SHAC
Day Camp
Program

V.1.0

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Overview

(Guide for Day Camp Chairs and Program Directors)

Day Camp is an organized program conducted by the council under certified leadership. Day Camp is "the camp that comes to the boy." Sites are located in districts around the council convenient for maximum participation by Scouts (Camping and Outdoor Program Guide, page 6). Day Camp has a direct impact on Sam Houston Area Council's Strategic Plan and on District and Council Journey to Excellence (JTE) goals:

Cub Scout Camping: Increase the percentage of Cub Scouts attending day camp, family camp, and/or resident camp

Cub Scout Advancement: Increase the percentage of Cub Scouts earning rank advancements.

Youth Retention: Improve retention rate of traditional members.

Membership/Youth Growth: Increase number of registered youth.

Projects developed are based on Scouting literature (i.e., Cub Scout Handbooks, How-To Book, Webelos' Leader Guide) in order to be age appropriate, advancement based and easily implemented by current and future camp Program Directors delivering the program across the Council. Each Day Camp should offer a minimum of the following for each rank:

Six to Ten 45 minute Craft/Skills Sessions (or equivalent time equaling approximately 270 minutes)

Two (2) Field or Indoor Sports as permitted by facility

Shooting Sports (Archery, BBs, Wrist Rockets) as permitted by facility.

The 270 minutes of Craft and Skills that are to be offered are outlined in this document. Choose the number of Craft and Skills Sessions based on the amount of time your camp has to deliver the program. The delivery and instruction method is left up to the individual camp as long as it covers the outlined achievements for that specific rank along with the Projects/Crafts during the sessions.

Field Sports offered are left up to the discretion of each Camp depending on facilities available. Shooting Sports (i.e., BBs, Archery, Wrist Rockets) are highly encouraged as Cubs may only participate in these activities at a District/Council event but again, are left up to the discretion of the Camp depending on facilities available. If a Camp needs to fill more time, use the provided program aide materials to enhance the topic in the advancements listed, but do not add or change from what is listed.

Webelos Adventure: First Responder

Complete 1-8

Requirments and What you will need

Do all of these:

1. Explain what first aid is. Tell what you should do after an accident.

What Is First Aid?

You've probably had at least a few scratches and scrapes in your lifetime, and an adult in your family or the nurse at school knew just what to do. Maybe you've taken care of a few small injuries by yourself. All of this is first aid.

First aid is also knowing exactly *what* to do first to help a person with a more serious injury or illness. First aid is what you must do immediately. Someone has to help right away, and you might be the only person there who can do this job. It's important to know the right ways to help.

What to Do After an Accident

- First, stay calm and think! This may be hard to do- but try. The victim will feel better, knowing you are in control.
- If the victim seems badly hurt, send someone to call for medical help. If no one is there to do that, call for help and give what assistance you can to the victim.
- Do move a badly hurt person unless the victim is in further danger. It may be necessary to move the person if there is a nearby fire or if the person is lying in the road. But never move an injured person unless it is absolutely necessary.
- Check the victim for "hurry cases (addressed later).
- Treat the victim for shock (addressed later).

2. Show what to do for the hurry cases of first aid:

First Aid for Hurry Cases

If a person cuts a leg and blood is oozing, he or she needs first aid but is not going to die. A broken arm is a serious injury, but it won't kill.

Hurry cases are different. Unless you act fast and five the right first aid, the victim may die within a few minutes. The four hurry cases are:

• Breathing has stopped. It must be started quickly.

• Blood is spurting from a wound. The bleeding must be stopped quickly.

• Poison has been swallowed. The Poison must be made harmless. Get help quickly.

• Heart attack or stroke. Get help quickly

Protective Measures to Take When Handling Wounds and Giving CPR

Treat all blood as if it contains blood-borne viruses. Do not use bare hands to stop bleeding; always use a protective barrier (see the list below). Cover any cuts or scrapes you may have. Always wash exposed skin with hot water and soap immediately after treating the victim, and don't use a sink in a food preparation area.

The following equipment should be included in all first aid kits and used when giving first aid to someone in need:

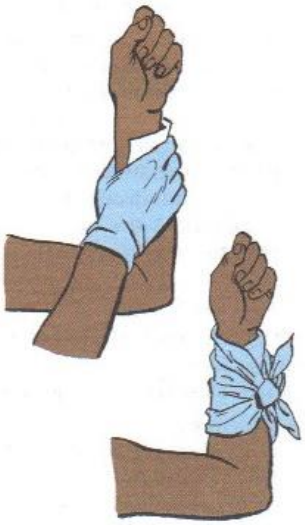
• Latex gloves, to be used when stopping bleeding or dressing wounds

• A mouth-barrier device, to be used when rendering rescue breathing or CPR (cardiopulmonary resuscitation)

• Plastic goggles or other eye protection, to prevent a victim's blood from getting into the rescuer's eyes in the event of serious arterial bleeding

• Antiseptic, for use in sterilization or cleaning exposed skin areas, particularly if soap and water are not available.

a. Serious bleeding



In a bad accident you might see blood spurting out of a wound. It doesn't ooze or flow slowly - it gushes out like a fountain. It must be stopped! Now!

Avoid direct contact with blood. Use latex gloves.

Grab the wound with your gloved hand and press hard!

Raise a cut arm or leg above the level of the victim's heart. that will help slow the bleeding.

With your free hand, grab your neckerchief, handkerchief, or other cloth. Fold it into a pad and quickly press it on the wound. Then press hard again. If you can, tie the pad in place with a bandage. Don't remove the pad even if it gets soaked with blood. Put another pad and bandage over the first. Send for medical help.

Direct pressure on the wound usually stops bleeding. If it doesn't press hard on one of the pressure points show to stop bleeding in an arm or leg. The arteries that carry blood from the hear d are squeezed against the bone. It's like stepping on a garden hose to stop the water.

b. Heart attack or sudden cardiac arrest

Heart attack is the number one cause of death in the United States. Most hear attacks happen to adults, especially older people. Here are the signs of a heart attack:

• A feeling of pain or pressure in the center of the chest lasting more than a few minutes. It may come and go. Sharp, stabbing twinges of pain are rarely signals of a heart attack. If in doubt, seek medical help.

• Sweating when the room is not hot

• Feeling like throwing up

• Shortness of breath

• A feeling of weakness

If you think a person is having a heart attack, call for medical help at once.

c. Stopped breathing

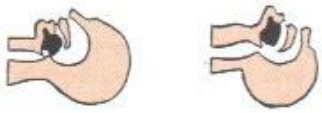
In drowning cases and some other accidents, the victim's breathing may stop. It must be started again quickly, or the person will die. Look at the chest. Is it moving up and down? Put your ear to the victim's mouth. Do you feel victim's breath? If the answer is no, start rescue breathing. This is a way of blowing air from your own lungs into the victim's lungs.

Rescue Breathing

Note: If available, a mouth-barrier device should be used when rendering rescue breathing or CPR.

Place the victim face up. Lift the chin with your right hand, and push the forehead down with your left hand.

This shows why it is important to tilt the head back. If the head is not tilted back, the tongue blocks the airway.



Pinch the victim's nostrils together. Seal your mouth over the victim's mouth. (If the victim is a small child, don't pinch the nostrils. Blow into both the mouth and nose at the same time.) Blow into the victim's mouth to fill the lungs with air. Look to make sure the chest rises.

Remove your mouth. Take a deep breath and county slowly to five - about five seconds (Count to three if the victim is a child). Watch to make sure the victim's chest falls as air escapes from the lungs. Then give another breath.

If the victim's chest does not rise when you blow in, the airway must be blocked. Turn the head to one side With your fingers feel whether something is in the mouth. If there is, pull it out.

If the airways still seems to be blocked, turn the victim's head face up. Place the heel of your hand midway between the victim's rib cage and belly button. Push upward quickly several times.

Don't give up. Continue rescue breathing until medical help arrives and takes over.

d. Stroke

A stroke occurs when a blood vessel in the brain is blocked or bursts. Without blood and the oxygen it carries, part of the brain starts to die. The part of the body controlled by the damaged area of the brain can't work properly.

Brain damage can begin within minutes so it's important to know the symptoms of stroke and to act fast. Quick treatment can help limit damage to the brain and increase the chance of a full recovery.

Symptoms of a stroke happen quickly. A stroke may cause:

- Sudden numbness, tingling, weakness, or loss of movement in your face, arm, or leg, especially on only one side of your body.
- Sudden vision changes.
- Sudden trouble speaking.
- Sudden confusion or trouble understanding simple statements.
- Sudden problems with walking or balance.
- A sudden, severe headache that is different from past headaches.

If a person is experiencing these symptoms, call 911or other emergency services right away.

e. Poisoning

Poisoning by Mouth

Young children will try anything! They will even drink poisons because they don't know any better. Keep all household cleaners, medicines, weed killers, and insect poisons out of their reach. Locked cabinets are best because children are curious and learn to climb.

If a child does swallow some poison, call a hospital or poison control center immediately. Tell them what the poison is. Follow their directions. Don't give anything to drink unless they tell you to. Save the poison container so the poison can be identified.

3. Show how to help a choking victim.

Choking

If a bit of food sticks in a person's throat, he will start chocking. He may not be able to cough it up by himself. Unless the person is a baby, use the Heimlich maneuver to help him.

Heimlich Maneuver

Heimlich Maneuver

Stand behind the victim and put your arms around him. Make a fist with one hand just above his belly button. Cover the fist with your other hand. Now make four quick thrusts inward and upward to force air from his lungs. This should dislodge the food. If it doesn't, repeat until the food is dislodged.

If the person is too big for you to do the Heimlich maneuver standing up, have him lie down face up. Put one open hand just above his belly button and put the other hand over the first. Make four quick, upward thrusts.

Note. Because of the possibly of injury, do not practice the thrust part of the Heimlich maneuver on a person. Thrust should be used only for actual choking cases.

