

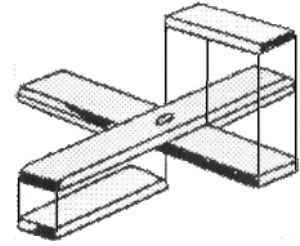
Webelos Activity Badge: Craftsman

Hat Rack or Neckerchief Slide Holder

You'll need a piece of wood 6" by 2', 6-8 spring type clothespins, sandpaper, hot glue gun, paint or stain, varnish, and a picture hook. Sand the wood smooth on all edges and wipe off excess dust. Glue the clothespins onto the wood so they all face the same direction. If you're hanging hats, put the clothespins in one column. If you're hanging neckerchief slides, you can put on more than one column. Let the glue dry thoroughly, then paint or stain the whole piece. Varnish it later for that Webelos shine and add the picture hook to the backside.

Flag Stand

Cut the boards (2 @ 1"x4" boards 16 inches; 4 @ 1"x4" boards 6.25 inches) and sand them. Be sure to round the ends of all six boards. Stain or paint the boards and let them dry completely. Assemble as in the diagram: both sections are fastened together with the 1.25" nails, driven from the bottom of the stand so the nails won't show. Once it is completely assembled, drill out a hole in the center big enough for the flagpole to fit snugly in.



Solo Ping Pong

For the paddle (base), cut a piece of 1/4" fir plywood 12"x6". Across the center of the underside, glue on an oak (dowel) handle that's 1"x1"x11" (perpendicular to the base). On the upperside of the base (just opposite the handle), glue on two 2" upright dowels to hold the net. Glue a 6" length of lace between the dowels to complete the net. Optionally, you can draw labels or boundaries on the base. Add a ping pong ball and compete with yourself to see how long you can volley the ping pong ball. Once you get really good, challenge your dad!

Tin Can Lantern

Gather some clean, empty cans (soup can size is good). Fill each with water and freeze them. The ice will keep the sides from collapsing later. Have the boys draw a design about 2-inches square (fleur-de-lis, animal shape, etc.). Cut it out and tape it to the frozen can (middle to lower). Remove the can from the freezer and place it on its side on top of a towel. Using a nail, follow the outside lines of the design and hammer in holes about 1/4" - 1/2" apart. The closer together you can get them, the prettier it will be. Dump out the ice being careful near the top edge of the can (may still be sharp). Melt a small bit of wax on the bottom inside of the can and immediately set a votive candle on this. A dried spaghetti noodle is a handy way to light the lantern. Light will emanate through the holes!

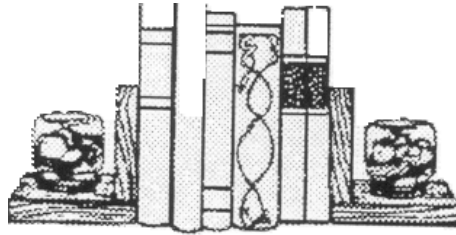
Key Rings

Cut a 10" - 12" length of suede leather cord. Loop it around a key ring. Add pony beads in a pattern and tie off each end of the cord. You can even add feathers (stick quill end inside two or three pony beads.)

Webelos Activity: Craftsman

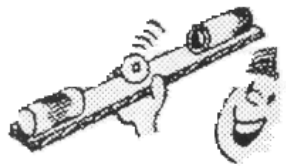
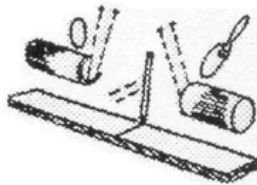
Bookends

Per project, you'll need four pieces of soft wood (fir or pine) cut to 4"x5" each, six finishing nails at least 1.5 inches long, sandpaper, paint or stain, and glue. Sand the wood until it is smooth to the touch, especially the ends. On the outer edge of one board, mark three evenly spaced dots (for nails) and hammer the nails through these so they just barely poke through the other side of the board. Put glue along the end edge (to be joined) of the other piece of board. Place the glued edge onto the edge of the barely through nails matching the edges of the two pieces. Tap the nails the rest of the way through, making the two boards into an "L" shape. Repeat this for the other two boards. Cut and glue felt pieces to the bottoms of the two bookends. You can even add additional items on the horizontal surface of each bookend, or just paint or stain and you're done!



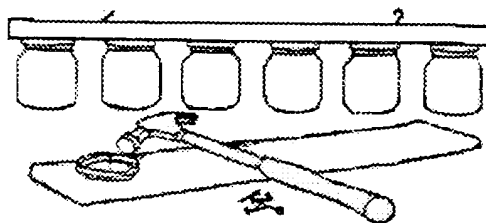
Can-Do Game

Per project, you'll need one piece of wood 1/2" x3" x24", two clean cans (with lids cut off), glue and one 1" diameter ball. Draw a line across the center of the board. Then glue the cans to the flat side of the smooth board with the closed ends of the cans even with the end of the board. Let this dry completely. Play the game! Hold the board near the center and place the ball in the center of the board. Try to get the ball into one can by tilting the board, tilt the other way and try to get the ball into the other can. Score one point for every time the ball goes into the can. After ten tilts, tally the scores!



Handy Dandy Nail Holder

Per project, you'll need 6 babyfood jars, 15" length of 1" x4" board, nails and a hammer, varnish and sandpaper. Sand and varnish the board. Wash and dry the babyfood jars and lids. Evenly space the lids on the dry wood and hammer them in place. Screw the jars onto the lids tightly. These are great for attaching onto workbenches and shelves to store nails and other small workshop items.



Webelos Activity: Craftsman

Leather – Tools and Tricks

Although there are certain carving tools for almost every type of design in leather work, your den will need only a few simple homemade tools to do a good job. You can make the stamping tools from large headed nails or spikes. File the heads into the shape desired. Make your modeling tools from hardwood dowels of different diameters and shapes. Check your scout distributor to order basic tools. You can make additional ones as you need them or add professional tools to your kit one or two at a time.

Background Tools: These vary from dowels shaped into dots, to nails filed into many designs such as flowers, stars, squares circles, single lines, double lines and cross-hatched lines.

Shader: Use this tool when depressed areas are required. The angle at which you hold the tool determines the size and depth of the depression. Hold shader in left hand and strike it with a good, firm blow of your striking stick.

Venires: Make flowers, leaves and ornamental designs with these tools. Hold the venire in an upright position. Start at the base and work toward the point of the leaf. Lean venire to the right or left depending upon the design.

Points to Remember:

1. Use a hard surface as a base when tooling leather.
2. Marble is an excellent base as it doesn't absorb moisture from the leather.
3. Dampen all leather completely through before working on it.
4. Redampen leather from the flesh side if it dries out before you complete the project.

Stamping:

1. Dampen leather on flesh side only (don't soak it)
2. Place leather on a piece of marble or Masonite.
3. Hold stamping tool in left hand and tap tool gently with wooden mallet.
4. Strike tool carefully to prevent cutting through leather.

