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|----------|--|
| CONTENTS | |
| | |

| where we live2 |
|----------------------------|
| Water All Around Us3 |
| Water Cycle4 |
| Water Systems Marathon 5 |
| Where Does It Go? 6 |
| Machine Scavenger Hunt 7 |
| Litter-Free Waterways8 |
| Litter Solutions9 |
| Stormwater Pollution 10-11 |

| Rainy City | 12 |
|----------------------------|----|
| Down and Dirty Farm | 13 |
| All About Compost | 14 |
| Pack A Waste-Free Lunch ' | 15 |
| Trees Are Cool | 16 |
| Energy! | 17 |
| Heroes for the Environment | 18 |
| Answer Key | 19 |

WHERE WE LIVE IN HAMPTON ROADS

Welcome to Hampton Roads! Hampton Roads is home to 1.7 million people. It is a region known for its rich history, military presence, and miles of beaches. In this Green Learning Guide, we'll explore the region and learn all about the different ways our actions have an effect on this place we all call home. Protecting the environment is everyone's responsibility. Every decision you make and every action you take makes a difference. Let's get started by taking a tour of the region from this bird's-eye view!



GETTING TO KNOW HAMPTON ROADS

USE THE MAP AND KEY TO ANSWER THE QUESTIONS

- In which square is the King Neptune landmark located?
- **2** What river is located in D2?
- 3 In which square is the Coliseum located?

- **4** What river is located in C5?
- **5** What is the largest river on the map?
- 6 How many squares on the map contain land only, no water?



WATER IS ALL AROUND US IN HAMPTON ROADS

From small creeks and streams to rivers, Hampton Roads is surrounded by water, including the largest estuary in the United States and the third largest in the world, the Chesapeake Bay. An estuary is a body of water where freshwater and saltwater mix. The Chesapeake Bay supports more than 3,600 species of plants and animals, and produces about 500 million pounds of seafood per year.

THE CHESAPEAKE BLUE CRAB BLUES

One of the most popular species in the Chesapeake Bay is the blue crab, but the blue crab population has fallen to near-record lows. Scientists say there are two main causes for the decline: pollution from human activity and overfishing (catching crabs faster than they can reproduce). Polluted stormwater runoff from human activity prevents sunlight from reaching underwater grasses and makes algae grow quickly. Once the algae decays, it robs the waterway of the oxygen needed to sustain life. This hurts blue crabs in two ways: by killing the food they eat, such as oysters and worms, and by destroying the underwater grasses they use to hide from predators such as fish, birds, and turtles. Clean water is essential for healthy populations of blue crabs and other species native to Hampton Roads.

Stormwater runoff is water from rain or melting snow that "runs off" across the land instead of seeping into the ground.



NOW CHALLENGE YOURSELF WITH THESE QUESTIONS!

How does pollution harm the habitat of the blue crab?

What are some ways you can think of to help the blue crab population?

If the blue crab population were to continue to decline, what impact would it have on other consumers and producers in the Chesapeake Bay?

Water Cycle

The water from your faucet goes through quite an amazing journey before it ever makes its way to your glass. This journey is called the natural water cycle. Through this continuing process of **evaporation**, **condensation**, **and precipitation**, Earth's water is recycled over and over again.

Treatment Systems and Processes

Increased population and development have changed the natural water cycle. The new water cycle is called an urban water cycle and includes things people do. It's the process by which our local water and wastewater utilities collect water from lakes and rivers in reservoirs, clean up the water, send it to your home, and take it away to be cleaned and put back into the environment.

Key Vocabulary Words



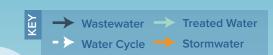
Evaporation occurs when water in rivers, lakes, oceans, and other waterways is heated by the sun and changes from a liquid to a gas called water vapor as it rises through the air.

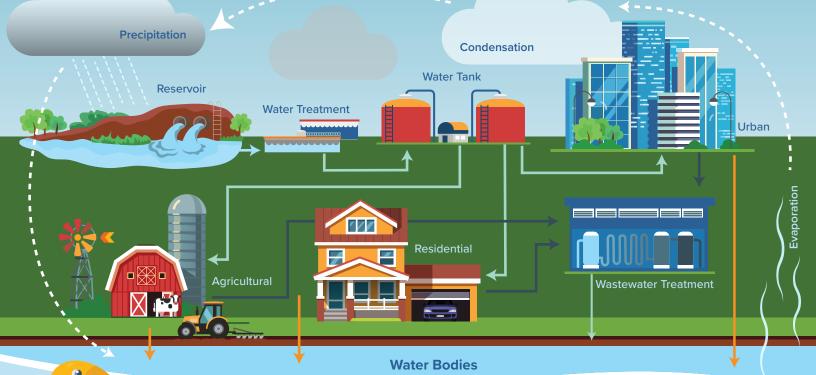


Condensation occurs when water vapor gathers in clouds and forms liquid water.