4. Show how to treat for shock.

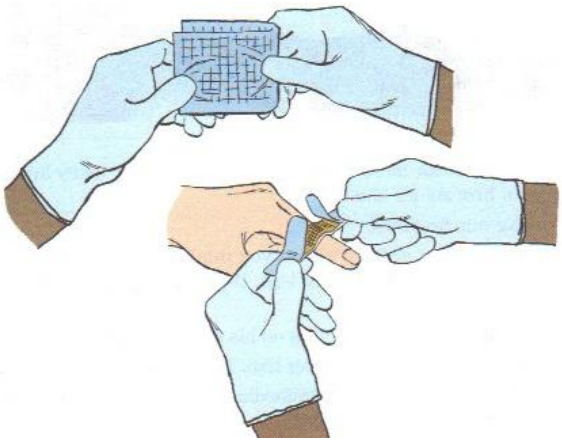
When a person is injured or under great stress, his circulatory system might not provide enough blood to all parts of his body. That's called *shock.* The person will feel weak. His face may get pale. His skin will feel cold and clammy. He may shiver or vomit.

Don't wait for these signals to appear. Give any badly injured person first aid for shock.

- Have him lie down.
- Raise his feet slightly, unless you think he has injury to his head, neck, back, hips, or legs. If you don't know, have him lie flat
- If he is not awake, turn him on his side, not on his back.
- If the weather is cool, cover him. If it's hot, don't.
- Call for emergency help immediately. He needs expert medical care as soon as possible.

5. Demonstrate that you know how to treat the following:

a. Cuts and scratches



Cuts and scratches are wounds-openings in the skin and tissues that can allow germs to enter the body and cause infection.

First aid for small wounds: Wash scratches and minor cuts with soap and water. Applying antiseptic can help prevent infection. Keep the wound clean with an adhesive bandage. On camping trips, clean and rebandage small wounds daily.

First aid for larger cuts: Treat large cuts by using direct pressure to stop bleeding, and then keep the wound as clean as you can to limit infection. Cover an open wound with a sterile gauze pad or clean cloth folded into a pad. Hold the pad in position with tape, a cravat bandage, or other binder.

Anyone suffering a serious wound should be treated for shock and seen by a physician.

b. Burns and scalds

First aid for burns and scalds depends on how serious the injury is. A burn from light contact with a hot object probably is a first-degree burn. Very serious burns are called third-degree burns.

<u>First-degree burn:</u>

The skin gets red and sore. Put the burned area in cold water until the pain stops. If you don't have any water, cover the burn with a clean, dry dressing.

<u>Second-degree burn:</u>

Blisters form on the skin. Try to protect them from breaking open, as this could cause infection. Cover the burned area with a sterile gauze pad from a first aid kit. Hold the pad loosely in place with a bandage. Don't apply creams, ointments, or sprays. All second-degree burns need medical attention.

<u>Third-degree burn:</u>

The skin may be burned away. Flesh may be charred. The victim may feel no pain. Don't try to remove clothing from around the burn. Wrap the victim in a clean sheet. Cover him with blankets if the weather is cool. Call for an ambulance to rush him to a hospital.

c. Sunburn

Sunburn is a common injury among people who enjoy being outdoors. Repeated burns can cause long-term skin damage and the potential for skin cancer. People with lighter skin are most at risk, though others are not immune. Prevent sunburn by using plenty of sunscreen with a sun protection factor (SPF) rating of at least 15. Reapply sunscreen after swimming or if you are perspiring. A bread-brimmed hat, long-sleeved shirt, and long pants provide even more protection.

d. Blisters on the hand and foot

Blisters are pockets of fluid that form as the skin's way of protecting itself from friction. Blisters on the feet are common injuries among hikers. Avoid getting blisters by wearing shoes or boots that fit, by changing your socks if they become sweaty or wet, and by paying attention to how your feet feel.

A *hot spot* is a warning that a blister might be forming. As soon as you notice it, treat a hot spot or blister with a "doughnut bandage" to relieve the pressure on your skin.

Cut moleskin in the shape of a doughnut and fit it around the injury. Shape several more "doughnuts" and stack them on top of the first. The doughnut bandage will keep pressure off the injury.

A gel pad made of the same material used to treat burns can be applied directly over a blister to reduce friction and speed healing. Follow the instructions on the package. Use together, a gel pad and a moleskin doughnut provide maximum relieve for blisters and hot spots.

e. Tick bites

Tick are small, hard-shelled arachnids that bury their heads in the skin of warm-blooded vertebrates. Protect yourself whenever you are in tick-infested woodlands and fields by wearing long pants and a long-sleeved shirt. Button your collar and tuck the cuffs of your pants into your boots or socks. Inspect yourself daily, especially the hairy parts of your body, and immediately remove any ticks you find. If a tick has attached itself, grasp it with tweezers close to the skin and gently pull until it comes loose. Don't squeeze, twist, or jerk the tick, as that could leave its mouth parts in the skin. Wash the wound with soap and water and apply antiseptic. After dealing with a tick, thoroughly wash your hands.

f. Bites and stings of other insects

Bee and Wasp Stings

Scrape away a bee stinger with the edge of a knife blade (or credit card). Don't try to squeeze out. That will force more venom into the skin from the sac attached to the stinger. An ice pack might reduce pain and swelling.

Chigger Bites

Chiggers are almost invisible. They burrow into skin pores, causing itching and small welts. Try not to scratch chigger bites. You might some relief by covering chigger bites with calamine lotion or by dabbing them with clear fingernail polish.

Spider Bites - There are two poisonous spiders in Texas.

The Brown Recluse lives in Texas along with other variations of the Recluse family. Brown Recluse Spiders have an hourglass figure shaped on their back and of course are brown in color.

The Brown Recluse can leave a very nasty bite that must be treated as soon as possible. The wound can become infected and lead to MRSA and even death. The bites from this spider tend to form a blister and can cause muscle pain and nausea.

Brown recluse

This poisonous spider likes closets and hiding under beds when inside. Outside they like wood piles and brushy areas where they can hide. They hunt at night so that is when you are more likely to see one. Be sure to shake out shoes and clothes before putting them on if you think one of the critters may be in your home.

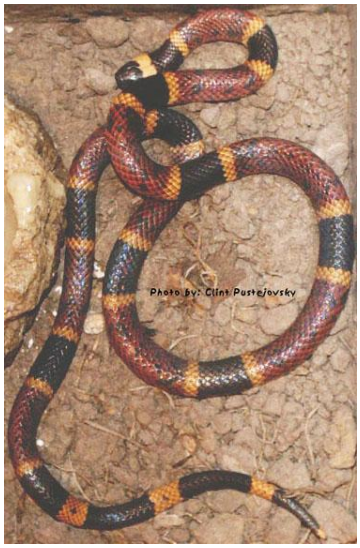
The bite of a brown recluse spider doesn't always hurt right away, but within two to eight hours there can be pain, redness, and swelling at the wound. An open sore is likely to develop. The victim might suffer fever, chills, nausea, vomiting, joint pain, and faint rash. Victims of spider bites should be treated for shock, and then seen by a physician as soon as possible.

Black widow

Black Widows are named because the female mates with a male, then kills and eats him! The Black Widow Spider is much more poisonous than a Rattlesnake; however since they are small they seldom get a huge amount of venom into a wound. Black Widow females are the dangerous ones and have a red hourglass shape on them. It is there to warn predators such as birds, not to eat the spider as it will poison them. Black Widow bites will have red marks around the bite. These bits can be dangerous to humans but according to insects.tamu.edu only 5% of people die from the Black Widow bites. The bite of a female black widow spider can cause redness and sharp pain at the wound site. The victim might suffer sweating, nausea and vomiting, stomach pain and cramps, severe muscle pain and spasms, and shock. Breathing might become difficult.

g. Venomous snakebite

Snakes are common in many parts of the country, but bites from them are rare. Snakes try to avoid humans, and normally strike only when they sense danger. Snakebites seldom result in death.



Coral Snake

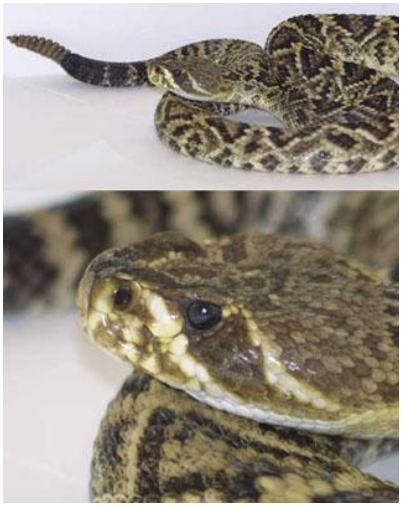
The bite of a nonpoisonous snake causes only minor puncture wounds. The bite of a venomous snake can cause sharp burning pain. The area around the bite might swell and become discolored; however, a venomous snake does not inject venom every time it bites.

Use a hiking stick to poke among stones and brush ahead of you when you walk through areas where snakes are common. Watch where you put your hands as you collect firewood or climb over rocks and logs.

1. Get the victim under medical care as soon as possible so that physicians can neutralize the venom.

2. Remove rings and other jewelry that might cause problems if the area around the bite swells.

3. If the victim must wait for medical attention to arrive, have him lie down and position the bitten part lower than the rest of his body. Encourage him to stay calm. He might be very frightened, so keep assuring him that he is being cared for.


Rattlesnake

4. Treat for shock.

5. If available within 3 minutes of the bite, apply a venom extractor such as a Sawyer Extractor directly over the fang marks and leave in place for no more than 10 minutes. Properly used, the extractor can remove up to 30 percent of the venom. Do not make cuts on the bite - that's an old-fashioned remedy that can harm the victim much more than help him.

6. Do not apply ice to a snakebite. Ice will not help the injury, but it can damage the skin and tissue.

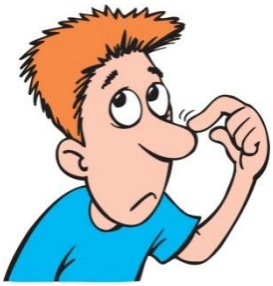
Note to Leader: a venomous snake injects venom when it bites. For a snake to be poisonous, you would have to eat it.

