BST - BASIC TECHNOLOGY JSS 2

SCHEME OF WORK

1. First – Aid
2. Rescue operation
3. materials and their uses
   - wood
   - metal
4. materials and their uses
   -ceramics / glass
   - Rubber
   - Plastics

5. Geometric construction

6. Angles

7. Angles [continue]

8. Triangles

9. Triangle [continue]

10. Circle

11. Revision

Week 1; first aid

First aid

From Wikipedia, the free encyclopedia

For other uses, see First aid (disambiguation).

The universal first aid symbol (or the background may be red with a white cross)

A US Navy corpsman gives first aid to an injured Iraqi citizen.

- *Medical portal*

First aid is the assistance given to any person suffering a sudden illness or injury,[1] with care provided to preserve life, prevent the condition from worsening, and/or promote recovery. It includes initial intervention in a serious condition prior to professional medical help being available, such as performing CPR while awaiting an ambulance, as well as the complete treatment of minor conditions, such as applying a plaster to a cut. First aid is generally performed by the layperson, with many people trained in providing basic levels of first aid, and others willing to do so from acquired knowledge. Mental health first aid is an extension of the concept of first aid to cover mental health.

There are many situations which may require first aid, and many countries have legislation, regulation, or guidance which specifies a minimum level of first aid provision in certain circumstances. This can include specific training or equipment to be available in the workplace (such as an Automated External Defibrillator), the provision of specialist first aid cover at public gatherings, or mandatory first aid training within schools. First aid, however, does not necessarily require any particular equipment or prior knowledge, and can involve improvisation with materials available at the time, often by untrained persons.[2]

First aid can be performed on all mammals, although this article relates to the care of human patients.

Contents

[hide]

History[edit]

The binding of a battlefield wound depicted on ancient Greek pottery

Early history and warfare[edit]

Skills of what is now known as first aid have been recorded throughout history, especially in relation to warfare, where the care of both traumatic and medical cases is required in particularly large numbers. The Ancient Egyptians (aka people of KMT) are the first known to use bandages including the high genius doctor Imhotep. They not only used them to create mummies but also as part of the treatments for surgical patients. Most ancient Greek doctors, philosophers, etc. studied in ancient

Egypt and then returned to Greece. The bandaging of battle wounds is shown on Classical Greek pottery from circa 500 BCE, whilst the parable of the Good Samaritan includes references to binding or dressing wounds.[3] There are numerous references to first aid performed within the Roman army, with a system of first aid supported by surgeons, field ambulances, and hospitals.[4] Roman legions had the specific role of capsarii, who were responsible for first aid such as bandaging, and are the forerunners of the modern combat medic.[5]

Further examples occur through history, still mostly related to battle, with examples such as the Knights Hospitaller in the 11th century CE, providing care to pilgrims and knights in the Holy Land.[6]

Formalization of life saving treatments[edit]

During the late 18th century, drowning as a cause of death was a major concern amongst the population. In 1767, a society for the preservation of life from accidents in water was started in Amsterdam, and in 1773, physician William Hawes began publicizing the power of artificial respiration as means of resuscitation of those who appeared drowned. This led to the formation, in 1774, of the Society for the Recovery of Persons Apparently Drowned, later the Royal Humane Society, who did much to promote resuscitation.[7][8]

Napoleon's surgeon, Baron Dominique-Jean Larrey, is credited with creating an ambulance corps (the ambulance volantes), which included medical assistants, tasked to administer first aid in battle.

In 1859 Jean-Henri Dunant witnessed the aftermath of the Battle of Solferino, and his work led to the formation of the Red Cross, with a key stated aim of "aid to sick and wounded soldiers in the field".[6] The Red Cross and Red Crescent are still the largest provider of first aid worldwide.[9]

Esmarch bandage showing soldiers how to perform first aid

In 1870, Prussian military surgeon Friedrich von Esmarch introduced formalized first aid to the military, and first coined the term "erste hilfe" (translating to 'first aid'), including training for soldiers in the Franco-Prussian War on care for wounded comrades using pre-learnt bandaging and splinting skills, and making use of the Esmarch bandage which he designed.[3] The bandage was issued as standard to the Prussian combatants, and also included aide-memoire pictures showing common uses.

In 1872, the Order of Saint John of Jerusalem in England changed its focus from hospice care, and set out to start a system of practical medical help, starting with making a grant towards the establishment of the UK's first ambulance service. This was followed by creating its own wheeled transport litter in 1875 (the St John Ambulance), and in 1877 established the St John Ambulance Association (the forerunner of modern-day St John Ambulance) "to train men and women for the benefit of the sick and wounded".[10]

Also in the UK, Surgeon-Major Peter Shepherd had seen the advantages of von Esmarch's new teaching of first aid, and introduced an equivalent programme for the British Army, and so being the first user of "first aid for the injured" in English, disseminating information through a series of lectures. Following this, in 1878, Shepherd and Colonel Francis Duncan took advantage of the newly charitable focus of St John,[3] and established the concept of teaching first aid skills to civilians. The first classes were conducted in the hall of the Presbyterian school in Woolwich (near Woolwich barracks where Shepherd was based) using a comprehensive first aid curriculum.

First aid training began to spread through the British Empire through organisations such as St John, often starting, as in the UK, with high risk activities such as ports and railways.[11]

first aid materials ;

First aid kit

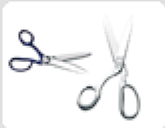
It is crucial to have a proper first aid kit at home, in your car, and in your backpack while hiking, and to know where to find one at work. Care should be taken to ensure that it is complete and kept in good condition. This first aid kit contains the materials required to treat most benign problems. It also helps to stabilize a more serious situation while waiting for professional medical assistance. The basic kit, of which the elements are numbered below, may be completed at home with a thermometer and acetaminophen or ibuprofen based analgesics and, for hiking, with sunscreen, insect repellent, and calming lotion for sunburn and insect bites (calamine). Metallic instruments must be disinfected with alcohol before and after use. Materials that are outdated or partially used, or whose packaging has been damaged by humidity, must be thrown out and replaced.

forms of medications

first aid kit

A basic first aid kit includes:

- Metal scissors with rounded ends

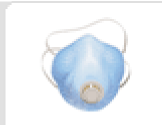


accessories

- Splinter tweezers

nail care

- Disposable gloves and masks to protect against infection



half-mask respirator

- Different sized safety pins to fasten a bandage
- Different sized adhesive bandages, sterile and individually wrapped, to protect a wound
- Gauze compresses, sterile and individually wrapped, to cover an extended wound or stop bleeding
- Different sized gauze bandages in rolls, sterile and individually wrapped
- Thick compress dressings, sterile and individually wrapped, to stop bleeding
- Elastic cloth bands
- Triangular bandages, to make a sling or to keep a splint or compress dressing in place
- Roll of adhesive tape, to secure dressings
- Swabs soaked in antiseptic, individually wrapped, to clean an injury
- Antiseptic cleanser

Risk of infection

All wounds are a means of entry for pathogenic agents and present a risk of infection. Superficial wounds must therefore be cleaned gently with soap and water and treated with gloved or clean hands, an antiseptic product and sterile dressing.Signs of wound infection are increase in pain, swelling and redness around the wound, increase in skin heat, and appearance of pus.

question

1. define first aid
2. list 5 materials in first aid box

week 2; rescue operation

Rescue comprises responsive operations that usually involve the saving of life, or prevention of injury during an incident or dangerous situation.