Precipitation occurs when water falls to earth. Gravity causes the water to fall to earth as rain, snow, hail or sleet.





Did you know?

Thanks to the water cycle, the water on our Earth today is the same water that has been here for nearly 5 billion years! That means there is a very good chance you are drinking the same water that thirsty dinosaurs were drinking about 65 million years ago.

Public Drinking Water System

Pumps water from reservoirs, lakes, and rivers to treatment plants where it is cleaned and brought to our homes through pipes. In rural areas, some homes may use a well for drinking water. Wells pull drinking water directly from water stored between rock layers in the ground.

Public Wastewater System

Takes used water from our homes through pipes when we flush the toilet, take a shower, or otherwise run water down our drains to a wastewater treatment plant where it is cleaned before being released into the environment. In rural areas, some homes may use septic systems for wastewater treatment. A septic system is basically a miniature wastewater treatment system right in your own backyard.

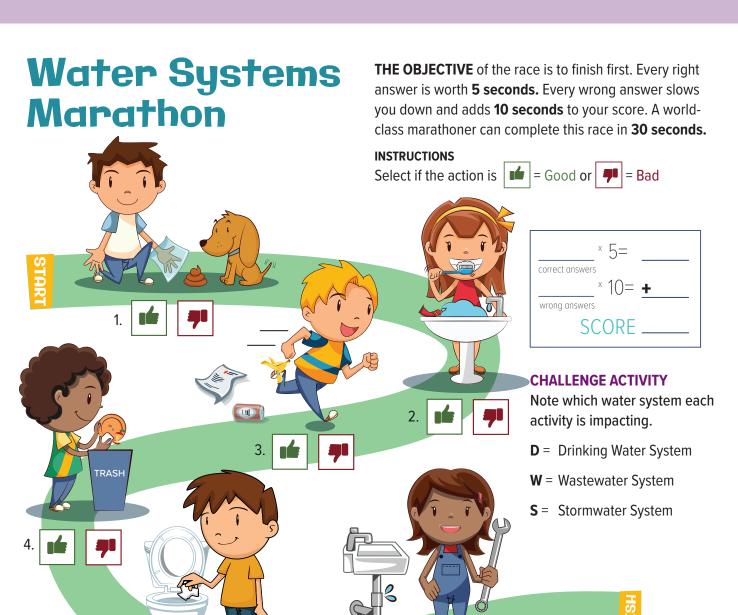
Stormwater System

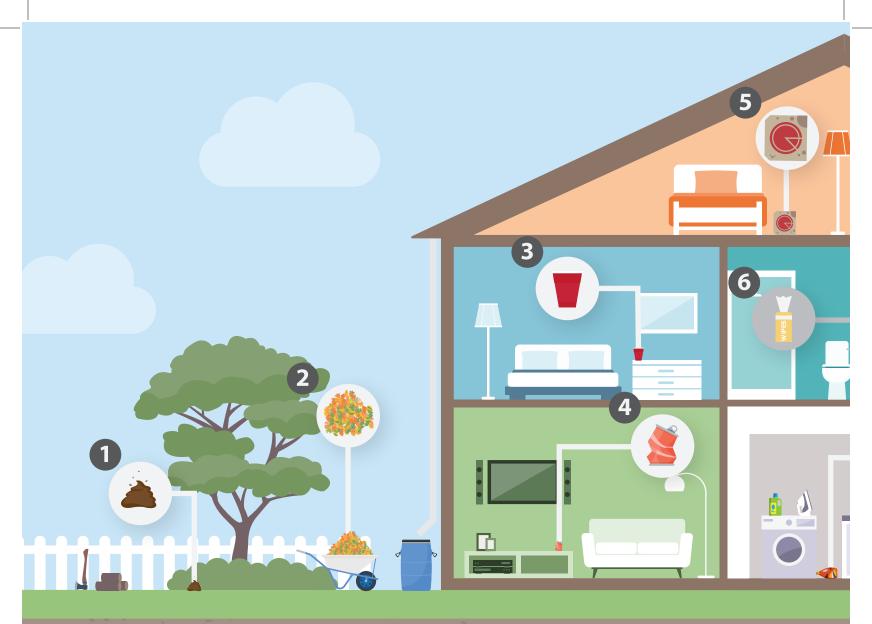
Takes rain water away from homes and streets through the stormwater openings on your neighborhood curbs or the grates in public streets. This water is not cleaned and flows directly to our local waterways.