Cottonmouth (Water

Copperhead Moccasin)

www.texassnakes.net/picturesvenomous.html

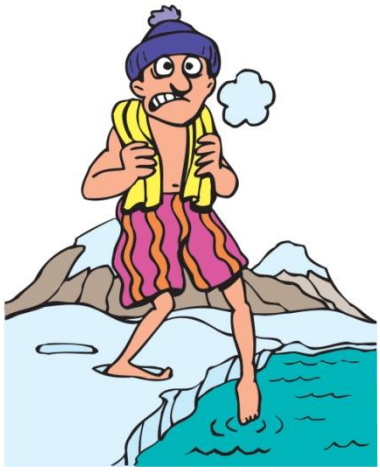
h. Nosebleed



A nosebleed can look bad, but it will usually stop in just a few minutes. Have the victim sit up and lean forward to prevent blood from draining into his or her throat. Pinch the nostrils together to maintain pressure on the flow. Apply a cool, wet cloth to the victim's nose and face.

If bleeding is severe or if there are other injuries to the face and head, position the head to keep blood out of his airway. Treat for shock and call for help.

i. Frostbite



Injury to body tissues caused by exposure to extreme cold, often resulting in gangrene. A victim of frostbite might complain that this ears, nose, fingers, or feet feel painful and then numb. Another frostbite victim won't notice anything. You might see grayish-white patches on his skin - a sure sign of frostbite.

Get into a tent of building, then warm the injury and keep it warm. If an ear or cheek is frozen, remove a glove and warm the injury with the palm of your hand. Slip a frostbitten hand under your clothing and tuck it beneath an armpit. Treat frozen toes by putting the victim's bare feet against the warm skin of your belly. Avoid rubbing frostbitten flesh, as that can damage tissue and skin.

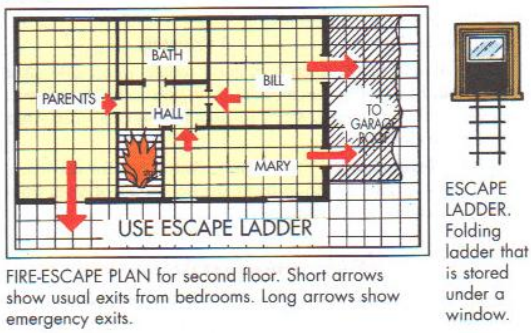
You can also warm a frozen party by holding it in warm-not hot-running water, or wrap it in a dry blanket. Have the patient exercise injured fingers or toes, and don't let the injured areas freeze again. Get the victim to a doctor.

6. Put together a simple home first - aid kit. Explain what you included and how to use each item correctly.

- small container (2x2x2 square container from Hobby Lobby)
  or
  Film canister or medicine bottles (request these on your own from places like Walgreen) 🛒
- Scissors
- Decorations such as pony bead, stickers, clip, etc.
- Plastic lanyard (ssww.com $1.77/$1.49 depending on style)
- Alcohol swab 🛒
- Band-Aid 🛒
- Q-tip🛒
- Sticker or red electrical tape to make a cross, optional🛒

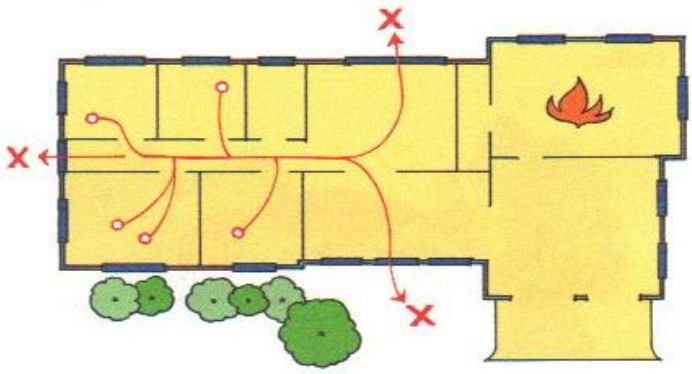
7. Create and practice an emergency readiness plan for your home or den meeting place.

Be sure everyone in the family knows how to escape from every room in the house. Have boys draw a diagram of their house and mark the escape routes.



FIRE-ESCAPE PLAN for second floor. Short arrows show usual exits from bedrooms. Long arrows show emergency exits.

ESCAPE LADDER. Folding ladder that is stored under a window.



Home Fire Escape Plan

Suppose you wake up some night and hear your smoke detector or smell smoke. What would you do?
That's easy. Wake the other members of your family and get them out of the house! Then call the fire department.

But what if your family sleeps on the second floor and the fire is coming up the stairway? How would the family get out?

Make a plan now. Discuss it with the adult members of your family.

Figure out two possible escape routes for each bedroom. If there is a two story drop from some bedroom windows, the famil than having a family member trapped in a fire because the only way out Is blocked by flames.

Make sure your family has a place to meet once they are outside. Then everyone knows when all family members are out an

8. Visit with a first responder.

Other Supporting Material

Bandage Demonstration

Equipment - As needed per relay instructions. Lots of triangular bandages or neckerchiefs.

People - One member of a Den is the patient; the rest are First-aiders.

The Play: On "Go" Number 1 runs to the patient and ties a head bandage and runs back. Number 2 ties cross chest. Number 3 ties a thigh bandage. Number 4 a rib bandage. Number 5 ties a sling for the arm, Then numbers 6 and 7 go up and make a chair carry transport for the patient back to the starting point. Base scoring on excellence. No time element. (Note: In case of a small den, one or more boys may go up twice, until the project is completed)

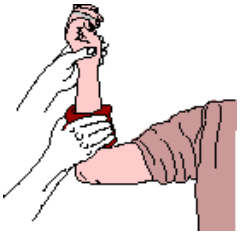
Banged Up Benny

Equipment - Neckerchiefs. Folded up paper towels to use as sterile pads. List of wounds on paper for each group.

Instructions: Split in groups of 4 to 6 scouts. One scout is Benny, he's all banged up from some terrible accident; the rest are rescuers. Scouts line up single file with Benny out in front of them 10-30 feet. Have first aid materials beside each Benny. On the leader's go signal, the first rescuer sees Benny, runs to him, and asks what is wrong. Possible injuries are: scalp wound (head bandage), thigh cut (pressure wrap), sprained ankle, broken arm (sling), hand or wrist cut (pressure

pad). Rescuer applies his neckerchief and sterile pads as required where indicated. When complete, he asks Benny if there's anything else wrong. If Benny says "Yes", the rescuer calls for help. The next rescuer takes a turn helping Benny and then asks if there is more. When Benny says "broken legs", the scout needs to get help and two scouts carry him back in a four-hand seat carry with the other scouts spotting. This is used for serious practice in a fun way and there should be no time limit - try to have the scouts make good application of the dressings.

Pressure Pad Relay



Equipment - Each boy using his own neckerchief

Instructions: One boy is about 30 feet in front of the team with arterial "bleeding' of the left wrist. There is one judge for each victim. On signal, the first boy from each team runs up and applies a pressure pad over the simulated would. When correct, the judge yells "off," the boy removes the pad and runs back to the team, tags off the next boy who repeats the operation

Stretcher Race

Equipment - Two staves, One blanket, and One inflated balloon for each team.

The Play: Teams line up in relay formation with two victims from each team lying from 30-70 feet in front of the team. On signal, two members of the team run up to the first victim with the blanket and staves, make a stretcher, and put the victim on it. When carriers are ready to lift the stretcher, a judge places the inflated balloon on the victim. Then the victim is carried to the starting line without the balloon falling off (to ensure care if handling the victim). If the balloon falls off; the judge counts off 20 seconds, places the balloon back on the victim's chest and the team continues on its way. When they reach the starting line, the second team from the group dismantles the stretcher and runs forward to bring in the second victim using the same procedure and rules as the first team. The first team to bring the second victim over the starting line is the winner.

What Should I Do?

This game is a fun way to practice the skills the boys will learn.

Write emergency conditions on cards. A Scout draws a card and then must demonstrate or explain the appropriate actions. The Heimlich maneuver, rescue breathing, and CPR should be explained. Have a phone (disconnected of course) and first aid kit available.

What's Wrong With Me? (charades)

Write down several different accidents or afflictions (example: broken leg, nose bleed, Choking, Shock, etc). Place these in a hat and have the boys draw them out one at a time. The boy that drew will have to act out that particular problem. The first boy to identify the problem must show how to treat it, he now gets to pick and act out an accident.

"Hug A Tree" program for what to do when you get lost. Here's a link that provides great information: www.gpsar.org/hugatree.html The Hug A Tree program was started in the San Diego area after a boy was lost on a local mountain. Its important information that every child should know, especially those that get in the outdoors a lot like scouts.

Webelos/AOL Elective Adventure: Art Explosion

Partial 2-4 only (1 will need to be done outside of camp)

Craft

Clay
Tin Lantern
Tie Dye Shirts (S&S FA3288 – kids provide shirt or pillowcase)
Soma Cube

Requirements and What you will need

~~1. Visit an art museum, gallery, or exhibit. Discuss with an adult the art you saw. What did you like?~~

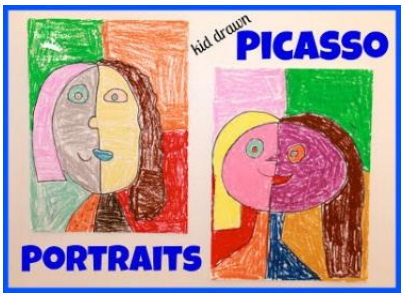
2. Create two self - portraits

Create two self - portraits using two different techniques, such as drawing, painting, printmaking, sculpture, and computer illustration.
Besides simply giving each boy paper and colors/markets, here are some ideas: -

Use pieces of paper to create a mosaic effect

Take a picture of each boy and have them use that as a guide line.

Have each boy create a “Picasso” version of himself.



3. Do two of the following:

a. Draw or paint an original picture outdoors, using the art materials of your choice.

b. Use clay to sculpt a simple form.

c. Create an object using clay that can be fired, baked in the oven, or air dried.

S&S CL284 Assorted Colores. (Box of 75)
Recommend each boy get 3-4 packs of different colors.

d. Create a sculpture or mobile using wood, metal, papier-mâché, or found or recycled objects.

Tin Can Project

Materials:

- Tin cans
- Nails, thin and long
- Hammer
- Pattern
- Tape, double sided
- Spray paint, optional
- Tea lights, optional

Source: http://socialcouture.typepad.com/tabletalk/2010/06/accessorize-your-backyard.html

Light up your backyard with these easy to make tin can luminaries.