Tools used might include search and rescue dogs, mounted search and rescue horses, helicopters, the “jaws of life”, and other hydraulic cutting and spreading tools used to extricate individuals from wrecked vehicles. Rescue operations are sometimes supported by special vehicles such as fire department’s or EMS heavy rescue vehicle.

Overview

Ropes and special devices can reach and remove individuals and animals from difficult locations including:

Air-sea rescue
Cave rescue
Combat search and rescue
Confined space rescue
Mine rescue
Rope rescue
Search and rescue
Ski patrol

Surface water rescue

Swiftwater rescue

Urban search and rescue

Vehicle extrication

Wilderness

Rescue operations require a high degree of training and are performed by rescue squads, either independent or part of larger organizations such as fire, police, military, first aid, or ambulance service.

More on rescue operations check Rescue Operation For a Collapse

steps involved in rescue operation ‘

Expanded Five Stages of Rescue by Ken Snider STAGE 1 The first stage is Reconnaissance which is divided into two parts, Information and Observation. The Information part is the gathering and documenting all of the available data to assist in making an intelligent rescue action plan. This Data should include: • Time and all factors surrounding the collapse. • Numbers of persons suspected in building at the time of collapse. • Type of structure, date built, if blueprints are available, and if so, where. • Hazards known, and what can and is being done about them. • Service locations of power, water, gas, etc. • Number of persons who made it out before the structure collapsed and how they got out. • Number of persons who got out after collapse and how they got out, as well as the damage and injuries they noticed. • Local knowledge, is it available about the building, if so, who and where. • If a disaster plan was used during the collapse and it's success. • Locations of dense populations in the building for that time of day. • Resources that could be used to assist in the rescue operation: tools, medical kits, fire equipment, etc. • Available rescuers and resources that are onsite now. • Rescue resources that will be onsite and when • Rescue resources that can be called in and how. • Any other information that can be gathered prior to entering structure. After the Information phase has started the Observation phase begins. The Observation phase requires that trained personnel survey the entire building looking for any clues as to stability, hazards, areas of entrapment and possible entry points. This data is passed on to the information personnel who record it for the rescue meeting which will take place prior to the commencement of Stage 3. During the Information / Observation phase [Stage 1] while the exterior is being surveyed, the other half of the team gears up for stage 2. When the personnel working on Stage 1 have completed the exterior of the building they move into the building with the Stage 2 personnel allowing the two stages to be carried out concurrently to save time. Inside the building the reconnaissance of information and observation continue as the Stage 2 personnel go to work. STAGE 2 As the Stage 1 staff record all building data such as hazards and stability, the Stage 2 personnel mark exit routes and get walking wounded in the correct direction to get out to the triage area. Stage 2 personnel are also responsible for the assessment regarding victims trapped in the building. They will document and mark [spray paint] the locations and degree of entrapment of the trapped victims. No rescue is carried out in Stage 2 other than assisting the walking wounded to the triage area in the safe zone. This is because a large picture must be developed prior to rescuing anyone in the collapse, to ensure the right resources get to the most easily accessible persons first. Save as many (as fast as we can) before spending 15 hours for one person requiring 75 ton air bags. The Stage 1 + 2 teams will only search out the locations of surface casualties. They will not waste time by attempting to search under the debris and into areas which will require specialty gear and personnel. Speed with caution is the goal of Stage 1 + 2 so that a proper plan can be formulated for rescue. It should be noted that both teams should be noting all materials and supplies that can be used for the next stages, such as: • Fire Extinguishers, Fire Hose, Fire Blankets, Axes [found in fire station cabinets] • Carpet, Wire, Nails, Screws, Tools • Wood, Building Supplies • Doors [that can be used as stretchers] • Ladders, Scaffolding • Spray Paint, Tape • Furniture suitable for cribbing • Emergency Lights [{still usable} shut them off so they may be useful later unless it will hinder the walking wounded] • First Aid Kits and Medical Supplies • Food and Drinking Water All teams entering the building will be assigned a search direction and area. In regards to Stage 1 + 2 teams, they will be given the entire accessible building with the first team in, going always to the right and the second always going to the left. This is the means for a safe form of navigation inside a hostile, dangerous and very dark environment. In theory the two teams containing both Stage 1 + 2 personnel will meet and the end of Stage 1 + 2 will be at hand. Once Stages 1 + 2 have been completed, the teams will meet with the rescue manager outside at the safe zone, and brief all rescue management staff. While Stages 1 + 2 where going on inside, the rescue staff outside gathered all able bodied survivors and put them to work setting up the safe zone. The safe zone has a four level triage area [critical, stable, minor wounds {walking wounded}, dead], a staging area for equipment and personnel, communications area [radio, briefing, debriefing, P.A. etc.], rest shelters, and volunteer assignment area, with the appropriate personnel staffing each one [volunteers]. At the meeting, the rescue staff must be briefed and regrouped after the Stage 1 + 2 information has been placed into the rescue action plan and then, and only then, may Stage 3 begin. STAGE 3 Stage 3 involves the further exploration of survival points. The teams are now sent to the densely populated areas inside the building which only light entrapment is suspected. The stage 3 teams will take with them a very long line up of volunteers, all given single simple tasks. These tasks are: • Stretcher bearers [marked on their clothes with "S" front and back] • Debris haulers • Runners [marked with "R" front and back] • Tool persons Since there are so many persons that want to help and so much menial labour to be done, the volunteers are named with their function, and are taught only one task. The Stretcher bearers use doors or whatever and transport all persons pulled out by the Stage 3 teams to triage, then return to the end of the line, following the rescue team. The Debris haulers form human chains to move small amounts of debris to the outside. The Runners [in pairs of two] act as messengers keeping rescue base outside informed of the teams progress and requirements [as radios will be in high demand]. Tool people, their job is to bring the item they keep with them at all times to the rescuers when called for. These persons are called by tool name thus preventing the need for the rescue team leaders to have to remember the volunteers names. When a tool or tools [hand tools] are required the team leader simple calls out that tool's name and it will come to him. Once the tool is done with, the volunteer caring for it takes it, and goes back behind the Stage 3 search team. The job of the Stage 3 search team is to get only lightly [very lightly] entrapped and unable to walk victims out, and locate and document voids that persons may be trapped in. These voids will not be searched at this time but will be well marked and documented for the next stages of the rescue. The primary goal of the Stage 3 teams is to find and remove all surface causalities. All Stage 3 teams should be in the safe zone prior to starting Stage 4. Most of the saveable casualties will be saved in Stage 3 if time is not spent attempting to get at trapped persons [voids]. It is imperative that the volunteers be equipped with the basic safety items to prevent wasting resources on helping them and that they are appropriately chosen for the task they are given to carry out. STAGE 4 Stage 4 involves exploration of voids and selected debris removal. The Stage 4 personnel will go to the highest probability of survival areas identified by the Stage 3 teams, starting with the area suspected to have the highest number of entrapped persons first. Once at these locations they will start a subsurface search for survivors. The search usually starts with a call and listen. A call and listen is carried out with voice or hammer. With the hammer method a pipe or beam appearing to go into the void in question which would transmit vibrations is struck solidly three times then a minute of silence is observed by all in the team. If required, the Stage 4 team will use small tools and light hydraulics for selected debris removal to gain access to the voids. Stage 4 teams will document any areas that will require further exploration with heavy equipment or rescue specialists. The same types of volunteers will be needed to follow the trained rescuers as were used in Stage 3. Often it is this stage that electronic subsurface search gear is used and those personnel operating this type of equipment will have special demands of the search teams. This must be discussed at the team briefing prior to starting the search areas. Stage 4 will require advanced urban search technicians, as they will be venturing into unstable areas of the building, and may be required to use technical equipment such as: S.C.B.A., Sniffers, Rope Gear, etc. STAGE 5 Stage 5 requires all teams evacuate the building and only one Stage 5 team is usually allowed to work in the structure at one time. This is due to the heavy equipment that will be used to gain access to all voids and subsurface areas that may contain casualties, alive or dead. The main objective of the highly trained Stage 5 rescuers is to systematically remove debris to gain access to the remaining victims. The areas identified by the Stage 4 search teams will be prioritized by the rescue manager, then access will be gained to these areas via appropriate means, such as: • Heavy debris removal with Hydraulics. • Trenching or Tunnelling using cutting tools. • Lifting or moving large masses with crane or backhoe. • Forcing with Air Bags. • Burning through walls with Electric Oxygen Plasma Cutters • etc. Stage 5 continues with constant assessment of the structures stability. If stability is being lost, the building is shored up and the stability is maintained throughout the operation. When all the Stage 5 operations are complete, a thorough search is conducted of the entire building. If the search proves negative to any possibility of any persons alive or dead being in the building, then the rescue manager will have the structure secured and sealed, ready for demolition. The rescue unit may move to the next site. To save the most lives if many buildings are involved the heavy rescue teams will leave all Stage 5 work until all buildings have been done up to Stage 4. This is due to the incredible amount of time and resources that have to be spent on a Stage 5 operation for few results. There is not much logic in digging out bodies while survivors are dying in another building, lightly entrapped.