Pretend you are a water drop traveling through the water cycle.

Create a comic strip about your journey starting in a cloud. Where will you fall? What will happen next?







WHERE DOES IT GO?

Find the nine items with numbers next to them on these two pages. Write the number of each item next to where they go: the compost bin, recycling bin, or trash bin.

COMPOST BIN



Biodegradable, organic waste (meaning it can be broken down) goes here. Compost decomposes into nutrient-rich soil

that can be used to fertilize plants. Nothing gets wasted!

RECYCLING BIN



This is for waste that can be turned into a totally new product. It might look like trash, but it can be

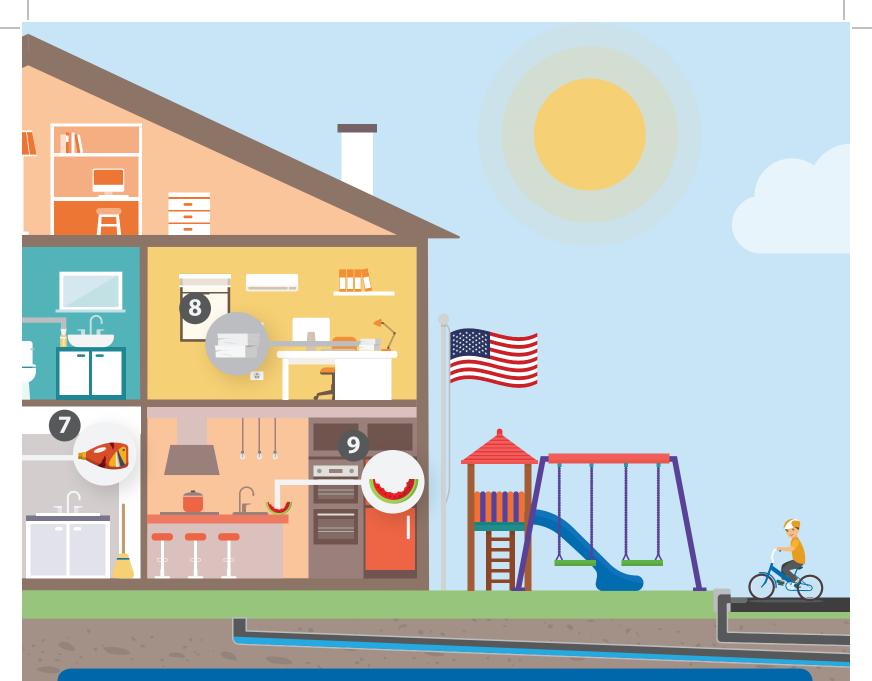
broken down and given a new life instead of going to the landfill.

TRASH BIN



This is for waste that can't be recycled or composted. These items are taken to a landfill and can stay

there for thousands of years. Try to avoid items that go in this bin when possible.



MACHINE SCAVENGER HUNT

You don't see them, but there are pipes in your walls and floors that are connected to every drain in your home. Sometimes water moves through pipes with the help of gravity, and other times pumps are used to push the water through the pipes. Moving clean water into your home and taking dirty water away to be treated are just two examples of "work" that happens every day with the help of machines.

Simple machines are simple tools used to make work easier. Compound machines have two or more simple machines working together to make work easier.

Name six simple machines on these pages.

- **1** Lever:
- 2 Inclined Plane:
- **3** Wedge:
- 4 Screw:
- **5** Wheel and Axle:
- **6** Pulley:

Find a compound machine. What simple machines work together to make this compound machine?

A ______ is a compound machine made up of these simple machines:

GET HOOKED ON LITTER-FREE WATERWAYS!

Litter starts and stops with us! Litter is 100% preventable. The actions we take every day affect the air, land, water, and the living creatures who make those areas their home.



Activity

You are fishing in the river in your neighborhood park. Unfortunately, it looks like litter from the park has ended up in the river! Can you "catch" everything in the water?

Circle the things that belong in the water. Draw an "X" on the things that DO NOT belong in the water.

