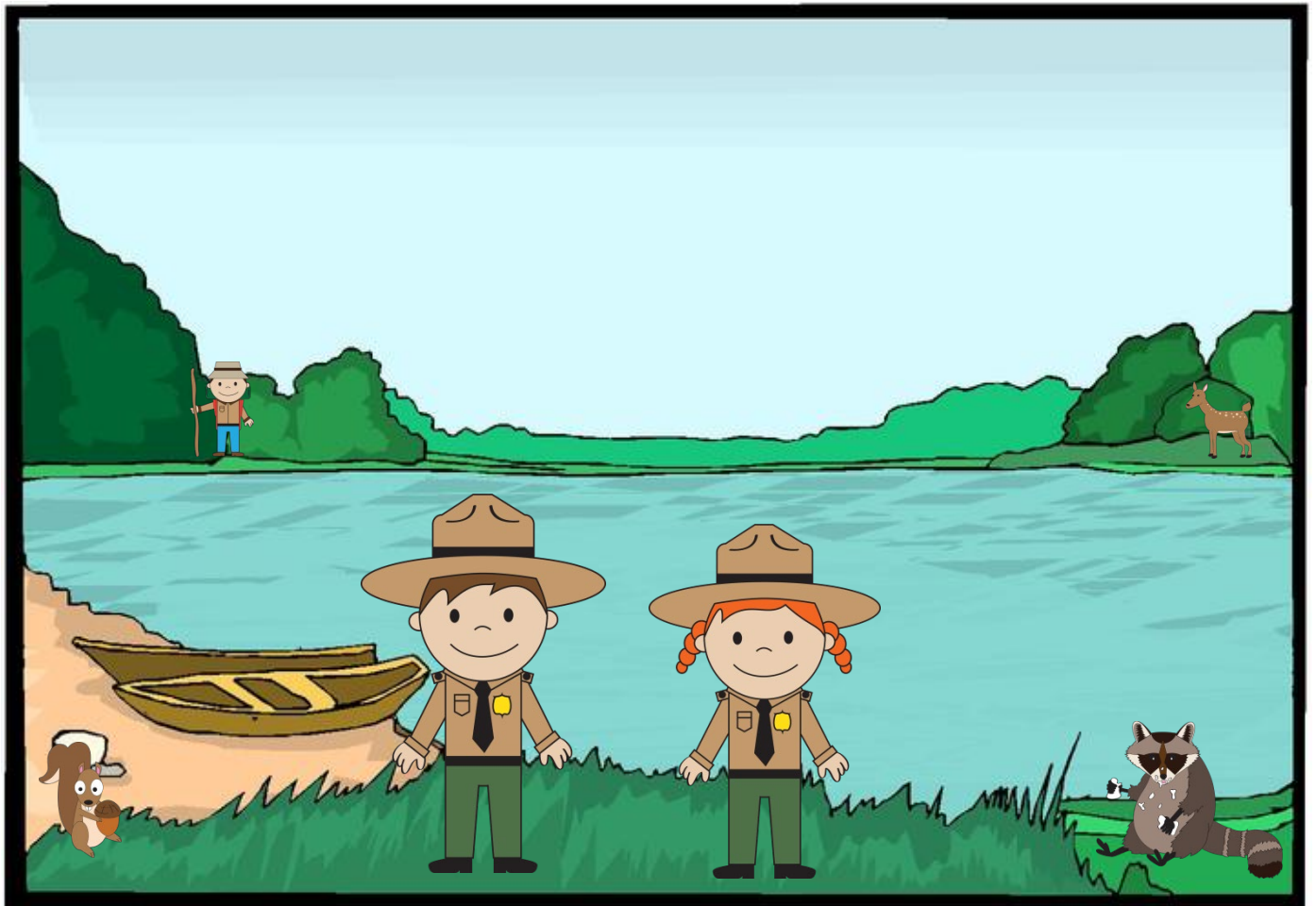


Junior Ranger Adventure Book



**Alum Creek
Lake**

You can earn a Junior Ranger Badge by completing activities in this book.

Age 4-7 complete 2 activities in each section

Age 8-11 complete 3 activities in each section

Age 12 & Up complete 4 activities in each section

1) Corps of Engineers



- a. History & Mission
- b. USACE Word Scramble
- c. How Dams and Locks Make Navigation Possible
- d. Locking Through
- e. What is a Dam?
- f. Types of Dams
- g. Dams and Hydroelectric Power
- h. Decode the Facts
- i. Join the Corps of Engineers

2) Natural Resources



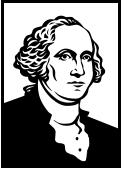
- a. Ranger for a Day
- b. Let's Go on a Hike
- c. Sign Matchup
- d. Woodland Scavenger Hunt
- e. A Natural Menu
- f. Trees, Our Life Support System
- g. I Spy.....
- h. Beaks and Eats

3) Boating and Water Safety



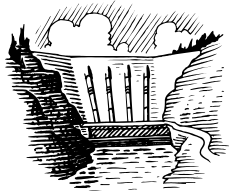
- a. Water Safety Scramble
- b. Don't Just Pack it
- c. Reach or Throw, but Never Go in the Water
- d. Let's Go to the Lake
- e. Draw a Water Safety Poster

History of the US Army Corps of Engineers



George Washington appointed the first engineer officers of the Army in 1775, during the American Revolution. In 1802, the Army made the Corps of Engineers a separate branch of the Army.

From the beginning, the Corps has had many responsibilities. Some of those responsibilities benefit the Army and some benefit everyone in the United States. The Corps mapped the land and waterways for the country, eliminated navigational hazards, and built coastal forts, lighthouses, harbors, government buildings, and monuments.



As time went on, the Corps became responsible for helping people during disasters such as floods, earthquakes, hurricanes, and blizzards. After seeing the damage that floods can cause and how much work it took to clean up after one, the government asked the Corps of Engineers to be responsible for building dams and levees to reduce flood damage. These dams provide many benefits: flood damage reduction, water supply for people to drink and use, recreation such as fishing, boating, and swimming, and some provide electricity.

The Corps is also responsible for protecting the country's water resources and making sure that barges can travel on the larger rivers. The Corps prevents waste from being dumped into harbors and wetlands. They also restore wetlands that have been damaged.

