Lava Lamp Heat Transfer

Summary

Students will explore heat transfer through observations of a lava lamp.

Time Frame

2 class periods of 45 minutes each

Group Size

Pairs

Life Skills

Thinking & Reasoning

Materials

1 lava lamp
science notebook
colored pencils

Background for Teachers

Heat transfer may be observed in a variety of natural processes. This lesson explores the transfer of heat through convection, conduction, and radiation. Conduction is the transfer of heat through direct contact (in this case, metal coil contact with the "lava" at the bottom of the lava lamp). Convection is the transfer of heat through movement such those in a flowing medium (such as liquids or gases, or in this case as the "lava" rises in a lava lamp). Radiation is the transfer of heat through energy waves (such as the sun heating the earth's surface, or in this case, a light bulb radiates heat to the bottom of the lava lamp.)

Student Prior Knowledge

Basic descriptions of heat transfer.

Intended Learning Outcomes

3. Understand Science Concepts and Principles
    a. Know and explain science information specified for the grade level.
    4. Communicate Effectively Using Science Language and Reasoning
    c. Use scientific language in oral and written communication.

Instructional Procedures

Show video on conduction, convection and radiation. Students should take notes if this is their first exposure to heat transfer. Prior to the lesson, turn on a lava lamp (this can take between 30 mins to 1 hour for the lava lamp to fully heat up to the proper temperature.)

Step 1: Students make observations about the lava lamp.

Step 2: Students create drawings that trace the cycle of a bubble of fluid as it rises to the top of the lava lamp and falls.

Step 3: After completing the drawings, explore the components of a lava lamp. This may include observations about the shape of the lava lamp, the coil at the bottom of the glass containing the lava. Continue these explorations. Carefully remove the glass from the lava lamp with potholders to point out the light (heat source) at the bottom of the lamp.

Step 4: Use inquiry-based methods to lead student thought about the workings of the lava lamp. These should include lines of inquiry about how the light bulb is heating the fluid and coil in the bottom of the lamp (radiation transfers heat through the glass to the fluid, coil and contents of the lamp); how the metal coil at the bottom of the lamp transfers heat through conduction; and how heat is transferred through the rising motion of the bubbles within the lamp via convection.

Step 5: follow up with an assessment of the students' understanding by instructing them to draw a cartoon with a minimum of 4 blocks on how heat transfers through a lava lamp. Students should use all 4 vocabulary key words in their cartoon and write in complete sentences.

Assessment Plan

Success and understanding of the students' ability to describe heat transfer in a lava lamp may be done through teacher assessment of students' heat transfer cartoon.

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