**BASIC TECHNOLOGY JSS 3**

**FIRST TERM**

## SCHEME OF WORK

1. Career prospect and opportunities in technology
2. processing of materials

-wood

3. processing of wood

-conversion

- seasoning

4. processing of wood

- defect in wood

- preservation

5. processing metal

6. processing of ceramics, plastics and rubber

7. drawing practices

- isometric drawing

8. oblique drawing

9. perspective drawing

10. orthographic drawing

11. scale drawing

12. simple blue print reading

**Week 1:** Career Opportunities in Technology

In the contemporary world, technology plays a crucial role in our daily lives, connecting us with friends and family, keeping us updated on current events, and providing entertainment. With our society's dependence on computers, tablets, smartphones, and other high-tech devices, professionals in technology jobs are essential to sustain our technological obsession. According to the Labor Department, tech jobs are anticipated to grow faster than the average for all jobs, with a 12 percent growth rate predicted for this decade. This industry not only offers high demand for hiring but also features well-paying jobs with low unemployment rates. Let's explore some of the best technology jobs of 2017 and understand why these positions are highly regarded.

1. Computer Systems Analyst

Ranked #1 in Best Technology Jobs

Computer systems analysts possess a diverse skill set, requiring expertise in information technology and business knowledge. They custom design computer systems and processes for clients, and the Bureau of Labor Statistics predicts 118,600 job openings in this field from 2014 to 2024.

2. Software Developer

Ranked #2 in Best Technology Jobs

Software developers need to be innovative, creative, and technically proficient. They create new code or troubleshoot existing code to enhance its functionality. The employment growth for software developers is estimated at 19 percent, with more than 135,000 new jobs expected by 2024.

3. IT Manager

Ranked #3 in Best Technology Jobs

The digital workplace's increasing complexity demands more IT managers who coordinate computer-related activities within organizations. Their responsibilities include analyzing computer needs, installing and maintaining hardware and software, securing networks, and exploring new technologies. The BLS expects a 15 percent employment growth in this field from 2014 to 2024.

4. Web Developer

Ranked #4 in Best Technology Jobs

Web developers are responsible for creating website elements, including special effects and search functionality. This profession, often requiring only an associate degree, is one of the fastest-growing jobs. The Labor Department predicts a 27 percent employment growth by 2024.

5. Computer Network Architect

Ranked #5 in Best Technology Jobs

Computer network architects design, build, and maintain various data communication networks, from extensive cloud infrastructures to smaller intranets. The BLS forecasts a 9 percent growth in this profession from 2014 to 2024, resulting in 12,700 new jobs.

6. Database Administrator

Ranked #6 in Best Technology Jobs

Database administrators establish and maintain databases, ensuring operational efficiency and implementing security measures. The BLS estimates 13,400 new positions in this field.

7. Information Security Analyst

Ranked #7 in Best Technology Jobs

Information security analysts play a vital role in safeguarding computer networks and systems. With a predicted 18 percent employment growth from 2014 to 2024, their expertise is in high demand.

8. Computer Support Specialist

Ranked #8 in Best Technology Jobs

Computer support specialists combine customer service and troubleshooting skills to assist computer users in resolving issues. The BLS projects 88,800 new jobs in this field from 2014 to 2024.

9. Computer Systems Administrator

Ranked #9 in Best Technology Jobs

Computer systems administrators identify and resolve network problems, update equipment and software, and are in high demand. The BLS expects 30,200 new jobs in this profession from 2014 to 2024.

10. Computer Programmer

Ranked #10 in Best Technology Jobs

Computer programmers write code to ensure the functionality of software programs. This job involves problem-solving, debugging, and maintaining software. While employment in this field is expected to decline by 8 percent from 2014 to 2024, it remains a crucial role in technology.

Questions:

1. Define a career.

2. List five related professions in technology.

**Week 2: Processing of Materials**

In the realm of wood processing, a diverse array of forest products is engineered, including pulp and paper, construction materials, and tall oil. Paper engineering stands as a subfield within wood processing. The primary wood product categories encompass sawn timber, wood-based panels, wood chips, paper and paper products, and miscellaneous items like poles and railway sleepers. Notably, forest product processing technologies have made remarkable strides, enhancing recovery rates, durability, and protection. Additionally, there is a growing emphasis on utilizing non-timber forest products (NTFPs) such as various grain stalks and bamboo, leading to the development of innovative products like reconstituted wood-panels. It is worth noting that advancements have not been uniform across all forest product utilization sectors. While information on technology acquisition, adaptation, and innovation in the forest-based industrial sector is limited, it is evident that innovations have had a more significant impact on panel product manufacturing than on sawmilling.

Wood processing generates additives for further processing of timber, wood chips, cellulose, and other prefabricated materials.

6 Steps to Successful Tree Felling

When felling trees, employing correct techniques is crucial for ensuring a safe working environment and enhancing overall efficiency.