The Corps responsibilities have changed throughout the history of the organization. Today its responsibilities include building military facilities, helping people during natural disasters, building and maintaining dams and levees, and protecting our water. The Corps mission will continue changing to meet the needs of the Army and the people of the United States.



US Army Corps of Engineers Word Find



TM

Word Bank

earthquake

fort

engineer

hurricane

damage

swimming

fishing

monument

dam

army

electricity

harbor

levee

boating

corps

flood

blizzard

lighthouse

ranger

safety

How Dams and Locks Make Navigation Possible

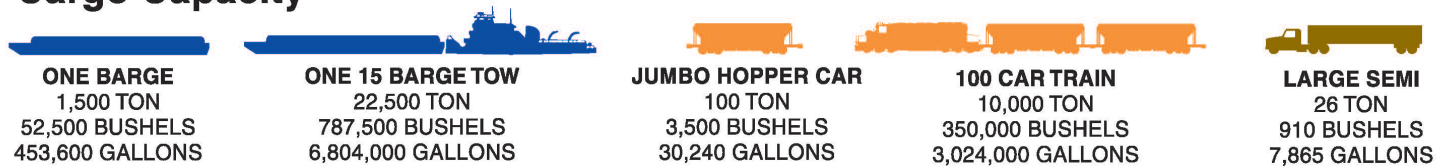
If it weren't for barges moving up and down the river, we would be paying more for all kinds of products. Anything made from materials shipped in large quantities such as grain, stone, and gravel, iron and steel, lumber, coal, and chemicals, for example, would cost more. Why? Because they'd have to be shipped by rail or truck, which would cost over \$550 million a year more than moving them by barge. One barge can carry as much stuff as 60 trucks, so there'd be a lot more 18-wheelers on the road, too. Using barges helps keep our highways safer and reduces fuel use, air pollution, and the number of tires going to our landfills.



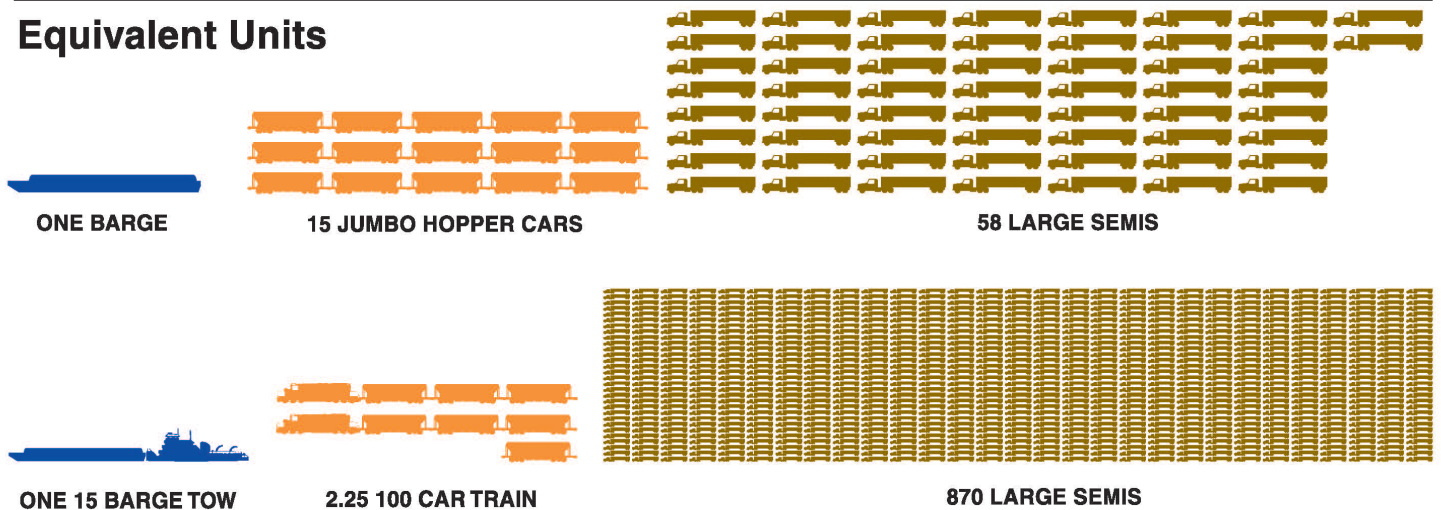
Source: Iowa Department of Transportation - 800 Lincoln Way - Ames, IA 50010 - 515-239-1372

Compare...

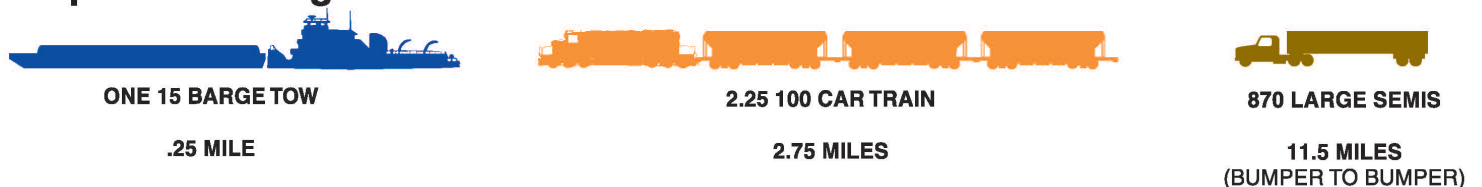
Cargo Capacity



Equivalent Units



Equivalent Lengths



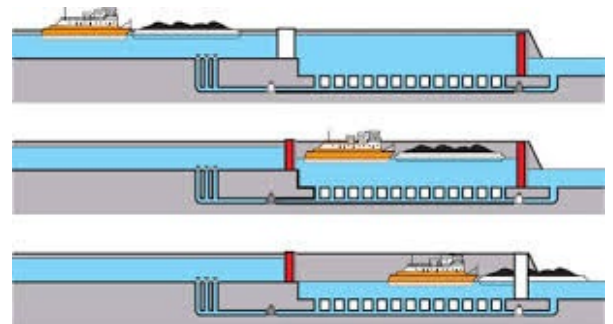


Dams on navigational rivers form a “staircase” of pooled water and controlled current along the entire length of the river. Dams on navigational waterways have at least one lock, a canal for raising and lowering boats, which allows boats to pass around the dam.

