

SAFETY BLOG0

Mark Twain once said, "It is better to be careful 100 times than to get killed once." Think about this; 80 of every 100 accidents that happen in the workplace are ultimately the fault of

the person involved in the incident. What does this tell us? Workers are not taking the proper precautionary measures before working, or they are simply too lazy to be bothered with it. After all, they do their jobs everyday right? Why do they need to waste their time with tedious things like inspections and precautionary measures? Well, considering the above statistic, there should be an ample amount of evidence to convince lazy and neglectful workers to start paying more attention to correct safety measures. A majority of workers seem to like to find “things” to blame when workplace accidents occur rather than “root causes”. However, there are 7 common causes for workplace accidents, and “root causes” account for every single one of them. To give workers more incentive to practice proper safety measures within the workplace, we have compiled these 7 common causes to give a better illustration of what the root causes of accidents in the workplace are.

Shortcuts

Humans are notoriously lazy, so taking shortcuts is a rather common practice in all walks of life, not necessarily work alone. However, when workers take shortcuts at work, especially when they are working around dangerous machinery or lethal chemicals, they are only exposing themselves to a potential catastrophe. Simply put, shortcuts that are taken on the job are not actually shortcuts. They are simply increasing your risk of injury, or worse, death.

Overconfidence

Confidence is always a great thing to have, but there is also such a thing as too much confidence. When workers walk into work everyday with the attitude that, “It will never happen to me”, they are setting an attitude that leads to incorrect procedures, methods, and tools while working. Be confident, but remember that you are not invincible.

Poor, or Lack Of Housekeeping

Whenever someone walks through your workplace, they can get a pretty good idea of your attitude towards workplace safety by just looking at how well you’ve kept up your area. Housekeeping is one of the most accurate indicators of the company’s attitude towards production, quality, and worker safety. A poorly kept up area leads to hazards and threats everywhere. Not only does good housekeeping lead to heightened safety, but it also sets a good standard for everyone else in the workplace to follow.

Starting a Task Before Getting All Necessary Information

The quickest way to get a job done is to do it right the first time. To do it right the first time, you need to make sure that you have any and all pertinent information relating to the task you will be performing. Workers who begin a job with just half the information, or half the

instructions, are essentially doing the job while blind. Remember this; it's not stupid to ask questions, it is stupid not to.

Neglecting Safety Procedures

This is probably the worst thing that any employee at any level in the organization can do. Deliberately neglecting set safety procedures in the workplace doesn't just endanger yourself, but it endangers the workers around you as well as the company as a whole. Casually following safety procedures doesn't work either. You are paid to follow workplace safety procedures, not your own.

Mental Distractions

Everyone has a life outside of the workplace, and sometimes life can take dips and turns that affect your emotions and your mood negatively. However, as harsh as it sounds, workers cannot let mental distractions from their personal lives affect their performance at work. Not only will they become less aware of their surroundings and less safe, but they will also become less productive, costing the company time and money.

Lack of Preparation

You may have heard of something called Job Hazard Analysis (JHA). JHA's are an effective method of figuring out the best way to work safely and efficiently. When workers begin a task without thinking through the process beforehand, or hastily start without any type of planning, they are setting themselves up for failure. Make sure you plan your work, then work your plan.

There are several reasons why workplace accidents happen, but these 7 are the most common, and sadly, the most overlooked, causes. It really comes down to awareness and focus. Lazy workers are not as effective and they are not as safe as their aware and focused counterparts. On top of this, lazy workers immediately become a direct threat to everyone around them. There needs to be a conscious effort each and every day in the workplace to make sure that these 7 causes don't happen. Your life, your coworkers' lives, and your company's overall well-being depends on it.

types of work shop accident

0. Driving-related injuries

This is related to driving heavy machinery in storage, warehouses or pretty much any industrial sectors where these machines are required. These accidents don't happen that often and they can be kept at a minimum with proper staff training and use of adequate machinery.

9. On the Job Violent Acts

Attacks and disputes resulted as office politics happen rarely and they mostly occur in stressful work environments where people work closely together. It is important to keep employee diligence and have some sort of supervision over your workers.

8. Repetitive Motion Injuries

These are often overlooked injuries as they happen over the course of time and it takes a while for the individual to actually notice the injury and realize the cause of injury. These injuries can be resulted as working in an unnatural position doing a repetitive movement or even just sitting in front of the computer for long hours, which can cause back pain, muscle strains or carpal tunnel syndrome.

7. Work Related Hearing loss

Working in extremely loud environment can cause noise induced hearing loss, which the sufferer may notice after decades of work. Ways to protect against this is to wear protective gear that will protect your ears.

6. Walking Into – Accidents

Well this pretty much happens everywhere, the busy lifestyle of 21st century makes us loose focus, and occasionally run into objects. This is type of accidents in the offices often causes head, knee, neck and other types of injuries. Only way to minimize these accidents is for people to have more focus, which is kinda hard to achieve.

5. Injuries From Falling Objects

Objects can fall on you from various places or dropped by someone. Head injuries are mostly results of these accidents. To prevent this from happening, employee diligence and employers focus to keep the workplace free from hazard is necessary. Also wearing safety gear like hard hat can keep employees safe from injuries in places where these types of accident happen more often.

4. Reaction Injuries

People can suffer injuries when tripping or slipping without even falling. They can strain their muscles or body trauma when they move all of a sudden to prevent them selves from falling. These injuries can be quite serious so be careful when crossing slippery surfaces or places where you can easily trip.

3. Falling From Heights

These accidents can be very serious with some cases resulting in fatal injury. This usually happens in elevated work environment like rooftops, stairways and ladders. This is mostly associated with construction industry. The cause of these accidents can be negligence or faulty equipment, and it is recommended to use proper safety gear, staff training and employee diligence.

2. Slipping/Tripping

The second most frequent workplace accident. This mainly happens by people slipping on wet surfaces or tripping on something lying on the floor. Employees need to pay good attention to their surroundings and the employer needs to make sure that everything is in order and safe for work.

1. Overexertion Injuries

This are by far the most common type of injuries at work, it involves lifting, pushing, carrying, pulling, and other types of moving heavy objects. Overexertion is not only number one most consistent injury, over the course of years but also most costly work accident. The overexertion accidents cost over 3\$ million in compensation claims yearly.