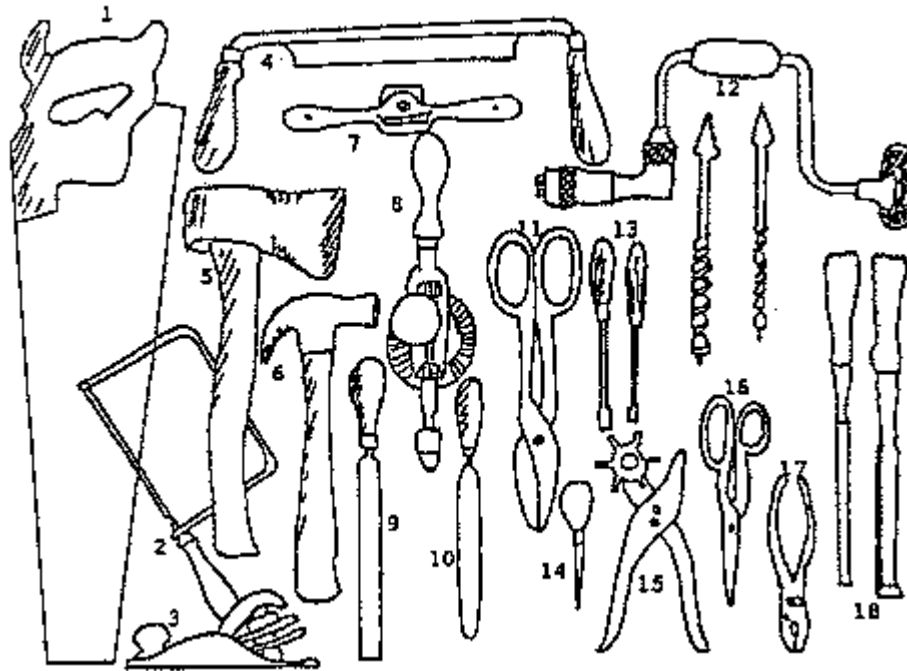
Embossing:

1. Dampen leather on rough side.
2. Place leather on a piece of carbon paper, face up. Lay pattern on leather and trace the design with a stylus. This will outline the pattern on both sides of the leather.
3. First, model the topside of the leather, then place the flesh side up on a pad of newspaper or corrugated board.
4. With the rounded end of the all-purpose tool, depress portion of the design to be raised. Move the tool with a circular motion, applying an even pressure.
5. Turn leather face up and retrace the modeled area where needed.
6. Fill the raised area on the back with cotton, wax, or plastic wood and glue muslin over filler to hold it in place.

Webelos Activity: Craftsman

Tool Identification

Pictured below are some basic tools Webelos Scouts may use when working with wood, leather or tin. Place the number of the tool next to the appropriate tool name.



- | | | |
|-------------------|---------------------|-------------------------|
| ___ Awl | ___ File | ___ Pliers (slip-joint) |
| ___ Ax (hand) | ___ Half-round File | ___ Saw |
| ___ Braces & Bits | ___ Hammer (claw) | ___ Screwdrivers |
| ___ Chisels | ___ Hand Drill | ___ Shears |
| ___ Coping Saw | ___ Leather Punch | ___ Spokeshave |
| ___ Drawknife | ___ Plane | ___ Tin Snips |

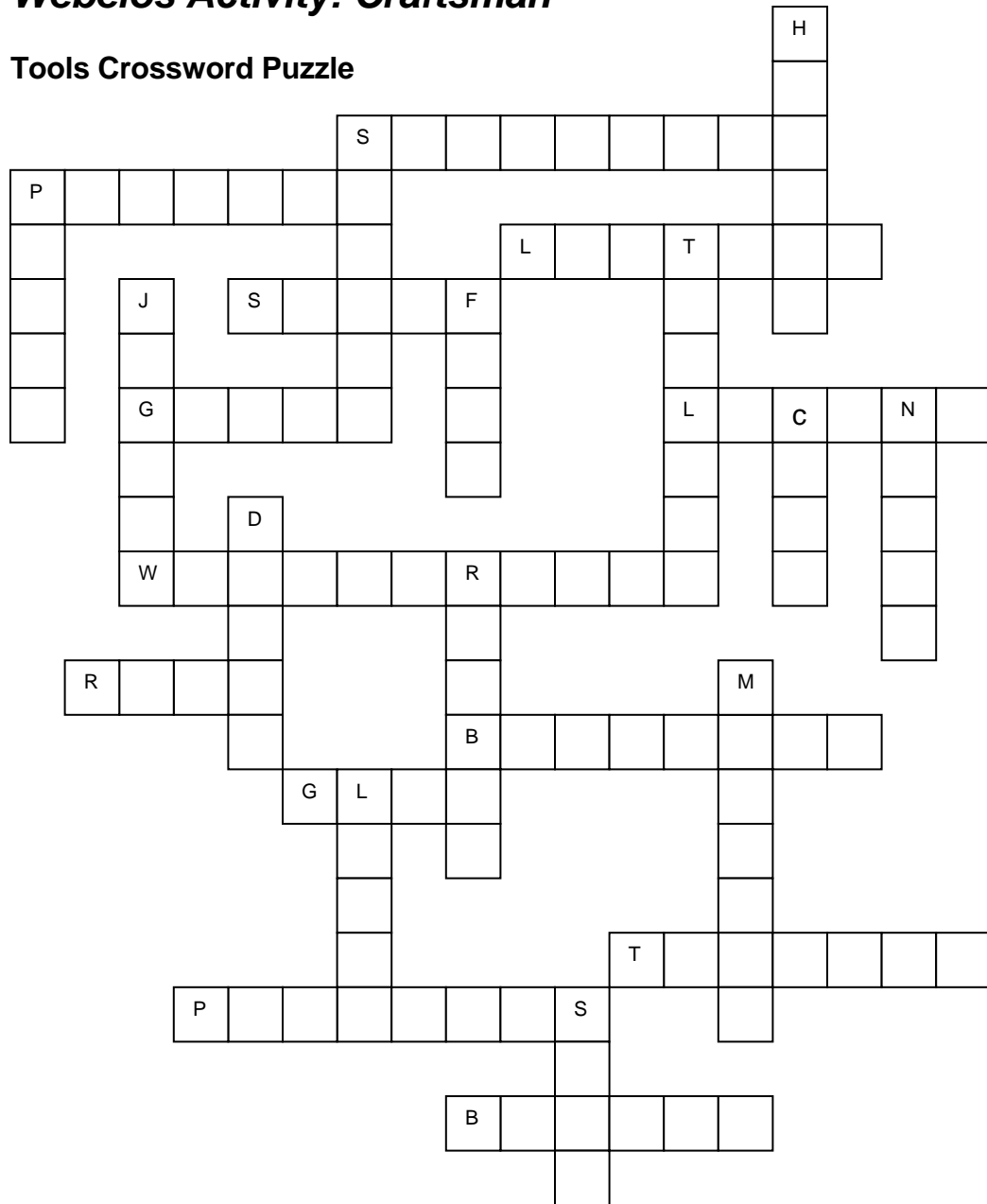
(Answers: Col. 1 - 14, 5, 12, 18, 2, 4

Col. 2 - 9, 10, 6, 8, 15, 3

Col. 3 - 17, 1, 13, 16, 7, 11)

Webelos Activity: Craftsman

Tools Crossword Puzzle



Place the following words into the crossword spaces above. The first letter of each word is already filled in for you!