1. Plan Ahead

Adequate preparation is fundamental in tree removal. By planning the felling process and selecting appropriate forestry equipment, not only do you create a safer working environment, but you also simplify post-felling tasks. Assess potential obstacles, such as overhead lines, roads, or buildings, in the vicinity. Deploy warning signs, especially if the work area intersects with a road or experiences high foot traffic.

2. Check the Felling Direction

Carefully observe the tree to determine its natural falling direction, considering factors like branch growth and wind direction. Clear the area in the intended felling direction, and create a retreat path by clearing approximately 45 degrees behind the tree in both directions.

3. Prune the Trunk

After clearing the area and determining the felling direction, ensure your chainsaw has enough fuel. Prune the trunk by removing branches and twigs to prevent obstructions during the felling cut. Pruning from the top down with a pulling chain (underside of the chainsaw guide bar) is the safest approach.

4. Decide on Cutting Technique

Once the trunk is clear up to shoulder height, make the felling cut. Ensure a uniform hinge thickness and insert the felling wedge or breaking bar before the tree can pinch the guide bar. The cutting technique depends on tree size, slope, and chainsaw dimensions.

5. Check for Diseases

Be cautious if the timber appears discolored, soft, or if the lower trunk section seems swollen or diseased. These signs indicate rot infestation, weakening the wood fibers. Fell the tree in its natural falling direction, and use a winch if uncertain. In severe cases, opt for an extra high stump.

6. Choose Your Tool

Select appropriate felling tools based on the tree's size. For smaller trees, manual force or a long pole might suffice. Felling wedges provide enhanced force, while a rope and winch offer the safest and most potent method for tree felling.

Questions:

1. Explain the processing of wood.

2. List five parts of a tree.

**Week 3: Processing Wood**

Wood conversion is the essential process of transforming freshly felled trees into usable lumber. Several cutting techniques can be employed for this conversion, each catering to specific purposes. If the lumber is intended for construction, it is usually cut plain or through and through. Although this method is cost-effective, it may lead to increased chances of cupping. However, properly used, this wood is considerably strong. For decorative purposes, lumber is cut quartered or rift sawn. While this approach is more expensive and generates more waste, the resulting wood is highly decorative and less prone to cupping and expansion.

Conversion and Processing

Timber conversion involves turning a log into boards or planks through the use of a sawmill. Various factors, such as the log's taper, size, presence of heart rot or cracks, and roundness, influence the optimal cutting methods to maximize timber utilization. Local sawmills or mobile sawmill services are often employed for this purpose, with the choice dependent on the quantity of timber and proximity to the mill.

Processing

Before wood can be converted or seasoned, it must undergo processing. This involves removing branches from the main trunk and cross-cutting it into appropriate lengths based on its intended use, whether for planking, fencing stakes, firewood, or other purposes. Branch wood can also find utility in applications like charcoal production, rustic furniture, and hedge stakes.

Seasoning

Seasoning, or drying wood, is a crucial step post-conversion or processing. Proper seasoning prevents wood from shrinking excessively during use and makes it less susceptible to rot. Adequate air circulation is vital during seasoning; insufficient airflow can trap moisture, leading to bacterial or fungal decay. Unless dried in a kiln, wood typically takes around two years to season effectively.

Seasoning firewood is simpler as it doesn't require worrying about splitting or staining. Proper seasoning methods involve cutting logs to size, cleaving them into quarters or smaller, and stacking them for a year before further processing. Alternatively, leaving logs to dry in their round shape for a year before sawing and splitting them ensures suitable firewood.

For sawn planks or boards, stacking them with air gaps between prevents improper drying and staining. Small pieces of wood, often called sticks or stickers, are placed between the planks to facilitate air circulation. Ensuring even placement of sticks both horizontally and vertically is crucial to prevent warping. Additionally, planks should be stacked away from direct sunlight, which can accelerate drying, potentially causing shakes.