When boats enter the lock, the gates close and the water level inside the lock is raised to the upstream level or lowered to the downstream level, depending on which way the boat is moving.

Locking Through

The locks are filled and emptied by gravity, which means that no pumps are used. If the boat is going downstream, the water level in the lock is lowered by opening the downstream valves so the water can drain out. If the boat is moving upstream, the downstream valves are closed and the upstream valves are opened. This allows water from the upstream side to flow into the lock, filling the chamber to the upstream water level.

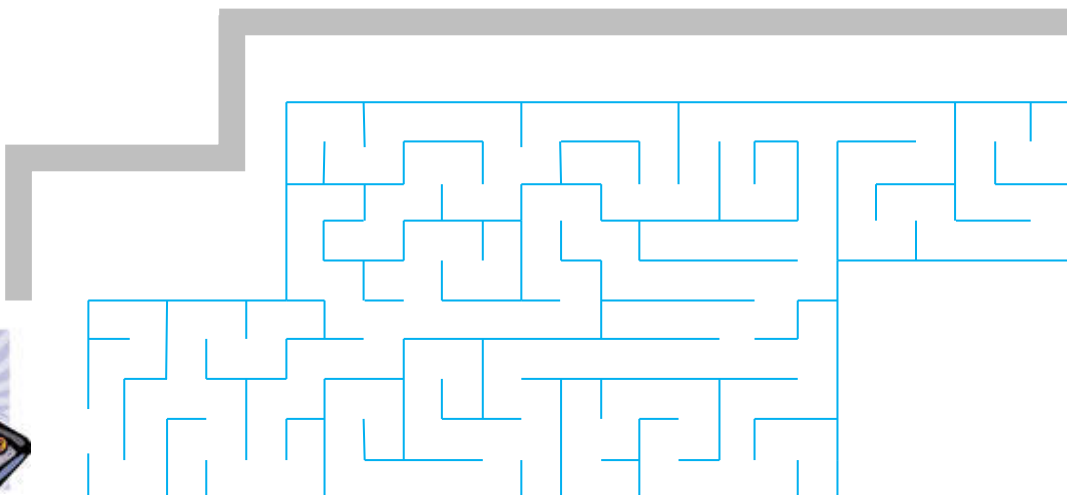


www.popularmechanics.com

In about 45 minutes, when the water level inside the lock is equal to the level of the next reservoir, gates at the other end of the lock are opened and the boat can continue on its way.

Help the barge navigate up river to deliver the logs to the sawmill!

If you are younger than 8 years old, follow the path from the barge to the sawmill.

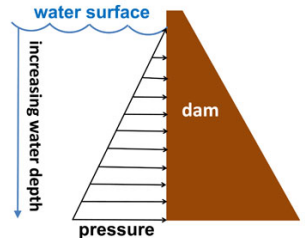


What is a Dam?



A dam is a barrier built across a stream or river to stop or slow the flow of water and can serve many purposes. Beavers make small dams by using sticks and mud to slow down the flow of water. This causes water to pool behind the dam which results in a new pond being built. Large dams are more complex to build and take a lot of work, time, and money. A dam can be made of concrete, rocks, wood, or dirt.

The amount of pressure that the water exerts on the dam is called water pressure and it increases with the depth of the water. A dam's design must allow it to withstand greater water pressure at the bottom than at the top. As a result, dams are wider at the bottom than the top.



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Why are Dams Built?

There are many reasons to build dams: store water for irrigation or for drinking, making electricity, and for recreation. The US Army Corps of Engineers dams are built mainly to reduce flooding. The dam at Alum Creek Lake was mainly built to reduce the risk of flooding in central Ohio, but it also provides water for irrigation and drinking. The third reason for Alum Creek dam was to provide recreation opportunities such as boating, fishing, and swimming.

Dams can reduce the amount of damage from floods by reducing the amount of water it releases. When water levels below the dam rise from the rain, the damtender closes the gates to release a minimal amount of water. This causes the water level in the lake to rise. When the level downstream goes down, the damtender opens the gates and releases the extra water stored in the lake.

To see how a dam works and earn a coin: explore the Water Management Exhibit at the Alum Creek Lake Visitor Center or take a tour of the dam!



Why was Alum Creek Lake Built?



Put the correct number (1,2,3) in front of each reason the dam was built, with 1 being the most important reason and 3 being the least important.

_____ Recreation: Fishing, Boating, Swimming, Hiking

_____ Flood Damage Reduction

_____ Water Storage: Drinking, Bathing, Laundry

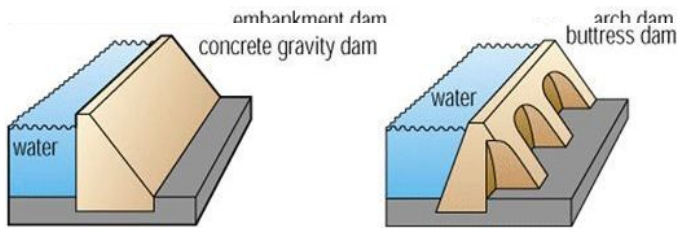
Types of Dams

Engineers think about a dam's location, the materials available, and the size of the dam to be built when they are designing it. There are different types of dams based on what materials and design are used.

The dam at Alum Creek Lake is an embankment, or earthen dam with a concrete spillway. A spillway is an area designed to release water and keep the dam safe if the water level in the lake gets too high.

Embankment dams are made of dirt and are very thick since dirt is not as strong as concrete. When building an earthen dam, engineers use soils that do not let water seep through such as clay.

Arch dams are concrete dams built with the curve facing the water. Arch dams can only be built in narrow canyons where the rock walls are solid and steep, since they support the dam. The water pushing on the dam helps secure the dam into place.



Gravity dams are the largest and heaviest concrete dams. These kinds of dams are built with a large base and rely on their weight to prevent the water from tipping them over. Gravity dams can only be built on a solid rock foundation.