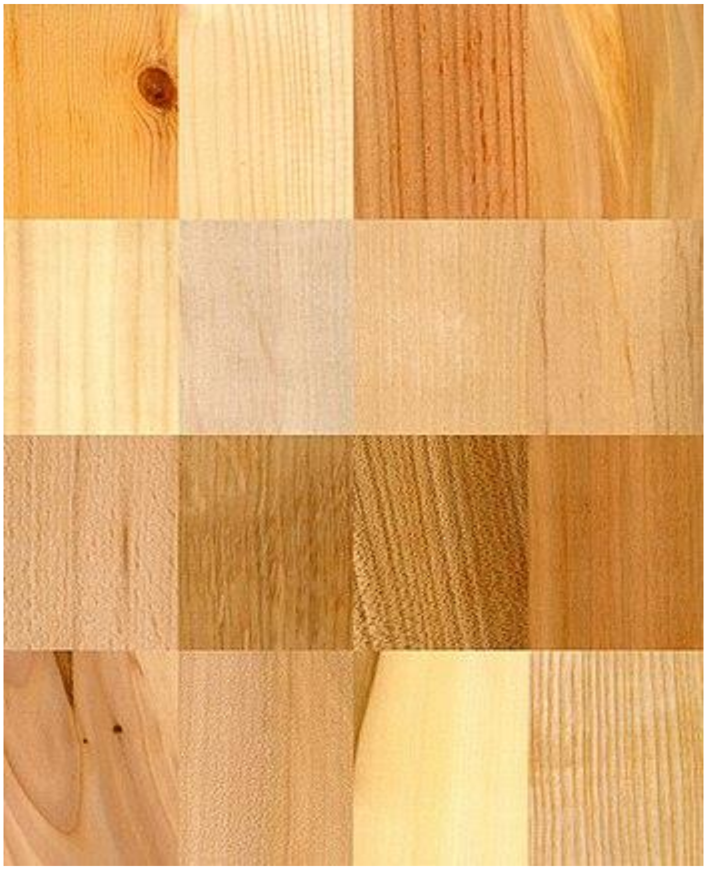
question

1. define rescue operation
2. list 5 steps involved in rescue operation

week 3; materials and uses

wood; *For small forests, see Woodland. For wood as a commodity, see timber. For other uses, see Wood (disambiguation).*

"Wooden" and "Heartwood" redirect here. For other uses, see Wooden (disambiguation) and Heartwood (disambiguation).



Pine
Spruce
Larch
Juniper
Aspen
Hornbeam
Birch
Alder
Beech
Oak
Elm
Cherry
Pear
Maple
Linden
Ash

Wood is a porous and fibrous structural tissue found in the stems and roots of trees and other woody plants. It is an organic material, a natural composite of cellulose fibers that are strong in tension and embedded in a matrix of lignin that resists compression. Wood is sometimes defined as only the secondary xylem in the stems of trees,[1] or it is defined more broadly to include the same type of tissue elsewhere such as in the roots of trees or shrubs.[citation needed] In a living tree it performs a support function, enabling woody plants to grow large or to stand up by themselves. It also conveys water and nutrients between the leaves, other growing tissues, and the roots. Wood may also refer to other plant materials with comparable properties, and to material engineered from wood, or wood chips or fiber.

Wood has been used for thousands of years for fuel, as a construction material, for making tools and weapons, furniture and paper, and as a feedstock for the production of purified cellulose and its derivatives, such as cellophane and cellulose acetate.

In 2005, the growing stock of forests worldwide was about 434 billion cubic meters, 47% of which was commercial.[2] As an abundant, carbon-neutral renewable resource, woody materials have been of intense interest as a source of renewable energy. In 1991 approximately 3.5 billion cubic meters of wood were harvested. Dominant uses were for furniture and building construction.[3]

Contents

[hide]

uses of metals

Uses of metals

We use different metals for different jobs as they have different properties: it’s important to choose the right metal for the job.

Choosing the right metal for the job

Metal	Properties	Uses
aluminium 	low density, does not corrode	suitable for the bodies of planes
copper 	good conductor of electricity, does not react with water	electrical wires as it is a good conductor water pipes due to its low reactivity
gold 	very good conductor of electricity, unreactive	electrical connections on circuit boards - due to its conductivity jewellery - due to its lack of reactivity
steel 	cheap and strong	suitable for building material

When you answer questions on properties of metals it's important to make sure that the property you give is relevant to the use you've been asked about: eg, copper is unreactive with water but that is not relevant if the question asks you about its use in electrical wires.

question

1. list 5 uses of wood
2. list 5 uses of metals

week 4; materials and their uses

ceramics and glass; 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

uses of rubber; Compared to vulcanized rubber, uncured rubber has relatively few uses. It is used for cements; for adhesive, insulating, and friction tapes; and for crepe rubber used in insulating blankets and footwear. Vulcanized rubber, on the other hand, has numerous applications. Resistance to abrasion makes softer kinds of rubber valuable for the treads of vehicle tires and conveyor belts, and makes hard rubber valuable for pump housings and piping used in the handling of abrasive sludge.