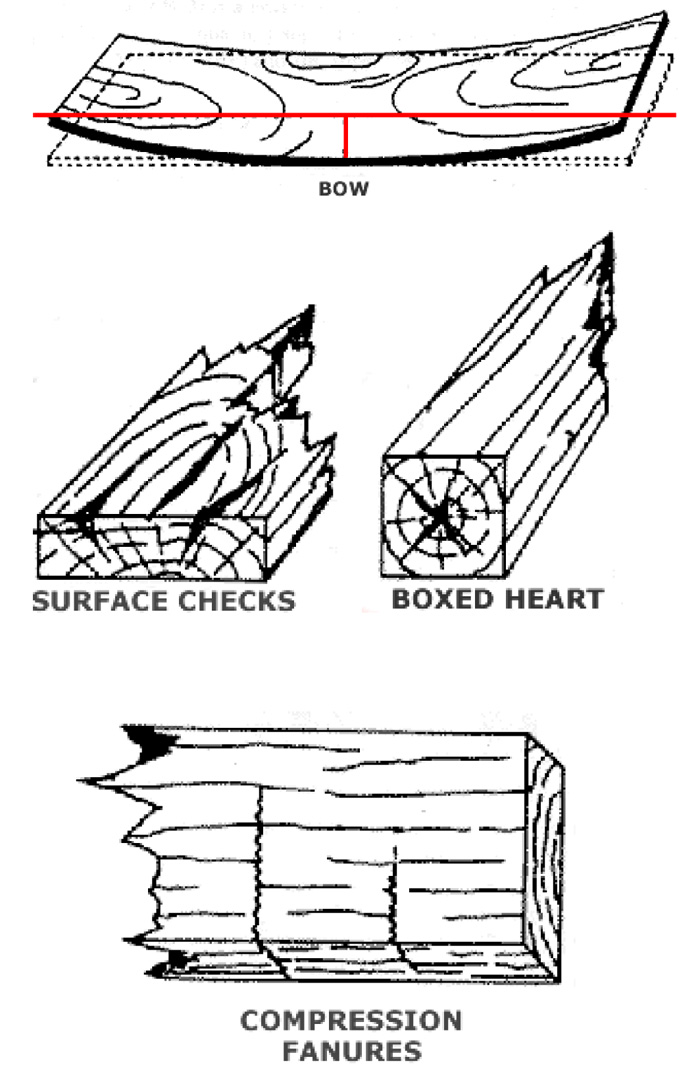
Questions:

1. What is wood conversion?

2. Define wood seasoning.

week 4; processing of wood

# defects in wood; WOOD DEFECTS



Timber is far from being a stable and consistent material. One of the biggest challenges of working with timber is learning to work within the constraints of a timber’s. The following are a list of the most common wood defects.

## BOW (BOWING)

The curvature of a piece of sawn timber in the direction of its length, cf. Spring and Curvature.

## BOXED HEART

A term used when the heart is enclosed within the four surfaces of a piece of sawn timber. Well boxed Heart means that the heart is enclosed within the four surfaces of piece of sawn or hewn timber throughout its entire length, and is reasonably well centered at both ends.

## CHECKS

Are small separations of the wood fibers in a longitudinal Wood Defects direction, not penetrating as far as the opposite or adjoining side of a piece of sawn timber; they usually result from strains developing during seasoning; Surface (or Seasoning) Checks, and End (or Heart) Checks are distinguished.

## COMPRESSION FANURES

Are fractures across the grain in which the fibers are broken transversely or are crushed by compression. Various causes are suggested, such as felling across obstructions, and failure inside the growing tree caused by high winds, growth stresses, etc. ls also known as Felling Shakes, Thunder, Rupture, Lightning, and Transverse Shakes, Upsets, Cross Breaks, or Cross Fractures. Very often they are difficult to detect until the timber is dressed.

## http://www.davidstimber.com.au/wp-content/uploads/2013/08/wood-defects-2.jpg

## CUP (CUPPING)

The curvature of a piece of sawn timber across its width.

## DIAMOND (DIAMONDING)

A distortion due to differential shrinkage in drying that causes a piece of timber originally square (or rectangular) in cross section to become diamondshaped. This defect occurs when the rays pass through diagonal corners of the square (or rectangle) and is caused by  the difference between tangential and radial shrinkage which in many timbers is in the proportion of about 2:1.

## HONEYCOMB

(Internal Checks) The development of checks in the interior of a piece of wood due to drying stresses, usually along the wood rays, often not visible at the surface. This defect  occurs when thick timber is dried too quickly in a seasoning-kiln.

## SPLIT (ALSO KNOWN AS A SHAKE)

Is a longitudinal separation of the fibers which extends to the opposite face or adjoining edge of a piece of sawn timber.

## SPRING

Is the curvature of a piece of sawn timber in the plane of its wide face: known as Crook or Free Side Bend.

## http://www.davidstimber.com.au/wp-content/uploads/2013/08/wood-defects-3.jpg

## TWISTING

Is the spiral distortion of a piece of sawn timber; it may be accompanied by either bowing or spring, or both.

## WANE (WANT)

Is the lack of wood on any face or edge of a piece of sawn timber, usually caused by a portion of the original rounded surface of a long remaining on the piece; bark may or may not be present.

Defects that exist in timber make the planer’s job more difficult and create a need for secondary machinery to produce quality products. It would be nice to be able to feed any piece of rough timber into a moulder and produce a perfect product, free from defects, but this seldom happens.

The numerous processes required to work timber free of defects are well known to the furniture, moulding, flooring and architectural woodwork industries. Most companies split their manufacturing operations into a rough mill and a finish mill. The job of the rough mill is to break down the timber to more uniform sizes and pre-work the main defects from the wood. The following section details the different types of planning processes and discusses the operations in the rough mill.

