

CENTERS OF THE UNIVERSE

FOR USE WITH ANDREW LOST BOOKS 9–12

How do scientists discover fossilized remains of ancient organisms? Why can't we see stars during the day? How much damage do asteroids leave behind after they hit the earth? Why are tsunamis so powerful? Andrew, Judy, and Thudd travel far, far back in time to the genesis of the universe where they experienced many of these things and so much more!

Step 1: Gather materials for the Centers of the Universe (five centers) in the classroom.

Materials:

- 10 plain manila folders or two each of white, blue, grey, brown, and red folders
- Permanent marker
- Laminating machine
- Five desks or small tables dedicated to being used as centers

Center #1: Stars

- Single-hole punch
- Plain white index cards
- Black construction paper
- Glue sticks

Center #2: Waves

- Large deep tub (blue if possible) half filled with water or light-colored tub with blue water
- Smooth, flat piece of wood or plastic that fits inside tub (to create waves)
- Small toy boat
- Large beach towel (placed under tub)

Center #3: Asteroids

- 9-1/2" x 13" x 2" pan
- Rulers with inches and centimeters
- Whole wheat flour
- White flour
- *Note: Either layer the two types of flour or mix together*
- Various small rocks, pebbles (some smooth, some jagged). These will be the "asteroids."

Center #4: Fossils

- "Loaded" cupcakes (NO frosting!)—using a boxed cake mix, make cupcakes. Gently stir in any of the following small items: chocolate chips, raisins, nuts, small colored candies, etc.
- Tweezers
- Old toothbrushes
- Large container with enough sand to bury a cupcake

Center #5: Solar System

- Word search (reproducible activity sheet below)

Step 2: Writing the instructions

Write procedure for each center on manila folders. Laminate folders. Optional oral instructions: Record instructions on a tape and leave machine on table for student to playback as many times as they need in order to complete the activity.

- 1 **Color code** and write **name of center**—e.g., "Stars"—on outside of manila folders (two for each center). You may want to use colored folders instead of color-coding).
- 2 Write **directions** for each center on *inside* of folders.
- 3 Write **expected results or solutions** on *back* of manila folders.

Step 3: Organize students and begin rotations

Rotation:

- 1 Give each student a copy of Centers of the Universe Activity sheet (below).
- 2 Divide students equally among centers. Students will stay with their groups the entire time as they travel from center to center.
- 3 Create a rotation pattern from center to center, including time allowed at each location. Recommended time for each center is 10 minutes.
 - a. Practice: Set the timer for 30-second intervals to practice rotating from center to center (while not touching any of the materials).
- 4 At each stop along the universe, students will take turns participating in the activity. Indicate when a minute is left so students can put their centers in order before the next group starts.
- 5 Dismantle and clean up the area at the one-minute warning.

Center #1: Stars (White)

Inquiry question: Do stars shine during the day?

Objective: Show the differences between visibility of stars during the day and at night.

Activity: Star simulation—day and night

- 1 Student will punch out 10 white holes from a plain white index card. These represent stars in the sky.
- 2 Student will glue half of the "stars" onto another white index card.
- 3 Student will look at cards while holding them straight ahead. Are the stars easily seen?
- 4 Student will then glue the other half of the "stars" onto the black construction paper. Are the stars easier or harder to see now? Why?

Teachers Notes: The stars are always shining, day or night. We cannot see them during the day because they become "invisible" in daylight. Our sun is the closest star to Earth. When it is shining, it keeps us from seeing the stars beyond it in outer space. When the sun is "down," the sky darkens and the other stars in the Milky Way galaxy are easier to see. When you are away from city or suburban lights at night, the stars appear *even brighter* because they are not "washed out" by ground lights. Additional question: Can you see the stars at night when clouds are out? Why or why not? Answer: The clouds are formed inside Earth's atmosphere. They block our ability to see the stars that exist outside our atmosphere.



EARTH SCIENCE

Center #2: Waves (Blue)

Inquiry question: What gives a wave so much power?

Objective: Demonstrate various strengths of mechanical waves by manipulating water.