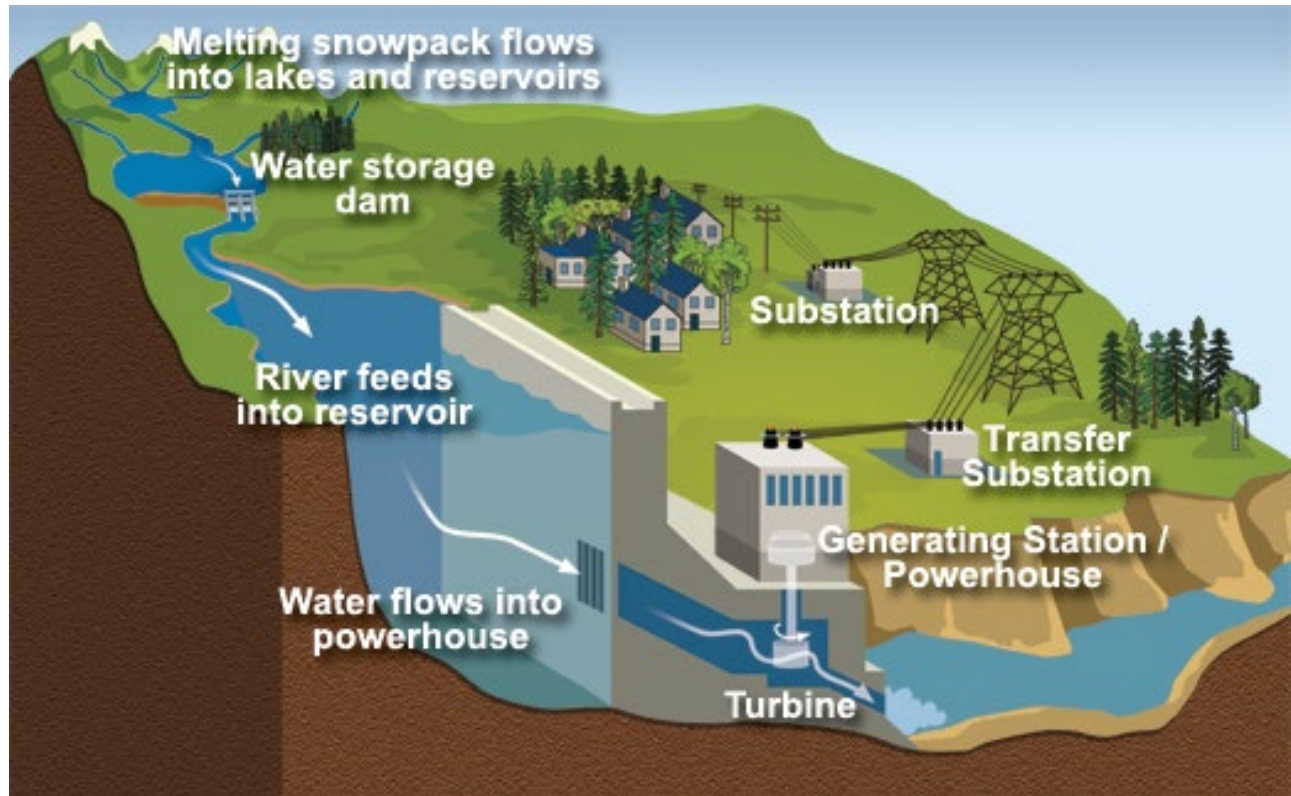
Buttress dams are another type of concrete dam. They have a sloping slab that is supported by buttresses or walls. Buttress dams use less concrete in the walls and use support buttresses around the outside for support. Water pushes against the buttress dam, but the buttresses push back and prevent the dam from tipping over.

Draw your own dam!



Dams and Hydroelectric Power

The dam at Alum Creek Lake does not generate electricity, but some dams do. Some dams are built to produce hydroelectric power, which is electricity generated from water. This sort of power is efficient and has minimal environmental impact. Water is carried by huge pipes to a powerhouse which is usually located by the dam. At the powerhouse, the power of the water pushes turbines around and around and this continuous motion creates a force that produces electrical energy.



Columbian Basin Trust

Electricity in my life



What do you use electricity for in your life? _____



Decode the Facts!

Answer the following questions using the clues and the word list below. Use the letters in the circles to discover why the Alum Creek Dam zig-zags.

Word Bank

million

dollars

alum creek

billion

kilbourne

hoover

miles

There are 26.7 b _____ gallons of water in Alum Creek Lake.

The drainage basin for Alum Creek Lake is 125 square _____.

Alum Creek Dam prevented 227 million _____ in flood damage from 1974 to 2018.

A pipe connects Alum Creek Lake and _____ Reservoir to provide drinking water for the city of Columbus during drought.

It cost \$56 _____ dollars to buy the land and build the dam and the buildings.

_____ is the main source of water for Alum Creek Lake.

The town of _____, located 10 miles north of the dam, is the most northern point of the lake.

The earthen Alum Creek Dam zig-zags as it crosses the valley to follow the strongest b _____ formation.



Join the Corps!

The US Army Corps of Engineers has several different missions and employs approximately 37,000 people worldwide. There are so many different types of jobs with the Corps of Engineers. Below are just a few of them. **Choose 3 that you think you would enjoy and put a 1, 2, or 3 in front of the description.**

	Wildlife Biologist study animals and use technology to track them. They help determine how human actions and changes in the environment affect animals.		Dredge Operators operate large boats that remove sand, gravel and other material from the bottom of waterways so that large boats can travel through the area.
	Lock & Dam Operators are responsible for operating navigation equipment and machinery that allow river traffic to pass safely through the lock, and maintaining required water levels.		Park Managers are in charge of the park and they help protect resources and people at the park. They direct the training and performance of anyone who works at the park.
	Civil Engineers design and supervise the construction of roads, buildings, bridges, dams, and other infrastructure. Some specialize in areas such as environmental, transportation, or water resources.		Hydrologists study the surface and ground water. They are often involved in the design of irrigation, waste treatment plants hydroelectric plants, and flood damage reduction systems.
	Park Rangers protect the parks and the people visiting the parks. Some park rangers specialize in public education which is called interpretation, and others specialize in law enforcement.		Environmental Compliance Coordinators plan and direct cleanup of contaminated areas so that they can be redeveloped into useable areas. They often turn landfills into sites for parks!
	Power House Electricians are responsible for maintaining the equipment used in hydroelectric dams.		Floating Plant & Repair Crew are responsible for major maintenance of the navigation lock and dam equipment and machinery.



philipmarrino



Ranger for a Day



Park rangers are responsible for protecting the parks and the people visiting the parks. **Imagine that you are the ranger. For each of the statements below, put Y for Yes if you think a park ranger should act that way, or N for No if you think it is a bad idea.**

- _____ 1) You walk through the campground and notice litter on the ground. You do not pick it up because the next family to stay there will clean up the site.
- _____ 2) Your dog wants to run and play, so you put it on a leash and take it for a walk.
- _____ 3) You put on your lifejacket before going on the boat.
- _____ 4) When hiking through the forest, you always stay on the trail so no plants or animals are hurt.
- _____ 5) A squirrel looks very hungry so you share your sandwich with it.
- _____ 6) A child fell and skinned his knee, you clean it and put a bandage on it.
- _____ 7) You love the wildflowers, so you pick some to take with you.
- _____ 8) You see someone having difficulty setting up their tent, and you stop to help them.