Note that providing safety gear and proper training to your employee to where its needed will greatly reduce the amount of accidents occurring.

prevention of work shop accident

RULES FOR PREVENTION OF ACCIDENTS IN WORKSHOPS.

The following notice for the guidance of employees is now conspicuously exhibited in our Workshops:—

- Never turn on any power to set machinery in motion without first seeing that no one is in a position to be injured.
- Do not oil, adjust, or clean machinery while it is in motion.
- If, for any purpose, fencing or other safeguards are removed, do not forget to replace them before restarting work.
- Do not operate any machinery unless authorised by proper authority.
- If a driving belt has to be adjusted or replaced, do not attempt this unless the machinery is first stopped. In shops where a special man is engaged for attending to main belts he should be notified at once; machinists should not attempt to replace main belts unless instructed to do so by the foreman or leading hand.

- Avoid wearing loose, torn clothing, long neckties, loose bootlaces or finger rings. All are dangerous as they are liable to be caught in moving parts of machinery.
- Boards containing projecting nails should not be left lying about. When you see such boards either turn them over or bend the nails down.
- When removing turnings, chips, shavings, etc., from machines, stop the machines first; provide yourself with a brush or other suitable cleaner. Do not remove them with your fingers or hands.
- When chipping with hammer and chisel, working at emery wheel, casting with a hand ladle, or doing any work for which it is necessary to protect the eyes, special goggles should be worn.
- Ladders should be placed at a safe angle to prevent slipping away, falling sideways or backwards. Secure ladders to prevent slipping away. Ladders should not be placed on running shafting.
- questions
- mention 2 causes of workshop accident
- describe 5 workshop accident

week 4; workshop safety

rules and regulations

1) Never work alone in the workshop, work at least in pairs. This is so because in case of industrial/workshop accident the other partner will be a helper (Ecclesiastes 4:9-10) it's all about Teamwork.

2) Think about what you are doing; think before you start a job and during the entire time you are doing it. Remember that your own personal caution is of more value to you than all the safeguards that can be set up.

3) Know where the main switch is. This stops processes immediately should anything go wrong in the industry.

4) Smoking and carrying matches or naked flames by employees is prohibited in and about the complex except in zone specifically designed for such purposes. Safety section must see that "No smoking" signs are placed in and about their area to warn the employee and visitors.

5) When work is being done which requires the wearing of a safety belt, the supervisor in charge shall determine whether or not stand-by personnel are required, and if necessary, will provide suitable personnel.

6) Any one working at or going to any plant area in the complex must wear a safety cap and safety shoes.

7) Always use a safety belt when working at height such as on stacks or columns where the danger of falling exists.

8) Do not tamper with or attempt to repair equipment or instruments which you do not understand.

9) Ability to communicate with the outside world, very important. This is usually achieved by the installation of telephones. Important phone numbers should include the following in Emergency cases;

a. Fire Service number

b. Ambulance number

c. Police number

d. NEPA/PHCN number

10) Defective tools are dangerous, do not use them. In fact never use a tool except for its proper purpose.

safety devices

Fire Extinguishers

Many common fires around the house can be stopped with the usage of a proper fire extinguisher. While quick action and correct usage may put out the fire, it is important to also be aware of the limitations of the extinguisher used. Fully understand and read all included instructions prior to usage. It is a good and safe practice to regularly inspect your extinguisher to verify that it is properly charged. It is also a good idea to make sure that the contents of the extinguisher do not become a solid mass. A few times a year it is recommended that the contents be shaken. Alternatively, a rubber mallet can be used to smack the bottom of the device (do not hit the valve or hose components). This agitation will help to prevent the solid materials from clumping into an unusable mass.

Smoke, Fire, Carbon Monoxide Detectors

These devices give advance warning to unseen, unknown, or undetectable dangerous conditions. It is important to check the condition of the power source to these detectors. If they are hardwired into the building, check to verify that a battery back-up exists. If the type of battery installed charges during normal conditions it probably does not need replacing every six months. If the battery is expendable, it is good practice to change it whenever daylight savings events occur. It is good practice to test these devices, either hard wired or battery type, at least once a month to verify that they are working correctly. If a test fails, replace the device immediately to assure your protection. Seek additional information regarding these devices from the manufacturer or online sources.

Fire Escape Ladders

Add extra safety to your family if you have multiple floors. Stairwells can often become chimneys, depending upon the location of a fire. In the event of a fire, it is important to have multiple egress points. Pre-boxed fire escape ladders can be kept under windows, beds or adjacent closets to be used in the event of a fire. Always check the condition of the ladder immediately after purchase to assure that the ladder is usable in the event of an emergency situation. These ladders are available in some home centers and online for immediate shipping.

Dust Masks & Respirators

Respirators and dust masks are an important part of many jobs. It is important to make sure that your lungs and airways are protected from adverse chemicals and airborne contaminants. There are many types of dust masks available. Dust masks should not be confused or interchanged with respirators. A dust mask is generally a low cost paper or synthetic filtering device manufactured to help stop dust, debris, and dirt from entering your nose and mouth. A respirator is generally considered a cartridge and filtered system to trap contaminants and purify the air particles prior to entering your respiratory system. Make certain that the usage of the proper type of mask or respirator is proven for the type of work that you are performing. Make certain that the filters and cartridges in a respirator are approved by NIOSH or OSHA and meet the requirements to protect you. An indication that a respirator needs the replacement of filters is when you begin to smell or taste the products you are using the respirator to filter. When that occurs, always stop work, replace the cartridge or filter prior to continuing. Always read, follow, and understand the instructions that come with this piece of safety equipment. Check with the manufacturer or supplier to verify that you are using appropriate products for your job.

More professional and stringent requirements for the usage of certain type of respirators include medical evaluations prior to the issuance of the respirator. An example of this type of

requirement would pertain to work related to asbestos or mold abatement. In addition to proper training prior to working with asbestos, it is important that a medical evaluation determines that your body is able to properly function while you are wearing the approved respirator. The removal of asbestos or mold is not to be taken lightly and should not be performed by an untrained, unlicensed or uncertified contractor. This is not a project for a homeowner.

Gloves

Gloves for all purposes (Rubber, latex, chemical resistant, electrical insulated, leather work, thermal insulated, heat resistant, Kevlar reinforced, etc.) - Gloves are a very basic and easy to find safety item. The importance of proper protection of your hands and arms cannot be overstated. There are as many types of gloves available as there are types of jobs. It is important to know the limitations and requirements of your gloves prior to beginning work.