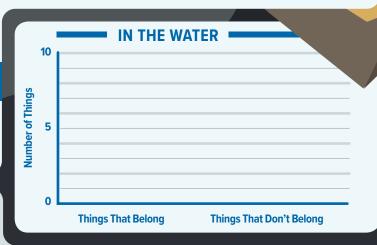
How many things belong in the water?

How many things do not belong in the water?

Did you know litter hurts our ecosystem? An ecosystem includes all the living and nonliving parts of an environment that interact together. Ecosystems support many plants and animals that share limited resources. There are two types of ecosystems: aquatic and terrestrial. Aquatic ecosystems are identified by a large body of water surrounded by land. In an aquatic ecosystem, there are two types of water: freshwater and saltwater. Water from the rivers and streams are freshwater. Water from oceans are saltwater. In Virginia, there are several rivers that flow into the Chesapeake Bay and eventually into the Atlantic Ocean.

Bonus Activity

Now, make a bar graph to chart the number of items in each category: things that belong in the water and things that do not belong in the water.



Some of the animals found in aquatic ecosystems include birds, insects, fish, turtles, crabs, and even ducks. Plants in an aquatic ecosystem help make oxygen and provide food for the animals. People are responsible for conserving resources to protect our ecosystem. When people throw trash on the ground, overuse chemicals, or destroy habitats, it creates **pollution**. When pollutants get into our waterways, they harm the plants and animals that depend on it to survive.

CAN YOU MATCH THE PROBLEM WITH THE SOLUTION?

SOLUTION **PROBLEM** Katie's plastic bag flew out of her hand Keep a litter bag in the car when she was leaving the grocery store. to collect vehicle trash. Jake threw his soda bottle on the Pick up litter on the ground so animals do not think it is food. ground after he finished drinking. Sam threw her chip bag out of the car window. Throw the bottle you're finished with in the recycling bin. A bird has a bellyache from eating a Put a lid on any piece of plastic it thought was food. uncovered trash cans. Trash has fallen out of a trash can without a lid. Use a reusable bag for groceries.

BONUS ACTIVITY



Can you think of other solutions to these problems? Write a different solution below each problem.

Test Your Knowledge

- **1** Litter is waste out of place. How did the litter get into the river?
 - **A** The fish put it there
 - **B** Humans put it there
 - The crabs put it there
- **3** Which of these can affect the quality of water in our local rivers?



В





- 2 Habitats can continue to support the fish, birds, and other animals that live there if people:
 - **A** Keep littering
 - **B** Add more water to the river
 - C Leave the natural habitat alone
- 4 People can help keep rivers a healthy place for aquatic wildlife by:
 - A Preventing litter and chemicals from flowing into the water
 - Draining the river and starting over
 - Leaving dog waste on the ground to run off into the water

Stopmwater Pollution

Oh, POOP!

Picking up dog waste is more important than just keeping your yard (and shoes) clean! It is important to the environment, too!



Dog poop is a major contributor to stormwater pollution. It doesn't just decompose. Dog poop contains harmful bacteria and parasites that can contaminate our water and spread disease to humans. It is also high in nutrients that will cause algae to grow in our waterways.

You can make a difference by being a responsible pet owner. Picking up after your pet is easy, if you're prepared. Simply carry a plastic bag with you on every walk with your dog, and you'll have the equipment you need to remove your dog's waste.

What is the correct way to dispose of your dog's poop? Bag it and throw it in the trash.

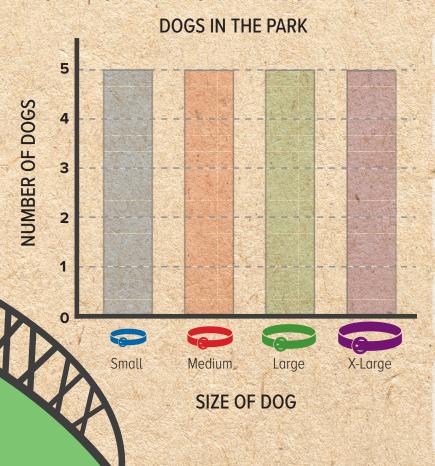


FUN FACT

The City of Norfolk has the **second highest number** of dog parks per person in the United States.

How many dogs are in the dog park (by size)?

Using the image on the left, graph how many of each size dog are in the park. Then, answer the questions.