Draw yourself as a park ranger!





Let's Go on a Hike!

Exploring the park is a lot of fun, but only if you learn to be safe.

Look at the items below and circle the items that you should pack for a hike that will take more than 2 hours.

Think about what type of shoes will keep your feet safe. What type of food should you pack in case you get hungry? How are you going to carry your items?



Earn more by hiking a trail!

What trail did you hike? _____

Did you see any animals? _____

What was your favorite part? _____



Sign Match Up

Everywhere we go there are signs. The signs in a park often help us navigate, but some tell us the rules. Some signs have words on them and sometimes the signs are just pictures.

Match the signs to their meanings!



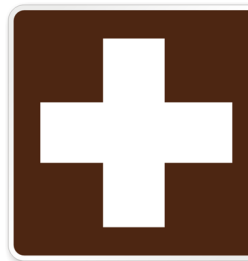














A. Keep your dog leashed

C. First Aid Station

E. Do Not Feed the Wildlife

G. Camping

B. No Swimming

D. Trash Can

F. Ranger Station

H. Dam

Woodland Scavenger Hunt



Alum Creek Lake is about more than flood damage reduction and water supply! Explore the park and **cross out each item as you find it!** Do not collect, or take, anything that you find!

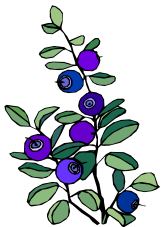
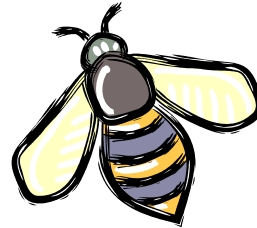
		Free Space, Draw Your Own!		

A Natural Menu

Coyotes, skunks, raccoons, deer, turkey, and squirrels are often seen in the park. People love to see wildlife and sometimes they offer food to wild animals to get as close as possible. This is not safe. Wild animals will often eat the food that is offered to them, and it can make them very sick. Some animals learn to crawl into trash cans, raid coolers, and search campsites to find our food. Our food is usually unhealthy for them and keeps them from searching for and eating the foods that they need to survive.



Circle the types of foods that are healthy and natural for wild animals to eat. Put an X through food items that are not good for them.



Trees, Our Life Support System

Trees are an important part of our world. They provide wood for building and pulp for making paper. They provide habitats (homes) for all sorts of insects, birds and other animals. Many types of fruits and nuts come from trees -- including apples, oranges, walnuts, pears and peaches. Even the sap of trees is useful as food for insects and for making maple syrup -- yum!

Trees also help to keep our air clean and our ecosystems healthy. We breathe in oxygen and breathe out carbon dioxide. Trees breathe in carbon dioxide and breathe out oxygen. We're perfect partners!



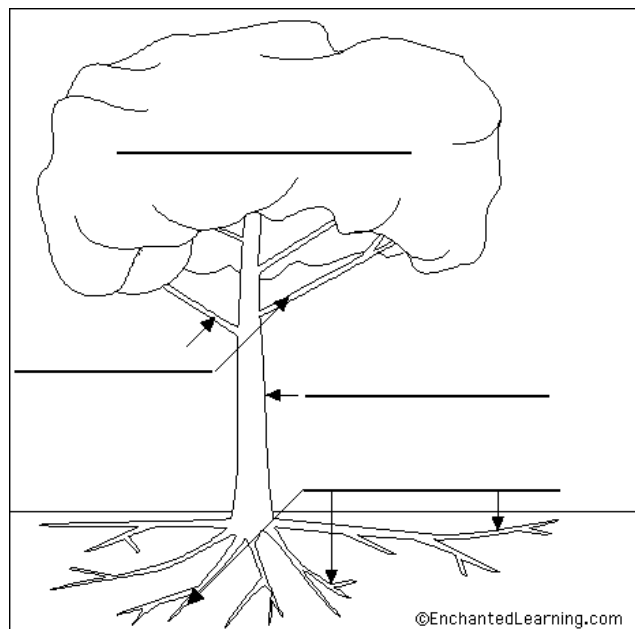
Parts of a Tree:

Roots: The roots are the part of the tree that grows underground. Trees have a lot of roots -- the size of the root system is usually as big as the part of the tree above the ground. Besides keeping the tree from tipping over, the main job of the roots is to collect water and nutrients from the soil and to store them for times when there isn't as much available.

Crown: The crown is made up of the leaves and branches at the top of a tree. The crown shades the roots, collects energy from the sun (photosynthesis) and allows the tree to remove extra water to keep it cool (**transpiration -- similar to sweating in animals**).

Branches: The branches provide the support to distribute the leaves. They also serve as paths for water and nutrients and as storage for extra food for the tree.

Trunk: The trunk of the tree provides its shape and support and holds up the crown. The trunk transports water and nutrients from the soil and sugar from the leaves.