## SLOPE OF GRAIN

Localised slope of grain can be caused by knots. Slope of grain can also be caused by a slight bend in the tree, which means that when a straight board is cut out of it, there is a bend in the grain. This tends to be a longer feature and may go unnoticed in an appearance product.

Some species of Australian hardwoods (such as Jarrah and Blackbutt) can have “wavy grain”. This gives a very attractive rippled appearance in high surface finish applications.

Where timber is “backsawn”, the slope of grain can give interesting effects in the growth rings that enhance the appearance of the timber for some applications.

wood preservation; Many commonly used wood species can deteriorate if exposed to conditions that support growth of wood-degrading organisms. Wood products can be protected from the attack of decay fungi, harmful insects, or marine borers by applying chemical preservatives. Preservative treatments greatly increase the life of wood structures, thus reducing replacement costs and allowing more efficient use of forest resources. The degree of protection achieved depends on the preservative used and the proper penetration and retention of the chemicals. Some preservatives are more effective than others, and some are more adaptable to certain use requirements. To obtain long-term effectiveness, adequate penetration and retention are needed for each wood species, chemical preservative, and treatment method. Not only are different methods of treating wood available, but treatability varies among wood species—particularly their heartwood, which generally resists preservative treatment more than does sapwood. Although some tree species possess naturally occurring resistance to decay and insects (see Chap. 14), many are in short supply or are not grown in ready proximity to markets. In considering preservative treatment processes and wood species, the combination must provide the required protection for the conditions of exposure and life of the structure. All these factors are considered by the consensus technical committees in setting reference levels required by the American Wood Protection Association (AWPA, formerly American Wood-Preservers’ Association)) and ASTM International (formerly American Society for Testing and Materials). Details are discussed later in this chapter. The characteristics, appropriate uses, and availability of preservative formulations may have changed after preparation of this chapter. For the most current information on preservative formulations, the reader is encouraged to contact the appropriate regulatory agencies, standardization organizations, or trade associations. Note that mention of a chemical in this chapter does not constitute a recommendation.

question;

1. describe wood preservation
2. list 3 methods of applying preservatives

**Week 5: Processing Metal**

Metal processing involves the cooling and shaping of molten metal to create solid structures. The techniques used in this process significantly impact a metal's mechanical properties due to the influence of heat and plastic deformation.

Grain Size Effect:

Metal properties can be altered through heat treating, a process known for changing a metal's grains. Heating metals causes grains to grow, affecting their strength and ductility. Smaller grains result in increased strength but decreased ductility. This relationship is crucial as it determines how dislocations, which affect a metal's movement, interact within the material.

Quenching and Hardening:

Metals undergo various heat treatments, including annealing and quenching. Quenching, which involves rapid cooling, leads to hardness but also brittleness. Subsequent gentle heating and slow cooling, known as tempering, balance hardness and brittleness. Quenching methods have evolved from ancient practices, such as using biological fluids, to contemporary techniques involving water, oil, or saltwater solutions.

Cold Working:

Metals can be strengthened through cold working, a process that prevents dislocation motion. Cold working involves shaping metal, generating dislocations that hinder further movement. Excessive dislocations, however, can lead to brittleness. Heating post-cold working induces recrystallization, restoring the metal's original properties.

Metal Alloys:

Alloys are materials formed by melting metals with other elements. These combinations create a wide array of alloys, each offering unique properties. Aluminum alloys, for instance, have diverse compositions like Al-Li, Duralumin, and Zamak, providing specific characteristics suited for various applications.

Properties of Metals:

Metals exhibit several key properties, distinguishing them from non-metals. They are strong, malleable, and ductile, conducting both electricity and heat effectively. Metals also form positive ions and have high densities and melting points. Non-metals, in contrast, are brittle, poor conductors, and form negative ions, often existing as solids, liquids, or gases at room temperature.

Common Metals and Non-Metals:

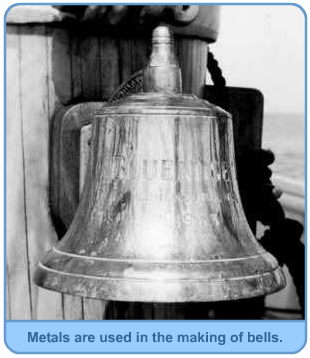
Metals such as calcium, potassium, lead, copper, aluminum, and zinc, find numerous applications. Non-metals like sulfur, oxygen, chlorine, hydrogen, bromine, and nitrogen contrastingly lack the metallic properties, rendering them valuable in various contexts.

Uses of Metals and Non-Metals:

Metals are utilized for their specific properties, making them essential in jewelry, cookware, electrical cables, construction, and bell making. Non-metals like oxygen and hydrogen serve vital roles in different chemical and industrial processes.

