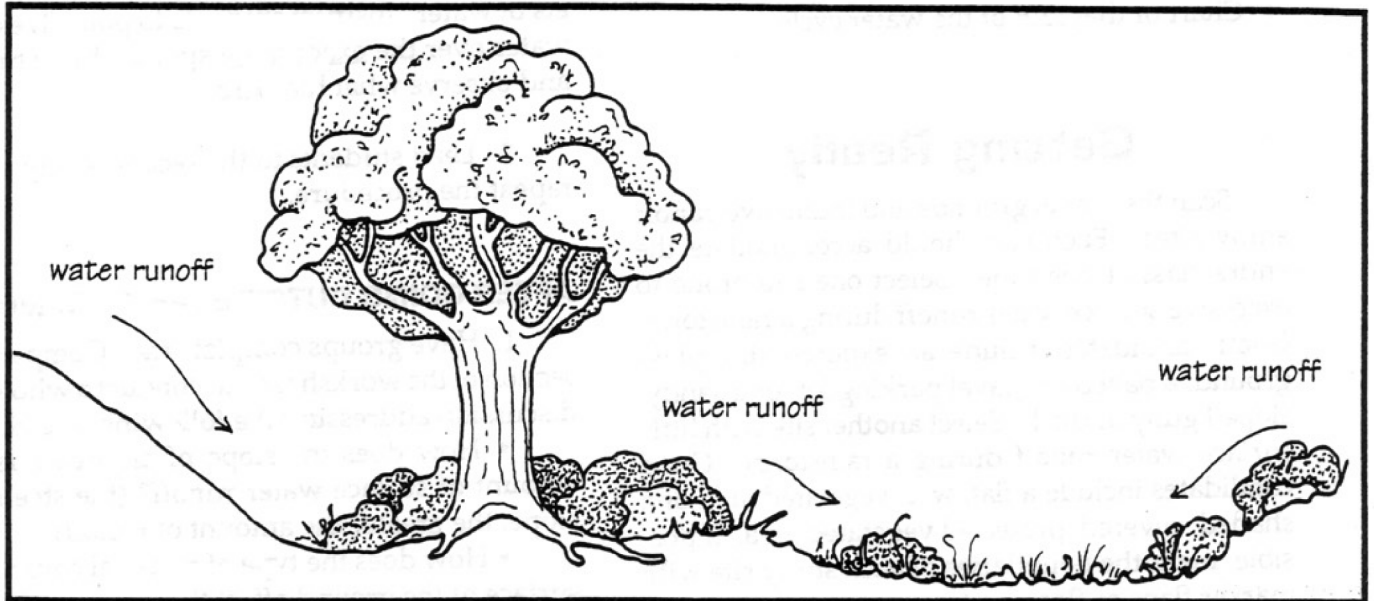


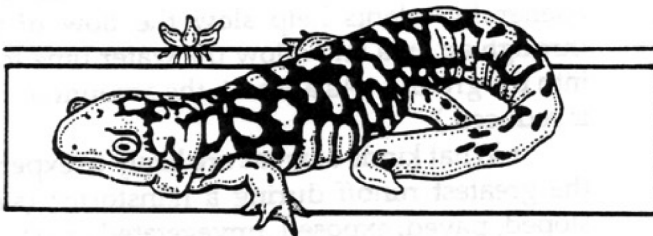
# RUNOFF ROUNDUP



## ■ Key Question(s)

*What is runoff?*

*How can runoff be prevented?*



### TARGET AUDIENCE:

*GRADES 3 - 5 AGES 8 - 10, Suitable for visual and kinesthetic learners. Appropriate for all academic ability levels.*

### SCIENCE PROCESS SKILLS USED:

*Observation, Prediction, Inference*

### TIME REQUIRED TO COMPLETE LESSON:

*In-class: 30-40 minutes, In-field: 30-35 minutes*

### BEST TIME OF YEAR FOR LESSON:

*All year*

## Behavioral Objectives

As part of this activity, students will:

- (C) 1. observe and compare the amount of surface water runoff in two different schoolyard sites.
- (C) 2. identify areas likely to experience greatest runoff during a rainstorm.
- (C) 3. describe the negative impacts of excessive surface water runoff on fresh water quality.
- (A) 4. explain how plants reduce the amount of surface water runoff.
- (A) 5. identify actions individual people can take to reduce the amount of surface runoff.

## Materials

### ESSENTIAL: (per group of 3-4 students)

- "Runoff Roundup" worksheet
- Clipboard or other hard writing surface
- Bucket of water
- Clear plastic measuring cup

## SUPPLEMENTAL:

- Marker flags or flagging tape
- Chart or diagram of the water cycle

## Getting Ready

Scan the school grounds and locate two runoff study sites. Each site should accommodate the entire class at one time. Select one site prone to excessive surface water runoff during a rainstorm. Good candidates include an exposed dirt playground, a paved or gravel parking lot, or a sandy, sloped gully or ditch. Select another site with little surface water runoff during a rainstorm. Good candidates include a flat, well vegetated area or a shaded, covered, protected vegetated area. If possible, mark the boundaries of each study site with marker flags or flagging tape.