The flexibility of rubber is often used in hose, tires, and rollers for a wide variety of devices ranging from domestic clothes wringers to printing presses; its elasticity makes it suitable for various kinds of shock absorbers and for specialized machinery mountings designed to reduce vibration. Being relatively impermeable to gases, rubber is useful in the manufacture of articles such as air hoses, balloons, balls, and cushions. The resistance of rubber to water and to the action of most fluid chemicals has led to its use in rainwear, diving gear, and chemical and medicinal tubing, and as a lining for storage tanks, processing equipment, and railroad tank cars. Because of their electrical resistance, soft rubber goods are used as insulation and for protective gloves, shoes, and blankets; hard rubber is used for articles such as telephone housings, parts for radio sets, meters, and other electrical instruments. The coefficient of friction of rubber, which is high on dry surfaces and low on wet surfaces, leads to the use of rubber both for power-transmission belting and for water-lubricated bearings in deep-well pumps

uses of plastics; he relatively low density of most plastic materials means the end products are lightweight. They also have excellent thermal and electrical insulation properties. However, some can even be made as conductors of electricity when required. They are corrosion resistant to many substances which attack other materials, and some are transparent, making optical devices possible. They are also easy to mould into complex shapes and forms, allowing integration of different materials and functions. And in the event that the physical properties of a given plastic do not quite meet the specified requirements, the property balance can be modified with the addition of reinforcing fillers, colours, foaming agents, flame retardants, plasticisers etc., to meet the demands of the specific application.

For these reasons and more, plastics are increasingly used in:


Packaging


Building and Construction


Transportation


Medical & Health


Electrical & Electronic

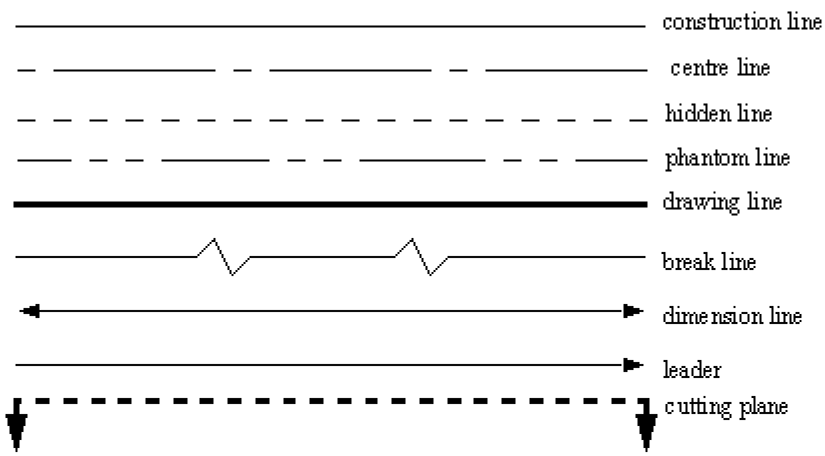

Agriculture


Sport & Leisure

question

1. list 5 uses of ceramics
2. list 5 uses of rubber

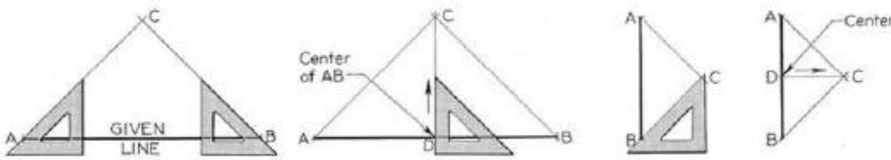
week 5; geometric construction



bisection of line

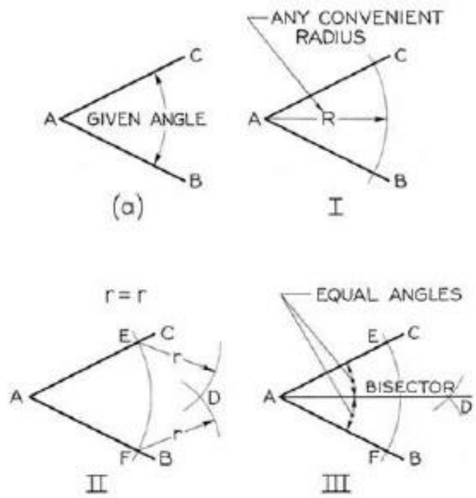
Bisecting a line with a triangle & T-Square

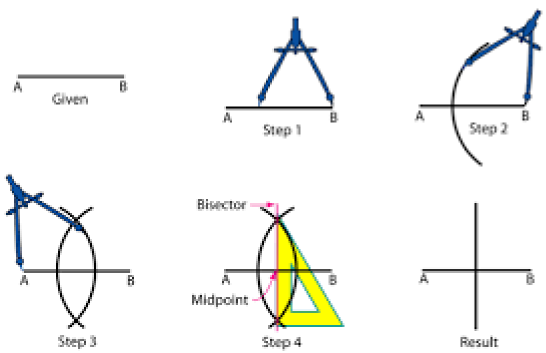
- From endpoints A & B, draw construction lines at 30, 45, or 60 degrees with the given line.
- Then through their intersection, C, draw a line perpendicular to the given line to locate the center C



Bisecting an angle

- Angle BAC is to be bisected
- Strike large arc R
- From intersection points C & B, strike equal arcs r with radius slightly larger than half BC, to intersect at D
- Draw line AD, which bisect the angle





division of lines ;

question

1. list 5 types of lines
2. bisect line [AB] = 80mm

week 6; angles

Types of angles

In geometry, angles can be classified according to the size of the angle.

In these lessons, we will learn the following types of angles:
right angles, acute angles, obtuse angles, straight angles, reflex angles and full angles.

The following table shows the different types of angles: right angles, acute angles, obtuse angles, straight angles, reflex angles and full angles. Scroll down the page if

you need more explanations about each type of angles, videos and worksheets.

What are the types of angles?
The following video will demonstrate and distinguish between the different types of angles: right, acute, obtuse, straight, reflex and full angles.

- **Show Step-by-step Solutions**

Worksheets

Practice Types of Angles with the following worksheets
Types of Angles - Acute, Obtuse, Reflex
Angles in a straight line
Angles at a point
Geometry Worksheets

What are Right Angles?

A **right angle** is an angle measuring **90** degrees. Two lines or line segments that meet at a right angle are said to be perpendicular.

The following video explains more about right angles.

- Show Step-by-step Solutions

What are Acute Angles?

An **acute angle** is an angle measuring between **0** and **90** degrees.

What are Obtuse Angles?

An **obtuse angle** is an angle measuring between **90** and **180** degrees.

What are Straight Angles?

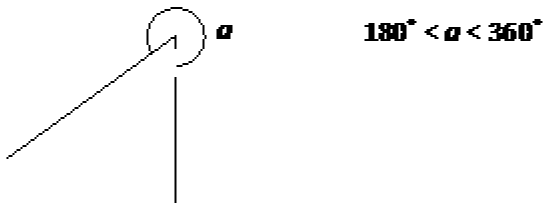
A **straight angle** is a straight line and it measures **180** degrees.