Instructions:

1. Rinse your tin cans out and remove the label. (Be careful when doing this they can sometimes be very sharp)
2. Tape design to the can. Simple star and geometric designs are easy.
3. Carefully punch a design onto one side of the can using a nail and hammer.
4. Optional: Spray paint your luminaries in a well-ventilated area using spray paint and don't forget to lay something some newspaper down before you get started.
5. Optional: Insert a tea light candle and set them on the ground or hang them from tree branches or porch umbrellas. A small amount of sand in the bottom of the can helps prevent it from being knocked over or blown around in a tree.

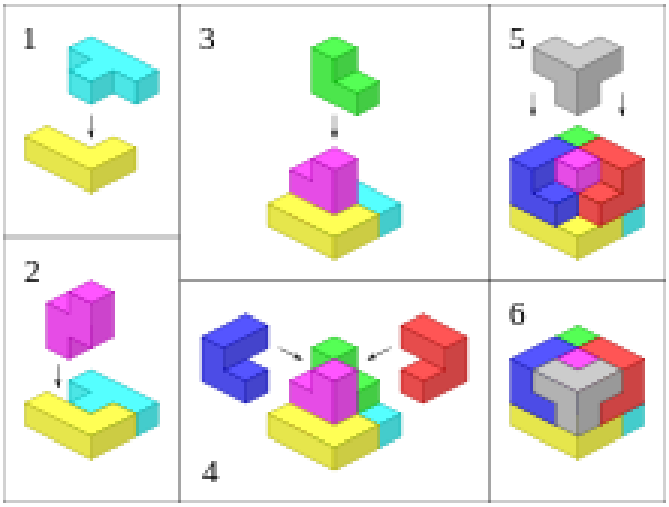
Make a Soma Cube (Wood Project)

The Soma Cube was invented by Peit Hein in 1936. It is a 3-D puzzle made from 7 irregular shapes, each made from 3 or 4 cubes. The cube itself is just one of many shapes that the seven pieces can be used to make. You can find these shapes and more at www.fam-bundgaard.dk/SOMA/SOMA.HTM

Working with the seven pieces to make different shapes is great for improving spatial skills. Being able to imagine how physical objects fit together is a good life skill to have. In addition, spatial skills often show up on placement and IQ tests. There are actually 240 different ways to solve the cube, so you'd think it would be easy, but it isn't for most people. Don't give up though; you can improve your spatial skills with practice. Once you've mastered the cube, be sure and check out the different figures: www.fam-bundgaard.dk/SOMA/FIGURES/FIGURES.HTM. There are many puzzles to solve!

Materials:

- wood, 1 square dowel 36" long, per boy
- wood glue
- paint or stain, optional
- pictures of the 7 pieces
- miter box
- coping or hand saw
- sandpaper
- pencil
- ruler



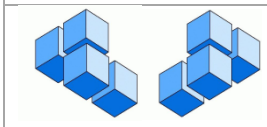
Instructions:

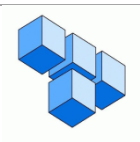
1. Mark out the pieces to cut. Use a miter box to be as accurate as possible.

2. Cut the dowel into 15 pieces as follows:

- 5 pieces 1" long
- 8 pieces 2" long
- 2 pieces 3" long

3. Glue the pieces to make 7 puzzle sections.

	L Tricube - Glue 1" piece to a 2" piece.
	L Tetracube - Glue 1" piece to a 3" piece.
	Left screw and Right screw Tetracubes - two that mirror each other, otherwise it's wrong. Glue a 2" piece to another 2" piece. Make another one that mirrors the first one.

	T Tetracube. - Glue 1" piece to a 3" piece.
	S Tetracube - Glue a 2" piece to another 2" piece.
	Branch Tetracube - Glue a 2"piece to a 1" to form an L tricube shape, and then add another 1" piece.

e. Make a display of origami or kirigami projects.

Materials:

- Instructions –go to http://www.origami-instructions.com for many, many, more ideas.
- 5 7/8" square Origami paper. S&S PE431 $9 for pack of 100

NOTE: Do **not** use construction paper as it doesn't fold well with crisp creases.

~~f. Use a computer illustration or painting program to create a work of art.~~

g. Create an original logo or design. Transfer the design onto a T -shirt, hat, or other object.

For this project the boys will be making Tie-Dye shirts or pillowcases (or anything else you want to Tie Dye).

Material Needed:

- S&S Kit FA3288 - OR
- S&S Kit FA3401 ($200 for 200 shirts!)
- Item to be tie Dyed (not included in kit)
    - Pillowcase
    - White T-shirt
    - White Bandanas – S&S CM166 ($14 for pack of 12)
    - White backpacks S&S FA3373 ($18 for pack of 12)
- Large plastic storage container for soaking shirts
- Clothes line set up for drying
- Clothes pins
- Plastic bags

Dye kit includes enough supplies for 36 shirts (more for smaller items) including turquoise, magenta and yellow dye in applicator bottles, soda ash fixer, gloves, rubber bands and 28-page "how to" book.

Here are instructions from instructables.com on how to make the cool pinwheel pattern. Because it takes 2-3 days for the shirts to “set” using these instructions, you may need to schedule this as a “Day 1” project.

Step 1: The shirt, fit to be dyed!

The shirts that work best are 100% cotton, although you can use 50% cotton/50% polyester (although the results will not be so vibrant. I once tried to dye a 100% polyester garment and when it was unwrapped - all the dye washed off! The dyes only bond well with natural fabrics, like cotton, silk and rayon - but we're talking cotton here....

Step 2: Presenting your choice of dyes

You will use the dye kit from S&S, which come with everything you need. They include rubber gloves, rubber bands, soda ash,urea and complete easy to follow instructions. All you have to add is warm water (not hot) These also come with the necessary urea and soda ash and instructions for mixing.

Step 3: The tools you will need for success

Don't forget to have paper towels and old rags to mop up the spills. Tie-dying does not have to be messy!

Step 4: Soaking the shirt

Soak it in a solution of WARM water and soda ash for about 10 minutes. Follow the instructions given with the soda ash so that you have the right mix. Do not use water that is too hot or too cold - and add a couple of table spoonfuls of common salt to the mix too!! Make sure the mixture is thorougly dissolved before adding the shirt. The temperature of the water should be about about the same as a baby's bath! As the soda ash is slightly caustic you may want to wear rubber gloves at this point, especially if you have a cut on your finger - it will sting! After soaking, wring the shirt out thoroughly. The more liquid that you can squeeze out, the more dye will be able to get in! I usually spin my shirts on the spin cycle of the washing machine. (note if you use a brand new shirt, wash it first to remove the newness, which I think they call "size", This "sizing" will prevent dye from bonding properly, and you may get a streaky effect.)

Step 5: Tying a rainbow swirl pattern!

After you have soaked and wrung out the shirt (by the way if you don't do it in the washing machine, try wringing it out with a friend!)place the shirt on a flat surface. Place it right side down, as you will then get a sharper pattern on the front of the shirt. Of course if you want the sharper pattern on the back - well, you know!

Place the dowel rod, (or your finger, or a wooden clothes pin) in the centre of the shirt and start turning clockwise until you have a nice flat pie shape. You can also turn counter-clockwise if you prefer, it makes no difference really.

Step 6: Achieving Pie!

This what your shirt should look like at this stage. Do not allow the shirt to creep up the dowel rod, make it behave with the hand not turning the dowel rod! You are now ready to remove the dowel and put on the rubber bands. The trick is to place the bands, without disturbing the shirt! It can be done! However, be careful removing the dowel. You do not want to pull the shirt up in the middle - thus unachieving pie! This part of the process is the most important step of all, believe me if you do a sloppy "tie" you will achieve a sloppy and messy "dye" and live to regret it.

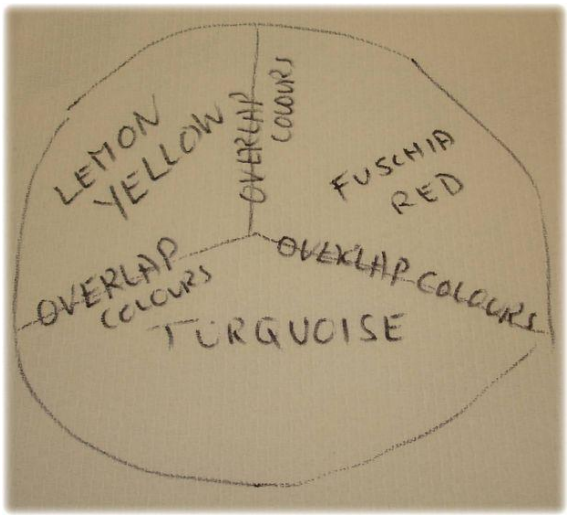
Step 7: Join the band!

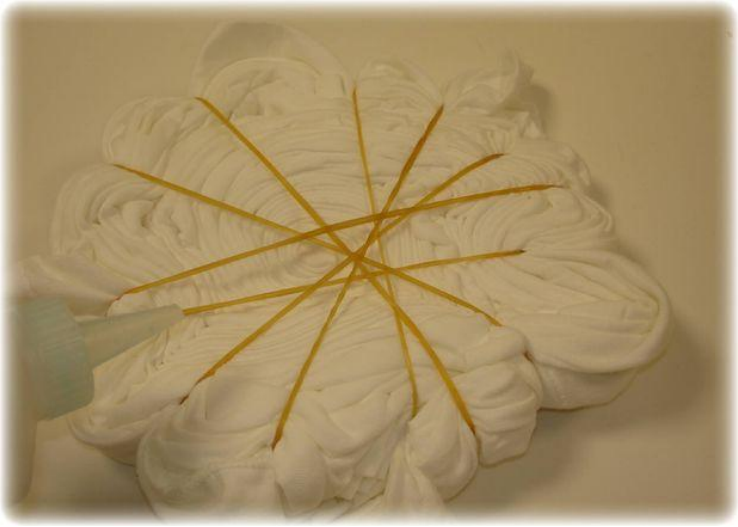
With your lovely pie shape achieved, you can now put on the rubber bands. Slip several bands on(see the picture) then turn the shirt over and put on some more. This keeps its shape. Keep the whole thing as flat as you can. Your are now ready to dye!