- | | | | | | |
|---------|-------------|--------|----------|-----------|---------|
| blades | bookrack | clay | dowel | fire | glass |
| glue | hammer | jigsaw | lacing | leather | level |
| mailbox | nails | paint | phillips | plastic | rope |
| rubber | screws | shelf | slab | styrofoam | tooling |
| toolbox | woodworking | | | | |

Webelos Activity Badge: Engineer

Block & Tackle

You need two dowels of broomstick diameter and a length of clothesline rope. Tie the line to one of the dowels. Wrap it around both dowels as you hold the dowels about 5" apart. Make two or three passes around the dowels. Have two of your larger boys hold onto the dowels while another boy pulls on the clothesline cord. The third boy will be able to pull the dowels together no matter how hard the larger boys try to hold back.

Simple Pulley

Cut a wire clothes hanger in half along the long lower edge. Bend the ends at right angles and slip them through an empty thread spool (opposite ends). Adjust them so the spool spins smoothly. Bend the ends of the wire down to keep them from spreading. Attach string to the spool with tape or glue and continue wrapping it freely around the spool. Now you've got a simple pulley!

Strength of a Hollow Tube

Begin the demonstration by laying a brick on a styrofoam cup laying on its side. Place another cup on its rim and add bricks (2 or 3) until it is crushed. Glue 4 cups together, rim to rim and bottom to bottom with white glue and allow it to dry. Place bricks (usually 4) on until the structure is crushed. This demonstration shows the use of columns in engineering and bridges.

The Power of Paper and the Triangle

This shows what makes corrugated cardboard boxes strong. Take a sheet of white paper and crease it 1/4" from the edge. Continue folding and creasing the paper in 1/4" folds accordion-style. Make two paper columns by rolling a sheet of paper around a can and taping the ends together. Remove the can(s). Stand the two columns on end 4" apart. Set the pleated sheet across the tops. Place the can on top of the pleated sheet. Wow! An engineer discovered that pleating paper gives it more strength.

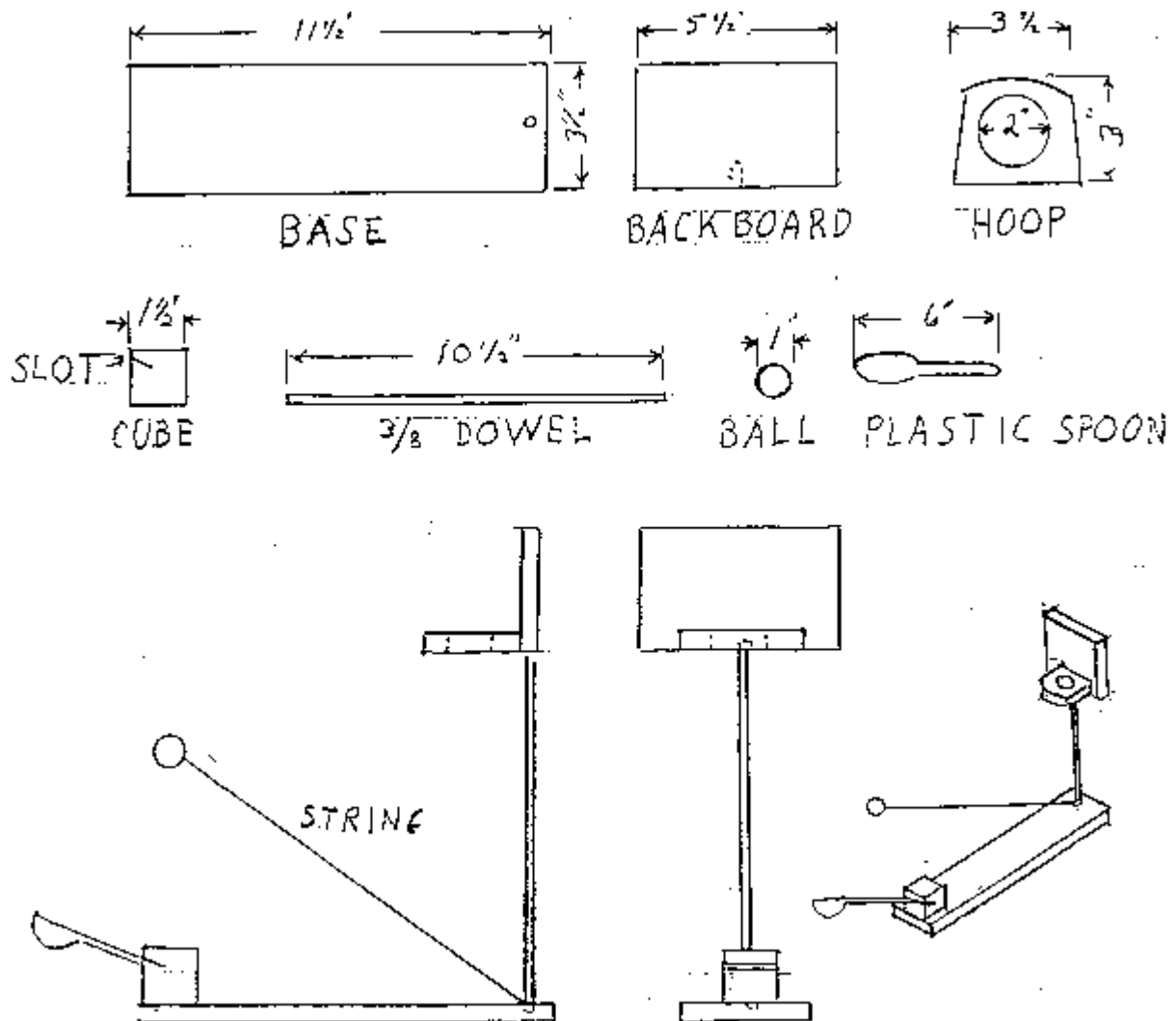
Bridges

Don't just draw bridges, build them and test their strength! A drawing can't demonstrate the structure, strengths, and weaknesses of various bridge types. Find some similar shaped wood blocks (rectangular in shape is best; square will do). Be sure there are enough for all the bridges you will be building. Now cut posterboard into even-width strips to represent the roads.

