

# Jeremy Jackrabbit Adds it All up

## Study Guide

### Objectives

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This study guide corresponds to the puppet show by the Great Arizona Puppet Theatre, *Jeremy Jackrabbit Adds it All*. This show is great for students in first through fourth grade and can be used by teachers or parents. By using this study guide students will improve their math and problem solving skills. They will also participate in a group activity called “Keep the Rain!” by Brad Lancaster; Lancaster is a hard working rain harvester based in Tucson, AZ and his books & website makes rain harvesting accessible and easy to understand. Finally, students will review their knowledge of plants and photosynthesis that is also covered in the puppet show. This guide is best used after seeing *Jeremy Jackrabbit Adds it All Up*. By seeing the puppet show and participating in the multiple activities in this study guide, students will satisfy an array of Arizona Common Core Standards.

### Arizona Common Core Standards by Grade Level

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*For all the following standards, the corresponding Grade Level is the first number noted.*

#### Arizona Mathematics First through Fourth Grade Standards:

- 1.OA.A.1.** Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. (*Word Problems for First and Second Grade*)
- 1.OA.D.8.** Determine the unknown whole number in an addition or subtraction equation relating three whole numbers. (*Word Problems for First and Second Grade*)
- 2.OA.A.1.** Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. (*Word Problems for First and Second Grade*)
- 2.NBT.B.9.** Explain why addition and subtraction work, using place value and the properties of operations. (Explanations may be supported by drawings or objects.) (*Word Problems for First and Second Grade*)
- 2.MD.C.8.** Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using \$ and ¢ symbols appropriately. (*Word Problems for First and Second Grade*)
- 3.OA.D.8.** Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding... (*Word Problems for Third and Fourth Grade*)
- 4.OA.A.3.** Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. Represent

these problems using equations with a letter standing for the unknown quantity...(Word Problems for Third and Fourth Grade)

Mathematical Practices First through Fourth Grade Standards:

- 1-4.MP.1. Make sense of problems and persevere in solving them. (Word Problems)
- 1-4.MP.2. Reason abstractly and quantitatively. (Word Problems)
- 1&2.MP.3. Construct viable arguments and critique the reasoning of others. (Word Problems)
- 1-4.MP.4. Model with mathematics. (Word Problems)
- 1-4.MP.5. Use appropriate tools strategically. (Word Problems)
- 4.MP.6. Attend to precision. (Word Problems)
- 4.MP.7. Look for and make use of structure. (Word Problems)
- 1&2.MP.8. Look for and express regularity in repeated reasoning. (Word Problems)

Arizona Science Standards:

- 1-2.1.2.PO 4. Record data from guided investigations in an organized and appropriate format (e.g., lab book, log, notebook, chart paper). (Keep the Rain Activity)
- 2.2.2.PO 2. Identify the following characteristics of a system: consists of multiple parts of subsystems; parts work interdependently. (Parts of plant worksheet)
- 3.4.3.PO 5. Describe how environmental factors (e.g., soil composition, range of temperature, quantity and quality of light or water) in the ecosystem may affect a member organism's ability to grow, reproduce, and thrive. (Puppet show, Keep the Rain Activity, Parts of Plant Worksheet)
- 4.1.PO 5. Record data in an organized and appropriate format (e.g., t-chart, table, list, written log). (Keep the Rain Activity)

Arizona Arts Standards for First through Fourth Grade:

- 1-4.3.2..PO 101. Demonstrate respectful audience behavior. (Attending the puppet show)

## The Story

*Jeremy Jackrabbit Adds it All Up* is based on the *Jeremy Jackrabbit* books by Sasha and Rodney Glassman. These books discuss topics such as recycling and harvesting rainwater and sunlight to save energy. The Great Arizona Puppet Theatre has taken each of these books and condensed their topics into one fun and education filled show!

In the puppet show, Jeremy is going outside to work on his garden and he discovers that it's not growing well even though he has been harvesting rain water to water his plants. Ruthy the Kangaroo Rat explains to him that he's planted his plants in the shade and they are not getting enough sunlight. Jeremy has to figure out where the best place for his plants will be; while he does this, Barry the Bee comes by. Barry and Jeremy talk about other things that the sun is good for besides just feeding plants. They talk about various ways that the sun is useful and how it can be captured to create energy. Then, Jeremy moves his plants so they will get more sunlight, but as he's digging he gets very thirsty and drinks from four water bottles. Rosie the Duck comes by and says that Jeremy should re-use these water bottles rather than just recycle them. She explains to Jeremy how much plastic we have in the world, and that we can be doing better than just recycling. This gets Jeremy thinking about all the lessons he's learned that day and how all our behavior adds up to make a big difference in the world!