Step 8: To dye for

When doing the actually dying bit, you will need to cover your working surface with plastic. Something like a plastic table cloth will work fine. You also need to wear old clothes, old shoes, etc. The dyes will stain your clothes, the floor, the walls, the ceiling, etc. So if you are not working outside please be careful. The dyes are harmless to your skin, but if you don't wear rubber gloves you will achieve red, yellow or blue dyed hands, which won't wash off. (Wears off in a couple of days - but can be amazingly embarrassing!) Also be ready with the rags to mop up spills. When I mix the dyes, I make sure that the caps are on tight and I also wipe the screw top and bottle neck to avoid "capillary action".

Step 9: Actually using the dyes





Place your shirt "pie" on a couple of thicknesses of paper towels on top of a paper plate on your plastic protected working surface. It's less messy, and easy to flip the whole thing over when dying the other side. Wear rubber gloves!

Just a note: When I tie dye I usually only use three colors, fuchsia red, turquoise and lemon yellow. With these three colors you can make any color you like. To make the rainbow swirl shirt, imagine that your "pie" is an actual pie chart! Working from the center of the shirt and holding the bottle low over the shirt, dye one third of the shirt lemon yellow. Do not wave the bottle around as you will make a mess! Dye the second third of the shirt fuchsia red and the final third, turquoise. Do not leave any white spaces showing - the "white" is hiding within the folds! If you overlap the colors at the edges of each section you will get the other rainbow colors, ie. green, purple and orange! It's magic!

Hint: Always put yellow - (or other light colored dyes) on first. Once you "lose" or cover it up by mistake - it is changed to something else (either orange or green) and you can't get it back.

Step 10: Turn the pie over!

When you have finished putting the dye on the first side, turn the whole thing over. This will be easy to do, if you just flip the plate over onto another paper plate with clean paper towel all ready for you. Throw the first paper plate and towel away (clean up as you go along whenever possible) Apply the dye on this second side in a similar manner. If you are making the rainbow swirl, you need to be sure to put the three colors behind the same colors you used on the other side (i.e. red behind red, blue behind blue, etc.) If you don't do this, you will not get a rainbow spiral, but a sort of rainbow spider pattern (which is quite nice actually!)

Step 11: Now comes the hard part - waiting!

After you have completed putting the dye on the shirt, pop it into a zip lock bag and seal it up tight. Put the bag in a warm place and leave it for AT LEAST 24 HOURS! The dye needs this length of time to "prove" and allow the beautiful colors to really bond with the fabric. For you desperate "have-it-nows", you can unwrap after 8 hours - but..... You can also leave the shirt for as long as 36 hours if you are very patient.. When you unwrap your shirt, wear rubber gloves and old clothes again. Don't make a mess!

Step 12: Unwrapping your masterpiece - wear rubber/latex gloves!

I love this part! This is the moment you have been waiting for. It's time to unwrap and discover your beautiful (we hope) creation for all to see. Take the shirt out of the bag! You can either take the bands off first, unwrap and start running the shirt under a cold water tap, or just run under the tap for a while and then take the bands off! BEWARE, if you have never tie dyed before you will be astonished at the amount of dye that pours out as you are rinsing. The water will turn black! Fear not, this is normal. All the dye you so lovingly applied will never bond with the fabric. Enough dye will remain, well and truly bonded. Keep rinsing until the water runs clear (it may take a while!) Hopefully, if you have done it right your pattern will be revealed in all its glory. It's like a butterfly emerging from a chrysallis! You may now wash your shirt in the normal way in a washing machine (on its own the first time). I usually wash my shirts two or three times on their own, before I trust them with other "colored".

Step 13: The moment of truth - It's gorgeous!

~~h. Using a camera or other electronic device, take at least 10 photos of your family, a pet, or scenery. Use photo - editing software to crop, lighten or darken, and change some of the photos.~~

i. Create a comic strip with original characters.

Include at least four panels to tell a story centered on one of the points of the Scout Law. Characters can be hand - drawn or computer - generate.

Material

- Template (found under Other Supporting Materila)
- Pencils
- Colors

4. Choose one of the following methods to show your artwork:

~~a. Create a hard - copy or digital portfolio of your projects. Share it with your family and members of your den or pack.~~

b. Display your artwork in a pack, school, or community art show.

Consider setting up a display on the last day of camp that parents can visit or have the “art show” set up so all camp can visit what was done throughout the week.

Cubism (artsmart4kids.blogspot.com)

In the early 1900s, some artists became interested in African and Native American art. The styles of those cultures inspired cubism.

Cubism began in France in 1907. Pablo Picasso and George Braque began painting figures that were made up of cubes, spheres, cylinders, cones, and other geometric shapes. The paintings looked like someone had cut them up and glued them back together.

And that's exactly what the cubists had in mind. Just like the ancient Egyptians, cubists wanted to show the most important parts of the things they painted. Look at the face in Juan Gris' Portrait of Picasso (left). Gris shows you every detail of Picasso's face even though you would never be able to see all sides of his face at the same time. The cubists took this idea much further than the ancient Egyptians, of course. Cubists wanted to show all the sides of an object in the same picture.

Some cubist paintings were extremely abstract. In Picasso's The Guitar Player (right), it is difficult to see the person in the painting.

At first, cubists used very little color in their paintings. They used mostly browns, greys, and blues. In 1912, color re-entered the picture and some artists, like Picasso, began using more then just paint and canvas in their art. You may remember reading about Picasso's musical collages in which he used paper and cloth in his paintings.

LIVING THE SCOUT LAW by:

Webelos/AOL Elective Adventure: Build It

Complete 1-5

Craft
Any wood project

Requirements and What you will need

Do all of these:

1. Learn about some basic tools and the proper use of each tool.

Learn about and understand the need for safety when you work with tools.

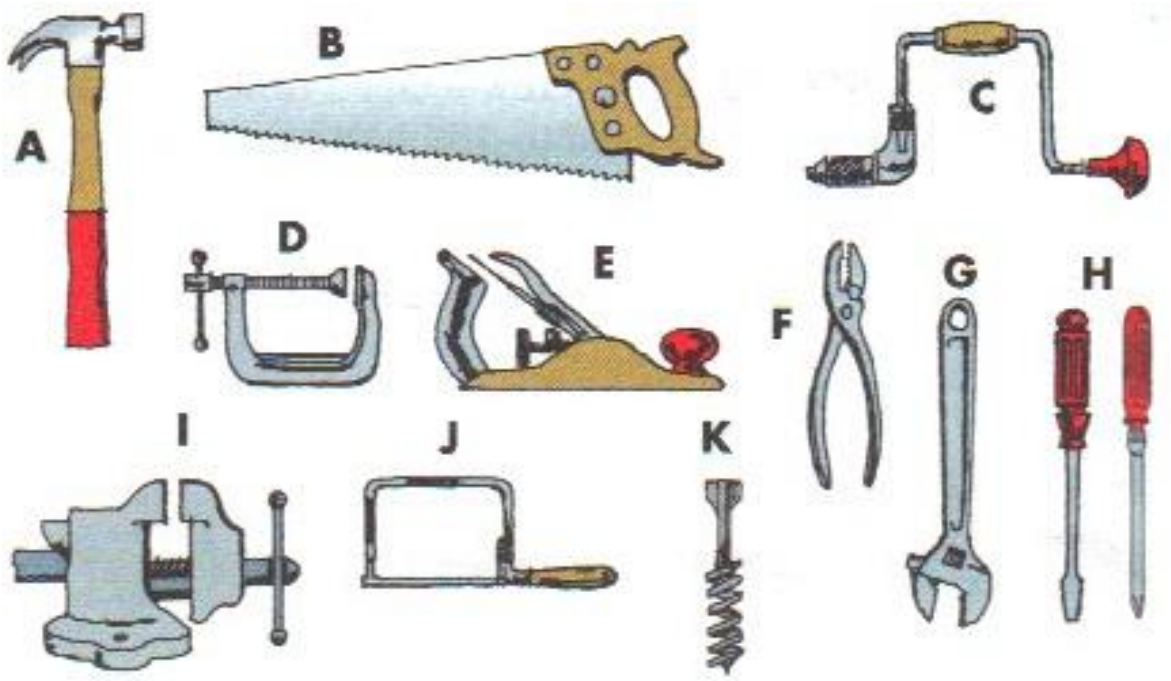
Note: Power tools are not appropriate for use by Cub Scouts including Webelos. Review the Age-Appropriate Guidelines for Scouting activities (*www.scouting.org/HealthandSafety/Resources/AgeAppropriateGuidelines*).

Materials:

- Pliers
- Philips head screwdriver
- Standard screwdriver
- Hammer
- Three more tools (such as C-clamp, coping saw, claw hammer, hacksaw, file, plane, adjustable wrench, awl, hand saw)
- Philips head screws
- Standard screws
- Nails
- Boards for nailing (and removal of nails)
- Soap for screwing (and removal of screws)
- Safety glasses

Hint: Set up 4 stations (naming tools, using pliers, using screwdriver, and use a hammer) that the Wolves can rotate through as a round robin style.

TOOLS



_____ HAMMER. Used for driving nails, for prying boards apart, and for pulling nails.

_____ SCREWDRIVER. Sets screws.

_____ PLIERS. Slip-joint pliers have wide and normal jaw openings to grip things of different sizes. (Don't use pliers on nuts-use a crescent wrench instead.)

_____ HAND SAW. There are two kinds: one for crosscutting, and another for ripping lengthwise along the grain of wood.

_____ COPING SAW. Lets you cut curves.

_____ CRESCENT WRENCH. This open-end wrench can be adjusted to fit many sizes or nuts.

_____ DRILL BIT. Corkscrew-shaped drills are called drill bits. They are used to drill holes in wood.

_____ HAND DRILL. Uses drill bits to bore holes in wood and metal.

_____ CLAMP. Holds pieces of wood together after gluing

_____ WOOD PLANE. Smoothes rough boards.

_____ BENCH VISE. Holds wood in place for sawing or planing.

2. With the guidance of your Webelos den leader, parent, or guardian, select and build a carpentry project.

Do any wood project. Supporting Material has instructions for building a checker board (or a cork board or chalk board).