Let the boys work in groups to make the various bridges pictured below. The suspension bridge will require more work and innovation (use dowels, long narrow wood blocks, etc for the posts and string or yarn for the wire). Once the bridges are built, test them for their strength. Place matchbox cars on one bridge, one at a time. Record how many cars it took to "break" the bridge. Repeat this testing on each of the other bridges. Then discuss what it was about each bridge that accounted for its strength or weakness.

Webelos Activity: Engineer

Basketball Catapult



Instructions:

1. The base and backboard and hoop are made from a 1"x4" board.
2. Drill holes in the top of the base and the bottom of the backboard $\frac{3}{8}$ " diameter and $\frac{1}{2}$ " deep.
3. Cut a slot at a 15-degree angle in a block cube that's large enough for the handle of a plastic spoon to be anchored in.
4. Use a slice of 2" diameter PVC pipe and screw it into backboard for the hoop.
5. Glue the dowel rod at both ends into the backboard and the base.
6. Glue the cube block to base and insert spoon into the slot.
7. Cut a string and attach one end to the dowel rod at base (glue in place) and the other end to any 1" sized ball (ping pong balls or plastic golf balls work well).

Webelos Activity: Engineer

The Right "Man" for the Job!

Use a word from this list to fill in the best answer for each statement below.

Aeronautics **Agricultural** **Chemical** **Civil**
Electrical **Industrial** **Mechanical**

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 - _____.

(Answers: 1-Civil 2-Mechanical 3-Chemical 4-Electrical 5-Aeronautics 6-Industrial 7-Agricultural)

Rubberband Strength

Before using materials in building, engineers must know the characteristics. Does it expand or contract? Is it weak or strong? Does it burn or not? You can try an experiment to learn more of the characteristics of rubberbands and other elastic material. Get a collection of different sized rubber bands. Measure them for length, width and thickness (if you can). Make a chart that shows this information and mark each rubberband clearly so you know which is which. (Using colored rubberbands is best.)

Rubberband	Original			Stretched		
	Length	Width	Thickness	Length	Width	Thickness

With each rubberband, attach one end to a cup hook that is screwed into a board. Attach the other end to a known weight. How far down does each rubberband stretch? Does its thickness change? Does its width change? Which rubberband is the strongest? Which rubberband is the weakest? How can you tell?

Webelos Activity: Engineer

Bridges & Machines

Use a word from this list to fill in the best answer for each of the statements below. Looking at the pictures may help.

Arch Bridge
Pier Bridge

Beam Bridge
Plank Bridge

Block & Tackle
Suspension Bridge

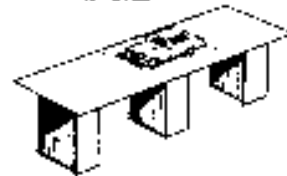
Catapult
Truss Bridge

1. A flat surface over two supports - _____.
2. A flat surface over three or more supports - _____.
3. A flat surface over an arched support - _____.
4. A flat surface with turned up edges - _____.
5. A bridge with sides made up of a series of triangles - _____.
6. A bridge that appears to hang from strong strung cables - _____.
7. A pulley(s) and a rope or cable - _____.
8. A slingshot or other device used to project something - _____.



PLANK BRIDGE

PIER BRIDGE



BEAM BRIDGE



ARCH BRIDGE



TRUSS BRIDGE

(Answers: 1-Plank Bridge 2-Pier Bridge 3-Arch Bridge 4-Beam Bridge 5-Truss Bridge
6-Suspension Bridge 7-Block & Tackle 8-Catapult)

Webelos Activity Badge: Handyman

Mark Those Tools

If Dagwood Bumstead in the comic strip "Blondie" ever bothered to mark his lawn tools, he'd have fewer battles with his neighbor Herb Woodley. Encourage your Webelos Scouts to avoid similar problems by marking family lawn/tool equipment. Use one of these ideas:

- Use enamel paint and a brush or a cotton-tipped swab to letter the family's name on a place on the handle that won't get too much wear.
- Wrap some colored electrician's tape around the handle in some distinctive manner.
- Use a wood-burning tool to burn the family's name into a wooden handle.
- Use a ten-penny nail or metal engraving tool to engrave the name into a metal handle.

Bicycle Maintenance

Tasks:

Tighten chain
Adjust saddle & handlebars
Lubricate chain crank
Check tire pressure
How to determine proper tire pressure
Inflate tire

Equipment Needed:

* bicycles
* (box) wrenches
* oil can
* rags
* tire gauge
* hand tire pump

Maintenance Chart:

- Every Saturday, give it air - pump tires to recommended pressure.
- Every Memorial Day and Labor Day, oil your chain. You can take it off and dunk it in oil or just oil it while still on the sprockets. If it crackles and squeaks, oil it more than twice a year. A good chain should be seen, not heard. Clean and re-grease the crank bearings.
- As needed: squirt oil into the inner ends of the pedals. Spin them now and then. If they don't spin quietly, oil them more often or repack with grease.

Handyman Games

Toolbox Sort Out - Give each player an egg carton for his toolbox. Have an assortment of nuts, bolts, screws, etc., to be sorted. The first boy to accurately sort by size in the proper places in the toolbox wins.

Nail Driving Contest - Give each boy a hammer and five nails. On the word go they are to hammer all five nails completely into a round log 4 inches in diameter. The first one finished is the winner.

Board Saving Contest - This is the same as the nail-driving contest. Give each boy a small hand saw and a 2 x 4 board. On the word "go", each boy is to saw his board in half.

Name the Tools - Cut different silhouettes of tools from construction paper, such as a hammer, plane, brace, bit, wrench, screwdriver, etc. Glue these on lightweight cardboard and use as flashcards.

Webelos Activity: Handyman

Handyman Scavenger Hunt

In a boy's home or meeting place, hunt for the following items—or create your own list. Boys should be accompanied by a parent or their leader. They should not gather the items, but instead, mark the location with a piece of yarn or write down the location.

Pruning shears	Edge trimmer	Oil can
Light bulbs	Lawnmower	Gasoline can
Old newspapers	Pliers	Hammer
Crescent wrench	Air pump	Coping saw
Sandpaper	Plunger	

Tire Inflation Game

Divide den into two teams. Have a bicycle for each team. Each boy pumps up empty tire until he thinks it's "full" as judged by his feeling of tire. Leader checks with tire gauge to agreed upon full tire pressure. Team with average pressure closest to correct, full pressure wins. Too easy? Add a time factor, like maximum of one minute per Scout.

Handyman Relay

Have other adults help you with the different stations for this relay. Time the boys, but emphasize that safety counts more than speed.

#1: Check oil level in car. Place clean rag on car hood, have boys open hood, check oil, close hood, tell results, and place rag in box.

#2: Check tire pressure. Have boy open front car door, take pressure gauge out of glove box, find correct pressure on edge of car door, close door, take tire pressure, tell results, open car door, replace gauge in glove compartment, close door.