Questions:

1. What is metal conversion?

2. Define metal processing.

***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.



### question;

### describe 5 properties of metals

### state 5 uses of metals

**Week 6: Processing of Ceramics and Glass**

Ceramic Material Manufacturing Methods:

Ceramic manufacturing initiates with a blend of powdered base material, binders, and stabilizers. This mixture undergoes shaping through methods like pressing, extruding, injection molding, tape casting, or slip casting. Subsequently, the shaped ceramic is fired (sintered) at high temperatures, creating solid, durable materials. "Green machining" allows pre-firing machining due to the softness of unfired materials. However, firing results in a 20% to 40% volume reduction, making green machining suitable for loose tolerance applications. Tight tolerance parts require post-firing machining using high-speed diamond tools.

Sintering (Firing):

Ceramics achieve densification by exposure to 1800°C - 2000°C for extended periods. Sintering promotes strong bonds between raw ceramic particles, leading to consolidation. Sintering accommodates green machined shapes or raw stock material.

Hot Pressing:

Hot pressing combines forming and firing by subjecting ceramic powder to both sintering temperatures and uniaxial pressure. Simple shapes are produced using high-temperature dies and pressure, shaping the material simultaneously.

Hot Isostatic Pressing (HIP):

HIP involves uniform pressure sintering of ceramics, reducing porosity and enhancing physical properties. Pressurization occurs using inert gases like Argon. The process demands a gas-tight container or pre-sintered ceramic as a pressure vessel.

Chemical Vapor Deposition (CVD):

CVD converts gases into solids by depositing material monolayers onto a heated substrate. Certain ceramics like Silicon Carbide and Silicon Nitride are produced via CVD. Sacrificial targets premachined into desired shapes form ceramic parts through this thermodynamically driven process.

Reaction Bonding:

Reaction bonding employs chemical reactions to solidify ceramic powders. After forming, the binder is burned off, creating a porous preform. Capillary pressure infiltrates liquefied reactants into the preform, generating solid ceramics. Reaction bonded ceramics often exhibit higher porosity.

Processing Plastic:

Various methods are employed for plastic processing, each suited for specific applications:

Injection Molding:

Plastic is softened and injected into a mold. Thermosetting materials harden into an infusible state, limiting their use in this method.

Blow Molding:

Utilized for creating hollow plastic items, this method involves blowing compressed air into a molten tube conforming to a chilled mold.

Thermoforming:

A plastic sheet is formed using molds, applying air or mechanical assistance. Vacuum forming is a common technique.

Transfer Molding:

Primarily used for thermosetting plastics, this process involves heating plastic to a pliable state before molding.

Reaction Injection Molding (RIM):

In RIM, liquid components react exothermically and are injected into molds, requiring lower energy compared to other injection molding systems. Reinforced RIM involves adding materials for increased stiffness.

Compression Molding:

This method is common for thermosetting materials. The material is compressed and heated, undergoing a chemical change and hardening into the desired shape.

Extrusion:

Dry plastic material is heated and forced through a die to create products like film, sheets, tubes, and profiles. The extruded plastic cools on a conveyor belt or in water to solidify.

Feel free to ask if you have any more specific questions or if there's anything else I can help you with!