## Procedure

### BEFORE GOING OUTSIDE (5-10 MINUTES):

1. Briefly review the water cycle and its component parts, using a chart or diagram if possible. Ask students what can happen to water after it falls to the ground as precipitation. Make sure students realize that, once water hits the ground, it can:

- a. evaporate back into the atmosphere,
- b. be absorbed into the ground, or
- c. be carried along the surface of the ground, eventually emptying into a body of water such as a lake, river, or man-made drainage basin.

Introduce the term "runoff" and define it as water from rainfall or irrigation that does not soak into the ground, but rather is carried along the surface of the ground to the nearest body of water. Explain that during this activity students will be working in groups to determine what factors affect the amount of runoff occurring in an area.

### WHILE OUTSIDE (30-35 MINUTES)

1. Divide students into groups of three to four and distribute a "Runoff Roundup" worksheet and a clipboard to each group. Lead students to the first study site and ask students to write a description of the site. Next ask students to predict what they

think happens when heavy rain falls on the site. Demonstrate the procedure for testing student predictions and distribute measuring cups and buckets of water. Instruct students to pour five cups of water over the exact same spot in their study site and observe what happens.

2. Lead students to the second study site and repeat the procedure.

### AFTER GOING OUTSIDE (25-30 MINUTES):

1. Have groups complete the "Comparisons" section of the worksheet and conduct a whole-class discussion addressing the following questions:

- How does the slope of an area affect the amount of surface water runoff? (the steeper the slope, the greater the amount of runoff)

- How does the type of material covering the surface of the ground affect the amount of surface water runoff? (Runoff is much greater from non-porous surfaces like cement or most types of asphalt.)

- How does the amount of vegetation in an area affect the amount of surface water runoff? (Generally, plants help slow the flow of water through an area and allow the water time to soak into the ground. As a result, the amount of runoff is reduced.)

- What kinds of areas are likely to experience the greatest runoff during a rainstorm? (steeply sloped, paved, exposed, unvegetated areas)

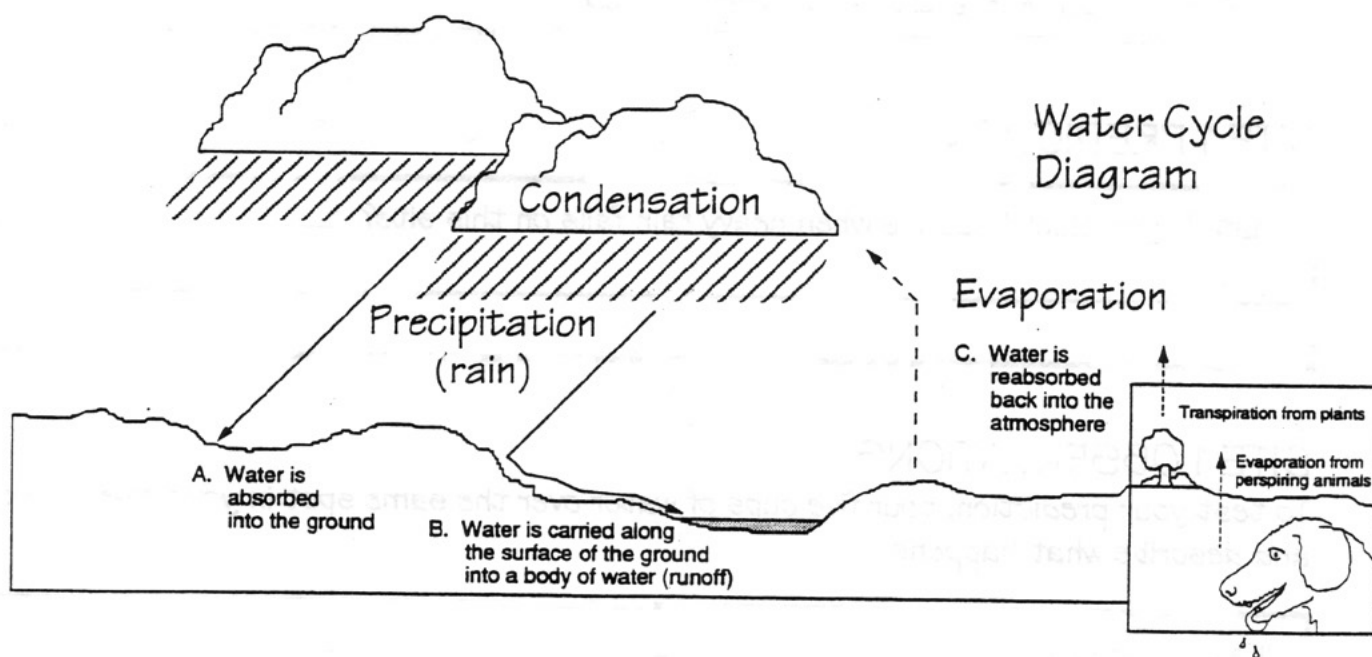
2. Ask students how runoff can affect water quality. Introduce the idea of erosion as one negative impact of excessive runoff. Define erosion as the gradual wearing away of the surface of the land due to factors like wind and water. Ask students how rainfall could cause erosion. Next ask students what areas of the schoolyard might be subject to erosion from rainfall. Students should realize that open, exposed areas like dirt playgrounds or dirt foot paths made by students repeatedly walking across the same grassy area are especially susceptible to erosion from rainfall. Ask students how erosion could affect the quality of surface water running into natural bodies of water like lakes or streams. Make sure students realize that surface water containing lots of soil particles can make a lake or stream cloudy and water loaded with soil particles can harm fish and other water organisms. Finally, ask students what can be done to reduce