#3: Adjust seat on bicycle. Have bike seat too high. Have boy choose from 3 different tools the one he needs to loosen the saddle clamp bolt. Have him wiggle saddle until it is at a proper height for him. Then he tightens the clamp bolt and returns the tool.

#4: Replace light bulb in a lamp. Have a lamp set up at a station with an old burned-out light bulb. Have boy unplug lamp, screw out bulb, place bulb gently in paper sack, look at lamp socket for proper wattage, choose correct wattage bulb from a box of assorted new bulbs, screw new bulb into socket, plug in lamp, turn on lamp and turn off lamp.

#5: Mark and properly store hand tools. Have a peg board, tool box, or piece of poster board with the outlines of the tools drawn on it. Set out several of the hand tools in a pile. Have boys use some red plastic tape (available at grocery, hardware stores) to wrap around handle of a tool that hasn't been marked yet. Then he sorts tools and places them neatly in their proper storage place.

Webelos Activity: Handyman

Handyman Matching Game

- | | |
|--|-------------------------------------|
| A. A place where two or more roads cross | _____ 1. Pedestrian |
| B. An act in which damage, injury or death may occur | _____ 2. Breaking distance |
| C. Time needed to walk across a two-lane street | _____ 3. Intersection |
| D. Signal which alerts you to check in all directions for traffic and proceed with caution | _____ 4. Hand signal |
| E. Distance traveled from the time the brakes are applied until you stop | _____ 5. Littering |
| F. Items that need periodical maintenance checks | _____ 6. Traffic |
| G. Movement of vehicles on streets, roads or highways | _____ 7. Stop sign |
| H. A person who enforces the laws of the road | _____ 8. Bicycle helmet |
| I. A designated place to cross streets | _____ 9. 8 to 10 secs |
| J. A person on foot | _____ 10. Seat belt |
| K. Places, objects or situations that could cause accidents | _____ 11. Policeman |
| L. An electrical device that controls movement of traffic | _____ 12. Accident |
| M. The side of the road to be on when walking in traffic | _____ 13. Traffic signal |
| N. Scattering trash in yards, streets and on the bus | _____ 14. Yellow light |
| O. Regulations people live by | _____ 15. Hazards |
| P. A sign that is red in color and has eight sides | _____ 16. Tires, brakes, handlebars |
| Q. An area which normal field of vision fails to see | _____ 17. Crosswalk |
| R. A safety device to be used by all occupants of a vehicle | _____ 18. Left |
| S. Use of left arm and hand to communicate your actions to other drivers | _____ 19. Laws |
| T. A safety device that should be used by all bicyclists | _____ 20. Blind spot |

(Answers: 1-J 2-E 3-A 4-S 5-N 6-G 7-P 8-T 9-C 10-R 11-H 12-B 13-L 14-D 15-K 16-F 17-I 18-M 19-O 20-Q)

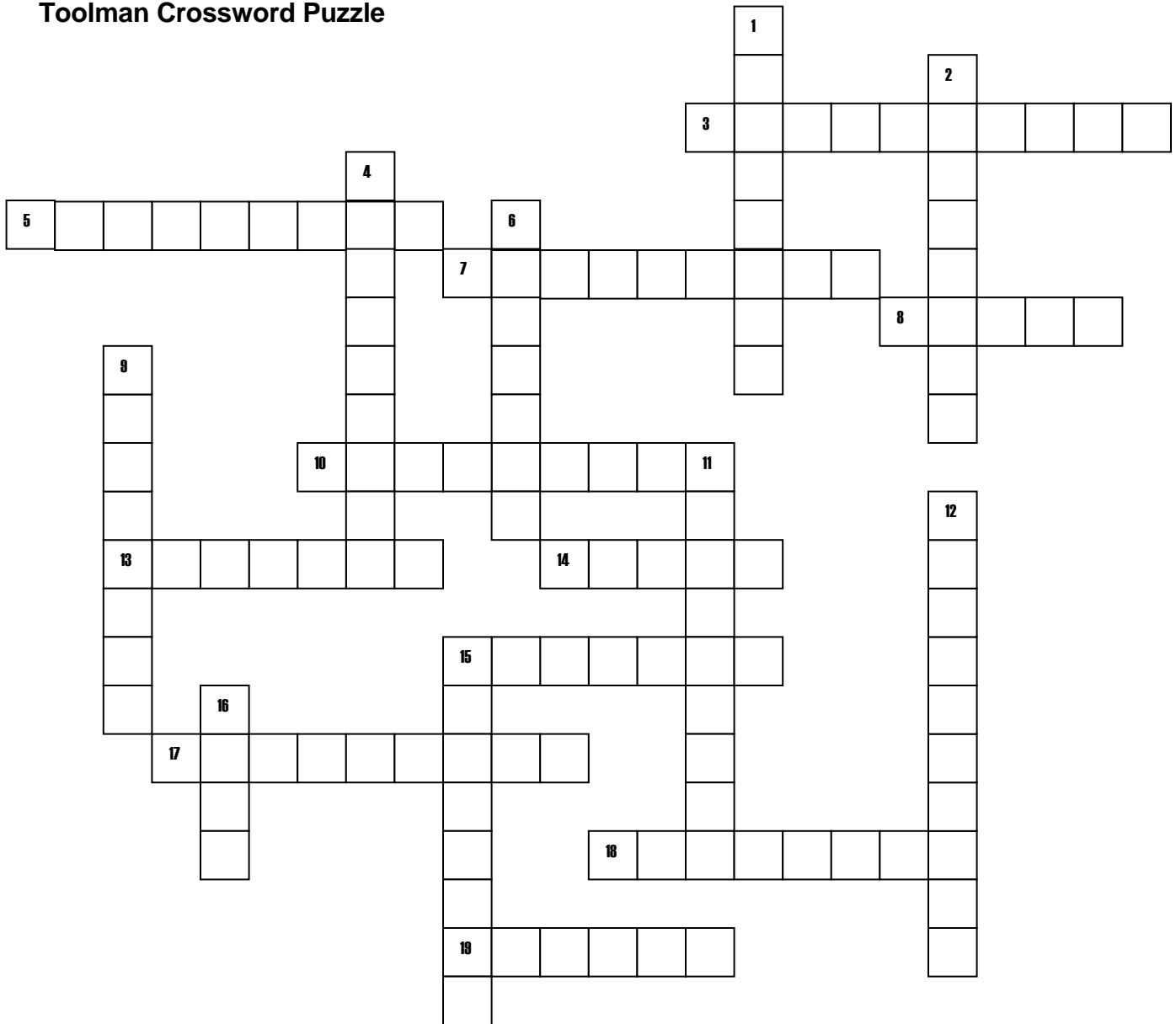
Match the Tool to its Function

- | | |
|--|--------------------|
| _____ 1. Drives and pulls nails | a. Screwdriver |
| _____ 2. Holds wood in place for gluing | b. File |
| _____ 3. Makes straight cuts in wood | c. Awl |
| _____ 4. Hold bit for drilling holes | d. Wood Plane |
| _____ 5. Cuts curves in wood | e. Steel Square |
| _____ 6. Makes holes in metal and wood | f. Claw Hammer |
| _____ 7. Corkscrew shaped drill | g. Hand Drill |
| _____ 8. Adjusts to different sizes | h. Brace |
| _____ 9. Smooths rough boards | i. Bit |
| _____ 10. Punches holes | j. Hand Saw |
| _____ 11. Can be "flat" or Phillips | k. "C" Clamp |
| _____ 12. Used to smooth metal | l. Coping Saw |
| _____ 13. Used for marking and checking cuts | m. Crescent Wrench |