Hearing Protection

Hearing protection includes equipment such as ear plugs and head phones. Long term hearing loss can be created by a sudden unexpected loud noise. It is important to plan for that possibility and provide adequate hearing protection. Long term exposure to low levels of certain frequencies can also damage hearing. Consult online guides, job related service manuals, and other available sources to determine the correct type of hearing protection that should be used for any job. Repeated exposure to yard and lawn equipment can be very damaging to your ears, and even though it may occur on an infrequent basis, it is important for anyone exposed to these products to protect their ears.

Safety Clothing

Safety clothing for specialized usage. Some examples of protective clothing products and related items include Kevlar chainsaw protective chaps, gloves, boots, hard hat with face shield, etc. Chain saw users can encounter several assaults on their bodies at every usage. Hearing can be seriously affected, so headphones are essential. A hardhat is recommended to protect against the inadvertent tree branch falling from above. A face shield is suggested to protect against flying wood chips, tree limbs, and branches that may brush past a user. Safety glasses are suggested to protect against sudden projectile impacts that pass the face shield. One of the most significant and potentially lifesaving products that can be worn are products made using Kevlar fabric. This fabric, when cut with an errant chain saw chain, becomes shredded and grabs the chain, hopefully stopping the chain before cutting your body parts. It is important to wear protective boots, chaps, gloves, and vests made with Kevlar at all times during usage of a chain saw to protect all major body parts and extremities.

Work Shop / Wood Shop Protection

Face masks, goggles, dust masks, respirators, hearing protection, proper gloves for specific tasks, ventilation devices for airflow, and dust collectors are recommended. Understand the task that you are planning, and make certain to have all needed safety products and equipment prior to starting your project. A good first aid kit is important to have in your workshop.

Boots

Steel Toed Work Boots or Regular Work Boots are essential for working with heavy objects that can fall on your feet. Steel toed boots have a protective reinforcement in the toe to protect your foot from falling objects, compression, or punctures. For light products, non-steel toed shoes may be sufficient. The addition of steel in your work boots is good additional insurance against foot injuries. Steel toed shoes are often professional requirements on most work sites. Why not add the protection of steel toed work boots when you plan to buy your next pair of work shoes?

Ladders

Proper and appropriate ladders for multipurpose use. Never use a ladder for more than its' intended purpose. Fiberglass ladders offer non conductivity from electrical sources, come in a variety of types and load ratings, and last for years. In most cases, they are far more durable than a wooden ladder or any aluminum ladder product. They may cost a little more, but are well worth the price in the long run, and will provide many years of safe usage if properly maintained and stored.

Ground Fault Circuit Protection

Ground fault circuit protectors for electrical outlets in water or moisture adjacent areas. While a G.F.I. (Ground fault interrupter) is an electrical code requirement in wet locations in newer construction, older homes may not have been upgraded to include these devices. Homeowners, not thinking about shock hazards, may not know if the outlet that they are connecting exterior extension cords to are grounded or protected by a G.F.C.I. (Ground fault circuit interrupter.) Unprotected circuits and outlets now connected to these electrical extension cords can lead to shock hazards or even death.

question

1. list 5 safety devices
2. what is safety precaution

week 5; properties of materials

[wood]; What is wood?

You often hear people grumbling about money and all kinds of other things that "don't grow on trees"; the great thing about wood is that it *does* grow on trees—or, more specifically, in their trunks and branches.

Structure of wood

Take a tree and peel off the outer "skin" or bark and what you'll find is two kinds of wood. Closest to the edge there's a moist, light, living layer called sapwood packed with tubes called xylem that help a tree pipe water and nutrients up from its roots to its leaves; inside the sapwood there's a much darker, harder, part of the tree called the heartwood, which is dead, where the xylem tubes have blocked up with resins or gums and stopped working. Around the outer edge of the sapwood (and the trunk) is a thin active layer called the cambium where the tree is actually growing outward by a little bit each year, forming those famous annual rings that tell us how old a tree is. Slice horizontally through a tree, running the saw parallel to the ground (perpendicular to the trunk), and you'll see the annual rings (one new one added each year) making up the cross-section. Cut vertically through a tree trunk and you'll see lines inside running parallel to the trunk formed by the xylem tubes, forming the inner structure of the wood known as its grain. You'll also see occasional wonky ovals interrupting the grain called knots, which are the places where the branches grew out from the trunk of a tree. Knots can make wood look attractive, but they can also weaken its structure.

Photo: This fence pole was once a tree—and you can still clearly see the annual growth rings if you look down on it from above.

Hardwoods and softwoods

Wood is divided into two distinct kinds called hardwood and softwood, though confusingly the names don't always refer to its actual hardness or softness:

- **Hardwood** typically come from broad-leaved (deciduous) trees (those that drop their leaves each fall, also known as angiosperms because their seeds are encased in fruits or pods). Examples include ash, beech, birch, mahogany, maple, oak, teak, and walnut.
- **Softwood** typically come from evergreen (coniferous) trees (those that have needles and cones and retain them year-round, also called gymnosperms. Examples include cedar, cypress, fir, pine, spruce, and redwood.

It's generally true that hardwoods are harder than softwoods, but not always. Balsa is the best-known example of a hardwood that is actually very soft. Hardwoods have lovely, attractive grains and are used for such things as making fine furniture and decorative woodwork, whereas softwoods often come from very tall, straight trees, and are better suited for construction work (in the form of planks, poles, and so on).

Photo: Left: Hardwood comes from deciduous trees like this oak. Its leaves (inset) drop off in the fall and new ones grow in spring. Right: Softwood comes from evergreen conifers, like this pine, which has needles that stay on all year and cones (inset).

Chemical composition

Look at some freshly cut wood under a microscope and you'll see it's made up of cells, like any other plant. The cells are made of three substances called cellulose (about 50 percent), lignin (which makes up a fifth to a quarter of hardwoods but a quarter to a third of softwoods), and hemicellulose (the remainder). Broadly speaking, cellulose is the fibrous bulk of a tree, while lignin is the adhesive that holds the fibers together.

What's wood like?

The inner structure of a tree makes wood what it is—what it looks like, how it behaves, and what we can use it for. There are actually hundreds of different species of trees, so making generalizations about something called "wood" isn't always that helpful: balsa wood is different from oak, which isn't quite the same as hazel, which is different again from walnut. Having said that, different types of wood have more in common with one another than with, say, metals, ceramics, and plastics.

