



COMPLETE INTRODUCTION TO EARTH & SPACE

(GRADES 9+)

KT-EARTHSC

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Each of the layers of the atmosphere is necessary for our survival here on Earth. The atmosphere provides many benefits and protections to humans and other organisms.

Learn more about the atmosphere in Activities 3 and 4.

ACTIVITY #3 – OXYGEN IN THE AIR

FROM THE KIT: Steel wool, 2 glass test tubes, 2 test tube clamps, 2 beakers, colored pencils, nature notebook, tape measure, marker, and stir rod.

YOU PROVIDE: Water

PREPARATION: The experiment will need to sit in an undisturbed location for a minimum of two days. Find an appropriate location and prepare for this activity to run for multiple days.

NOTE: Save the beakers, stir rod, marker, and nature notebook for future activities.

1. Use the beaker to measure the volume of the space in the test tube. **Volume** is the amount of space an object takes up.
Note: It is important you only get the inside of one test tube wet. If you get both wet, one needs to be completely dry before continuing.
2. Record the volume in your nature notebook. Label the volume " V_{empty} ".
3. Pour out the water in the test tube.
4. Pull off two pieces of steel wool that are each approximately 3 centimeters (cm) in diameter. Use the tape measure to help you measure the diameter.
5. Put one piece of steel wool in each test tube.
6. Use the stir rod to push the steel wool to the bottom of each test tube.
7. Invert each test tube to ensure the steel wool won't fall out.
Note: If the steel wool does fall out of the test tube, push the steel wool down harder and invert it again to test. If necessary, add more steel wool to both test tubes to maintain a consistent amount of steel wool in both test tubes and keep it from falling out.
8. Add water to the test tube that you measured volume with. Make sure to get the steel wool wet so that it is rinsed.
9. Pour out the water in the test tube.
10. Fill each beaker with 80 milliliters (mL) of water.
11. Hold each test tube with one test tube clamp.

As you hit or shook the table and box, you produced p-waves. Compression waves compress and expand as they move through a medium. This allows the wave to increase and decrease the pressure caused to the medium as it travels through the medium.

Earth's interior consists of liquid and solid layers. Compression waves can travel through any material, solid or liquid. This means they can travel down to Earth's inner core. Shear waves cannot travel through liquids, so they are unable to pass through the outer core of Earth's interior. Instead, they bend away from it rather than going through it.

ACTIVITY #7 – PLATE TECTONICS

FROM THE KIT: Colored pencils, 2 world maps, and nature notebook.

YOU PROVIDE: Scissors

NOTE: Save the colored pencils for future activities.

1. On one of the world maps, draw the boundaries for and label each tectonic plate.
 - African Plate
 - Antarctic Plate
 - Arabian Plate
 - Australian Plate
 - Caribbean Plate
 - Cocos Plate
 - Eurasian Plate
 - Indian Plate
 - Juan de Fuca Plate
 - Nazca Plate
 - North American Plate
 - Pacific Plate
 - Philippine Plate
 - Scotia Plate
 - South American Plate
2. Provide your reasoning for your tectonic plate boundaries and labeling in your nature notebook.
3. Cut the map into its tectonic plates along the boundaries you created. Each piece should be a separate tectonic plate.
4. Review the "Tectonic Plates of the Earth" diagram on the next page.
5. On the uncut world map, draw the boundaries for and label each tectonic plate.
6. Cut the map into its tectonic plates along the boundaries. Each piece should be a separate tectonic plate.
7. Reflect on your original map in comparison to the correct tectonic plate map.
8. Record your thoughts and impressions in your nature notebook.
9. Record any questions you have about tectonic plates in your nature notebook.

ACTIVITY #10 – DIY BIOGAS DIGESTER



FROM THE KIT: Stir rod, beaker, 3 balloons, 3 17-oz bottles, peat moss, newsprint, funnel, masking tape, tape measure, colored pencils, and nature notebook.

YOU PROVIDE: Fruit and vegetable scraps, and leaves and grass clippings.

PREPARATION:

- The leaves you provide are better if they are less fresh, but brown, crunchy leaves, like those that are common in Fall.
- The experiment will need to sit in a warm location away from direct sunlight for a minimum of five days. Find an appropriate location and prepare for this activity to run for multiple days.

NOTE: Save the colored pencils, nature notebook, and remaining masking tape for future activities.

1. Use the beaker to measure and add 500 mL of water to the bag of peat moss and seal it. Note: You will need to fill the beaker more than once.
2. Squish the bag to mix the peat moss and water. The peat moss should be a dark brown color. If there is extra water pooled in the bag, drain it off.
3. Put the stem or neck of the funnel in the mouth of one bottle.
4. Using the funnel, transfer one-third of the peat moss into the bottle. Use the stir rod to push the peat moss through the funnel.
5. Repeat Steps 3–4 with the other two bottles.
6. Cut the newsprint into pieces that are no larger than a nickel.
7. Put the stem of the funnel in the mouth of the first bottle.
8. Transfer enough newsprint into the bottle through the funnel to fill it half full. Use the stir rod to push the newsprint through the funnel.
9. Repeat Steps 6–8 with fruit and vegetable scraps in the second bottle.
10. Repeat Steps 6–8 with leaves and grass clippings in the third bottle. Note: You should have three different mediums in each bottle – (1) newsprint, (2) fruit and vegetable scraps, and (3) grass clippings and leaves.
11. Use the beaker to measure and add 100mL of water to each bottle.
12. Put your hand over the mouth of each bottle and shake to mix the contents.
13. Blow up and release the air from each balloon several times.
14. Put the mouth of a balloon over the mouth of each bottle.
15. Seal the balloons to the bottles with masking tape.
16. Place the three bottles in a warm location away from direct sunlight.