## The Characters

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Jeremy Jackrabbit

Ruthy the Kangaroo Rat

Barry the Bee

Rosie the Duck

## Word Problems for Various Grades

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**Objectives:** Students will use their math skills to solve problems relating to the show. This activity is best done after viewing the puppet show because students will be able to relate their math problems to the story they saw. Students will use addition, subtraction, and multiplication (fourth grade only) to solve their math problems. Students will also describe how they got their answers and write out their equation when needed. Pass out the worksheets below based on the appropriate grade level and have students answer the questions. After students have worked on them, go over the questions and work out how to solve each problem as a group.

Name: \_\_\_\_\_

## Word Problems for First and Second Grade

- Jeremy bought 50 water bottles from the store. While he was planting his garden, Jeremy drank 13 bottles of water. How many full water bottles does Jeremy have left?  $50 - 13 = ?$  Explain how you got your answer.

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- Rosie the Duck has been collecting flowers to give to his friends. She gave 24 flowers to Jeremy. Now she has 30 flowers left. How many flowers did Rosie have before she gave some to Jeremy?  $? - 24 = 30$

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- Jeremy has 42 different kinds of plants in his garden. Ruthy only has 27 kinds of plants. How many more types of plants does Jeremy have than Ruthy?  
 $42 - 27 = ?$

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- In June, Barry the Bee saved \$8 by using the sun to dry his clothes instead of the electric dryer. Barry saved another \$12 in July. How much money did Barry save all together? Explain how you got your answer.  $\$12 + \$15 = ?$

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Name: \_\_\_\_\_

## Word Problems for Third and Fourth Grade

- Jeremy has 231 water bottles that he needs to take to the recycling plant. Today, he took 82 of those water bottles to be recycled. If he drinks 40 more water bottles this week, how many water bottles will he have left to recycle? Use a letter to stand in for the unknown number when writing out your equation.
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- Barry the Bee bought two solar panels to harvest the sun and save money on electricity. It cost Barry the Bee \$55 to buy and install two solar panels. The cost included a \$12 installation fee and the cost of the two separate solar panels. Write an equation representing the cost of his solar panels and determine the price of just one solar panel.

S	S	\$12
\$55		

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- Rosie the Duck has been collecting flowers to give to his friends. She gave 24 flowers to Jeremy. Then, she gave 16 flowers to Ruthy. Now, she has 42 flowers left. How many flowers did Rosie have before she gave some to Jeremy and Ruthy?
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- Jeremy's red pepper seeds for his garden cost \$2. The pumpkin seeds cost three times as much as the red pepper seeds. How much do the pumpkin seeds cost?
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## Keep the Rain!

### Overview:

Youth explore passive rainwater harvesting techniques that can be used to capture water in a landscape.



*Passive rainwater harvesting involves shaping a landscape so that water moves through it more slowly and has a better opportunity to soak into the ground, thus benefiting plants and groundwater.*

### Materials:

- One 8" by 8" square aluminum cake pan for each pair or small group of participants
- Spray bottle for each pair or small group
- Water
- Two 6" by 3 ½" scour pad sponges for each pair or small group (look for the type with a green side to represent grass)
- 1-cup measuring cup for each pair or small group
- Bowls for collecting "runoff" water
- Plastic wrap for covering sponges
- 6" by 3" mosaic tile strip on open-weave, adhesive backing for each pair or small group (see included photo)
- "Water Lost/Water Saved" handout (included)
- Two berm and swale photographs (included)



### Activity Duration:

30 minutes

### Preparation:

- Make photocopies of the berm and swale photographs or bookmark them to show participants.
- Make photocopies for participants of the "Water Lost/Water Saved" worksheet.
- Purchase and prepare participant materials.