Strength

Physically, wood is strong and stiff but, compared to a material like steel, it's also light and flexible. It has another interesting property too. Metals, plastics, and ceramics tend to have a fairly uniform inner structure and that makes them isotropic: they behave exactly the same way in all directions. Wood is different due to its annual-ring-and-grain structure. You can usually bend and snap a small, dead, tree branch with your bare hands, but you'll find it almost impossible to stretch or compress the same branch if you try pulling or pushing it in the opposite direction. The same holds when you're cutting wood. If you've ever chopped wood with an ax, you'll know it splits really easily if you slice with the blade along the grain, but it's much harder to chop the opposite way (through the grain). We say wood is anisotropic, which means a lump of wood has different properties in different directions.

Photo: Wood is a traditional building material, as popular today as ever. Because wood is anisotropic, natural wooden beams work better as vertical posts (where they are in compression) than horizontal beams (where they are in tension). That's not a problem here, because these beams are laminated so they are equally strong in all directions. The diagonal members add further strength to stop the horizontal beams from bending. Photo by Robb Williamson courtesy of US DOE/NREL (Department of Energy/National Renewable Energy Laboratory). Read more about [how buildings work](#).

That's not just important to someone chopping away in the woodshed: it also matters when you're using wood in construction. Traditional wooden buildings are supported by huge vertical poles that transmit forces down into the ground along their length, parallel to the grain. That's a good way to use wood because it generally has high compressive strength (resistance to squeezing) when you load it in the same direction as the grain. Wooden poles are much weaker placed horizontally; they need plenty of support to stop them bending and snapping. That's because they have lower tensile strength (resistance to bending or pulling forces across the grain). Not all woods are the same, however. Oak has much higher tensile strength than many other woods, which is why it was traditionally used to make the heavy, horizontal beams in old buildings. Other factors such as how well seasoned (dry) a piece of wood is (as discussed below) and how dense it is also affect its strength.

Durability

One of the best things about wood is how long it lasts. Browsing through the daily news, you'll often read that archeologists have unearthed the buried remains of some ancient wooden article—a wooden tool, perhaps, or a simple rowboat or the remnants of a huge building—that are hundreds or even thousands of years old. Providing a wooden object is properly preserved (something else we discuss later), it will easily outlast the person who made it. But just like that person, a wooden object was once a *living* thing—and it's a natural material. Like other natural materials, it's subject to the natural forces of decay through a process known as rotting, in which organisms such as fungi and insects such as termites and beetles gradually nibble away the cellulose and lignin and reduce wood to dust and memories.

Photo: Under attack! The big problem with wood is that it's a natural material subject to attack from other natural things, notably fungi and insects. This is what Formosan subterranean termites can do to wood. Photo by Scott Bauer courtesy of US Department of Agriculture/Agricultural Research Service.

Wood and water

Wood has many other interesting characteristics. It's hygroscopic, which means that, just like a sponge, it absorbs water and swells up in damp conditions, giving out the water again when the air dries and the temperature rises. If, like mine, your home has wooden windows, you'll probably notice that they open much more easily in summer than in winter, when the damp outdoor conditions make them swell into the frames (not necessarily such a bad thing, since it helps to keep out the cold). Why does wood absorb water? Remember that the trunk of a tree is designed to carry water from the roots to the leaves: it's pretty much a water superhighway. A freshly cut piece of "green" wood typically contains a huge amount of hidden water, making it very difficult to burn as firewood without a great deal of smoking and spitting. Some kinds of wood can soak up several times their own weight of water, which is absorbed inside the wood by the very same structures that transported water from the roots of the tree to the leaves when the tree was a living, growing plant.

Wood and energy

What other properties does wood have? It's a relatively good heat insulator (which comes in handy in building construction), but dry wood does burn quite easily and produces a great deal of heat energy if you heat it up beyond its ignition temperature (the point at which it catches fire, anywhere from around 200–400°C, 400–750°F). Although wood can absorb sound very effectively (another useful property in buildings, where people value sound insulation shutting out their neighbors), wooden objects can also be designed to transmit and amplify sounds—that's how musical instruments work. Wood is generally a poor conductor of electricity but, interestingly, it's piezoelectric (an electric charge will build up on wood if you squeeze it the right way).

Environmentally friendly

Wood was one of the first natural materials people learned to use, and it's never lost its popularity. These days, it's particularly prized for being a natural and environmentally friendly product. Forestry is a rare example of something that has the potential to be completely sustainable: in theory, if you plant a new tree for every old tree you cut down, you can go on using wood forever without damaging the planet. In practice, you need to replace like with like and forestry is not automatically sustainable, whatever papermakers like us to believe. A brand new tree has much less ecological value than a mature tree that's hundreds of years old so planting a thousand saplings may be no replacement for felling just a handful of ancient trees. Logging can be hugely environmentally damaging, whether it involves clearcutting a tropical rainforest or selectively felling mature trees in old-growth temperate woodland. Some of the processes and chemicals used in forestry and woodworking are

also environmentally damaging; chlorine, used to bleach wood fibers to make paper, can cause water pollution in rivers, for example. But on the positive side, growing trees remove carbon dioxide from the atmosphere and planting more of them is one way to reduce the effects of climate change. Trees also provide important habitats for many other species and help to increase biodiversity (the wide range of living organisms on Earth). Practiced the right way, forestry is a good example of how people can live in perfect harmony with the planet.

Using wood

How does wood get from the tree to the roof of your house, your bookshelf, or the chair you're sitting on? It's a longer and more complex journey than you might think that takes in harvesting, seasoning, preserving and other treatment, and cutting. Here's a brief guide.

Harvesting

Photo: Chopping down a longleaf pine is only the start of the fun: now you've got to get it home preferably without damaging the rest of the forest in the process. That's where this skidder machine comes in, lifting up the logs with a hydraulic crane and dragging them away with a powerful diesel engine. Photo by Randy C. Murray courtesy of US Army.

Growing plants for food is called agriculture; growing trees for human use is silviculture—and the two things have a great deal in common. Wood is a plant crop that must be harvested just like any other, but the difference is how long trees take to grow, often many years or even decades. How wood is harvested depends on whether trees are growing in plantations (where there are hundreds or thousands of the same species, generally of similar age) or in mature forests (where there's a mixture of different species and trees of widely differing ages).