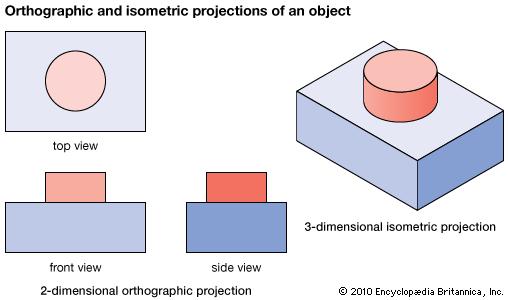
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| Topics Covered |
| List Topics  Natural Rubber Trees  Dry Rubber Production  Tapping Rubber Trees  Processing of Natural Rubber  Natural Rubber Production  Applications of Natural Rubber |
| Background |
| Thailand, Malaysia and Indonesia are the largest producers of natural rubber in the world. Figures from the World Trade organisation posted on www.thailand.com indicate the following worldwide natural rubber production in 1998.   |  |  | | --- | --- | | Country | Production (Tons) | | Thailand | 2,065,000 | | Indonesia | 1,680,000 | | Malaysia | 866,000 | | India | 591,000 | | China | 450,000 | | Africa | 334,000 | | Vietnam | 219,000 | | Latin America | 112,000 | | Sri Lanka | 96,000 | | Philippines | 64,000 | | Others | 113,000 | | **Total** | **6,590,000** |   Natural rubber comes from the Havea brasiliensis tree, which grows in tropical regions. They typically reach 20-30 metres in height on rubber plantations, and are able to produce commercial quantities of latex at about 7 years of age, depending on climate and location. Economical life span of a rubber tree is between 10 to 20 years, but may extend past 25 years in the hands of a skilled tapper and bark consumption.  It should be noted that latex is different to tree sap. Dry Rubber ProductionTapping Rubber TreesHevea trees are tapped no more often than once per day, with 2 or 3 days being the usual practice. In countries like Thailand, tapping occurs in the early morning hours, before dawn, due to the high daytime temperatures and the protective clothing worn to guard against snakes and other hazards. Additionally, flow rates are higher during these times because of increased turgor pressures. A tapper employs a sharp, hook-shaped knife to carefully remove a thin layer of fresh bark from the tree. This exposes the latex vesicles. The cut is typically made at a 25-30° angle to the horizontal, maximizing the exposure of vesicles. The same incision is reopened the next time, usually the following day, by shaving off a small amount of bark. Initially, virgin bark is exposed, working around in panels. The same area may be tapped again after about 7 years.AZoM - Metals, ceramics, polymers and composites - Tapping a rubber tree using angular, semi-spiral incisions.  **Figure 1.** Tapping a rubber tree using angular, semi-spiral incisions.  The thickness of the layer is important as too thick a slice will damage the tree and reduce its productivity and life, while too thin a slice will not produce sufficient latex. Bark is removed in a localised area for a period of time, and then a new area is tapped allowing the tree to repair itself.  The latex runs down and is collected in a cup. Each tree usually produces about half a cup of latex per day and is collected later in the day. Latex will flow for approximately 1 to 3 hours after which time the vesicles become plugged with coagulum. Processing of Natural Rubber Processing of natural rubber involves the addition of a dilute acid such as formic acid. The coagulated rubber is then rolled to remove excess water.  AZoM - Metals, ceramics, polymers and composites - Rolling the latex into thin sheets.  **Figure 2.** Rolling the latex into thin sheets.  Then a final rolling is performed using a textured roller and the resultant rubber sheet is dried. Following this, the rubber is ready for export of further processing. This type of natural rubber accounts for about 90% of natural rubber production.  AZoM - Metals, ceramics, polymers and composites - Final rolling of the latex sheets using a textured roller.  **Figure 3.** Final rolling of the latex sheets using a textured roller.  AZoM - Metals, ceramics, polymers and composites - The dried sheet of latex.  **Figure 4.** The dried sheet of latex. Natural Rubber Production Natural rubber is used in a pure form in some applications. In this case, the latex tapped from trees is concentrated using centriguges, removing water and proteinaceous materials. It is then preserved using a chemical such as ammonia. |
| Applications of Natural Rubber |
| The natural rubber is used for making products such as:  •         Glue  •         Tyres  •         Toys  •         Shoes  •         Condoms  •         Gloves  •         Catheters  •         Balloons  •         Some medical tubing  •         Elastic thread |

question;

1. explain methods of processing ceramics
2. explain processing of natural rubber

week 7; drawing practices

 isometric drawing; A pictorial representation of an object in which all three dimensions are drawn at full scale rather than foreshortening them to the true projection. An isometric drawing looks like an isometric projection but all its lines parallel to the three major axes are measurable.  
  
**Isometric drawing,**also called **isometric projection**, method of graphic representation of three-dimensional objects, used by engineers, technical illustrators, and, occasionally, architects. The technique is intended to combine the illusion of depth, as in a perspective rendering, with the undistorted presentation of the object’s principal dimensions—that is, those parallel to a chosen set of three mutually perpendicular coordinate axes.

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Encyclopædia Britannica, Inc.

The isometric is one class of orthographic projections. (In making an orthographic projection, any point in the object is mapped onto the drawing by dropping a perpendicular from that point to the plane of the drawing.) An isometric projection results if the plane is oriented so that it makes equal angles (hence “isometric,” or “equal measure”) with the three principal planes of the object. Thus, in an isometric drawing of a cube, the three visible faces appear as equilateral parallelograms; that is, while all of the parallel edges of the cube are projected as parallel lines, the horizontal edges are drawn at an angle (usually 30°) from the normal horizontal axes, and the vertical edges, which are parallel to the principal axes, appear in their true proportions.

question

1. define isometric
2. draw isometric block

week 8; oblique drawing

## Definition of oblique drawing

1. **:**  a projective drawing of which the frontal lines are given in true proportions and relations and all others at suitable angles other than 90 degrees without regard to the rules of linear perspe

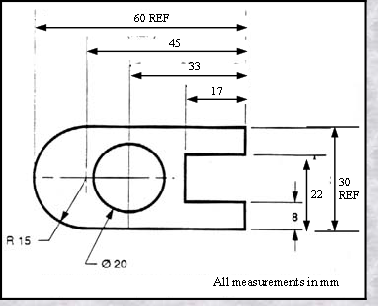
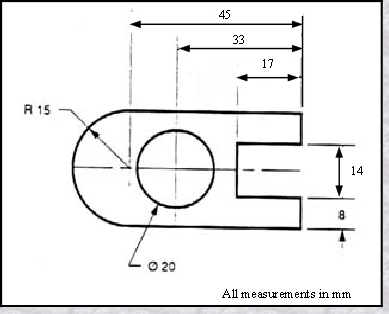
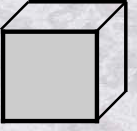
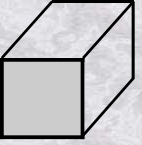
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5. **‘Cabinet Oblique’**  
   **In *Cabinet oblique* the scale (depth) is halved whilst in Cavalier**  
   **oblique the depth scale is the same as in the X and Y directions.**
6. **One remaining drawing conventions is Oblique drawing –**  
     