3. List the tools that you use safely as you build your project;

Create a list of materials needed to build your project. (Template in the supporting material section)

4. Put a check mark next to the tools on your list that you used for the first time.

5. Learn about a construction career. With your Webelos den leader, parent, or guardian, visit a construction site, and interview someone working in a construction career.

(Information from Northwestern Ohio Construction Education Center)

The Construction Industry is a vital employer in the nation's economy. It offers you the opportunity to create and to build. Careers as craftworkers and professional management personnel cover a wide range of construction activities. The industry itself is diverse and embraces all kinds of projects such as office buildings, plants, schools, interstate highways, hydroelectric dams, hospitals, churches, houses and tunnels. It also includes major maintenance and alteration projects. Large or small, the project is built carefully and capably by people with the ingenuity, skill and education to create. This could be your world.

Construction offers many different types of career paths, from semi- and skilled craft careers covering over 20 different trades, to jobs in management covering a wide scope of activities. The opportunities for advancement are virtually unlimited, regardless of where you choose to start.

The industry also offers national and international job markets, giving you the opportunity to select an employer in any city or town anywhere in the world. Few other careers offer this sort of opportunity.

Who hires employees trained in the building trades or with degrees in construction science? Obviously, one answer would be general contractors and subcontractors. These are the companies that do the greatest amount of new construction, rehabilitation, remodeling and maintenance. Many men and women with construction backgrounds are hired by other companies and agencies to evaluate, plan and oversee construction. Prospective employers in this group includes local, state and federal governments; hospitals; schools; and corporations that build and maintain warehouses, factories and offices.

Contractors normally specialize in one or more of the following types of construction:

General Building Construction: Erecting office buildings, houses, apartments, plants, schools, hospitals, churches, government buildings

Highway Construction: Building highways and bridges, doing grade separations and culverts, paving, moving earth, and landscaping

Heavy Construction: Building tunnels, airports, dams, military bases, railroads and doing flood control projects

Utilities Construction: Constructing power plants and transmission stations, doing pipeline installations, sanitation projects, and waterworks

The following information gives you a little more detail on each type of job.

Journeyperson: A member of one of the building trades who has successfully completed an apprenticeship program, or one who has successfully completed the skills to become a Journeyperson.

Foreman: Supervises all journeypersons and apprentices of a particular trade working on a project and plans work, maintains schedules, ensures procedures as directed by the superintendent.

Draftsman: Prepares working plans, drawings and diagrams for engineering and construction purposes.

Construction Engineer: Responsible for technical aspects of a project including the design, testing and analysis of specifications and materials, planning, surveying, research and other critical factors in the building process.

Safety Engineer: Responsible for setting up job site safety operations, ensuring safety consciousness of employees, ensuring that activities are conducted in accordance with federal and state safety and health regulations and procedures, and provides professional advice on safety of various construction activities.

Estimator: Prepares basic data concerning a proposed construction project (usually from plans and specifications) including quantities of materials, man-hours to perform items of work, methods to be used, equipment required, and, with the assistance of other members of the office staff, computes the cost of construction which represents the contractor's competitive bid for the job.

Expediter: Maintains construction schedules by reviewing deliveries, scheduling arrival of materials and men at job sites, establishing work priorities, and obtaining necessary clearances.

Purchasing Agent: Determines most economical sources for materials, stores, supplies, equipment and parts, and ensures purchase at lowest price consistent with required delivery schedule.

Inspector: Inspects the work of contractors to ensure that the requirements of the drawings, specifications and codes for the work are met.

Office Manager: Performs or supervises the variety of support services required of a construction business, such as keeping books, preparing payroll, billing clients, and handling mail.

General Superintendent: Directs all construction functions for large projects according to established schedules, specifications, methods, and procedures, supervises job superintendent on very large projects or on a variety of smaller projects.

Project Manager: Directs all construction functions on very large projects, establishes and develops methods, procedures, schedules, and policies, coordinates the work of all units and divisions, performs such administrative duties as are required for proper completion of the project.

General Contractor: Often a company owner, a businessperson and construction specialist in most cases, responsible for all construction activities, deals with all key individuals on a project... the architect, the owner, the subcontractors and company personnel.

Wood Project Checkerboard/Chalkboard/Corkboard

Materials: Calculations for Supplies you need to buy: -Pre-cut as indicated. If you have time, boys can do all the cutting.

- 4ft or 8ft sheets Plywood for Base -approx $15-20 per sheet
  Sold in x 8ft. approx. 15-depending thickness and quality at Lowe's & Home Depot - you will need to cut sheets into 16" x 16" segments.
- Each 4'x8' sheets yields sixteen (16) 16"x16" bases. Recommend you pre-cut these before camp.
- 1"x2" wood furring for frame Sold in 8ft. segments ($.75-$1.00 depending on quality per 8 foot segment) at Lowe's & Home Depot -
  Each boy will need two (2) 12" sections and two (2) 16" sections for the frame.
- You can get eight (8) 12" sections from a single 8 ft. length or you can get six (6) 16" sections from a single 8 ft. length.
- Nail - 1.5-2" Long - Buy 8 per boy plus some extras. Neeed to be very short so they don't go all the way through frame and base.
- Wood Glue - Ordered and Purchased in Bulk from S&S

Measure everything. Some plywood and furring is not "true" 1" or 2" so measure it out.

Insert Options- Checker board. You can use precut 1.5"x1.5" square wood tiles. Alternate painted squares (64) or leave 1/2 the spaces for beltloops. (See below for ordering information).
Chalkboard - Paint the base plywood with chalkboard paint (available at Lowe's and Home Depot) BEFORE attaching frame. (approx. $15 per quart) Don't forget paint brushes.
Corkboard - Cut corkboard tiles to fit area inside frame. Self adhesive sqares are already the right size. Self stick cork tiles are around $9 for a pack of 4. Roll of 2' x 4' is around $10.

1. Instructions: Make a base for the board in light wood with little grain. Sand. Optionally Seal with spray polyurethane.

2. Make frame for base with heavier grained wood, with about 3/16" recess (match thickness of wood squares) for belt loops and checkerboard squares. Sand. Optionally stain with 1-step stain/poly, in color of your choice.
3. Attach base to frame.
4. Optionally Stain checkerboard squares – don't forget the edges! – with 1-step stain/poly, in same color as frame.
5. Either make a jig for proper spacing of squares, or draw grid on light wood for placement of squares.
6. Glue wood squares with wood glue (a little dab will do) paying attention to the direction of the wood grain.

Insert Options-

Checker board. You can use precut 1.5"x1.5" square wood tiles. Alternate painted squares (64) or leave 1/2 the spaces for beltloops.

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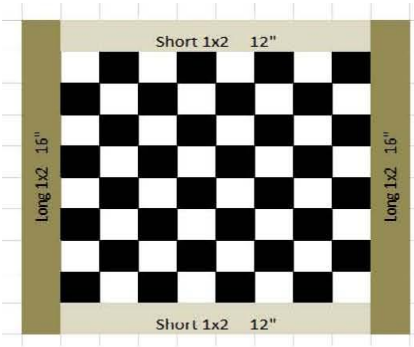
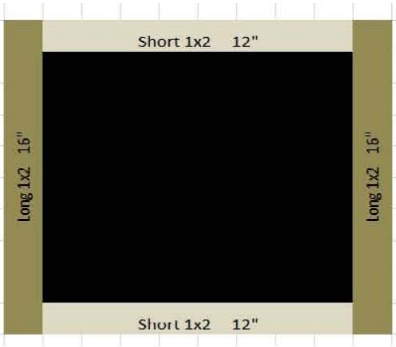
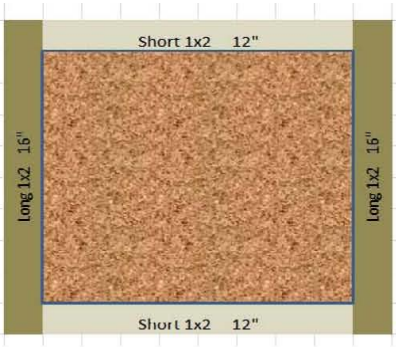






JC7818

Wooden Square Cut Out
1-1/2" tall x 1-1/2" wide x 3/16" thick

enlarge

<< Back Product 2 of 7 Next >> Listing - Square Cutouts, Wood

Select the quantity for each item (bag size) you wish to order and click the "Add To Cart"

Bag of	Pricing per Bag Quantity Discounts - Buy More - Save More!			Select
25	1+ $3.75			0
100	1-4 $11.25	5-9 $9.75	10+ $8.50	0

Name : _____

Project: _____

Tools I used for my project:
(check the box if it's the first time you have used this tool)

- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

Webelos/AOL Elective Adventure: Engineer

Complete 1-4

Craft
Catapult (S&S GP3045)
Water rocket
Electric circuit

Requirements and What you will need

Do all of these:

1. Pick one type of engineer. Record three things that describe what an engineer does.

With the help of the Internet, your local library, or a local engineer you may know or locate, discover and record in your book three things that describe what that engineer does. (Be sure to have your Webelos den leader, parent, or guardian's permission to use the Internet.) Share your findings with your Webelos den.

Engineers designed your school bus, the cars on the road, the road itself, and the bridges you cross. Engineers designed all the different kind of computers you see at school, in offices, and at home.

Almost anything you use that was manufactured was probably designed by an engineer. Not only that, but engineers designed the machines that workers used to make the product and the factory building where it was made.

Airplanes, space shuttles, space stations--all designed by engineers work in many exciting and challenging fields.

Some Engineering Functions

Research: A search for new scientific knowledge, with the objective of applying it to solving problems.

Development: Applied research which results in working model.

Design: Conversion of developed ideas into economical, reliable, and producible plans of manufacture, use or construction.

Maintenance: Plan and direct the methods of making the design and transforming it into a useful product.

Sales: Define and explain the application of the product and the sale of it.

Management: Administrate any or all of the engineers which perform the functions listed above and any other personnel required to perform the assigned task.

2. Learn to follow engineering design principles by doing the following:

a. Examine a set of blueprints.

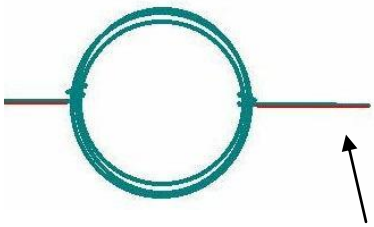
Using these as a model, construct your own set of blueprints or plans to design a project

b. Using the blueprints or plans from your own design, construct your project.