Anatomy of the Trunk:

Inside the trunk of a tree are a number of rings. Each year of the tree's life a new ring is added so many people refer to them as the annual rings. The rings are actually made up of different parts. **Look at the picture, read the description, and label the parts of the trunk!**

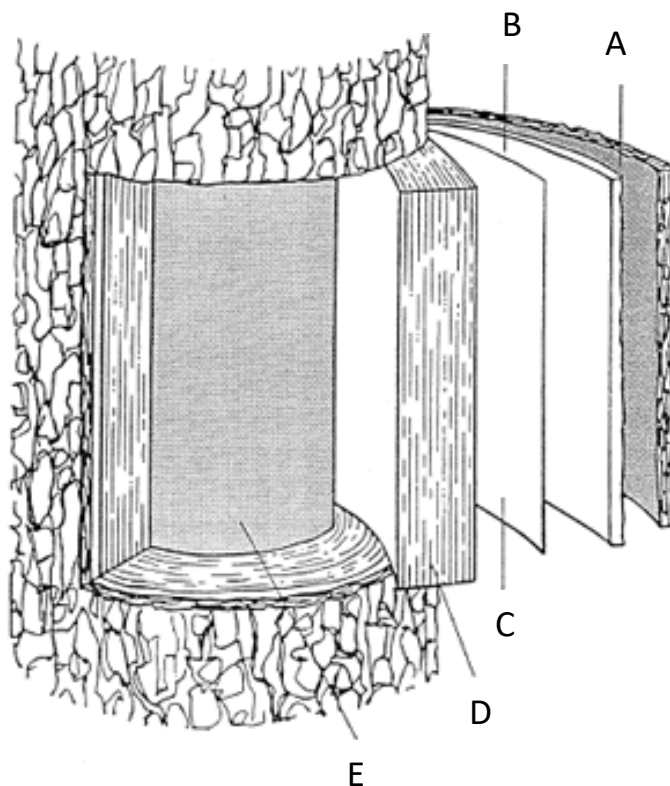
_____ **Bark:** The outside layer of the trunk, branches and twigs of trees. The bark serves as a protective layer for the more delicate inside wood of the tree. Trees actually have inner bark and outer bark -- the inner layer of bark is made up of living cells and the outer layer is made of dead cells.

_____ **Inner Bark (Phloem):** The main job of this inner layer is to carry sap full of sugar from the leaves to the rest of the tree.

_____ **Cambium:** The thin layer of living cells just inside the bark is called cambium. It is the part of the tree that makes new cells, allowing the tree to grow wider each year.

_____ **Sapwood (Xylem):** It is made up of a network of living cells that bring water and nutrients up from the roots to the branches, twigs, and leaves. It is the youngest wood of the tree -- over the years, the inner layers of sapwood die and become heartwood.

_____ **Heartwood:** The heartwood is dead sapwood in the center of the trunk. It is the hardest wood of the tree giving it support and strength. It is usually darker in color than the sapwood.



I Spy...

Check the boxes next to the birds that you see around Alum Creek Lake. There are bird viewing scopes and ID Cards located behind the Visitor Center.

<input type="checkbox"/>	<p>Red Tailed Hawk</p>	<input type="checkbox"/>	<p>Robin</p>	<input type="checkbox"/>	<p>Canada Goose</p>
<input type="checkbox"/>	<p>Blue Jay</p>	<input type="checkbox"/>	<p>House Sparrow</p>	<input type="checkbox"/>	<p>Eastern Bluebird</p>
<input type="checkbox"/>	<p>Cardinal</p>	<input type="checkbox"/>	<p>Cliff Swallow</p>	<input type="checkbox"/>	<p>Great Blue Heron</p>
<input type="checkbox"/>	<p>Mallard</p>	<input type="checkbox"/>	<p>Purple Martin</p>	<input type="checkbox"/>	<p>Osprey</p>



Beaks and Eats

Did you ever wonder why there are so many types of bird beaks (scientists call them bills)? The most important function of a bird bill is feeding, and it is shaped according to what a bird eats. Here are some common bill shapes and the food they are especially adapted to eat. Identify at least 1 bird from the **I Spy** activity for each type of beak.



Seed eaters like sparrows and cardinals have short, thick conical bills for cracking seed.



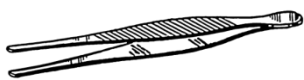
Birds of prey like hawks have sharp, curved bills for tearing meat.



Some have long, flat bills that strain small plants and animals from the water.



Birds like herons and kingfishers have spear-like bills adapted for fishing.



Insect eaters like warblers have thin, pointed bills.



How Fast Can You Fly?

Eagles beat their wings 60 times in one minute while hummingbirds beat their wings 5,400 times in one minute. Most birds that you see in your yard beat their wings between 600 and 1,500 times in one minute. How fast can you fly? Have someone time you for 15 seconds and flap your arms as many times as you can.

_____ X 4 = _____ wing beats per minute!

Number of Wing Beats in 15 Seconds



Water Safety Scramble

Look at the pictures and unscramble the messages!



N A L R E O T M I W S



W I M S IN A F S A E AREA.