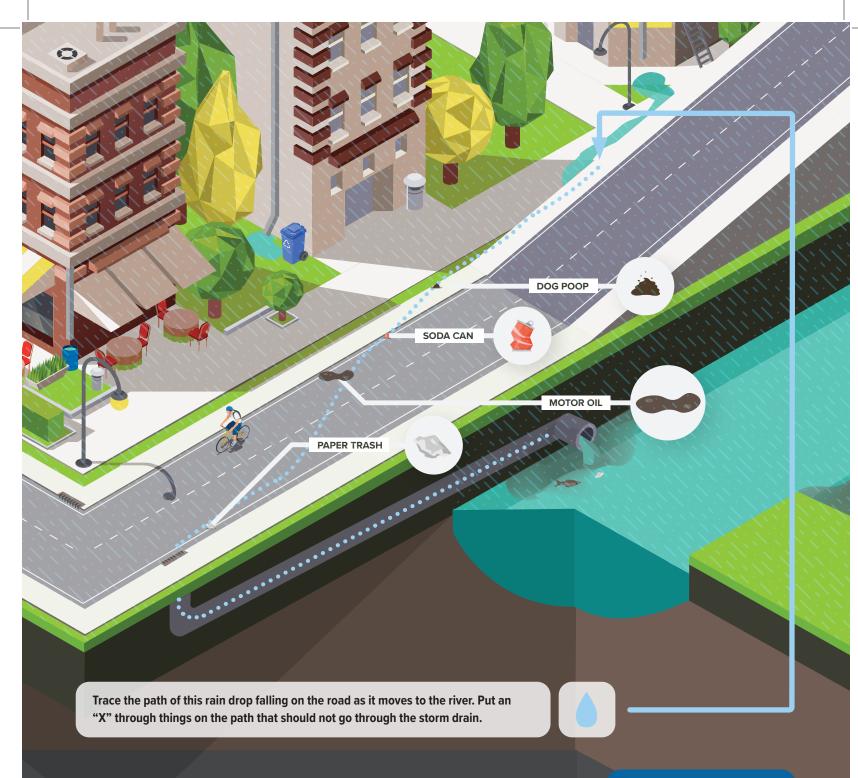
- How many **medium-sized** dogs are in the park?
- How many more large dogs are there in the park than extra-large dogs?
- If two more small dogs came to play in the park, how many small dogs would there be in all?
- 4 Using the graph, order the groups of dogs from least to greatest.
- If there were seven frisbees in the park, would there be enough for the medium and large dogs to each have one?

No one picked up the dog poop in the park today!

Figure out how many ounces of poop each group of dogs left behind to run off and pollute the river.

How many ounces of dog poop in all was left to run off and pollute the river?





A QUIET, RAINY DAY

It's raining in the city. Everyone takes out their umbrellas and jumps over puddles. Rain that falls on grass and trees soaks into the ground. The plants use the water to help them grow, but there aren't a lot of plants in the city. Most of the rain falls on buildings or the hard ground. Then it goes into the street and moves downhill. Rain that runs off of buildings and the street is called **stormwater**.

The water picks up trash and oil from the road as it flows. It goes into an opening in the road called a **storm drain**. The storm drain connects to a big pipe under the road. This pipe carries water to nearby waterways, such as streams and rivers. The trash and oil in the water also go to these places.

Animals and plants depend on clean water. What are some ways you can make sure only clean rain water goes down the storm drain?

HELP KEEP THE WATER CLEAN

Farmer Jane needs some help protecting water quality. Her field is bare and there are no trees or shrubs surrounding it. When it rains, the soil runs off into the nearby stream. This is called erosion. She also needs help containing her cows. Her pasture is open and she has no way to keep them (and their manure) out of the water.

CHALLENGE YOURSELF

In this picture, draw some solutions to help Farmer Jane keep the river clean.

- What can you add to protect the shoreline?
- How can you reduce erosion from bare fields?
- 3 How can Farmer Jane keep her cows from going into the water?



DOWN AND DIRTY

What is the difference between soil and dirt? Soil is a mixture of inorganic particles weathered from bedrock and organic material, both alive and dead. And dirt, well, that's what gets under our fingernails or tracked across the carpet when we don't clean our shoes. (Sorry, Mom!)

Without proper soil, a farmer cannot grow food. Soil stabilizes crops so they can grow tall and plants stabilize soil to prevent erosion. Soil is also important for filtering stormwater, but when soil becomes compacted or hard, it cannot filter rain down to the roots of a farmer's crops. Healthy soil is an important part of our human food chain. Soil is important off the farm, too. It provides a foundation for building roads, houses, schools, and businesses.