Planted trees may be grown according to a precise plan and clear-cut (the entire forest is felled) when they reach maturity. A drastic approach like that makes sense if the trees are a fast-growing species planted specifically for use as biomass fuel, for example. Individual trees can also be selectively felled from mixed forests and either dragged away by machine or animal or even (if it makes economic and environmental sense) hauled upward by helicopter, which avoids damaging other nearby trees. Sometimes trees have their bark and small branches removed in the forest before being hauled away to a lumber yard for further processing, though they can also be removed intact, with the entire processing done offsite. It all depends on the value of the tree, the growing conditions, how far away the lumber yard is, and how easy the tree is to transport. Another interesting form of forestry is called coppicing, which involves removing long, thin, low-growing branches from trees such as hazel and willow in a careful and respectful way that does no long-term damage.

Photo: These cottonwood trees might look too spindly for making poles or planks, but they'll not be used for either. They're part of a fast-growing plantation that produces biomass, a type of renewable energy burned in power plants. Biomass is better for the environment because the trees take in as much carbon dioxide when they grow as they give out when they're burned; leaving aside the energy wasted in harvesting and processing, a biomass plant produces no overall carbon dioxide emissions, unlike a traditional power plant fueled by oil or coal. Other "energy crops" include willow, poplar, and eucalyptus. Photo by Warren Gretz courtesy of US DOE/NREL (Department of Energy/National Renewable Energy Laboratory).

Seasoning

A freshly cut tree is a bit like a sponge that comes presoaked in water, so it has to be completely dried out or seasoned before it can be used. Dry wood is less likely to rot and decay, it's easier to treat with preservatives and paint, and it's much lighter and easier to transport (typically, half a freshly felled tree's weight may come from water trapped inside). Dry wood is also much stronger and easier to build with (it won't shrink so much) and if a tree is destined for burning as firewood (or an energy crop), it will burn more easily and give out more heat if it's properly dried first. Typically wood is dried either in the open air (which takes anything from a few months to a year) or, if speed is important, in vast heated ovens called kilns (which cuts the drying time to days or weeks). Seasoned wood is still not completely dry: typically its moisture content varies from about 5–20 percent, depending on the drying method and time.

Preserving and other treatment

In theory, wood might last forever if it weren't attacked by bugs and bacteria; preservatives can greatly extend its life by preventing rot. Different preservatives work in different ways. Paint, for example, works like an outer skin that stops fungi and insects penetrating the wood and eating it away, but sunlight and rain make paint crack and flake away, leaving the wood open to attack underneath. Creosote (another popular wood preservative) is a strong-smelling, oily brown liquid usually made from coal-tar. Unlike paint, it is a fungicide, insecticide, miticide, and sporicide: in other words, it works by stopping fungi, insects, mites, and spores from eating or growing in the wood.

Photo: A fence before (right) and after (left) treatment with wood preservative.

Different kinds of treatment help to protect and preserve wood in other ways. It's a great irony that wood can be used to build a fine home that will last many decades or burn to the

ground in minutes. Wood is so plentiful and burns so well that it has long been one of the world's favorite fuels. That's why fire-protection treatment of wooden building products is so important. Typically, wood is treated with fire retardant chemicals that affect the way it burns if it catches fire, reducing the volatile gases that are given off so it burns more slowly and with greater difficulty.

Cutting

There's a big difference between a tree and the table it might become, even though both are made from exactly the same wood. That difference comes mainly from skillful cutting and woodworking. How much cutting a tree needs depends on the product that's being made. Something like a utility pole or a fence post is not much more than a tree stripped of its branches and heavily treated with preservatives; that's an example of what's called roundwood. Trees need a bit more work in the sawmill to turn them into lumber, timber, or sawnwood (the three names are often used interchangeably, though they can be used with more specific meanings). Flat pieces of wood can be made from trees by cutting logs in two different directions. If you cut planks with the saw running in lines parallel to the length of the trunk, you get plainsawn (sometimes called flatsawn) wood (with ovals or curves on the biggest flat surface of the wood); if you fell a tree, cut the trunk into quarters, then slice each quarter into parallel planks, you get quartersawn wood (with the grain running along the biggest flat surface in broadly parallel stripes).

Photo: Left: Plainsawn wood is cut straight across the trunk, revealing the annual rings as curves or ovals. Right: Quartersawn wood is first quartered and then sawn, revealing a pattern of roughly parallel lines.

See how attractive those patterns look? Not surprisingly, wood that's destined for furniture and other decorative uses has to be cut much more thoughtfully and carefully with regard to what's called its figure. This is the way a particular tree is cut to show off the growth patterns it contains in the most attractive way in the final piece of wood. The figure can also depend on which part of a tree is used. Wood cut from near the stump of a tree will sometimes produce a more attractive figure than wood cut from higher up.

question

1. explain 5 properties of hard wood
2. list 2 classes of wood

week 6; wood

identification of wood

Hardwood is usually from a deciduous tree and softwood is usually from a coniferous one. Hardwoods typically have a higher density(hence hardwood).

Seriously?

For the most part that is the *general* accepted (although broad) definition and yes there are several exceptions.

Little more than that please

Much like identifying wood species; determining if a particular wood is soft or hard depends on the kind of tree it came from. More specifically

Hardwood

Comes from *dicot angiosperm* which mean the tree reproduces with flowers and most have broad leaves that are shed in response to natural climate change or drought. There are several species of evergreen that fit into this category as well. These evergreens are usually located in more tropical/subtropical zones.

up vote13down
voteaccepted

Hardwood trees have large vessels for transporting water. These pores are responsible for the grain appearance in hardwood and are best seen under microscope.

Softwood

Almost all softwood comes from *gymnosperm* plants such as conifers or also known as coniferous trees. Where hardwood tree use flowers for reproduction softwood trees use seeds, such as cones. Conversely to hardwood, water and sap are transported via *medullary rays* and *tracheids* which can appear corrugated (like cardboard).

Comparison

As mentioned before, the best way to be sure is to examine the wood under microscope. In the hardwood you can see the "pores" shown as large holes (In the diagram below it is the picture on top). Softwood does not have visible pores.

Picture comes from **Wikipedia**

Notable exceptions

Just because a wood is classified as soft does not mean it is necessarily softer than a hardwood. There is a wide range of hardness when it comes to the many species of trees. I mentioned earlier that there are a couple of exceptions as far as the generic hardwood/softwood definition are concerned.

