

BIRDEE Unit 1 Lesson Plans

1.4.5. Thermal Regulation Experiment Part 3: Additional Data & BID Analogy

Students will learn about the principles of heat transfer. They will apply this knowledge to examine additional data provided from jars with multiple layers of material. They will then make a BID analogy to how the layers of fur and skin keep the polar bear warm.

Engage: 5 min

View: [1.4.5. BID WOW!](#)

- How can trees help create more stable structures—buildings, houses, etc.?
- What part of a tree helps them on windy days?
- **Class Discussion** on what students think
- **Play video:** [Trees and Roots](#) (in ppt)

Explain: 15 min (*Presentation and Class Discussion*)

Now that we've done our thermal regulation experiment, we are going to learn about the scientific concept behind thermal regulation: heat transfer.

View: [1.4.5. Heat Transfer \(Thermal Regulation Experiment\)](#) presentation.

Evaluate: 20 min (*Individual worksheets but can work in Groups*)

Evaluate Additional Data

You will now use what you've learned about heat transfer in thermal regulation to analyze some additional experiment data that was previously collected. Then, you will compare what you've learned in the experiment to what you learned about polar bear fur.

View: [1.4.5. Thermal Regulation Experiment Part 3: Additional Data](#) on the Smartboard.

You will use these graphs to complete Part 1 of the [1.4.5. Evaluate Data & BID Analogy](#) [handout](#).

Teacher Note:

- *The worksheet has two parts.*
- **Part 1: Evaluate Data**
Students will use the information gathered during Parts 1 and 2 of the Thermal Regulation Experiment, their new knowledge of heat transfer and conduction, and the [Thermal Regulation Experiment Part 3: Additional Data](#) to answer the questions.
- **Part 2: BID Analogy**
Students will be prompted to connect Heat Transfer principles and what the students learned in the thermal regulation experiment to BID and polar bear fur.

Student Handouts:

[1.4.5. Evaluate Data & BID Analogy](#) [handout](#)

Student Materials:

[1.4.5. Thermal Regulation Experiment Part 3: Additional Data](#)

Instructional PPT's & Materials:

[1.4.5. BID WOW!](#)

[1.4.5. Heat Transfer \(Thermal Regulation Experiment\)](#)

Teacher Resources:

[1.4.5. Additional Data EXCEL File from Experiment](#)

[1.4.5. Thermal Regulation Part 3: Evaluate Data & BID Analogy](#) [TEACHER KEY](#)

(optional) [Crash Course Video - Heat Transfer](#)

(Extend) [Heat Transfer Equation Image](#)

Web Resources:

N/A

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- *Part 2 of the worksheet is particularly challenging so the teacher should be prepared to help guide students through this part of the worksheet. The teacher may choose to have a class discussion about Part 2 if needed.*

Extend: 5 min (Group)

EDPL: Add information learned from the activity that contributes to your understanding of the problem or Research Notes in the EDPL.

Extend: (optional)

View: [Heat Transfer Equation Image](#)

- Which variable in the heat transfer equation changes when the material the jar is wrapped in switches? Explain.
- Which variable in the heat transfer equation changes when the number of layers of material the jar is wrapped in switches? Explain.
- Looking at the heat transfer equation, what variables were constant across all tests (including both the experiments you did and the additional data)?

Play video: [Crash Course Video - Heat Transfer](#)