   **In this convention the angles used are 45 degrees and 90 degrees.  The only difference between the two named styles is in the scale of the dimension going away from the viewer.**  
   **This first example is *Cavalier Oblique* and shows the full scale (1:1) in the axis**
7. **This drawing (shown to the left) is symmetric about the horizontal centre-line.**  
     
   **Centre-lines are chain-dotted and are used for symmetric objects, and also for  showing the centre of circles and holes.**  
   **Drawing dimensions should generally be done directly to the centre-line, as shown on the left.   In many cases this method**  
   **can be clearer than just dimensioning**  
   **between surfaces.**  
     
   **Note again that the measurements show only numbers.  The statement at the bottom of the drawing identifies that these numbers are the dimensions in *Millimetres*.**
8. 
9. 
10. 
11. 
12. **A Simple Guide to Dimensions ... Continued ...**  
      
    **With the left side of the block composed solely of  "radiuses" (radii)  - as shown here, we break our rule that we should not duplicate dimensions. The total length is known because the radius of the curve on the left side is given.  Then, for clarity, we add the overall length of  60 and we note that it is a reference (REF)  dimension.**  
    ***This means that it is not really required.***  
      
    **Somewhere on the paper, usually the bottom, there should be placed information on what measuring system is being used    (e.g. inches and millimetres) and also the scale of the drawing.**

question;

* 1. define oblique drawing
  2. draw oblique block

week 9; perspective drawing

*…a mathematical system for representing three-dimensional objects and space on a two-dimensional surface by means of intersecting lines that are drawn vertically and horizontally and that radiate from one point on a horizon line…*

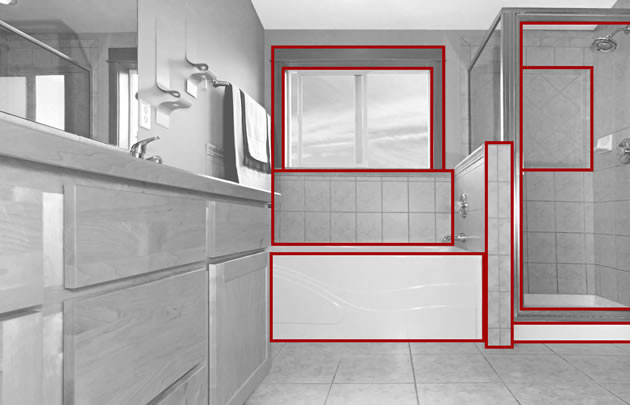
Although this definition sounds complicated, the concept is relatively simple. One point perspective is a drawing method that shows how things appear to get smaller as they get further away, converging towards a single ‘vanishing point’ on the horizon line. It is a way of drawing objects upon a flat piece of paper (or other drawing surface) so that they look three-dimensional and realistic.

Drawing in one point perspective is usually appropriate when the subject is viewed ‘front-on’ (such as when looking directly at the face of a cube or the wall of building) or when looking directly down something long, like a road or railway track. It is popular drawing method with architects and illustrators, especially when drawing room interiors. To understand more about the history of perspective in art, please read our accompanying Guide to Linear Perspective (coming soon).

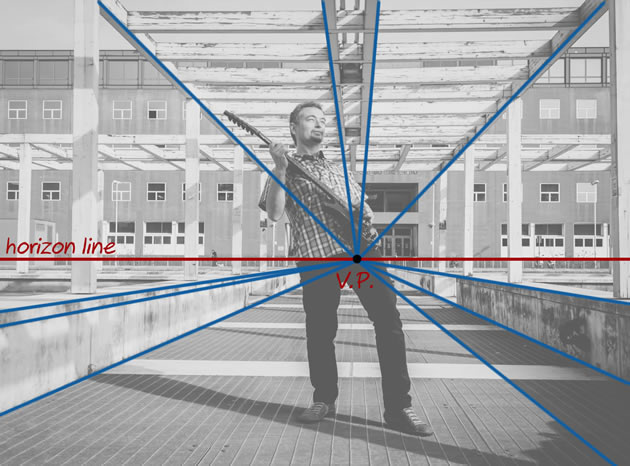
Note: If you need to draw something that is not facing you directly, but rather has a corner nearest to you, two point perspective is likely to be more appropriate.