Chemistry Connection: The two hydrogen atoms and one oxygen atom (H₂O) that make up each individual molecule of water pass energy to one another by “bumping” each other. In this way, the waves continue until they eventually die out or run into land. A tsunami may not appear large out in the ocean, but gains height as the water shallows and eventually becomes enormous and very dangerous when it comes ashore.

Activity: Re-create waves in a plastic tub while floating a small boat in the water.

- 1 Place small plastic boat on water.
- 2 Put your head down close and horizontally to the water. Blow continuously until ripples form. Observe what happens to the boat.
- 3 Next, create waves using the flat board and a motion from left to right.
- 4 Observe what happens to the boat.
- 5 Try slow waves and fast waves. Observe the differences.



Teachers Notes: Water waves are a form of *mechanical energy*. Wind (as simulated by blowing on the water) is one way that waves are formed. Another is an underwater earthquake often resulting in a tsunami (simulated with motion of board to displace the water).

Center #3: Asteroids (Grey)

Inquiry question: What happens when an asteroid hits a planet?

Objective: Examine results of displacement caused by a falling object.

Activity: Drop various objects into a pan of flour. Use different objects and drop from different heights. This simulates asteroids hitting a planet’s surface.

- 1 Choose an “asteroid” from the pile. Hold it about 5” from the pan of flour. Drop it. Observe what happens.
- 2 Carefully remove your “asteroid.” Observe the hole left behind. Measure the width and depth with a ruler uses inches and/or centimeters.
- 3 Choose another “asteroid” from the pile. Repeat procedure above. Compare observations . . . was the effect the same or different?
- 4 Continue activity varying the height that the “asteroid” is dropped from and types of “asteroids” used.
- 5 Remove all “asteroids” and level out surface of flour for the next student.

Teachers Notes: This activity simulates an asteroid’s affect on the surface of the planet. Students can observe the displacement of the flour (simulating soil) and the hole left behind. This will vary depending on the size of the rock they choose, *and* the height from which it is dropped. Taking measurements is one way of validating an observation for future study.

Extension: Discuss what it must have been like for Andrew, Judy, and Thudd in the exciting conclusion to Andrew Lost: *With the Dinosaurs* when the giant asteroid started to fall from the sky!

Center #4: Fossils (Brown)

Inquiry question: How do scientists find and isolate petrified fossil remains?

Objective: Discover and examine faux fossilized remains.

Activity: Dig up and dissect a “loaded” cupcake. This simulates the work of paleontologists when they go on an expedition to find and remove important fossils from the earth.

- 1 Bury a cupcake in the sand.
- 2 Have students dig through sand and find the “fossil” (cupcake). Once the “fossil” is removed, have students use their hands and tweezers to carefully extract the fossilized materials for further study (chips, nuts, etc.).
- 3 Once extracted, have students use the toothbrush to carefully remove any cake crumbs from their finds!
- 4 Have students remove any cake remains from the sand and bury a new cupcake for the next students to discover.

Teachers Notes: By digging up and dissecting a cupcake, students are simulating a scientific “dig” for a fossil with petrified remains. Removing all traces of the cupcake from the items baked inside simulates the work necessary to isolate specific petrified remains (e.g., bones) of an ancient organism.

Center #5: Solar System (Red)

Inquiry question: What are common names and words we use when discussing our solar system?

Objective: Recognize common words from our solar system while solving a puzzle.



Language Arts Connection:

- 1 Find and circle all the words from the Word Search
- 2 Check for solution in manila folder

To download the reproducible puzzle, please visit the Andrew Lost Classroom Club Web site at

www.randomhouse.com/teachers/andrewlost

Name: _____

ANDREW LOST CENTERS OF THE UNIVERSE



Center #1: Stars

What I learned:

Center #2: Waves

What I learned:

Center #3: Asteroids

What I learned:

Center #4: Fossils

What I learned:

Center #5: Solar System

What I learned:

To read all of the books in the Andrew Lost series, visit your local library or bookstore: www.randomhouse.com/kids/andrewlost

EDUCATORS: Reproduce this activity sheet to use with students.