Vernier Scientific Probes

TARGET
Curriculum

Vernier CO2 Gas and Temperature Experiment
Use with Math Lesson 6
Use with Science Lesson 6

Cricket Respiration and the effects of temperature

Objective: Use CO2 Gas Sensor to measure concentrations of CO2
Study the effects of temperature on cricket respiration
Compare the rate of respiration in warm and cold crickets

TEKS: same a Math lesson 6

Materials:
Dana
Vernier LabPro
Vernier CO2 Gas Sensor
Vernier Temperature Probe
5 crickets
Triple beam balance
Ice
3 inch deep tray
Respiration chamber
Stop watch
Black line master with tables for data collection

Activities:

1. Discuss how living animals take in oxygen and give off carbon dioxide when they breathe.
2. Ask students "Will warm or cold crickets produce more carbon dioxide?" Why?
3. When done discuss the results.

Materials:
Dana
Vernier LabPro
Vernier CO2 Gas Sensor
Vernier Temperature Probe
5 crickets
Triple beam balance
Ice
3 inch deep tray
Respiration chamber
Stop watch
Black line master with tables for data collection

Attach Dana to LabPro with USB cable and start Data Pro software.

1. Plug in Vernier CO2 sensor into LabPro Ch1
2. Plug in Vernier Temperature Probe into LabPro Ch2
3. Weigh empty respiration chamber.
4. Place crickets in chamber and weigh.
5. Subtract the weight of 4 from 3 to get the weight of the crickets.
6. Place chamber with crickets inside on desk and attach CO2 sensor to top.
7. Wait one minute then tap **start** on the Dana.
8. Record data for five minutes.
9. On the Dana tap **analyze** then tap **curve fit** enter the data A on the table as rate of respiration. Record the temperature on the chart.
10. Place crickets into another cage while setting up the next stage. (Do not mix your crickets, use the same crickets.)
11. Rinse the chamber with water and dry.
12. Place ice and water in tray.
13. Place crickets back in the chamber and put chamber in the ice water. Wait 3 minutes
14. Record the temperature of the water.
15. Repeat steps 8, 9, 10
16. Return crickets to cage.
17. Clean up materials
18. Share information with other groups and discuss as a class.

Conclusions:
Which group of crickets had the higher rates of respiration? Why?

Table 1

Condition	Temperature
Room	
Cold water	

Table 2

Condition	Rate of respiration
Room	
Cold water	

Cricket Respiration and the effects of Light

Use with Math Lesson 6

Objective: Use CO_2 Gas Sensor to measure concentrations of CO_2
Study the effects of light on cricket respiration
Compare the rate of respiration in crickets placed in light and dark

Materials:
Dana
Vernier LabPro
Vernier CO_2 Gas Sensor
Vernier Light Probe
5 crickets
Triple beam balance
Box with lid
Respiration chamber
Stop watch
Black line master with tables for data collection

Activities:

1. Discuss how living animals take in oxygen and give off carbon dioxide when they breathe.
2. Ask students "Will crickets in light or dark produce more carbon dioxide?" Why?
3. When finished, discuss the results.

Materials:
Dana
Vernier LabPro
Vernier CO_2 Gas Sensor
Vernier Light Sensor
5 crickets
Triple beam balance
Ice
3 inch deep tray
Respiration chamber
Stop watch
Black line master with tables for data collection

Attach Dana to LabPro with USB cable and start Data Pro software.

1. Plug in Vernier CO2 sensor into LabPro Ch1
2. Plug in Vernier Light Sensor into LabPro Ch2
3. Weigh empty respiration chamber.
4. Place crickets in chamber and weigh.
5. Subtract the weight of 4 from 3 to get the weight of the crickets.
6. Place chamber with crickets inside on desk and attach CO2 sensor to top.
7. Wait one minute then tap **start** on the Dana.
8. Record data for five minutes.
9. On the Dana tap **analyze** then tap **curve fit** enter the data A on the table as rate of respiration. Record the amount of light on the chart.
10. Place crickets into another cage while setting up the next stage. (Do not mix your crickets, use the same crickets.)
11. Rinse the chamber with water and dry.
12. Get the box with a lid ready.
13. Place crickets back in the chamber and put chamber in the box. Place the light sensor in the box and place lid on the box. Wait 3 minutes
14. Record the amount of light.
15. Repeat steps 8, 9, 10
16. Return crickets to cage.
17. Clean up materials
18. Share information with other groups and discuss as a class.