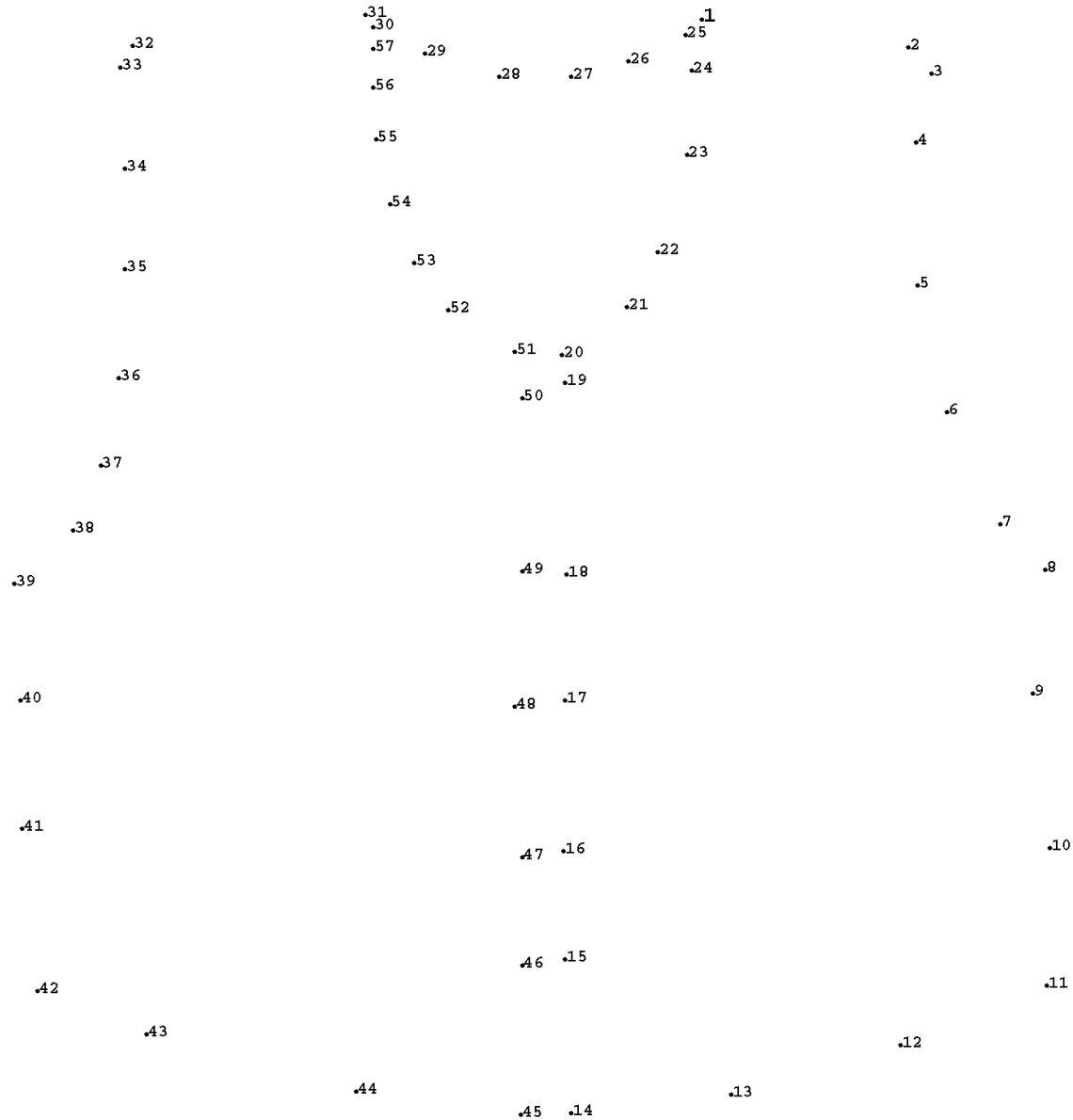
L A S A W Y SWIM WITH A D U D B Y

Don't Just Pack It, Wear Your _____!



Connect the dots below to reveal the image, then fill in the blank in the page title!

Color in the picture and receive a bonus coin!



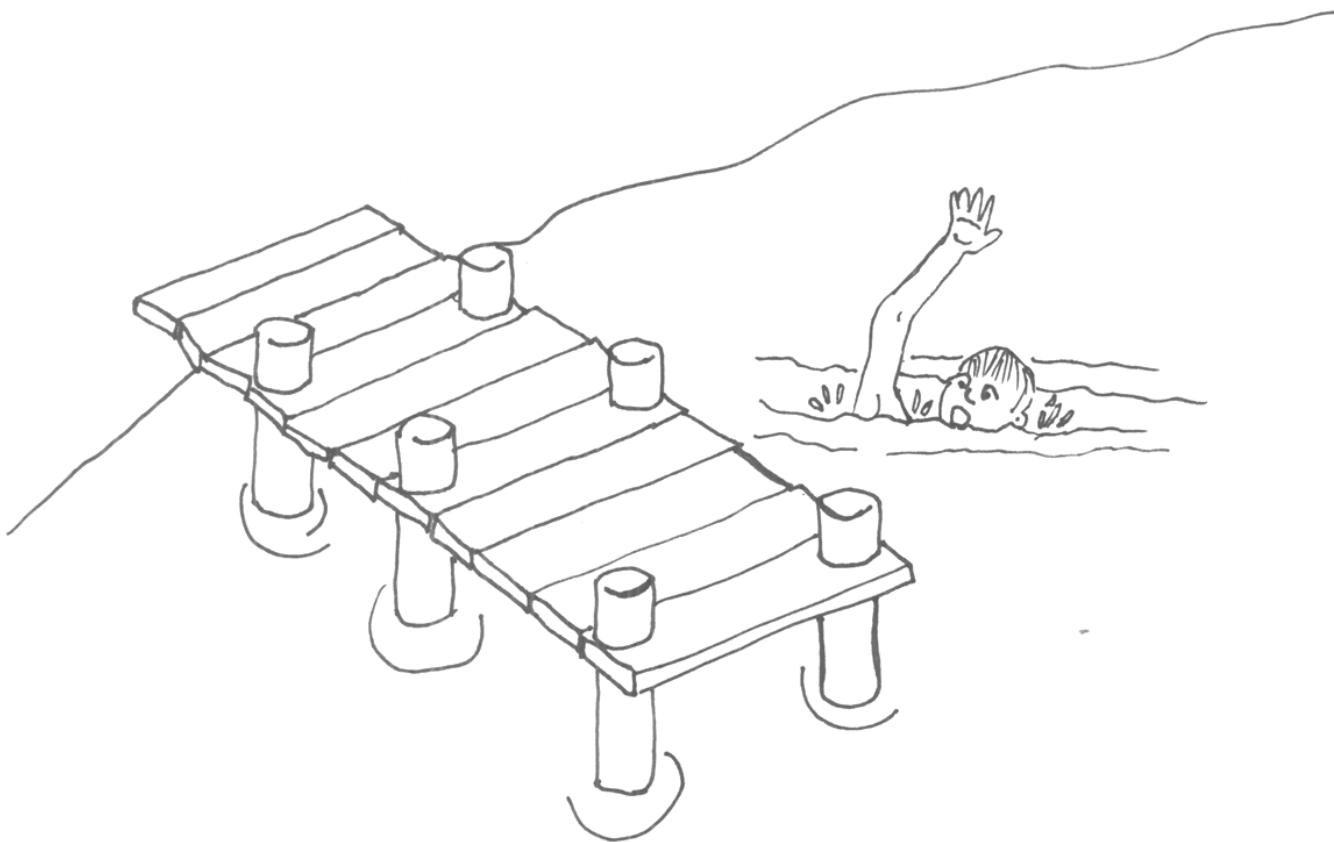
Attend a water safety program or stop by and see the rangers and Corey the Safety Boat at an event and earn a Bonus Coin!