erosion due to rainfall. Explain that one of the easiest ways to control erosion from rainfall is to cover exposed sloped areas with vegetation.

3. Introduce the idea of water pollution as another negative impact of excessive runoff. Ask students what they think happens when water from rain, sprinklers, car washing, or other outdoor sources flows along the surface of streets and parking lots. Make sure students realize that as this water runs along the surface of the ground, it picks up whatever materials are also laying on the ground, including pesticides, fertilizers, motor oil, animal waste, and many other harmful substances. Explain that in Florida, stormwater runoff is one of the main causes of pollution in our rivers and lakes. Categories of stormwater runoff pollutants include: nutrients, organics, pesticides and herbicides, sediments, bacteria and viruses, petroleum products and heavy metals. Some of the most

harmful pollutants found in runoff are heavy metals such as lead and mercury. These pollutants are poisonous to humans and wildlife. Scientists estimate that 80-95% of all the heavy metals found in Florida's water come from stormwater runoff.

4. Conclude the lesson by asking students what individual people can do to reduce the amount of potentially harmful surface water runoff in their communities. Make sure students are aware of the wide variety of things they can do to help, including: planting exposed or steeply sloped areas, washing a car on a lawn instead of a driveway, using a hose nozzle to turn the water on and off instead of letting the hose run, sweeping driveways and patios instead of hosing them off, setting sprinklers so they don't spray water on the street or sidewalk, avoiding the excessive use of fertilizers and pesticides, picking up animal waste, and not pouring harmful substances such as used motor oil or paint thinner on the ground.



# RUNOFF ROUNDUP

Name \_\_\_\_\_

Name \_\_\_\_\_

Name \_\_\_\_\_

Name \_\_\_\_\_

## DIRECTIONS:

At each site, complete a site description and predict how much runoff will occur. Then, test your prediction and record the results.

## SITE 1 DESCRIPTION

ELEVATION (flat, slight slope, steep slope)

SURFACE (cement, asphalt, sand, topsoil, etc.)

VEGETATION (covered with plants, few sparse plants, no plants)

LOCATION (open/exposed or shaded/protected)

## SITE 1 PREDICTION

What do you think happens when heavy rain falls on this site? \_\_\_\_\_

\_\_\_\_\_

## SITE 1 OBSERVATIONS

To test your prediction, pour five cups of water over the same spot in your site. Observe and describe what happens.

Observations: \_\_\_\_\_

\_\_\_\_\_

How much water was absorbed by the ground? (all, some, none)

How much water ran off the surface? (all, some, none)

Was your prediction correct?

# RUNOFF ROUNDUP

Name \_\_\_\_\_

Name \_\_\_\_\_

Name \_\_\_\_\_

Name \_\_\_\_\_

## SITE 2 DESCRIPTION

ELEVATION (flat, slight slope, steep slope)
SURFACE (cement, asphalt, sand, topsoil, etc.)
VEGETATION (covered with plants, few sparse plants, no plants)
LOCATION (open/exposed or shaded/protected)

## SITE 2 PREDICTION

What do you think happens when heavy rain falls on this site? _____ _____
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## SITE 2 OBSERVATIONS

To test your prediction, pour five cups of water over the same spot in your site. Observe and describe what happens.

Observations: _____ _____
How much water was absorbed by the ground? (all, some, none)
How much water ran off the surface? (all, some, none)
Was your prediction correct?

## COMPARISONS

Was the amount of runoff in the two sites different?
What factors can increase the amount of runoff in an area?