### Activity Steps:

1. Ask participants if they have ever been in a rainstorm in a place where a lot of the area is covered with concrete or asphalt (city roads, parking lots, buildings with cement courtyards, etc.) Ask where the water goes. Get responses.
2. Explain that areas around buildings, including houses, are designed to move water away as quickly as possible to keep the buildings from flooding. In natural, unpaved areas, rain has a better opportunity to soak into the ground and move more slowly across a landscape. Where there is pavement, water can move very quickly and collect in areas that can cause damage or injury. Cities have stormwater systems that move water from buildings to streets and into gutters or washes as quickly as possible. Most water that falls on a city landscape is lost to that landscape.

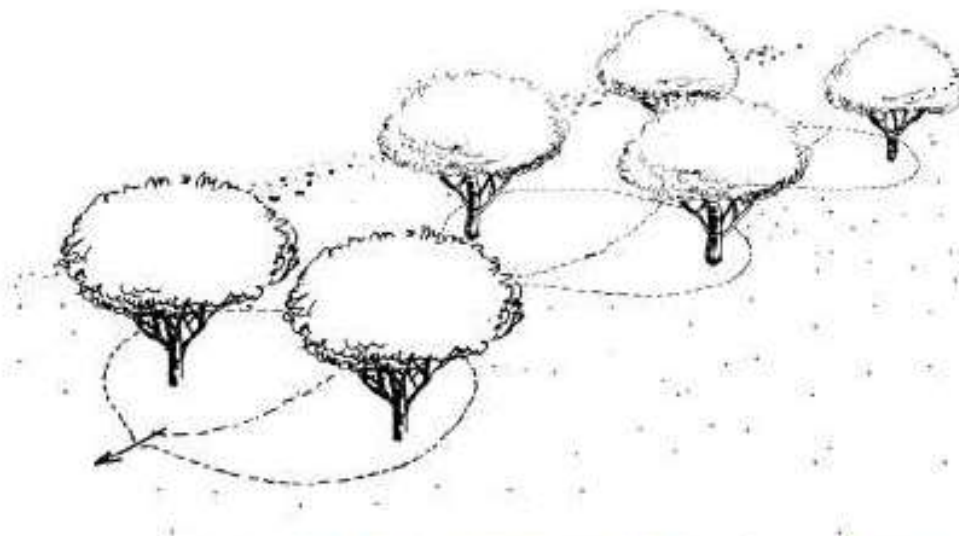
3. Explain that participants will explore ways to keep water in a landscape as a welcome and appreciated addition.
4. Distribute the aluminum pans, spray bottles filled with water, and worksheets to pairs or small groups. Turn a pan upside down and demonstrate bending the lip up on all sides to form a gutter. Explain that the bottom of the pan is an impervious surface; water will either collect on the surface (if it is level) or run off downhill (if there is a slope).
5. Participants spray the bottoms of their pans until water spills over the edge(s) and begins to collect in the gutter. Participants carefully pour the water into collection bowls. Explain that, just as they dumped their water into bowls, cities either "dump" their stormwater into systems of pipes that carry water (and whatever is in the water) to waste treatment plants or the water (and whatever is in the water) runs into nearby washes, streams, and rivers.
6. Next, participants bend one corner of their pans so that there is a spout and place that end into their measuring cups. They create a slight downward slope toward the spout and spray the pan bottom 50 times (the number of times is important for consistent measuring). They record their findings on the worksheet.
7. For the next activity, show participants a sponge. The green side represents unpaved areas (soil with or without turf). Explain that soil is like a sponge in its ability to absorb and hold water.
8. Participants place two sponges side by side on the upside down pan, spray the two sponges with a total of 50 sprays, and squeeze the water from both sponges into the measuring cup. They record their findings on the worksheet.
9. Participants compare and discuss the water lost or saved.
10. Ask participants to think about the processes for covering landscapes. Soil can be muddy or get washed away when it rains and raise dust when it is windy. People like level places to walk so they build paved sidewalks, driveways, and patios. Sometimes the materials people choose do not allow water to soak in (like cement) or do allow water to soak in (like brick in sand or loose flagstone pavers).
11. Explain that materials that do not allow water to soak in are considered "impervious" and materials that do allow water to soak in are considered "pervious" (see glossary).
12. Participants wrap one of their sponges in plastic wrap (this mimics covering the soil with an impervious material such as a concrete sidewalk or putting a plastic weed barrier under a landscaped area). They place a mosaic tile strip onto the top of the other sponge (this mimics covering the soil with a permeable pavement material such as concrete paving tiles).
13. Participants then place the two sponges side by side on the upside down pan. One participant slightly tilts the pan and holds it with the spout over the measuring cup and another participant sprays the two sponges with a total of 50 sprays. They record their findings on the worksheet.
14. Show participants the photographs of berms and swales. Explain that "berms" are mounds of soil that have been put in place to keep water in. Water flows from the higher places to the lower places which are called "swales." The low places collect and hold the water, allowing it to soak into the ground instead of running off the property.
15. Ask participants to notice how plants are planted. Show them a muffin tin, held upside down. Explain that many people plant on mounds (berms). Ask why planting this way might be a problem. Get responses. Spray water onto the upside down tin so participants can watch the water run between the "berms."