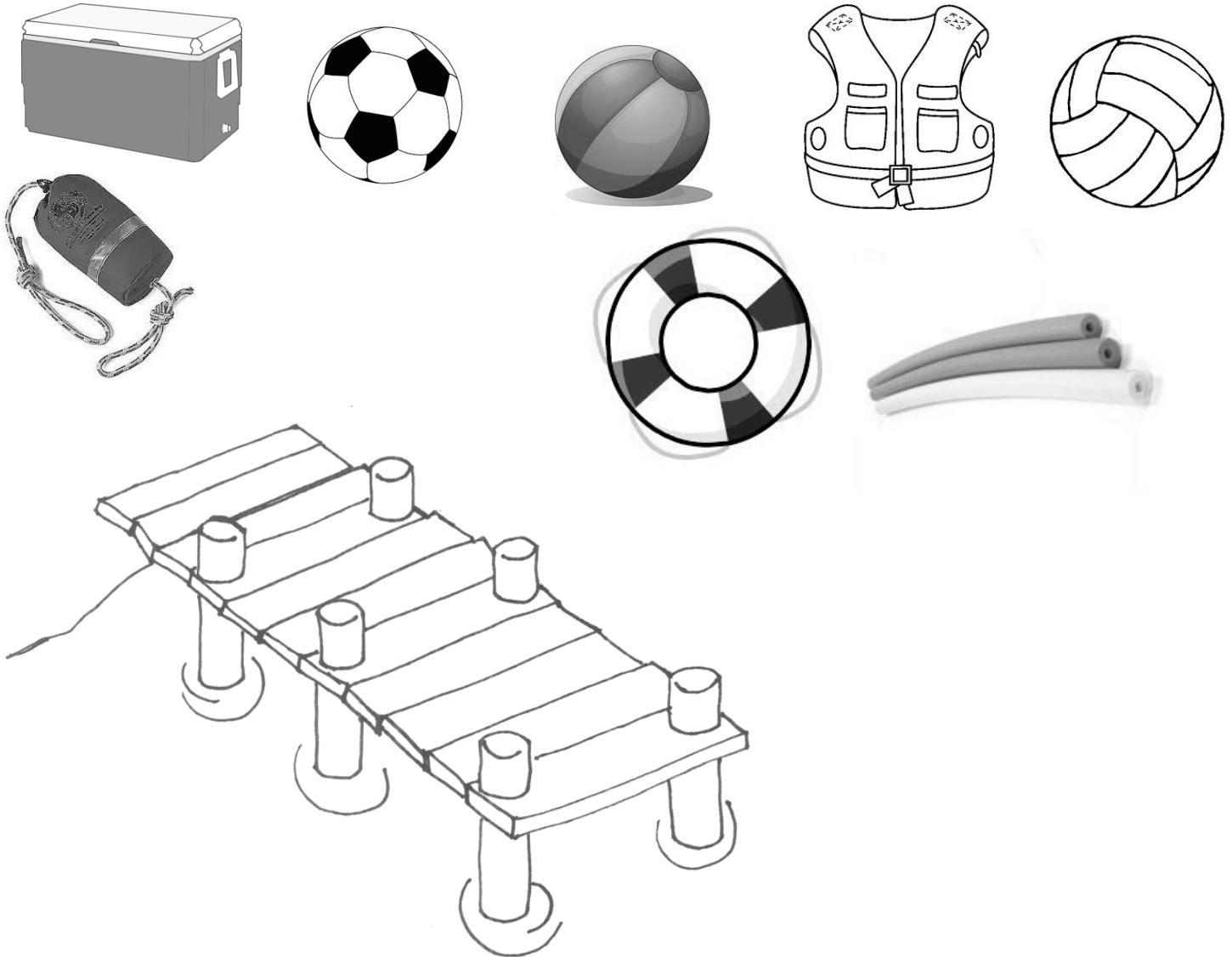
Reach or Throw, But Never Go in the Water

Michael fell in the water and needs your help! **He is 4 feet from the dock.** Have someone call 911. It is not safe for you to go in the water to rescue him. **What items can you use to reach him without going in the water?**



Reach or Throw, But Never Go in the Water

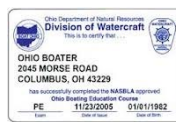
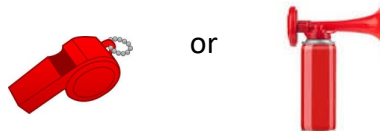
Michael fell in the water and needs your help, again. **He is 8 feet from the dock.** Have someone call 911. It is not safe for you to go in the water to rescue him. **What items can you throw to him that float?**





Let's Go to the Lake!

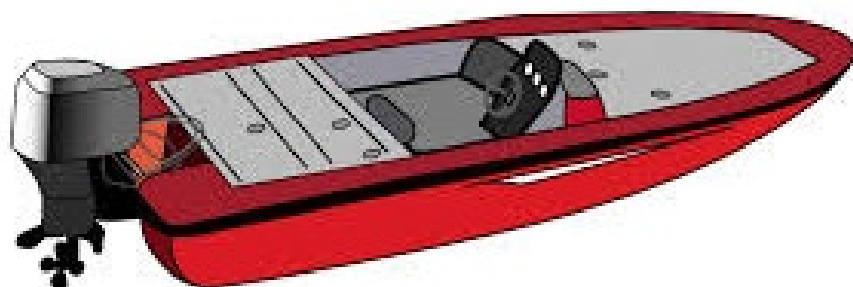
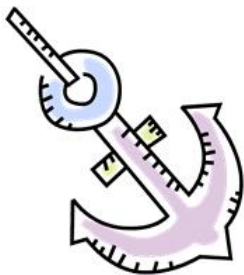
- 1) Circle the items that should be with the Gonzalez Family
- 2) Draw a line from each item that belongs in the boat, to the boat.



Boating License



Distress Signal



Help Spread the Water Safety Message, Make a Poster!



Help the Park Rangers spread the word by creating a water safety poster. If you want, you can leave your poster with the Park Rangers so they can show it to everyone!

Congratulations!

You've earned your Alum Creek Lake Junior Ranger Badge!

Bring your completed book to the Alum Creek Lake Visitor Center to pick up your badge and certificate!



Credit

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Microsoft Office Clip Art

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