What are the differences between a right, acute, obtuse and straight angle?

- Show Step-by-step Solutions

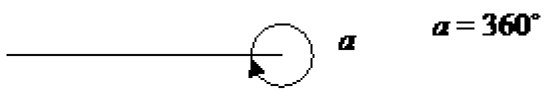
What are Reflex Angles?

A reflex angle is an angle measuring between **180** and **360** degrees.



What are Full Angles?

A full angle is an angle of one complete turn which is 360 degrees.



An **angle of one whole turn** is 360˚.

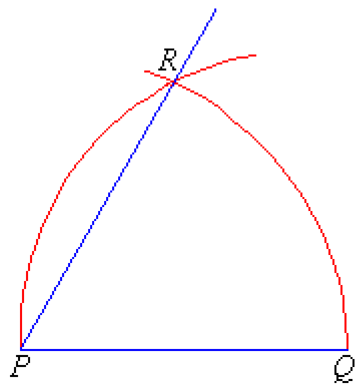
Constructing Angles of 60º, 120º, 30º and 90º

In this section, we will consider the construction of some angles with special sizes.

Constructing a 60º Angle

We know that the angles in an equilateral triangle are all 60º in size. This suggests that to construct a 60º angle we need to construct an equilateral triangle as described below.

Step 1: Draw the arm *PQ*.
Step 2: Place the point of the compass at *P* and draw an arc that passes through *Q*.
Step 3: Place the point of the compass at *Q* and draw an arc that passes through *P*. Let this arc cut the arc drawn in Step 2 at *R*.
Step 4: Join *P* to *R*. The angle *QPR* is 60º, as the Δ *PQR* is an equilateral triangle.



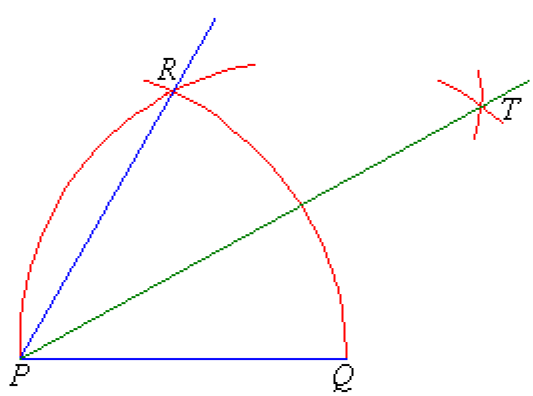
Constructing a 30º Angle

We know that:

$\frac{1}{2}$ of $60^\circ = 30^\circ$

So, to construct an angle of 30º, first construct a 60º angle and then bisect it. Often, we apply the following steps.

Step 1: Draw the arm *PQ*.
Step 2: Place the point of the compass at *P* and draw an arc that passes through *Q*.
Step 3: Place the point of the compass at *Q* and draw an arc that cuts the arc drawn in Step 2 at *R*.
Step 4: With the point of the compass still at *Q*, draw an arc near *T* as shown.
Step 5: With the point of the compass at *R*, draw an arc to cut the arc drawn in Step 4 at *T*.
Step 6: Join *T* to *P*. The angle *QPT* is 30º.

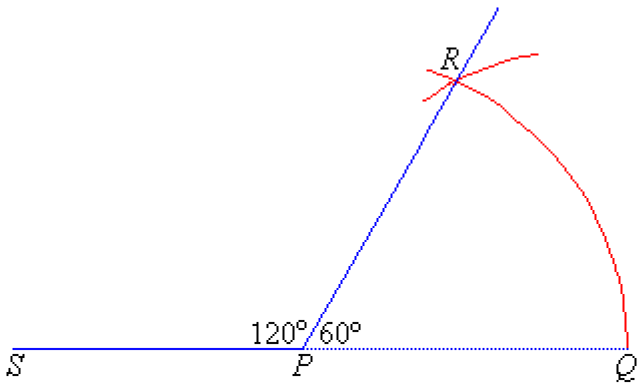


Constructing a 120º Angle

We know that:

$$60^\circ + 120^\circ = 180^\circ$$

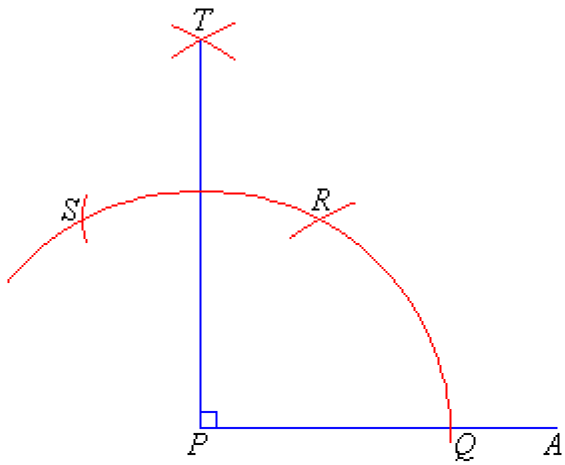
This means that 120º is the supplement of 60º. Therefore, to construct a 120º angle, construct a 60º angle and then extend one of its arms as shown below.



Constructing a 90º Angle

We can construct a 90º angle either by bisecting a straight angle or using the following steps.

Step 1: Draw the arm *PA*.
Step 2: Place the point of the compass at *P* and draw an arc that cuts the arm at *Q*.
Step 3: Place the point of the compass at *Q* and draw an arc of radius *PQ* that cuts the arc drawn in Step 2 at *R*.
Step 4: With the point of the compass at *R*, draw an arc of radius *PQ* to cut the arc drawn in Step 2 at *S*.
Step 5: With the point of the compass still at *R*, draw another arc of radius *PQ* near *T* as shown.
Step 6: With the point of the compass at *S*, draw an arc of radius *PQ* to cut the arc drawn in step 5 at *T*.
Step 7: Join *T* to *P*. The angle *APT* is 90º.

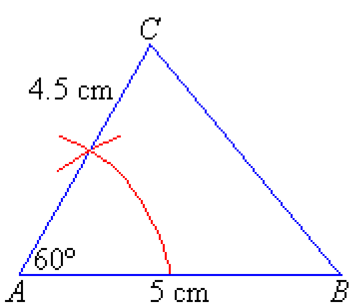


Example 12

a. Use a ruler and compass only to construct a triangle ABC with $AB = 5$ cm, $\angle BAC = 60°$ and A
b. Measure the size of $\angle ABC$ and the size of $\angle ACB$. Hence, calculate the angle sum of triangle
c. Measure BC to the nearest millimetre. Hence, find the perimeter of triangle ABC in millimetres

Solution:

a. **Step 1:** Draw a line, AB, 5 cm long.
Step 2: Use the compass to construct a $60°$ angle at A.
Step 3: Use the ruler to find C such that AC is 4.5 cm long.
Step 4: Join B to C.
The ΔABC is the required triangle.



b. Using a protractor, we find that:
$\angle ABC = 55°$
$\angle ACB = 65°$
$\therefore$ Angle sum of the triangle $ABC = 60° + 55° + 65°$
$= 180°$

c. Using the ruler, we find that:

$BC = 48$ mm

$\therefore$ Perimeter $= AB + BC + CA$

$= 5\text{ cm} + 48\text{ mm} + 4.5\text{ cm}$

$= 50\text{ mm} + 48\text{ mm} + 45\text{ mm}$

$= 143\text{ mm}$

Activity 10.3

1. Construct the following angles using a ruler and compass:

a. $30°$ b. $45°$ c. $135°$ d. $225°$

e. $120°$ f. $150°$ g. $210°$ h. $245°$

2. Use a ruler and compass to construct the triangle PQR with $PQ = 8$ cm, $PR = 7.5$ cm and $\angle QP$
3. Use a ruler and compass to construct a square $ABCD$ of side 6 cm.