16. Turn the muffin tin over and explain that passive rainwater harvesting encourages planting in depressions in the soil (swales) that can collect water. Spray water over the tin so participants can see that the water moves into the cups.
17. Ask youth to describe ways to create landscapes that collect water (see diagram below for one idea).
18. As a wrap-up, ask participants to notice surfaces around town and look for ways that people incorporate pervious surfaces to hold onto more water.



### Example of landscape design to collect rainwater in the landscape



*Series of planted water harvesting basins on a slope.*

Drawing courtesy of Patricia Waterfall

#### Sources:

Developed by Alison Barrett, Former Instructional Specialist, Sr.  
The University of Arizona Cooperative Extension, Cochise County  
450 S. Haskell Avenue  
Willcox, AZ 85643-2790  
(520) 384-3594  
<http://extension.arizona.edu/cochise>

Creative inspiration from Brad Lancaster  
Author of *Rainwater Harvesting for Drylands, Volumes 1 and 2*  
Rainsource Press, 2008  
[www.HarvestingRainwater.com](http://www.HarvestingRainwater.com)

Activities for teachers can be found at:  
<http://www.harvestingrainwater.com/rainwater-harvesting-inforesources/water-harvesting-curriculum/>

Drawing can be found in *Harvesting Rainwater for Landscape Use*, by Patricia Waterfall  
Available from <http://ag.arizona.edu/pubs/water/az1052/harvest.html>



## Water Lost/Water Saved Worksheet

Name \_\_\_\_\_ Date \_\_\_\_\_

### Activity 1:

- Use an 8" by 8" disposable, aluminum cake pan. Turn it upside down and bend the lip on all sides upward to form a gutter. Bend one corner downward to make a spout. Then rest the spout over a 1-cup measuring cup so that water will flow into the cup.
- Next, tilt the pan slightly to create a downward slope toward the cup and spray the surface of the pan 50 times.

Amount of water in the cup: \_\_\_\_\_ (Water lost to runoff)

### Activity 2:

- Place two sponges side by side on the upside down pan.
- Spray the two sponges with a total of 50 sprays.
- Squeeze the water from both sponges into the measuring cup.

Amount of water in the cup: \_\_\_\_\_ (Water saved through infiltration)

### Activity 3:

- Wrap one of the sponges in plastic wrap (this mimics an impervious surface like concrete).
- Put a mosaic tile strip onto the top of the other sponge (this mimics a pervious, paved surface).
- Place the two sponges side by side on the upside down pan.
- One participant slightly tilts the pan and holds it with the spout over the measuring cup.
- Another participant sprays the two sponges with a total of 50 sprays.
- Measure the amount of water in the cup (from runoff).

Amount of water in the cup from runoff: \_\_\_\_\_ (Water lost)

- Empty the water from the measuring cup.
- Squeeze the water from the sponge with the tiles into the measuring cup.
- Measure the amount of water in the cup.