Your project may be something useful or something fun.

c. Share your project with your Webelos den and your pack by displaying the project at a pack meeting.

Complete requirements a-c by having the boys diagram and thenbuild a simple circuit with these instructions.



Remove enamel from **bottom** of here on both "legs." **Leave enamel on the**

Construct an Electric Circuit

Advancement: Engineer 6

Materials:

- "D" size battery
- Ceramic magnet
- Magnetic Wire
- Paper clips
- wire.
- shelf clips
- Sandpaper

Approx. Cost: $3.00

Instructions:

Give each team a piece of magnet wire 20 - 30 cm long.

Wrap it around a Sharpie or cylindrical object about the same diameter.

Wrap the ends back around the coil. This will both support the coil and create the "axle" for your motor. THIS IS THE MOST CHALLENGING PART. It is critical that the axles balance the coil. That is, they must be almost exactly opposite one another on the circle of wire. Draw pictures on the board; talk about diameters... whatever it takes to get this idea across.

Use a piece of sandpaper to remove the enamel from the "bottom" of the wire on both sides

Now put it all together as shown below

When the switch is off, the circuit is open, which means there is a gap in the circuit. Electricity cannot flow to the light bulb. When the switch is on, it closes the circuit. The circuit is complete, and electricity reaches the bulb.

3. Explore other fields of engineering and how they have helped form our past, present, and future.

Use this information about Engineering to have a discussion about what the boys think the various types of Engineers contributed.

Field of Engineering

Aeronautical Engineering: Deals with the whole field of design, manufacture, maintenance, testing, and the use of aircraft both for civilian and military purposes.

Astronautical Engineering: Closely related to aeronautics, but is concerned with the flight of vehicles in space, beyond the earth's atmosphere, and includes the study and development of rocket engines, artificial satellites, and spacecraft for the exploration of outer space.

Chemical Engineering: Concerned with the design, construction, and management of factories in which the essential processes consist of chemical reactions.

Civil Engineering: Perhaps the broadest of the engineering fields; deals with the creation, improvement, and protection of the communal environment; providing facilities for living, industry, and transportation, including large buildings, roads, bridges, canals, railroad lines, airports, harbors, and other constructions.

Electrical Engineering/Computer Science: Divided broadly into the engineering of electrical power distribution systems, electrical machinery, and communication, information, and control systems.

Geological & Mining Engineering: Includes activities related to the discovery and exploration of mineral deposits and the financing, construction, development, operation, recovery, processing, purification, and marketing of crude minerals and mineral products.

Industrial or Management Engineering: Pertains to the efficient use of machinery, labor, and raw materials in industrial production.

Mechanical Engineering: Broadly speaking, covers the design and operation of all types of machinery and small structures.

Safety Engineering: Concerned with the prevention of accidents.

Sanitary Engineering: A branch of civil engineering that has acquired the importance of a specialized field due to its great importance for a healthy environment, especially in dense urban population areas.

Computer Engineering - involves many aspects of computing, from the design and programming of individual microprocessors, personal computers, and supercomputers, to circuit design.

Petroleum Engineering – relates to finding and producing hydrocarbon resources.

4. Pick and do two projects using the engineering skills you have learned.

Share your projects with your den, and also exhibit them at a pack meeting. (catapult, water rocket)

Catapult

Kit S&S GP3045 (pack of 12)

Includes:

- wood pieces
- rubber bands
- assorted pom poms
- dowels
- glue
- markers
- instructions.

Finished size: 5"L x 2"W x 3"H.

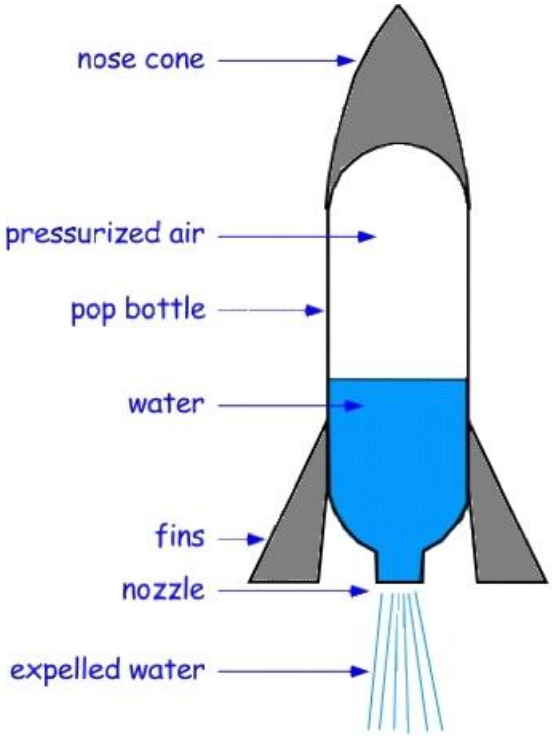
Need to add instructions

Water Rocket

Materials:

- water rocket launchers (from quartermaster)
- empty 16 oz or 2 ltr. soda bottles (must be from carbonated drinks to take the pressure. Other bottles may explode)
- construction paper to add fins and nose cone
- tape
- decorations

Instructions: Fill bottle about ¼ to ½ full of water. Place on launcher. Pump to around 100 psi. LAUNCH!



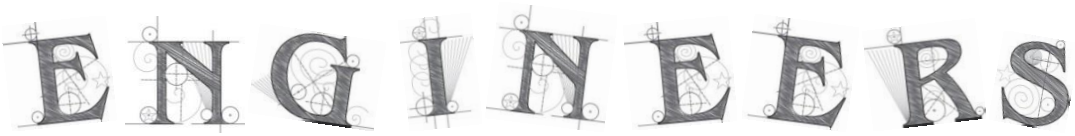
The Right "Person" for the Job! Worksheet

Answers:

Use a word from this list to fill in the correct answer.

Aeronautical	Chemical	Computer	City	Agricultural
Electrical	Metallurgical	Industrial	Mechanical	Civil

1. An engineer who designs plants to make water safe to drink - City.
2. An engineer who designs machines in a factory - Mechanical.
3. An engineer who tests new processes and checks old ones in a chemical plant - Chemical.
4. An engineer who plans new circuits and directs workers in an electrical plant - Electrical.
5. An engineer who designs and tests new space techniques - Aeronautical.
6. An engineer who designs and tests new techniques for new equipment for industry - Industrial.
7. An engineer who designs and tests equipment for farmers and ranchers - Agricultural.
8. An engineer who tests new processes and checks old ones in a steel plant - Metallurgical.
9. An engineer who designs bridges and roads - Civil.
10. An engineer who designs programs and new computers - Computer.



Name: _____

Interview an Engineer

1. What type of Engineer are you? _____

2. What does that type of Engineer do? _____

_____

3. What other jobs can this type of Engineer have? (Research, Sales, etc.) _____

_____

4. What education is needed for this type of Engineer? _____

_____

5. What other types of Engineers do you work with? _____

_____

6. What do those types of Engineer do? _____

_____

The Right "Person" for the Job!

Use a word from this list to fill in the correct answer.

Aeronautical	Chemical	Computer	City	Agricultural
Electrical	Metallurgical	Industrial	Mechanical	Civil

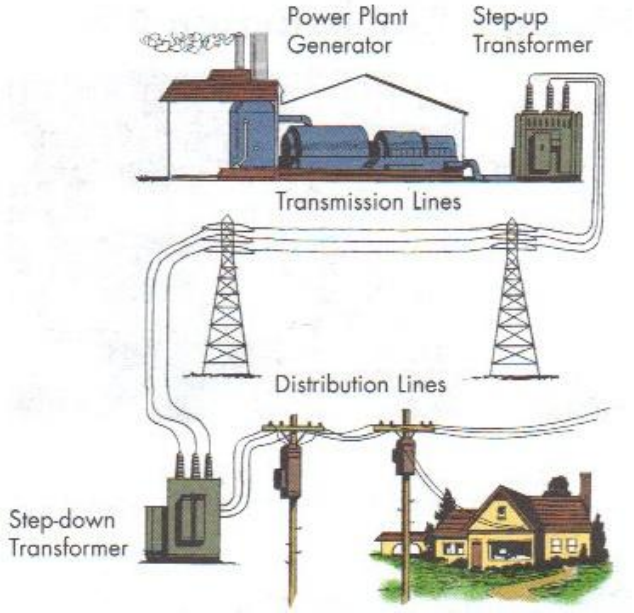
1. An engineer who designs plants to make water safe to drink - _____.
2. An engineer who designs machines in a factory - _____.
3. An engineer who tests new processes and checks old ones in a chemical plant - _____.
4. An engineer who plans new circuits and directs workers in an electrical plant - _____.
5. An engineer who designs and tests new space techniques - _____.
6. An engineer who designs and tests new techniques for new equipment for industry - _____.
7. An engineer who designs and tests equipment for farmers and ranchers - _____.
8. An engineer who tests new processes and checks old ones in a steel plant - _____.
9. An engineer who designs bridges and roads - _____.
10. An engineer who designs programs and new computers - _____.

Electric Power

An electric current is created when a magnet is spun rapidly inside a coil of wire. The huge generators in a power plant work on that principle. The turbines that spin the magnet are powered by water, steam, or wind power.

Electricity moves along wires like water running through a pipe. The electricity generated by a power plant moves over wires to a nearby *step-up transformer*. There, the voltage is raised so that the electricity can go efficiently over long distances.

A high voltage line carries electricity to your town. But the voltage must be reduced by a *step-down transformer* before you can use the electricity in your home.



Be Safe With Electricity

Even low-voltage electricity is strong enough to kill you. It can give you a hard shock or a bad burn. For your safety's sake:

- Don't touch a switch with wet hands or while standing on a damp floor.
- Don't touch anything electrical while taking a bath.
- Plug only one cord into each electrical outlet. Over-loading causes fires.
- Don't put electric wires under rugs and carpets. Walking on wires wears off the insulation and causes short circuits.
- *Newer* homes have circuit breakers. But if your home has a fuse box, use the correct size fuse in it.
- Don't get under a tree during a thunderstorm. Lightning could hit the tree.
- Get out of a swimming pool or lake when you see a storm or lightning, even in the distance.