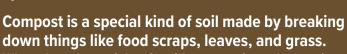
CAN YOU IDENTIFY EACH LAYER OF SOIL?

- This layer is made mostly of minerals and most plant roots live here. This layer is also dark in color due to the amount of decaying plant and animal matter.

This layer is made of sand, silt and clay that have not been broken down all the way, so it usually has less organic material and is lighter in color.

- The lowest layer of soil. It is a solid rock layer.

ALL ABOUT COMPOST



When these materials mix with water, air, and sometimes high temperatures, they start to decompose, or break down. With the help of tiny organisms like worms and bacteria, the materials turn into a rich, dark substance called humus. This humus is full of nutrients that plants need to grow strong and healthy, making it a great fertilizer or mulch for gardens.

Composting is also good for the environment. It helps reduce the amount of food waste that ends up in landfills, which means fewer harmful gases are released into the air. Plus, when compost is added to soil, it makes the soil healthier, helps plants grow better, and even helps the soil hold more water. This is why composting is an easy and important way to take care of the Earth.

When you compost, it's important to know what you can and cannot put in your compost pile. You can compost "browns," like leaves, pine needles, sawdust, wood chips, and uncoated paper. These items give your compost carbon, which helps it break down. You can also add "greens," like fresh grass clippings, vegetable scraps, and plant trimmings. These give your compost nitrogen, another important ingredient. Other good things to add are coffee grounds, tea bags, and flowers.

Never add meat scraps, bones, dairy products, or pet waste, as these can attract pests and create bad smells. Following these simple rules will help you make great compost for your garden!

Draw a circle around all of the compostable items



For each item listed below, put an X in the table under the correct category or categories.

| Items | Compost | Recycle | Trash |
|-----------------------------|---------|---------|-------|
| Pet Waste | | | |
| Meat/Bones | | | |
| Newspaper | | | |
| Leaves | | | |
| Paper Towels | | | |
| Aluminum Cans | | | |
| Tea Bags | | | |
| Cheese | | | |
| Cardboard Boxes | | | |
| Fruit & Vegetable Scraps | | | |
| Plastic Bottles | | | |
| Plant Trimmings | | | |
| Pine Needles | | | |
| Styrofoam Containers | | | |

Pack A Waste-Free Lunch

Did you know that what we eat for lunch can have a positive or negative impact on the environment? By eliminating single-use items from our lunch boxes, we can reduce waste going to the landfill every day.

Can you pack a waste-free lunch? Pick the items that create zero landfill waste by drawing a line from the item to the lunch box.



Trees Are Cool - Give 'em a Hug!

Why would we want to hug a tree? Trees provide so many benefits to our environment. They help clean our air, protect our water, and keep us cool.

Trees improve air quality by removing pollutants from the atmosphere. They absorb carbon dioxide from the air, store the carbon, and release the oxygen back into the air. By doing so, trees help to reduce the effects of climate change.

Trees also play an important role in cooling our streets and cities. They provide shade that helps cool the air and reduce the heat absorbed by pavement and buildings. Trees also have a cooling effect by releasing water vapor into the air through their leaves, a process known as transpiration.

By soaking up rain and reducing excess stormwater runoff, trees help to prevent flooding. They also improve water quality by filtering rain water.

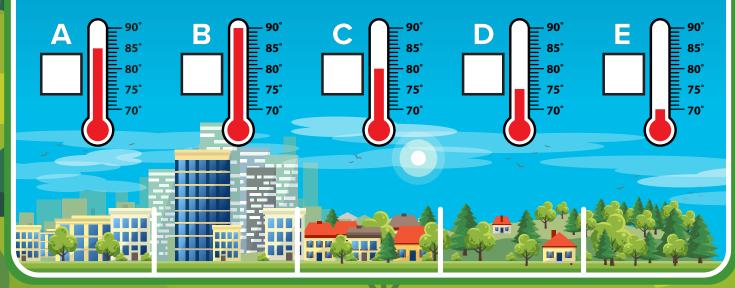
Trees also serve as important habitats for many species of wildlife who rely on them for food, protection, and shelter. And let's face it...they're just plain beautiful! So go on, give 'em a hug... They deserve it for all they do for us.

DID YOU

More than 20% of the world's oxygen is produced in the Amazon Rainforest.