4a. Use a ruler and compass to construct a triangle PQR with $PQ = 7$ cm, $\angle QPR = 30°$ and $\angle PQ$
b. Calculate the size of $\angle PRQ$ and check your answer with a protractor.
c. Measure PR and QR to the nearest millimetre. Hence find the perimeter of triangle PQR in m

5a. Use a ruler and compass to construct a triangle ABC with $AB = 8$ cm, $BC = 6$ cm and $\angle ABC$
b. Measure the size of $\angle BAC$ and hence calculate the size of $\angle ACB$.
c. Measure AC to the nearest millimetre. Hence find the perimeter of triangle ABC in millimetre

6a. Use a ruler and compass to construct a trapezium $PQRS$ with $PQ = 8$ cm, $PS = 7$ cm, $QR = 7$
$\angle QPS = 60°$ and $\angle PQR = 60°$.
b. Measure RS to the nearest millimetre. Hence find the perimeter of the trapezium $PQRS$.

7a. Use a ruler and compass to construct a triangle PQR with $PQ = 6$ cm, $\angle QPR = 30°$ and $\angle PQ$
b. Calculate the size of $\angle PRQ$ and check your answer with a protractor.
c. Measure PR and QR to the nearest millimetre. Hence find the perimeter of triangle PQR in mi

8a. Use a ruler and compass to construct a trapezium $DEFG$ with $DE = 6.5$ cm, $\angle DEF = 90°$, $EF = 5.5$ cm, $\angle EFG = 90°$ and $\angle EDG = 60°$.
b. Calculate the size of $\angle DGF$ and check your answer with a protractor.
c. Calculate the sum of the interior angles of the trapezium.
d. Measure DG and FG to the nearest millimetre. Hence find the perimeter of trapezium $DEFG$ millimetres.

Question;

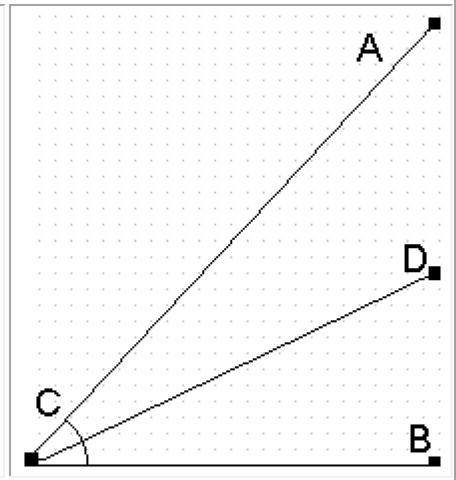
1. define angles
2. mention 3 types angles

week 7; angles

bisection and construction of angles

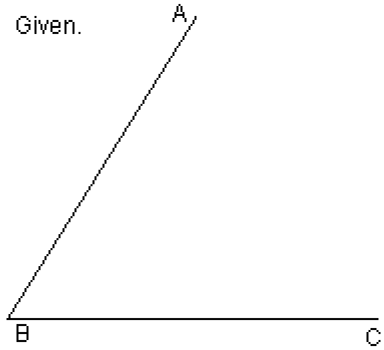
Definition The **bisector of an angle** is a ray whose end point is the vertex of the angle and which divides the angle into two equal angles.

In the diagram to the right, the ray CD is the bisector of the angle ACB if and only if the angles ACD and BCD have equal measures.

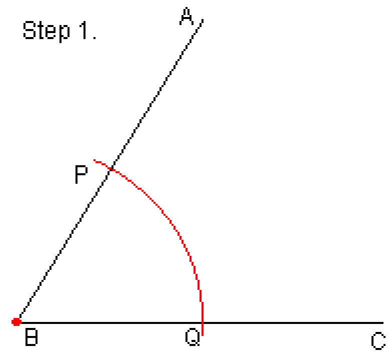


Bisect Angle. To construct the Angle Bisector of an angle follow the following steps.

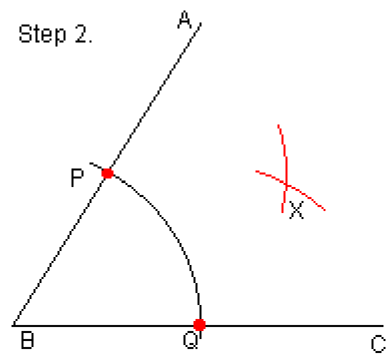
Given. An angle to bisect. For this example, angle ABC.



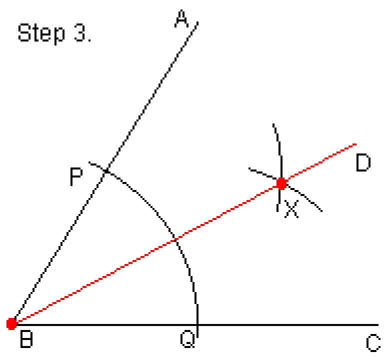
Step 1. Draw an arc that is centered at the vertex of the angle. This arc can have a radius of any length. However, it must intersect both sides of the angle. We will call these intersection points **P** and **Q** This provides a point on each line that is an equal distance from the vertex of the angle.



Step 2. Draw two more arcs. The first arc must be centered on one of the two points **P** or **Q**. It can have any length radius. The second arc must be centered on whichever point (P or Q) you did NOT choose for the first arc. The radius for the second arc MUST be the same as the first arc. Make sure you make the arcs long enough so that these two arcs intersect in at least one point. We will call this intersection point **X**. Every intersection point between these arcs (there can be at most 2) will lie on the angle bisector.



Step 3. Draw a line that contains both the vertex and **X**. Since the intersection points and the vertex all lie on the angle bisector, we know that the line which passes through these points **must** be the angle bisector.



Now, try to do this construction yourself.

Applet Instructions

- **Drawing lines**. Start by depressing the ruler button. Then, click on the point where the line should begin. You can then move the mouse to the other point and click again.
- **Drawing arcs**. Start by depressing the compass button. Click on the center of the arc. Use the up and down arrow keys to increase or decrease the angle of the arc (or use the method listed below). Click again to place the arc.
- **Drawing arcs with same radius**. If you hold down the "Shift" key when you select the first point of the arc the radius of your new arc will be same as that of last arc drawn.
- **Selecting Items**. Make sure both the ruler and compass are not depressed. Then, you can select items by clicking on them. The color of the marks will change from red to green. To deselect something click on it again.
- **Adjusting lines and arcs**. After placing a line or arc you can make adjustments to them. First, selecting the object you want to change. Then, by clicking (not holding down mouse button) on different points you can make different adjustments.
    - Lines. Clicking on either endpoint of a line will release that point and thus allow you to move.
    - Arcs. When you select an arc four points will be drawn in addition to the arc. By clicking on each of these points you can modify a different aspect of the arc.
        1. Center of the circle containing the arc. You can move the center while leaving the center of the curve in the same place. If you hold down the shift key while moving this point, the entire arc will move and keep the same relative position to the center. Be

careful not to move the curve off of the screen.