- Basla: Is actually a soft hardwood.
- Yew: Is actually a hard softwood.
- Bamboo: Considered a hardwood but classified as a grass.

Question

1. differentiate between hard wood and soft wood
2. list 5 part of a tree

week 7; properties of metals

Reactions of Metals

Differences and similarities between metals and non-metals

Properties:

Metals:

Strong

Malleable and ductile

React with oxygen to form basic oxides

Sonorous

High melting and boiling points

Good conductors of electricity

Good conductors of heat

Non-metals:

Brittle

Brittle

React with oxygen to form acidic oxides

Dull sound when hit with hammer

Low melting and boiling points

Poor conductors of electricity

Poor conductors of heat

Mainly solids at room temp. Exception mercury - liquid at room temp.

Solids, liquids and gases at room.temp.

Shiny when polished

Dull looking

When they form ions, the ions are positive

When they form ions, the ions are negative - except hydrogen that forms a positive ion, H⁺.

High density

Low density

Common Metals and Non-Metals

Metals: Non-metals:

Calcium Sulphur

Potassium Oxygen

Lead Chlorine

Copper Hydrogen

Aluminium Bromine

Zinc Nitrogen

Lithium Helium

Uses of metals and non-metals

Metals

The uses of metals are related to their properties:

They are made into jewellery due to their hard and shiny appearance.

They are used to make pans, since they are good conductors of heat.

They are used in electrical cables, because they are malleable, ductile and good conductors of electricity.

They are strong so used to build scaffolding and bridges.

They make a ringing sound, sonorous, hence their use in bell making.

Non-metals

Used as insulating material around wire cables since they do not conduct electricity.

Used to make pan handles as they are poor conductors of heat.

alloy of metals;

Alloys are metallic compounds composed of one metal and one or more metal, or non-metal, elements.

Examples of common alloys include:

- Steel, a combination of iron(metal) and carbon (non-metal)
- Bronze, a combination of copper(metal) and tin (metal) and
- Brass, a mixture of copper (metal) and zinc (metal)

Properties

Individual pure metals may possess useful properties, such as good electrical conductivity, high strength, and hardness, or heat and corrosion resistance.

Commercial metal alloys attempt to combine these beneficial properties in order to create a metal that is more useful for a particular application than any of its component elements.

The development of steel, for example, required finding the right combination of carbon and iron (about 99% iron and 1% carbon, as it turns out) in order to produce a metal that is stronger, lighter and more workable metal than pure iron.

The precise properties of new alloys are difficult to calculate because elements do not just combine to become a sum of parts, but form through chemical interactions that depend on their component parts as well as the production method. As a result, much testing is required in the development of new metal alloys.

One thing that is for certain is that when metals are alloyed, the melting temperature is always affected. Galinstan[®], a low-melt alloy containing gallium, tin, and indium, is liquid at temperatures above 2.2°F (-19°C), meaning that its melting point is 122°F (50°C) lower than pure gallium and more than 212°F (100°C) below indium and tin.

Galinstan® and Wood's Metal are examples of eutectic alloys. Eutectic alloys have the lowest melting point of any alloy combination containing the same elements.

Composition

Thousands of alloy compositions are in regular production, while new compositions are developed regularly.

Accepted standard compositions include the purity levels of constituent elements (based on weight content).

The makeup, as well as mechanical and physical properties for common alloys, are monitored by international organizations such as ISO, SAE International, and ASTM International.

Production

Some metal alloys are naturally occurring and require little processing to be converted into industrial grade materials. Ferro-alloys such as Ferro-chromium and Ferro-silicon, for instance, are produced by smelting mixed ores and are used in the production of various steels.

Commercial and trade alloys, however, generally require greater processing and are most often formed by mixing molten metals in a controlled environment. Yet, one would be mistaken in thinking that alloying metals is a simple process.

For example, if one were to simply mix molten aluminum with molten lead, we would find that they would separate into layers, much like oil and water. The procedure for combining molten metals, or mixing metals with nonmetals, varies greatly depending on the properties of the elements required.

Metal elements have a great variance in their tolerance of heat and gasses. While elements like the refractory metals are stable at high temperatures, others begin to interact with their environment, which can affect purity levels and, ultimately, the alloy quality.

Important considerations when alloying metals include the melting temperatures of component metals, impurity levels, the mixing environment and the alloying procedure.

In some cases, intermediate alloys must be prepared in order to persuade elements to combine.

An alloy of 95.5% aluminum and 4.5% copper is made by first preparing a 50% mixture of the two elements. This mixture has a lower melting point than either pure aluminum or pure copper and acts as a 'hardener alloy'. This is then introduced to molten aluminum at a rate that creates the right alloy mix.

question

1. describe 5 properties of metal
2. define alloy

week 8; metals

classification of metals

Metals - Ferrous and Non Ferrous

1. **Metals. Exercise 1: Make a list of all the different metals that you know about.**
2. **Metals. Two main groups, 1.Ferrous. 2.Non-Ferrous.**
3. **Metals Ferrous Pure Ferrous Metals Non Ferrous Ferrous Alloys Pure Non Ferrous Metals Copper Non Ferrous Alloys Alum. Brass Bronze Solder Zinc Tin High Speed Steel Copper + Zinc Copper + Tin Lead + Tin Lead Silver High Speed Steel Cutting Tools Gold Mercury Steel Iron Mercury is the only non ferrous metal that is liquid at room temperature. Alloying.**
4. **Ferrous Metals. Ferrous metals: Ferrous metals are metals that consist mostly of iron and small amounts of other elements. Ferrous metals are prone to rusting if exposed to moisture. Ferrous metals can also be picked up by a magnet. The rusting and magnetic properties in ferrous metals are both down due to the iron. Typical ferrous metals include mild steel, cast iron and steel. Examples: 1.Mild Steel. 2.Cast Iron. 3.High Carbon Steel. 4.High Speed Steel. 5.Stainless Steel. Rusting. Magnetism.**
5. **Ferrous Metals. Metal Type. Metal Uses. Melting Point. Mild Steel. A ductile and malleable metal. Mild steel will rust quickly if it is in frequent contact with water. Used as Nuts and bolts, Building girders, car bodies, gates, etc. 1600°C**
6. **Ferrous Metals. Metal Type. Cast Iron. Is a very strong metal when it is in compression and is also very brittle. It consists of 93% iron and 4% carbon plus other elements. Metal Uses. Melting Point. Used as car Brake discs, car cylinders, metalwork vices, manhole covers, machinery bases eg: The pillar drill. 1200°C**
7. **Ferrous Metals. Metal Type. High Carbon Steel . It is a very strong and very hard steel that has a high resistance to abrasion. Properties – Up to 1.5% carbon content. Very tough. Metal Uses. Melting Point. Used for hand tools such as screwdrivers, hammers, chisels, saws, springs and garden tools. 1800°C**
8. **Ferrous Metals. Metal Type. High Speed Steel. HSS is a metal containing a high content of tungsten, chromium and vanadium. However it is very brittle but is also very**

resistant to wear. Metal Uses. Melting Point. Used for drill bits and lathe cutting tools. It is used where high speeds and high temperatures are created. 1400°C