Conclusions:
Which group of crickets had the higher rates of respiration? Why?

Table 1

Condition	Temperature
Room	
Box	

Table 2

Condition	Rate of respiration
Room	
B	

Cricket Movement and the Effects of Temperature

Use with Math Lessons 7 - 8

Objective:
Study the effects of temperature on cricket movement

Materials:

- Dana
- Vernier LabPro
- Vernier Temperature probe
- 5 crickets
- Plastic ruler
- Meter stick
- Black line master with tables for data collection

Activities:

1. Students will work in small groups to measure the effects of temperature on the jumping ability of crickets.

Materials:

- Dana
- Vernier LabPro
- Vernier Temperature probe
- 20 crickets
- 3 inch deep tray
- Ice
- Plastic ruler
- Meter stick
- Black line master for data collection

Attach Dana to LabPro with USB cable and start Data Pro software.

1. Plug in Vernier Temperature probe into LabPro Ch 1.
2. Weigh the crickets in groups of five. Try to get the groups approximately the same weight.
3. Place each group of crickets in a container. Place one container on the desk, one in the refrigerator, one in a warm window, and one in a tray of ice water.
4. Record the temperature of the of the air near the crickets on the desk. Place a cricket in the palm of your hand 20 cm off the floor. Measure how far the cricket jumps. Do the same procedure that was done in lesson 7. Record your data after each jump.
5. Repeat #4 for each group of crickets.
6. Make a bar chart for each group, and then another bar chart for the mean of each group.

Conclusions: Which group of crickets jumped the farthest? Why?
Name _____ Date_____

Laboratory Observation Sheet

Cricket Long Jump

Warm area Temp. ____

1. The first jump measured _____ inches.

2. The second jump measured _____ inches.

3. The third jump measured _____ inches.

4. The fourth jump measured _____ inches.

5. The fifth jump measured _____ inches.

Put a circle around the longest jump. Underline the shortest jump.

Find the **mean** (average) jump (use your calculator to help).

Find the **median** jump.

Find the **mode** of the five jumps.

Name _____ Date_____

Laboratory Observation Sheet

Cricket Long Jump

Refrigerator Temp. ____

1. The first jump measured _____ inches.

2. The second jump measured _____ inches.

3. The third jump measured _____ inches.

4. The fourth jump measured _____ inches.

5. The fifth jump measured _____ inches.

Put a circle around the longest jump. Underline the shortest jump.

Find the **mean** (average) jump (use your calculator to help).

Find the **median** jump.

Find the **mode** of the five jumps.

Name _____ Date_____

Laboratory Observation Sheet

Cricket Long Jump

Ice Tray Temp. _____

1. The first jump measured _____ inches.

2. The second jump measured _____ inches.

3. The third jump measured _____ inches.

4. The fourth jump measured _____ inches.

5. The fifth jump measured _____ inches.

Put a circle around the longest jump. Underline the shortest jump.

Find the **mean** (average) jump (use your calculator to help).

Find the **median** jump.

Find the **mode** of the five jumps.

Name _____ Date_____

Laboratory Observation Sheet

Cricket Long Jump

Room Temperature _____

1. The first jump measured _____ inches.

2. The second jump measured _____ inches.

3. The third jump measured _____ inches.

4. The fourth jump measured _____ inches.

5. The fifth jump measured _____ inches.

Put a circle around the longest jump. Underline the shortest jump.

Find the **mean** (average) jump (use your calculator to help).

Find the **median** jump.

Find the **mode** of the five jumps.