(Answers: 1-F 2-K 3-J 4-H 5-L 6-I 7-G 8-M 9-D 10-C 11-A 12-B 13-E)

Webelos Activity: Handyman

Toolman Crossword Puzzle



ACROSS

3. Bright lights on the front of a car are called _____.
5. Cleaners that are _____ are often marked with a skull.
7. When it burns out, the _____ must be replaced in a lamp.
8. The _____ bulb in a turn signal can burn out.
10. One light found on the back of a car is a _____.
13. If a bike chain becomes loose, you should _____ it.
14. The extra tire in a vehicle is called the _____.

DOWN

1. Air inside a tire exerts _____.
2. Use the _____ to check the level of oil in your car.
4. When you put oil on your bike chain, you _____ it.
6. A two-wheeled vehicle Scouts can ride is a _____.
8. A nail on the road may cause a _____.
11. You need a _____ to check tire pressure.
12. The _____ is the part of the car that holds the wheels.

Webelos Activity Badge: Scientist

Remember the Scientist Activity Badge is a "doing" badge, not a "watching" badge. For best results, follow this procedure:

1. Demonstrate the experiment.
2. Explain the experiment.
3. Ask questions to test understanding.
4. Allow Webelos to do experiment.
5. Have each boy log the experiment.

What Color is Black Ink?

coffee filters scissors black watercolor pen
small (juice) glass pencil ruler

Cut a strip of filter paper 2" wide and 1" longer than the height of the glass. Fold over 1" on one end and cut two small slits in this fold so that when opened again, you can slide a pencil through both slits to hold the paper. Lay the pencil across the glass and adjust the length of the strip so that it just touches the bottom of the glass (or a bit shorter). Take out the strip and about 1" from the bottom edge, make a spot of ink that is about the size of the tip of your little finger. Pour water into the empty glass to a depth of about 1/4" and lower the strip into the water, letting the pencil hold it in place. Watch as the water rises up through the paper. What color appears first? How many different colors do you see?

What's going on? Each color has a slightly different density, so each color is carried upward at a different rate. (least dense travels fastest) This process is called chromatography, and is used by scientists to discover the ingredients of a substance. It's also used by police investigators to discover if a check or document has been altered (ink samples from the part thought to be real are compared to ink samples from the part thought to be forged).

Magic Bottle

1 or 2 liter plastic bottle 2 pushpins water

Work outside or over a sink. Fill the bottle to the very top with water. Screw the cap on tightly. Stick one pushpin into the soft side of the bottle. Push the second pushpin into the opposite side of the bottle. Then pull out both pins. Surprise! If water leaks out at all, it quickly stops. Did the bottle magically plug itself? If you squeeze the bottle, you'll see that water squirts out the holes. But when you stop squeezing, the water will immediately stop flowing.

Why? The science secret that makes the bottle appear to magically "plug" its holes is air pressure. Even though it's invisible, air has weight and takes up space. Air doesn't simply push down, though. It exerts force in all directions and the force of the air pushing in on water at the holes you made is greater than the force of the water that's inside the bottle is pushing out. What would happen if you took the cap off the bottle? Try it!

Webelos Activity: Scientist

PASCHAL'S LAW

Experiment 1:

Materials: Coke bottle, balloon, 1/4 cup vinegar, 1/4 cup baking soda

Place baking soda in the coke bottle. Pour vinegar into the balloon. Fit the top of the balloon over the top of the bottle without spilling out the vinegar. Now flip the balloon so the vinegar does go into the bottle. The gas formed will inflate the balloon.

Why? Baking soda mixed with vinegar produces carbon dioxide, which pushes equally in all directions.

Experiment 2:

Materials: Medicine dropper, tall jar filled with water, sheet of rubber (cut from a balloon), rubberband

Dip the medicine dropper in the water and press the rubber bulb so the dropper is partly filled. Test to see if the dropper will float. If it starts to sink, eject a few drops until it floats with the top of the bulb almost submerged. Cap the jar with the rubber on top and the rubberband around the jar neck, holding it in place. Now, push the rubber cover down and watch the medicine dropper sink. Release the rubber and the dropper rises again.

Why? The downward pressure on the rubber forces water into the medicine dropper, compressing the air about it, producing the effects of sinking, suspension and floating, according to the degree of pressure applied.

Experiment 3:

Materials: Rubber balloon, several straight pins, plastic tape

Inflate the balloon and affix little squares of tape to it. Stick each pin through the center of the tape pieces. Now pull them out. The balloon doesn't burst either time!

Why? The adhesive substance on the tape acts like a self-sealing tire, adhering to the pin as it is pressed inward. When the pin is removed, the adhesive is forced outward by the air pressure from the balloon, automatically sealing the tiny pinholes.

BERNOULLI'S PRINCIPLE

Experiment 1:

Materials: Ping-pong ball, adhesive tape, foot of string, water faucet

Fix the ball to the end of the string and turn on the water to form a steady stream. While holding onto the string, flip the ball into the water from a few inches away. Not only will the ball stay with the string at an angle, but you can draw the ball up the stream almost to the faucet.

Why? The water, streaming around one side of the ball, exerts less pressure than the air which surrounds the other side. Even though you feel the resistance of the water as you draw the ball upward, the air pressure is still stronger.

Experiment 2:

Materials: candle, candlestick, bottle with round corner, bottle with square corners

Light the candle and place the round bottle in front of it. Blow hard against the bottle and the candle will go out. Repeat the process with the square bottle. The candle will remain lit.

Why? With the round bottle, the air current flows around the bottle and puts the flame out. With the square bottle, the air currents are dispersed.

Webelos Activity: Scientist

Diving Raisins

Cut a raisin into four equal pieces and drop all the pieces into a glass of clear soda. They should sink to the bottom. After a few minutes of observation, you will note that the raisins will rise to the surface, dive to the bottom, then rise and dive repeatedly. *Why?*

Why? Look closely at the raisins. What do you see? Tiny gas bubbles have become attached to each piece of raisin. The raisins and their accompanying gas bubbles rise after their combined weight becomes less than the weight of the water they displace. Eventually, when enough gas bubbles break loose and escape, the raisins sink to the bottom of the glass and the process repeats.