9. Ferrous Metals. Metal Type. Metal Uses. Melting Point. Stainless Steel. Stainless steel is very resistant to wear and water corrosion and rust. Properties – It is an alloy of iron with a typical 18% chromium 8% nickel and 8% magnesium content. Used for kitchen sinks, cutlery, teapots, cookware and surgical instruments. 1400°C

10. Classwork /Homework. 1.) What are the properties of a ferrous metal? 2.) What is cast iron used for? 3.) Why is it good to make hammers out of high carbon steel? 4.) Why is it good to make cutlery out of stainless steel? 5.) List one application and one property of the following alloy steels: (i) Stainless Steel; (ii) High Speed Steel.

forms of metals;

There are different types of metals based on physical and chemical properties. They are the hardest elements which are found on the earth.

Most of the metals are solids in nature except for mercury which shows liquid-like motion. They are bendable into different shapes and have many uses in human life.

They have special properties unlike other elements in the periodic table.

When oxidized they are alkaline in nature. They react with acids and even get rusted when exposed to air for a long time.

They are also present in minute quantities in living beings.

Based on properties, metals can be differentiated as:

1. Ferrous metal :Ex: iron, steel.
2. Non-ferrous metals: Ex; Aluminum, lead, copper.
3. Noble metals: Ex; Gold, platinum, silver.
4. Heavymetals: Ex: Arsenic, cadmium, lead.
5. Metal alloy: These are metals which are made of combination of metals. They are alloyed (mixed) to get desired properties like greater strength, durability and also resistance to corrosion. Also these metals alloys are used to avoid or resist heat generation.

questions

1. differentiate between ferrous metals

2. mention 5 forms of metals

week 9; properties of ceramics and glass

Ceramic Material Characteristics Ceramics and glasses are inorganic, nonmetallic materials consisting of metallic and nonmetallic elements bonded primarily with ionic and covalent bonds. These high strength bonds give rise to the special characteristics of these materials. They occupy a unique place in the spectrum of engineered materials offering many desirable alternatives to the metals and polymers in common usage.

General Characteristics of Structural Materials

Characteristic	Ceramics	Metals	Polymers
Density	Low to High	Low to High	Low
Hardness	High	Medium	Low
Tensile Strength	Low to Medium	High	Low
Compressive Strength	High	Medium to High	Low to Medium
Young's Modulus	Medium to High	Low to High	Low
Melting Point	High	Low to High	Low
Dimensional Stability	High	Low to Medium	Low
Thermal Expansion	Low to Medium	Medium to High	High
Thermal Conductivity	Medium	Medium to High	Low
Thermal Shock	Low	Medium to High	High
Electrical Resistance	High	Low	High
Chemical Resistance	High	Low to Medium	Medium
Oxidation Resistance	Medium to High	Low	Low
Machinability	Medium	Low	Medium

.

There are wide variations in the properties of ceramics and glasses due primarily to differences in bonding and wide variations in chemical composition. However, as a materials class, the following characteristics are typical.

Low to moderate density compared to metals

High modulus of elasticity (stiffness)

Good strength retention at elevated temperatures

Resistant to high temperature creep

Dimensional stability

High compressive strength

Low to moderate tensile and shear strength

High hardness

Corrosion and oxidation resistant

Good electrical insulation properties

Wide range of thermal conductivity

Wide range of thermal expansion coefficient

Brittle

Low impact strength

Sensitive to thermal shock

uses of ceramics;

Uses of Ceramics

Ceramic products are hard, porous, and brittle. As a result, they are used to make pottery, bricks, tiles, cements, and glass. Ceramics are also used at many places in gas turbine engines.

Bio-ceramics are used as dental implants and synthetic bones. Given below are some other important uses of ceramics.

Uses of Whitewares

Whitewares find application in spark plugs, electrical insulators, laboratory equipments, crucibles, dishes, and high-class potteries.

Uses of Clay

Clay is the starting raw material for manufacturing bricks, tiles, terracotta, pottery, earthenwares, sewer, drain pipes, and covers for electrical cables.

Uses of Stonewares

Stonewares are used for constructing sanitary fixtures, such as sinks and bath tubs. Stonewares are also used in the construction of piping vessels, drainage pipes, underground cable sheathings, sewerage pipes, home pipes, absorption towers, valves, and pumps in the chemical industry. They are cheaper than many other construction materials but are rather fragile and once broken, they have no resale value.

Uses of Glass

The main use of glass is to make household glassware, decorative items, and optical lenses. Glasses are used for heat insulation purposes, for example, in ovens. Glass is used as an insulator in metal pipelines, in vacuum cleaners, and on the walls and roofs of houses. Glass is resistant to chemicals. As a result, it is used to filter corrosive liquids such as acids and acid solutions. It is also used for sound insulation. Safety glass is used in aircraft, automobiles, helicopter, and submarines. Glass can also be...

question

1. define ceramics
2. 5 properties of ceramics

week 10; rubber and plastics

Rubber vs. Plastic

In the past, people have seen the progress of technology. From the simple usage of wood and cement to the invention of metal, mankind has really made great progress to become what they are today. Along with this progress are some changes to their lifestyle. These changes

were brought about by the materials surrounding them, and two materials that revolutionized man's life today is rubber and plastic.

It is quite easy to differentiate between the two. By simply looking at each material, one can immediately tell that a particular thing, or object, is made of rubber and not plastic, or vice versa. The only confusion between the two is when the term polymer is used. Yes, polymer as a term that greatly denotes plastics, but nonetheless, this term also describes the characteristic of rubbers. Although rubber is more of the specific elastomer (a viscous or elastic variation of polymers), it is still considered to be a polymer.