### Rules of perspective: true shapes, vanishing points and horizon lines

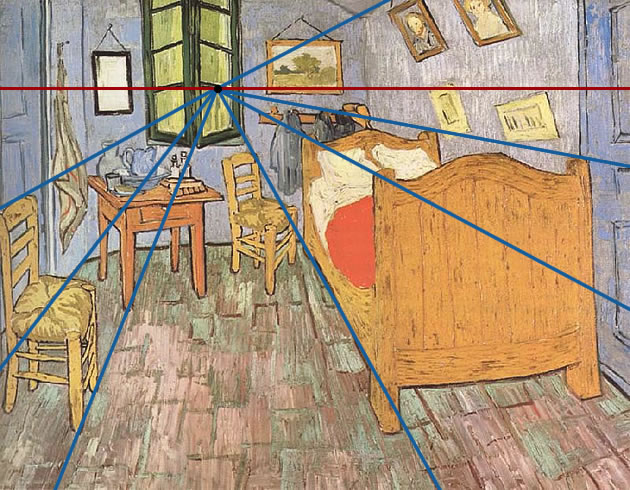
In one point perspective, surfaces that face the viewer appear as their **true shape**, without any distortion. They are drawn using primarily horizontal and vertical lines, as illustrated by the diagram below:

In this one point perspective photo, surfaces facing the viewer are undistorted and show their true shape. For example, we see the side of the bath, window and facing surfaces as ordinary squares and rectangles. Their sides are parallel with the edges of the photograph.

Surfaces that travel away from the viewer, on the other hand, converge towards a single ‘**vanishing point**‘. This is a point that is located directly in front of the viewer’s eyes, on a ‘**horizon line**’ (also known as an ‘eye level line’), as illustrated in the photo below:

All receding edges of the buildings in this one point perspective photo angle towards the single vanishing point. The position of the vanishing point tells us that the photographer was crouching down, with his eye level lowered.

It is possible to draw over photographs to identify vanishing points, horizon lines and true shapes. Studying the work of famous artists can also help you gain an understanding of one point perspective, as shown in the example by Vincent van Gogh below.

‘Bedroom in arles’ by Vincent van Gogh – identifying perspective lines

**Key Points:**

* Surfaces that face the viewer are drawn using their true shape
* Surfaces that travel away from the viewer converge towards a single vanishing point

## One point perspective tutorial

The following tutorial explains how to draw one point perspective step-by-step. The exercises are designed to be completed in the order given, with each one building upon the previous task. All worksheets are available as a free **perspective drawing PDF** that can be printed at A4 size (more worksheets will be added to this over time).

The downloadable PDF has been provided by the Student Art Guide for classroom use and may be issued freely to students (credited to studentguide.com), as well as shared via the social media buttons at the bottom of this page. The worksheets may not be published online or shared or distributed in any other way, as per our terms and conditions.

**Recommended Equipment:**

* Mechanical or ‘clutch’ pencil (with an HB or 2H lead)
* Blank paper and/or the printed worksheets

A ruler and compass can be useful while learning to draw in one point perspective, however most Art students find that these exercises are best completed freehand, with dimensions and proportions gauged by eye. This is so that the skills are easily transferrable to an observational drawing.

question

1. explain 1 point perspective drawing
2. draw an object in 1point perspective

week 10; orthographic drawing

te and imagine you are shopping for a chair to go in your living room. You find the perfect one, but it is way too expensive. Fortunately, you have a cousin that builds furniture. Maybe he can build the chair for you! Describing the chair over the phone was more than a challenge. Your cousin suggests you send him pictures of the chair from multiple angles, along with the measurements.

This experience illustrates the process that a furniture designer must go through in order for the manufacturer to create the chair as intended. Three-dimensional drawings can be used to show the overall concept and design, but they are often not clear or detailed enough. Orthographic drawings can help to overcome those challenges.

An **orthographic drawing** represents a three-dimensional object using several two-dimensional views of the object. It is also known as an orthographic projection. For example, you can see in this image the front, top and side views of an aircraft.

|  |
| --- |
| 3 views of plane |

## Two Different Styles

There are two different styles of orthographic projections:

|  |
| --- |
| First-angle projection |
| ***First-Angle Projection*** |

In **first-angle projection**, each view is shown as if the viewer is looking through the object and projecting the image on the other side. This style is the most common one used in Europe. Here is example of first-angle projection (see video). The red arrows represent the view of the observer with the image being projected on the other side.

|  |
| --- |
| Third-angle projection |
| ***Third-Angle Projection*** |

In **third-angle projection**, each view is created as if the object is projecting an image away from itself onto a plane in front of it. It is the image exactly as the observer sees it on that side. Third-angle projection is the preferred style in the United States.

The results of the two styles are very similar. The main difference is the position of the images. It's all about the **perspective**. Just like first-person and third-person describes perspective in literature, first-angle and third-angle describe the perspective of the projection. Not knowing which style was used may result in a product with a similar image but incorrect orientation.

question

1. differentiate between 1st angle projection and 3rd angle projection
2. draw object in orthographic form