Condiment Diver

First, find the best condiment packet (ketchup, soy sauce, etc. from fast food restaurants) to serve as your Cartesian diver. The best packets are those that just barely float in a glass of water. Fill an empty, clear plastic bottle to the top with water. Shove your unopened condiment packet into the bottle and replace the cap. Now, squeeze the bottle to make the diver sink and release it to make it rise. *Why does this work?*

Why? Many sauces are more dense than water, but it is the air bubbles at the top of the sauce packet that determines whether the packet will sink or swim. Squeezing the bottle causes those air bubbles to shrink. These smaller bubbles are less buoyant and the packet sinks.

Corrected Vision

Find a few friends (and/or adults) who wear glasses. Hold them out at arm's length and look at the view. Look at the shape of the lenses too. Try several pairs. Be careful not to hurt the glasses. People who wear glasses need them to see with. Respect that. If you wear glasses, keep yours on when you view a pair of glasses.

Nearsighted: These lenses will make the view look smaller. When people are *nearsighted*, *they can see near*. They cannot clearly see things that are far away. Their eyeballs may be too long.

Farsighted: These lenses will make the view look bigger or even upside down. When people are *farsighted*, *they can see far*. They cannot clearly see things that are close up. One cause of it is eyeballs that are too short.

Astigmatism: These lenses will change the shape of the view, stretching it out and maybe twisting it. People with *astigmatism have a cornea that is out of shape*. The weird stretched-out lenses fix it.

Webelos Activity: Scientist

Paper Plate Puzzle

Cut a one-quarter slice out of paper plate and set the plate on a table. Roll a marble around the plate's rim. What direction will the marble go when it gets to the cut edge? Will it continue to curve inward, go straight ahead or curve outward?

Explanation: The action of the marble follows Newton's first law of motion: a body in motion will continue in a straight line unless a force is applied to it to move it out of the straight line. When you give the marble a push, it would roll in a straight line, but the curved edge of the paper plate supplies the force to push it into a circular path. As soon as the push is removed, the marble rolls in a straight line.

Balancing Stick

Place a lump of clay about the size of your fist eight inches from the end of a three foot length of 1/2" dowel. Wrap the clay around the dowel so it stays in place. Balance the dowel on the tip of your finger, putting your finger under the end that's near the clay. Now, turn the dowel over and balance it with the clay near the top. Notice that the dowel is easier to balance when the clay is near the top.

Why? The dowel rotates more slowly when the mass is at the top, allowing you more time to adjust and maintain balance. When the mass is at the bottom, the stick has less rotational inertia and tips more quickly. The farther away the mass is located from the axis of rotation (such as your hand), the greater the rotational inertia and the slower the stick turns. An object with a large mass is said to have a great deal of inertia. Just as it is hard to change the motion of an object that has a large inertia, it is hard to change the rotational motion of an object with a large rotational inertia. Here's a way to feel the change in inertia. Grab the end of the dowel that's near the clay. Hold the dowel vertically and rapidly move the dowel back and forth with the same motion you use to cast a fishing line. Next, turn the dowel upside down and hold it at the end that's farthest from the clay. Repeat the casting motion. Notice that it is much harder to move the dowel rapidly when the clay is near the top. The mass of the dowel hasn't changed, but the distribution of the mass of the dowel with respect to your hand has changed. The rotational inertia depends on the distribution of the mass of the dowel.

Fog Chamber

Barely cover the bottom of a wide-mouthed gallon jar with water. Hang a rubber glove inside the jar, fingers pointing down and stretch the glove opening over the mouth of the jar. Insert your hand into the glove and pull it quickly outward without disturbing the jar's seal. Nothing will happen. Now remove the glove, drop a lit match into the jar and replace the glove. Pull outward on the glove once more. Fog forms inside the jar when you pull the glove outward and disappears when the glove snaps back.

Why? Water molecules are present in the air inside the jar but they are in the form of invisible gas molecules or vapor. When you pull the glove outward, the air must do work which means that it gets cooler. When the water molecules slow down, they can stick to each other more easily so they begin to bunch up in tiny droplets. The particle of smoke in the jar help this process along. The water molecules bunch together more easily when there is a solid particle to act as a nucleus. When you push the glove back in, you warm the air in the jar slightly, which causes tiny droplets to evaporate and then become visible.

Webelos Activity: Scientist

Balancing Tests

The Super Stoooper: Try this your self then try it on a friend. Place a coin or dollar bill on the floor, two feet out from the wall. Now, stand in front of the money, with your back up against the wall. Without moving your feet or bending your knees, try picking up the money! Chances are that you'll fall over first because, when you stoop down, your body shifts so it is off balance.

Center of Gravity: Extend your index finger. Pick up one of these items: drinking straw, ruler, pencil, pen, yardstick. Place it on your finger. Move your finger until the object is balanced. The point of balance of the item is its center of gravity. Now, try taping a penny or a washer on the item being balanced. See what happens when you tape the weight on one end, or two different weights any place you want to. If you change the location of the weight, what happens to the balance point?

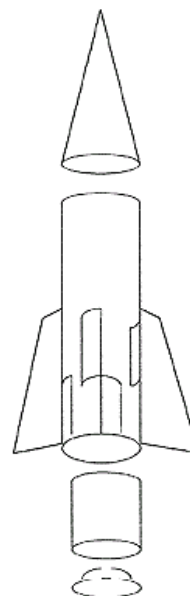
Up Against the Wall: Stand with one shoulder, arm, leg and foot close to the wall. Try to bring your outside foot up to touch the one next to the wall. Stop at the point where you feel yourself losing your balance. The wall is in your way, so you can't move your body that direction to adjust your center of gravity and keep your balance.

Coal Garden Crystals

Place a small piece of coal in a bowl. Sprinkle one tablespoon of salt over the coal and then carefully pour two tablespoons of water over the salt. Now add two tablespoons of laundering "bluing," three drops of mercurochrome, and three or four drops of food coloring. Take this concoction home carefully. After several days, there should appear a colorful, moss-like growth covering the coal!

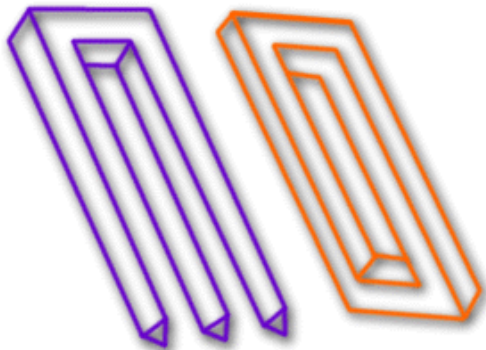
Film Canister Rocket

Roll a piece of construction paper around the film canister (the kind with the lid that is inset) so that you have a tube. It's OK if it's longer than the canister. Make sure that the cover of the film canister is the bottom end of the tube. Tape the construction paper to the canister, leaving the canister lid extending outside the tube a little. Make a nose cone by cutting a circle out of construction paper, cutting a line to the middle of the circle (the radius) and twisting the paper into a cone shape. Tape the ends together and tape the cone on top of the construction paper tube. Add some triangle-shaped fins near the bottom end to help stabilize the rocket. Now, move outside to complete this project. Put 1/2 tables of alkaselzer and one teaspoon of water into the film canister and put the lid on quickly. (Or, take off the lid of the film canister and put a small amount of baking soda in the film canister with some vinegar and put the lid back on quickly.) Set the rocket down so that the nose cone points up. Stand back and get ready for blast-off! In 10-30 seconds it should shoot up to 10 feet.