What is Electricity?

Electricity is a form of energy. Electricity is the flow of electrons. All matter is made up of atoms, and an atom has a center, called a nucleus. The nucleus contains positively charged particles called protons and uncharged particles called neutrons. The nucleus of an atom is surrounded by negatively charged particles called electrons. The negative charge of an electron is equal to the positive charge of a proton, and the number of electrons in an atom is usually equal to the number of protons. When the balancing force between protons and electrons is upset by an outside force, an atom may gain or lose an electron. When electrons are "lost" from an atom, the free movement of these electrons constitutes an electric current.

Electricity Generation

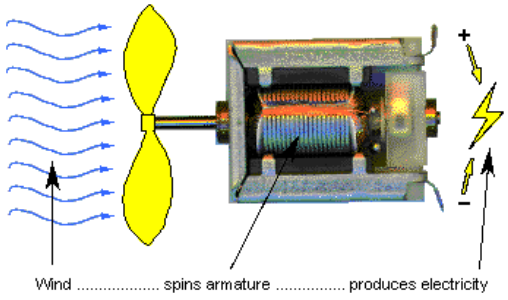
Whether from fossil fuels, nuclear, renewable fuels, or other sources - is usually based on the fact that "When magnets are moved near a wire, an electric current is generated in that wire."

A "generator" and "motor" are essentially the same thing: what you call it depends on whether electricity is going into the unit or coming out of it.

A generator produces electricity. In a generator, something causes the shaft and armature to spin. An electric current is generated, as shown in the picture (lightning bolt).

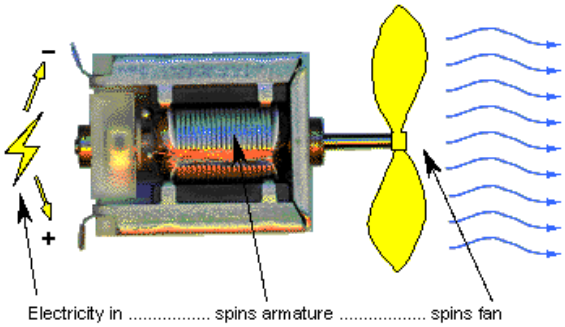
Lots of things can be used to make a shaft spin - a pinwheel, a crank, a bicycle, a water wheel, a diesel engine, or even a jet engine. They're different sizes but it's the same general idea. It doesn't matter what's used to spin the shaft - the electricity that's produced is the same.

Generator produces electricity



In the picture, the shaft and armature (with copper wire) spin around. The magnets are on the outside (they don't move). Electricity, at the "+" and "-" terminals, is shown in the picture as a lightning bolt.

Motor uses electricity



A motor uses electricity. In a motor, the electricity comes in through wires attached to the positive (+) and negative (-) terminals. The electric current causes the armature and shaft to spin. If there's just a little current and it's a small motor, it won't do very much work (i.e. it can only spin a small fan). If it's a large motor and it's using a lot of electricity, it can do a lot of work (i.e. spin a large fan very fast; lift a very heavy load; or whatever the motor is being used for).

Large (Utility-) Scale Electricity Generation

What if the coils are stationary and the magnets are spinning? That works, too.

An electricity generator has two parts:

The armature, also known as the stator, is the stationary part of the generator. It is a hollow cylinder, with coils of wire on the walls of the cylinder. *The coils are stationary.*

The rotor is an electromagnet that rotates inside the stator. *The magnets are spinning.*

Here's an inside look at one of the two turbine generator units at the Kalaeloa Partners' 180 MW power generation facility.

The rotor has been removed for system maintenance. You can see the coils in the armature. The armature is on the outside and does not rotate.

Here's the magnet, which rotates.

As you can see from the photos above, a commercial utility electric generator can be quite large. Another example is the 180-megawatt generator at the Hawaiian Electric Company's Kahe power plant on Oahu; it is 20 feet in diameter, 50 feet long, and weighs over 50 tons. The rotor spins at 3600 revolutions per minute.

Steam turbine generators, gas turbine generators, diesel engine generators, alternate energy systems (except photovoltaics), even nuclear power plants all operate on the same principle - magnets plus copper wire plus motion equals electric current. The electricity produced is the same, regardless of source.

So where do all the different energy sources come in? It's all a question of how to get (and keep) the system moving

In a steam power plant, fuels (such as petroleum, coal, or biomass) are burned to heat water which turns into steam, which goes through a turbine, which turns...*spinning the rotor and generating an electric current.* A geothermal power plant is pretty much a steam power plant, since what comes out of the earth is steam. Rainwater soaks into the ground and goes down, down, down...far enough until it reaches a region which is really hot (in Hawaii, that's about 6000 feet). A well is drilled, the steam comes out, goes through a heat exchanger, and spins a turbine... *spinning the rotor and generating an electric current.* By the time the steam has gone through the heat exchanger, it has cooled off and become warm water. It is then re-injected into the ground.

In a gas turbine power plant, fuels are burned to create hot gases which go through a turbine, which spins...*spinning the rotor and generating an electric current.*

In a nuclear power plant, nuclear reactions create heat to heat water, which turns into steam, which goes through a turbine, which spins...*spinning the rotor and generating an electric current.*

In a wind turbine, the wind pushes against the turbine blades, causing the rotor to spin...*spinning the rotor and generating an electric current.*

In a hydroelectric turbine, flowing (or falling) water pushes against the turbine blades, causing the rotor to spin...*spinning the rotor and generating an electric current.*

So you see, the different energy sources just provide energy to do the same basic thing...*spinning the rotor and generating an electric current*.

Electricity Transmission

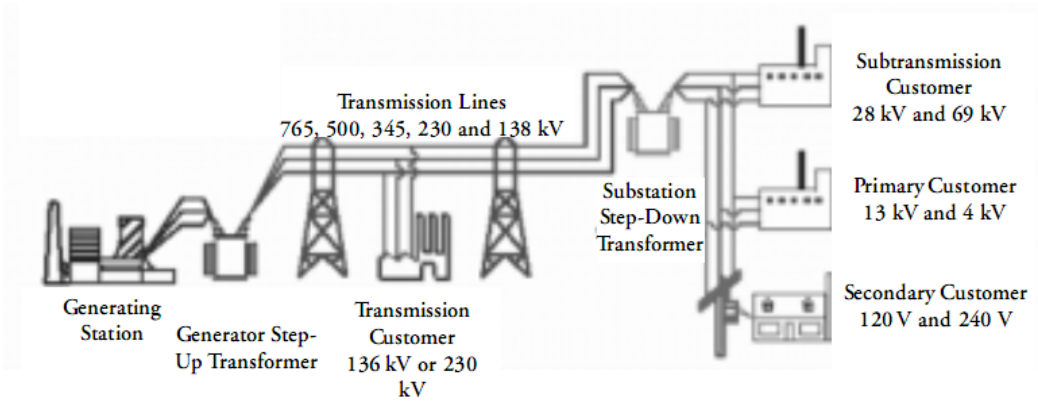
The earliest distribution system surrounded Thomas Edison's 1882 Pearl Street Station in lower Manhattan, and another that Edison built in Menlo Park, New Jersey. These, like most of the systems constructed during the next few years, distributed power over copper lines, using direct current. This method of distribution was so inefficient that most power plants had to be located within a mile of the place using the power, known as the "load." It appeared at the time that the power industry would develop into a system of many small power plants serving nearby loads. All the early power systems were what most people now refer to as distributed generation systems: generators were located close to the machines that used electricity.

By the 1890s, other inventors further developed this system of power distribution. The most important development was high-voltage power transmission lines using alternating current (AC), which was invented by Nicola Tesla. Alternating current allowed power lines to transmit power over much longer distances than the direct current (DC) system that Edison preferred. In 1896, George Westinghouse built an 11,000 volt AC line to connect a hydroelectric generating station at Niagara Falls to Buffalo, 20 miles away.

Much has changed since the late 1800's and at the start of the 21st century, the transmission system is a truly interconnected network with more than 150,000 miles of high-voltage transmission lines. The nation's increasingly technology-dependent society depends upon the network itself as much as on the power plants that use and feed the network.

The system developed into a sophisticated network, involving interconnected power plants and power lines that operate at many different voltages. Figure 1 illustrates today's transmission system. The network performs well nearly all the time, although weaknesses sometimes emerge. Fast-growing counties sometimes stress the transmission system's ability to deliver power reliably; at least until the transmission owners find ways to accommodate the growth. On rare occasions, the network breaks down and causes blackouts such as the one in the northeastern and Midwestern United States on August 14, 2003.

Figure 1. Key Elements of the Electric Power Grid



Source: U.S.-Canada Power System Outage Task Force, *Final Report on the August 14, 2003, Blackout in the United States and Canada: Causes and Recommendations*, April 2004.

Short History of the Catapult

The catapult is a machine used to hurl projectiles over a great distance without the use of explosives.

The earliest catapults date back to ancient Greece -- their mechanism was closely tied to the crossbow. The word "catapult" comes from the Greek *kata* meaning "downward," and *pultos*, meaning "shield." Its literal translation was "shield piercer."

First described by the historian Diodorus in the first century B.C., catapults evolved into arrow-shooting machines. But catapults as we know them were often-used in medieval times, as they were effective in breaking down a castle's fortified walls. They were also the weapon of choice in early biological warfare -- corpses and diseased carcasses were hurled over the walls of the enemy.

There were different types of catapults used in the Middle Ages. They included:

Ballista -- Like a crossbow, it worked by using tension

Trebuchet -- It included a lever and sling, and could hurl up to 200 pounds nearly a mile

Mangonel -- Projectiles were launched from a bowl-shaped bucket at the end of a giant arm

With the invention and use of gunpowder and the subsequent creation of artillery the catapult became obsolete as the weapon of choice for warfare around the fourteenth century.

Catapults have a long history and changed dramatically over many centuries. The true catapult that we think of today as a siege engine only saw limited use in the middle ages. Just as it was coming into its power as a machine of destruction gunpowder and artillery quickly replaced it as the weapon of choice.

Paracord Bracelet – Not associated with advancement