2. Center of the curve. You can move the position of the curve while leaving the center of the circle in the same place. If you hold down the shift key while you are moving, the radius is remain constant.
3. Ends of the curve. You can adjust the length of the curve.

Question

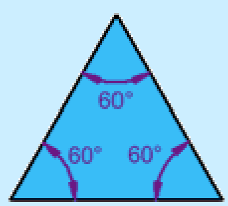
1. bisect angle 90 and 45
2. bisect angle 60, 30 and 15

week 8; triangle

Equilateral, Isosceles and Scalene

There are three special names given to triangles that tell how many sides (or angles) are equal.

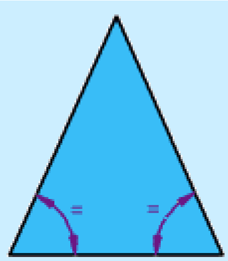
There can be **3**, **2** or **no** equal sides/angles:



Equilateral Triangle

Three equal sides

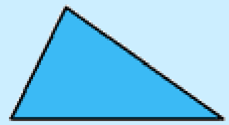
Three equal angles, always 60°



Isosceles Triangle

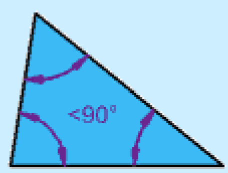
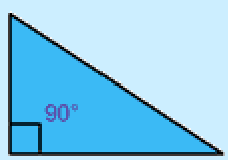
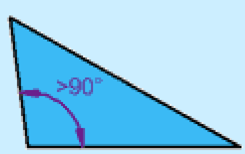
Two equal sides

Two equal angles

	Scalene Triangle **No** equal sides **No** equal angles

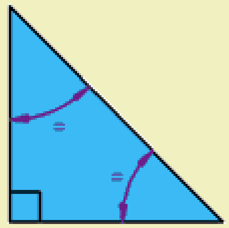
What Type of Angle?

Triangles can also have names that tell you what **type of angle** is inside*:*

	Acute Triangle All angles are less than 90°
	Right Triangle Has a right angle (90°)
	Obtuse Triangle Has an angle more than 90°

Combining the Names

Sometimes a triangle will have two names, for example:



Right Isosceles Triangle

Has a right angle (90°), and also two equal angles

Can you guess what the equal angles are?

Play With It ...

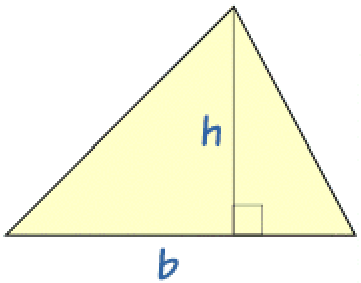
Try dragging the points around and make different triangles:

You might also like to play with the Interactive Triangle.

Perimeter

The perimeter is the distance around the edge of the triangle: just add up the three sides:

Area



The area is **half of the base times height**.

- "b" is the distance along the base

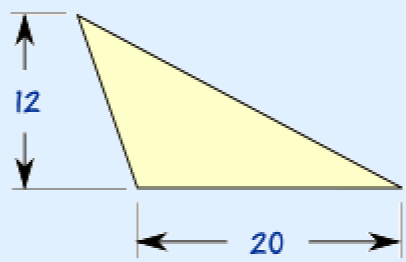
- "h" is the height (measured at right angles to the base)

$$\text{Area} = \tfrac{1}{2} \times b \times h$$

The formula works for all triangles.

Note: a simpler way of writing the formula is **bh/2**

Example: What is the area of this triangle?



*(Note: 12 is the **height**, not the length of the left-hand side)*

Height = h = 12

Base = b = 20

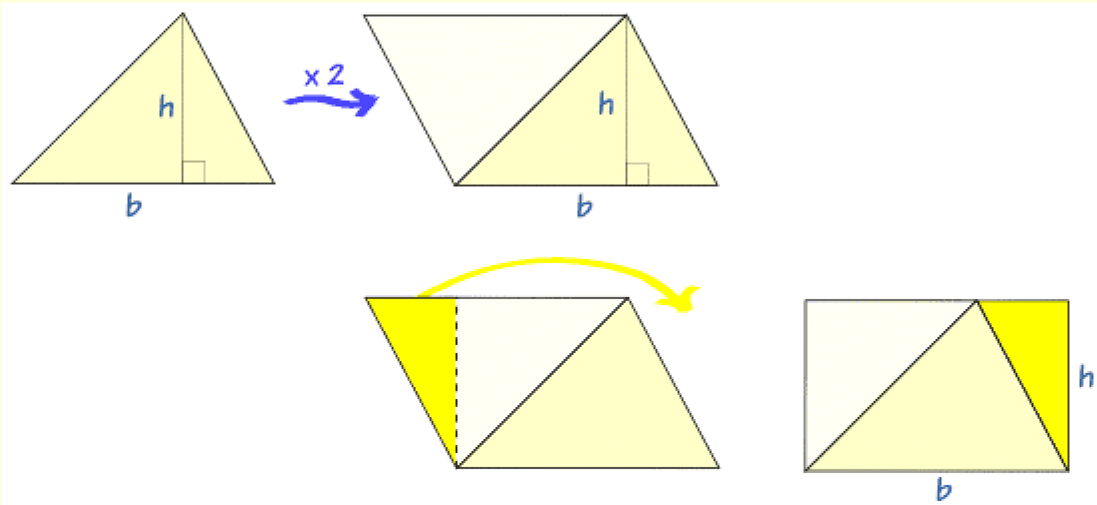
Area = ½ × b × h = ½ × 20 × 12 = **120**

The base can be any side, Just be sure the **"height" is measured at right angles to the "base"**:

(Note: You can also calculate the area from the lengths of all three sides using Heron's Formula.)

Why is the Area "Half of bh"?

Imagine you "doubled" the triangle (flip it around one of the upper edges) to make a square-like shape (a parallelogram) which can be changed to a simple rectangle:



THEN the whole area is **bh**, which is for both triangles, so just one is **½ × bh.**

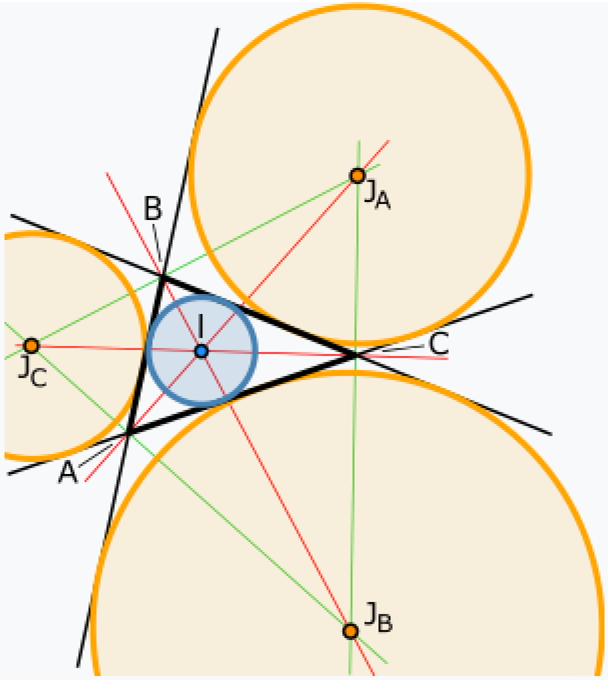
Question;

1. define triangle
2. list 3 types of triangles

   week 9; triangles

   inscribing circle in a triangle

"Incircle" redirects here. For incircles of non-triangle polygons, see Tangential quadrilateral and Tangential polygon.