Source: Rain Forest Alliance





| Which area is the coolest? | Which is the hottest? |
|--|--|
| What are the main differences between the two | ? |
| Which community would be the most likely to e | xperience flooding in a heavy rain event? Why? |
| | |
| What are some of the other impacts, aside from from our environment? | increased temperatures, that we experience when we remove trees |
| Based on what you have learned in this activity | , what areas in your community might have increased temperatures due |



ENERGY! What do we need to light and heat our homes or drive our cars?

Energy gives power to many things we need and use. What is energy? Energy is the ability to do work.

We get energy from two kinds of sources: renewable and non-renewable. Renewable energy refers to a natural resource that is available and abundant in nature, like wind and sunlight. **Non-renewable** energy refers to the limited energy sources that can run out of supply as time passes. Some examples of non-renewable energy are oil, coal, and natural gas.

Watts Your Day Like?

A watt is a unit of power that measures how much energy an item needs to function. The higher the wattage, the greater the energy use.

| Appliances | Watts Used | X | The list to the left shows some common household | |
|---------------------------------|-------------|---|---|--|
| Phone Charger | 5 watts | | appliances and their power consumption (how much power they use). | |
| Alarm Clock | 10 watts | | Put an X next to all appliances your family uses on | |
| Aquarium Pump & Filter | 24 watts | | a typical day and then add up the total watts to find out how much power you use at home. Then answer | |
| Ceiling Fan | 75 watts | | the questions that follow. | |
| Xbox | 100 watts | | | |
| LED Television | 100 watts | | How many watts does it take to power your home? | |
| Refrigerator | 180 watts | | Why do you think washing clothes with hot water uses | |
| Washing Machine (Cold Water) | 500 watts | | so much more energy than washing with cold water? | |
| Coffee Maker | 800 watts | | | |
| Toaster | 1,200 watts | | What do you notice about the appliances that use the | |
| Microwave | 1,200 watts | | What do you notice about the appliances that use the greatest wattage? | |
| Hair Dryer | 1,200 watts | | | |
| Vacuum Cleaner | 1,400 watts | | How can you save water and energy when it comes to washing clothes and dishes? | |
| Washing Machine (Hot Water) | 2,500 watts | | | |
| Electric Clothes Dryer | 3,000 watts | | | |
| Electric Oven | 3,000 watts | | What are some ways your family can save energy? | |
| Air Conditioner | 3,500 watts | | | |
| Water Heater | 4,000 watts | | | |



Sometimes it's easy to say "I'm just a kid. What can I do to help the environment?" Take a look around at AMAZING kids here in Hampton Roads and what they are doing!



JAMES CITY COUNTY HERO

Boy Scout Troop 1607 cares about the environment - and boy, do they love oysters! The scouts built an oyster collection bin at the Toano Convenience Center and have bagged 18,000 oyster shells. They use these shells to help baby oysters who need the shells to grow on. They are also working with their Soil and Water Conservation District to learn about topography and soil conservation.

WHAT GAN YOU DO WITH ALL THOSE BOTTLE GAPS?

Keep Suffolk Beautiful collected over 20,000 bottle caps of various sizes and colors and turned them into a beautiful mural. Suffolk Art League assisted in the masterpiece. This fantastic project drew community-wide attention to the problem of plastics in the environment.



NEWPORT NEWS GETS A MEDAL!

Eagle Scout Conner McKeown placed more than 100 medallions on Newport News storm drains to call public attention to what goes down the drains. Sedgefield **Elementary School** also took positive steps to address stormwater on school grounds by planting over 100 trees and plants.



Norfolk Collegiate "Oak Ambassadors"

They participate in the annual Great American Cleanup around Earth Day.

Maury High School Recycling Club

They partnered with Keep Norfolk Beautiful to expand recycling at their high school. They also purchased recycling bins with an askHRgreen.org grant to supplement bins given by KNB and planned a Go Green Fair.

Norfolk Collegiate 7th Graders

They cleaned up Lafayette Park and boat ramp for International Coastal Cleanup. They also collected 18 bags of trash (270 pounds) and categorized 4,037 pieces of litter.

Oceanair Elementary School Community

They joined the Adopt-A-Spot program and cleaned along Dudley Avenue in Norfolk. In one school year, they have collected 405 pounds of litter.

The message is clear. People working together can make a BIG difference in our communities!

ANSWER GUIDE

Page 2

- 1. H5
- 2. York River
- 3. F4
- 4. Blackwater River
- 5. James River
- 6. 0

Challenge Answer:

The area of one square is 100 miles.