Both plastics and rubbers are classified in many different manners. In fact, for plastics alone there are more than 10,000 different types. Some are grouped according to type, quality, design or to the material(s) used to make the rubber or plastic. This is why both materials have become very diverse in terms of their usage. Plastics are used in almost every aspect, like clothing, food, beverages, construction and many others. Its major classes are the more common thermoplastics (plastics that will melt when enough heat is applied) and the thermosets (can only melt or take form once, because they remain solid after they have been solidified). Rubbers are more commonly used in vehicle tires, industrial purposes and basic to advanced warfare.

It is also important to denote that it was around the year 1976 when plastic become widely used around the world. Plastics are basically made from natural gas and petroleum. Both of these raw materials are nonrenewable. Hence, recycling plastics is the immediate solution to the growing demand for the said material. On the contrary, rubber can be either synthetic or natural. Synthetic means that the rubber is made from crude oil, which also happens to be another nonrenewable resource. Nevertheless, the other type (natural rubber) can be harnessed from trees (i.e. rubber tree), in which a substance (latex) is then extracted.

Although both are polymers, plastic and rubber differ because:

1. Rubber can be considered elastomers, and that's why when compared to plastics, they are naturally more elastic.
2. Synthetic rubber is derived from crude oil, whereas synthetic plastic is made of petroleum and natural gas.

identification of rubber and plastics

How to Identify Plastics Here is a preliminary guide that will help you to identify many of the basic types of plastics using simple techniques and readily available tools. Naturally, these tests should be used only for tentative identification because some complex plastic compounds require a rigorous analysis for identification. To initially determine whether a

material is thermoset or thermoplastic, heat a stirring rod (to about 500° F) and press it against the sample. If the sample softens, the material is a thermoplastic; if not, it is probably thermosetting. Next, hold the sample to the edge of a flame until it ignites. Hold the flame for about 10 seconds, if no flame is produced immediately. If the material burns, note the color of the flame, the nature of the smoke, the presence of the soot in the air and, if while burning, the sample drips. Next, extinguish the flame and cautiously smell the fumes. In identifying odor, a known sample is most helpful for comparison. Finally, check your observations against the known characteristics of each plastic given below. Once you have made a tentative identification, it usually is desirable to make one additional test to confirm the results of the original identification.

No Flame Burns, but extinguishes on removal of flame source	Continues to burn after removal of flame source	Materials	Odor	Color of Flame	Drips
Odor Color of flame Drips Speed of Burning Remarks	Thermoplastics	ABS	Acrid	Yellow, Blue edges	No
Acrid Yellow, Blue edges	Yes	Slow	Black smoke with soot in air	Acetals	Formaldehyde
Blue, no smoke	Yes	Slow	Acrylics	Fruity	Blue, Yellow tip
No (cast)	Yes	(molded)	Slow	Flame may spurt if rubber modified	Cellulosics
Acetate	Vinegar	Yellow	Yes	Slow	Flame may spark
Acetate	Butyrate	Rancid	Butter	Blue, Yellow tip	Yes
Slow	Flame may spark	Ethyl Cellulose	Burnt	Sugar	Yellow, Blue edges
Yes	Rapid	Nitrate	Camphor	White	No
Rapid	Propionate	Burnt	Sugar	Blue, Yellow tip	Yes
Rapid	Chlorinated Polyether	Green, Yellow tip	No	Black smoke with soot in air	No
Flame Burns, but extinguishes on removal of flame source	Continues to burn after removal of flame source	Materials	Odor	Color of Flame	Drips
Odor Color of flame Drips Speed of Burning Remarks	Fluorocarbons	FEP	Faint odor of burnt hair	Deforms; no combustion but drips	PTFE
Faint odor of burnt hair	Deforms; does not drip	CTFE	Faint odor of acetic acid	Deforms; no combustion but drips	PVF
Deforms	Nylons	Type 6	Burnt Wool	Blue, Yellow Tip	Yes
Type 6/6	Burnt Wool or Hair	Blue, Yellow Tip	Yes	More rigid than Type 6	Nylon
Phenoxies	Acrid	Yellow	No	Acrid	Yellow
Slow	Black smoke with soot in air	Polycarbonates	Faint, Sweet	Aromatic Ester	Orange
Yes	Black smoke with soot in air	Polyethylenes	Paraffin (wax)	Blue, Yellow Tip	Yes
Slow	Floats in water	Polyphenylene Oxides (PPO)	Phenol	Yellow	Orange
No	Flame spurts; very difficult to ignite	Modified Grade	Phenol	Yellow	Orange
No	Flame spurts; difficult to ignite; soot in air	Polymides	Chars; material very rigid	Polypropylene	Acrid
(burning rags)	Yellow	No	Sweet	Blue, Yellow Tip	Yes
Slow	Float in water; more difficult to scratch than PE	Polystyrene	Illuminating gas	Yellow	Yes
Rapid	Dense black smoke with soot in air	Polysulfones	Orange	Yes	Black smoke
Polyurethanes	Yellow	No	Slow	Black smoke	Vinyls
Flexible	Hydrochloric Acid	Yellow with green spurts	No	Chars, melts	Rigid
Hydrochloric Acid	Yellow with green spurts	No	Chars, melts	Polyblends	ABS/Polycarbonate
Yellow, Blue edges	No	Clack smoke with soot in air	ABS/PVC	Acrid	Yellow, Blue edges
No	Black smoke with soot in air	PVC/Acrylic	Fruity	Blue, Yellow tip	

No - - - - Thermosets Alkyds - - - - - Diallyl Phthalates - - - - Phenolic Yellow No Slow
Black smoke, cracks Diglycol Carbonate - - - - Acrid Yellow No Slow Black smoke with soot
Epoxyes - - - - Phenol Black smoke No Slow Black smoke with soot Malamines Formaldehyde
and fish - - - - - Phenolics Formaldehyde and phenol Phenol and wood or paper Yellow No -
- - - May crack Polyesters - Hydrochloric acid Yellow No b Yellow, blue edges No Slow Cracks
and breaks Silicones b - - - - - Deforms Ureas Formaldehyde - - - - - * Flame retardant
grade b Nondescript e Inorganic filler d Organic filler Credit: Materials

question

1. define rubber
2. list 2 types of rubber