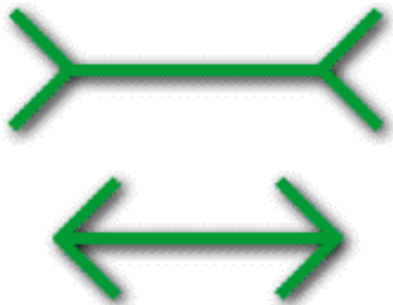


Webelos Activity: Scientist

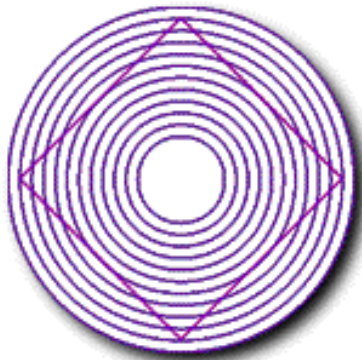
Optical Illusions



Can these objects truly exist?



Which line is longer - top or bottom?



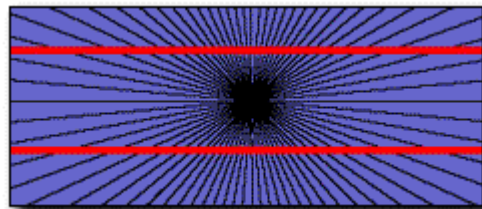
Is the "box" over the concentric circles a square or not?



Is this a young girl or an old lady?



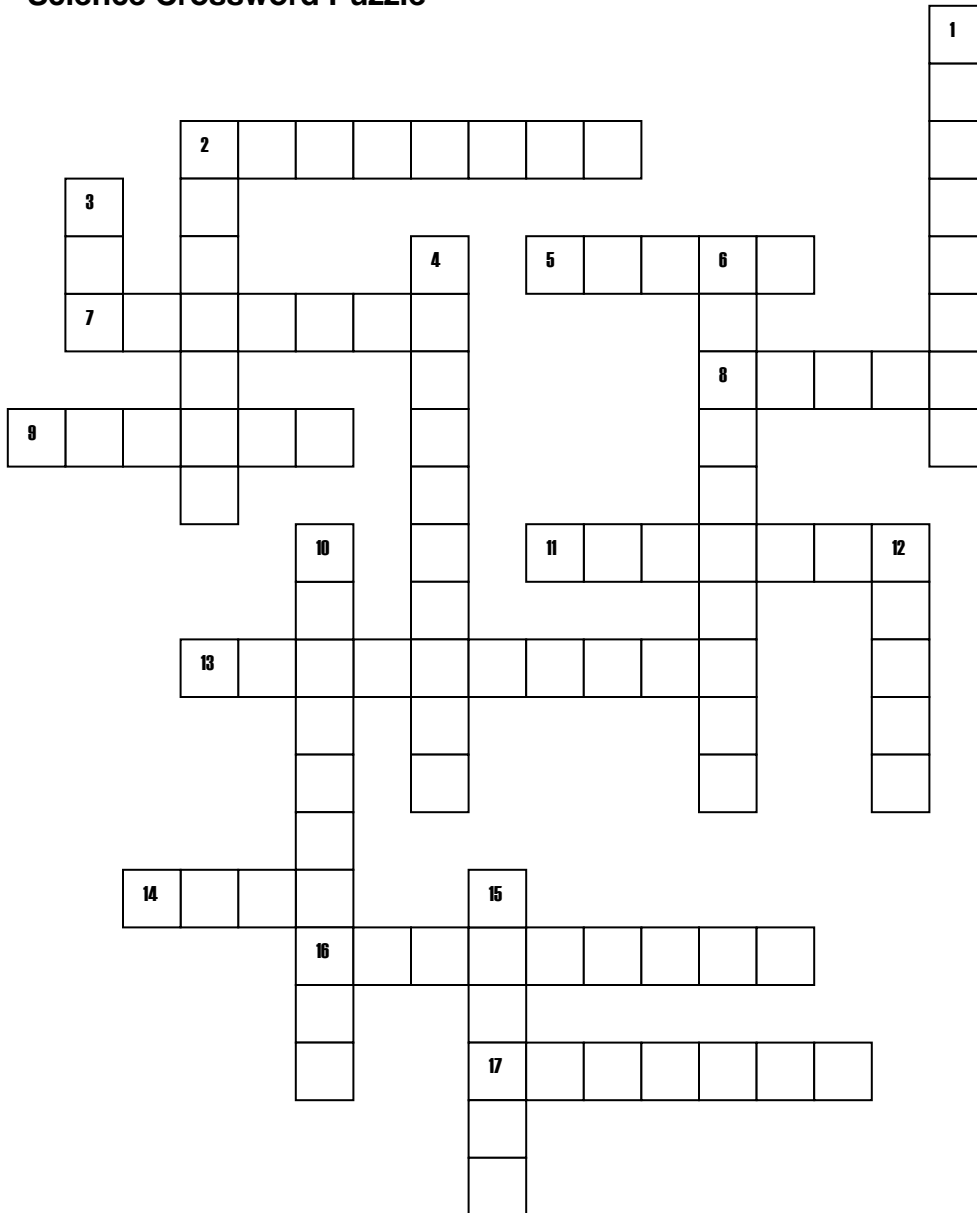
Do you see a woman's silhouette or a saxophone player?



Are the lines parallel or curved?

Webelos Activity: Scientist

Science Crossword Puzzle



DOWN

1. Some liquids when they get solid, form shapes called C_____ that are all the same shape.
2. Your B_____ enables you to stand steadily, and it's also a mechanical tool that lets you weigh things.
3. Mixing cool air into warm air causes F____ to appear.
4. An educated scientific "guess" is an H_____.
6. A scientific task that tests a hypothesis is an E_____.
10. C_____ air used in machines like air pumps and jackhammers helps do work

ACROSS

2. B_____ developed the principle that explains how a plane can fly.
5. Air has W_____ in it, but the molecules are so small you don't feel the dampness.
7. The force that keeps us from floating is G_____.
8. The P_____ in the center of each eye adjusts in size depending on how much light is available.
11. An O_____ illusion is something you "see" that really isn't there.
13. The blanket of air around the earth is it's A_____.
14. Your eyes are very much like the L_____ of a camera.
16. We learn all about these laws, principles and phenomenon in the S_____ activity badge.