Page 5

- 1. Good, S
- 2. Bad, D
- 3. Bad. S
- 4. Good, W
- 5. Bad, W
- 6. Good, D

Page 6

Compost Bin: 2, 9 Recycling Bin: 4, 7, 8

Trash Bin: 1, 3, 5, 6

Page 7

- 1. Broom, Swing, Office Lamp, Axe, Toilet Handle
- 2. Pipe, Slide, Ladder, Downspout, Roof
- 3. Axe
- 4. Light Bulbs
- 5. Bicycle, Wheelbarrow
- 6. Flag Pole

Compound Machine:

A wheelbarrow is made of a wheel and axle and lever.

A bicycle is made up of wheels, axles and levers

Page 8

Eight things belong in the

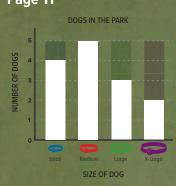
Ten things do not belong in the water.

Page 9

Problem and Solution

- 2. C
- 3. A
- 4. B
- 5. D
- 1. B
- 2. C
- 3. B
- 4. A

Page 11



- 1. 5
- 2. 1
- 3. 6
- 4. X-Large, Large, Small, Medium
- 5. No

Small dogs = 20 oz. Medium Dogs = 55 oz. Large Dogs = 60 oz. X-Large Dogs = 74 oz. 20 oz. + 55 oz. + 60 oz. + 74 oz = 209 oz

Page 12

Draw a X on dog poop, motor oil, and litter.

Page 13

Topsoil Subsoil

Bedrock

Page 14

Compostable Items are: Leaves, Grass, Pinecones and Pine Needles, Apple, Coffee Grounds, Peanut Shells, Egg Shells,

Newspaper, Banana Peel

| ltems | Compost | Recycle | Trash |
|-----------------------------|---------|---------|-------|
| Pet Waste | | | х |
| Meat/Bones | | | × |
| Newspaper | × | х | |
| Leaves | х | | |
| Paper Towels | х | | |
| Aluminum Cans | | x | |
| Tea Bags | X | | |
| Cheese | | | × |
| Cardboard Boxes | X | х | |
| Fruit & Vegetable Scraps | х | | |
| Plastic Bottles | | х | |
| Plant Trimmings | х | | |
| Pine Needles | × | | |
| Styrofoam Containers | | | × |

Page 15

Reusable utensils (not in plastic) Soup in Thermos

Apple

Chips in reusable container Water in reusable container Sandwich in reusable container

Page 16

- A. 85°
- B. 90°
- C. 80°
- D. 75°
- E. 70°

Answers to Questions:

- 1. E
- 2. B
- 3. Number of Trees
- 4. B
- 5. Flooding forcing animals out of habitats
- 6. Denser cities with more buildings and less trees

Page 17

Answers to Questions:

- 1. Answer depends on Household
- 2. Creating heat requires more energy
- 3. Heat
- 4. Use cold water and wash full loads
- 5. Answer varies depending on household.



YOU GAN MAKE A DIFFERENCE!

Pledge to do these five things and be a Hampton Roads hero!



Recycle paper, aluminum cans, and plastic bottles.



If you see litter, pick it up! Don't leave trash in your yard, playground, or school.



ask

Carry a reusable bottle to fill with tap water to quench your thirst.



Adopt the storm drain or ditch in your neighborhood. Make sure your neighbors know only rain goes down the drain (or ditch).



Only flush the three Ps pee, poo, and (toilet) paper.



Want to take your commitment to the next level?

CHECK OUT THE ASKHRGREEN.ORG MINI GRANT PROGRAM

askHRgreen.org offers environmental education mini grants of up to \$500. The mini grants are intended to provide funding for environmentally-themed projects and may be used to fund a portion of or an entire project. All Hampton Roads school teachers (K-12), youth leaders, or organizations working with youth are eligible to apply. Some project ideas include school recycling or composting programs, learning gardens, choose tap water campaigns, and wastewater treatment tours.



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askHRgreen.org is your go-to resource for all things green in Hampton Roads — from recycling tips and pointers for keeping local waterways clean to water-saving ideas and simple steps to make local living easy on the environment.

askHRgreen.org is administered through the Hampton Roads Planning District Commission (HRPDC) and powered by the following members: the cities of Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, and Williamsburg; the counties of Gloucester, Isle of Wight, James City, Southampton, Surry and York; the Town of Smithfield; and HRSD.

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