A triangle (black) with incircle (blue), incenter (I), excircles (orange), excenters (J_A,J_B,J_C), internal angle bisectors (red) and external angle bisectors (green). The green triangle is the excentral triangle.

In geometry, the **incircle** or **inscribed circle** of a triangle is the largest circle contained in the triangle; it touches (is tangent to) the three sides. The center of the incircle is a triangle center called the triangle's incenter.[1]

An **excircle** or **escribed circle**[2] of the triangle is a circle lying outside the triangle, tangent to one of its sides and tangent to the extensions of the other two. Every triangle has three distinct excircles, each tangent to one of the triangle's sides.[3]

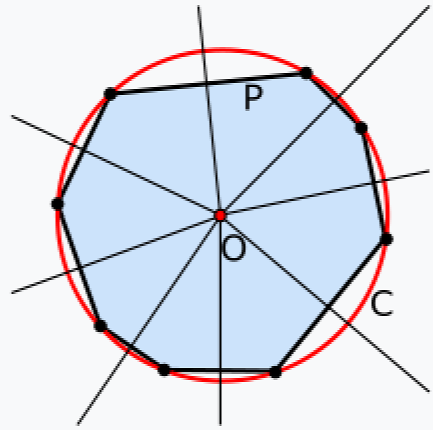
The center of the incircle, called the **incenter**, can be found as the intersection of the three internal angle bisectors.[3][4] The center of an excircle is the intersection of the internal bisector of one angle (at vertex *A*, for example) and the external bisectors of the other two. The center of this excircle is called the **excenter** relative to the vertex *A*, or the **excenter of *A***.[3] Because the internal bisector of an angle is perpendicular to its external bisector, it follows that the center of the incircle together with the three excircle centers form an orthocentric system.[5]:p. 182

Polygons with more than three sides do not all have an incircle tangent to all sides; those that do are called tangential polygons. See also Tangent lines to circles.

Circumscribed circle

From Wikipedia, the free encyclopedia

This article is about circumscribed circles in Geometry. For the use of circumscribed in Biological classification, see Circumscription (taxonomy).



Circumscribed circle, *C*, and circumcenter, *O*, of a *cyclic polygon*, *P*

In geometry, the **circumscribed circle** or **circumcircle** of a polygon is a circle which passes through all the vertices of the polygon. The center of this circle is called the **circumcenter** and its radius is called the **circumradius**.

A polygon which has a circumscribed circle is called a **cyclic polygon** (sometimes a **concyclic polygon**, because the vertices are concyclic). All regular simple polygons, all isosceles trapezoids, all triangles and all rectangles are cyclic.

A related notion is the one of a minimum bounding circle, which is the smallest circle that completely contains the polygon within it. Not every polygon has a circumscribed circle, as the vertices of a polygon do not need to all lie on a circle, but every polygon has a unique minimum bounding circle, which may be constructed by a linear timealgorithm.[2] Even if a polygon has a circumscribed circle, it may not coincide with its minimum bounding circle; for example, for an obtuse triangle, the minimum bounding circle has the longest side as diameter and does not pass through the opposite vertex.

Question;

1. Construct triangle [AB] = 60mm
2. [AB] 70mm

   Week 10; circles

The following figures show the different parts of a circle: tangent, chord, radius, diameter, minor arc, major arc, minor segment, major segment, minor sector, major sector. Scroll down the page for more examples and explanations.

Circle

In geometry, a circle is a closed curve formed by a set of points on a planethat are the same distance from its center O. That distance is known as the radius of the circle.

Diameter

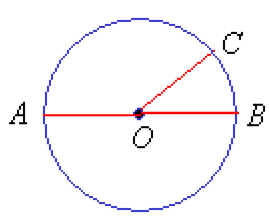
The diameter of a circle is a line segment that passes through the center of the circle and has its endpoints on the circle. All the diameters of the same circle have the same length.

Chord

A **chord** is a line segment with both endpoints on the circle. The diameter is a special chord that passes through the center of the circle. The diameter would be the longest chord in the circle.

Radius

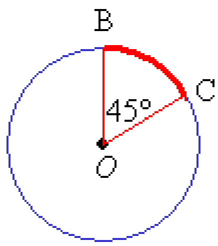
The radius of the circle is a line segment from the center of the circle to a point on the circle. The plural of radius is radii.



In the above diagram, O is the center of the circle and $\overline{OB}$ and $\overline{OC}$ are radii of the circle. The radii of a circle are all the same length. The radius is half the length of the diameter. $\overline{OB} = \frac{1}{2}\overline{AB}$

Arc

An arc is a part of a circle.



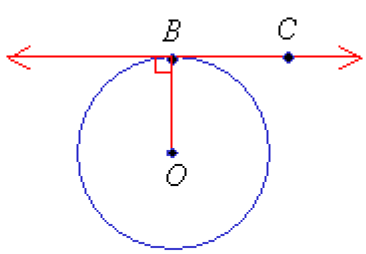
In the diagram above, the part of the circle from B to C forms an arc.

An arc can be measured in degrees.

In the circle above, arc BC is equal to the ∠BOC that is 45°.

Tangent

A tangent is a line that touches a circle at only one point. A tangent is perpendicular to the radius at the point of contact. The point of tangency is where a tangent line touches the circle.



In the above diagram, the line containing the points B and C is a tangent to the circle.

It touches the circle at point B and is perpendicular to the radius $\overline{OB}$. Point B is called the point of tangency.

is perpendicular to $\overline{OB}$ i.e. $\overline{BC} \perp \overline{OB}$.

Parts of a Circle

The following video gives the definitions of a circle, a radius, a chord, a diameter, secant, secant line, tangent, congruent circles, concentric circles, and intersecting circles.
A **secant line** intersects the circle in two points.

A **tangent** is a line that intersects the circle at one point.

A **point of tangency** is where a tangent line touches or intersects the circle.

Congruent circles are circles that have the same radius but different centers.

Concentric circles are two circles that have the same center, but a different radii.

Intersecting Circles: Two circles may intersect at two points or at one point. If they intersect at one point then they can either be externally tangent or internally tangent.

Two circles that do not intersect can either have a common external tangent or common internal tangent.
In the **common external tangent**, the tangent does not cross between the two circles.
In the **common internal tangent**, the tangent crosses between the two circles.
Question;

1. define circle
2. list 5 part of a circle