Amount of water in the cup from the sponge: \_\_\_\_\_ (Water saved)

## Berms and Swales



## Berms and Swales



# Photosynthesis

Name: \_\_\_\_\_



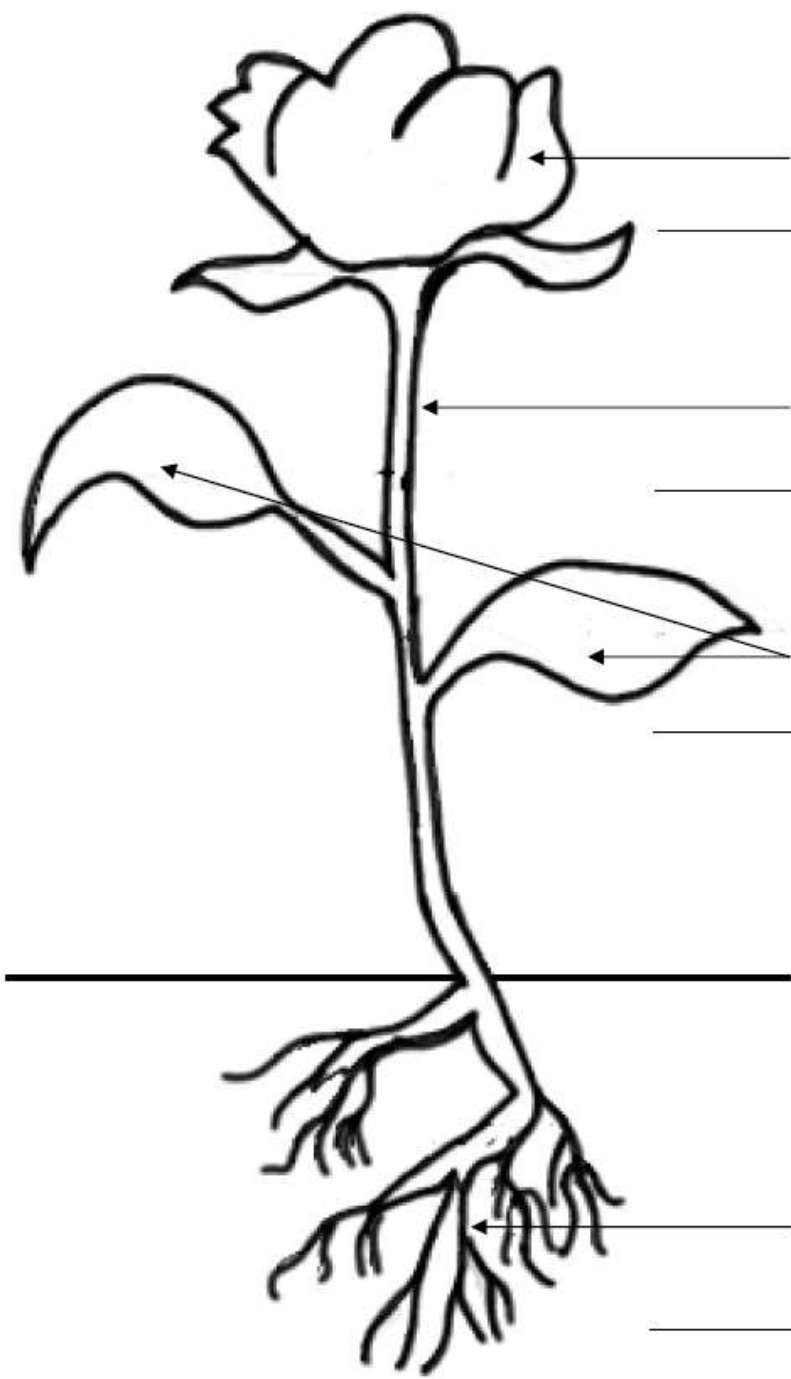
Complete the photosynthesis process by adding soil, sun and some rain.

Plants use the light from the sun, carbon dioxide in the air, and water to make food and oxygen.

Plants make food and they provide us with oxygen.

# Parts of a Plant

Name: \_\_\_\_\_



flower

stem

roots

leaves

## Sources

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Arizona Common Core Standards:

[www.azed.gov/standards-practices](http://www.azed.gov/standards-practices)

Great Arizona Puppet Theatre:

[www.azpuppets.org](http://www.azpuppets.org)

*Keep the Rain* activity and for more activities/resources for rainwater conservation:

Brad Lancaster, [www.harvestingrainwater.com](http://www.harvestingrainwater.com)

Plant worksheets:

[www.worksheetplace.com](http://www.worksheetplace.com)

Please send any thoughts or appreciation letters to:

Great Arizona Puppet Theatre

302 W Latham St

Phoenix, AZ 85007

[info@azpuppets.org](mailto:info@azpuppets.org)

We Love Hearing from You and Your Students