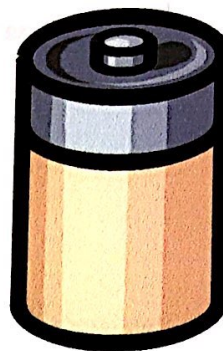


Line'Em Up Student Activity

Name _____
Class _____

Open the TI-Nspire document *Linethemup.tns*.

Every day people use one or more batteries when they use a flashlight, their calculator, toys, or any other battery-operated devices. Look on the outer jacket of your batteries. You should see a positive terminal (+) and a negative terminal (-) at the ends of your battery. You will also see a size AA, AAA, C, D, and the voltage.



If you look at the position of batteries in many flashlights, you will notice that they are lined up in a column, Figure 1 or a **series**. The positive (+) terminal is lined up so they come in contact with the negative (-) terminal. Other devices, your calculator or LabQuest, use alternate their series as in Figure 2. Batteries supply electrical energy to electronic devices when a **circuit** is created. For now, think of a circuit as a path linking the positive (+) terminal to the electronic device (**the load**) and then back to the negative (-) terminal.

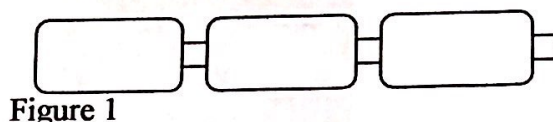


Figure 1

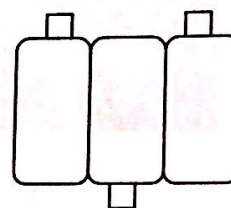


Figure 2

Batteries supply electrical energy to electronic devices when a **circuit** is created. For now, think of a circuit as a path linking the positive (+) terminal to the electronic device (**the load**) and then back to the negative (-) terminal.

Move to pages 1.2, 1.3, and 1.4

Press ctrl > and ctrl < to
navigate through the lesson.

Answer the following questions on your handheld.

1. What is it called when batteries are lined up in a column?

- A. Series
- B. Parallel
- C. Size
- D. Voltage

2. A _____ must be completed for energy to reach electronic devices?

- A. Load
- B. Series
- C. Circuit
- D. Parallel

Line'Em Up Student Activity

Name _____
Class _____

2. Another name for the electronic device which is receiving electrical energy from batteries is called the _____.
- Series
 - Load
 - Battery
 - Terminal

Move to page 2.1.

1. Connect the TI-Nspire™ Lab Cradle to the TI-Nspire CX handheld
2. Connect the Vernier® Voltage Probe to the TI-Nspire Lab Cradle (Ch. 1) (see the photo to the right).
3. Find the voltage labeled on each of your batteries and **record this in your data table**.
4. First you will take the voltage of each individual battery and record in your data table. Red on positive (+) terminal and black on the negative (-) terminal as shown to the right.
5. In the Data Quest App, set up the data-collection mode by selecting **MENU > Experiment > Collection Mode > Events with Entry**.
6. Enter **Batteries** as the Name, leave the Units field blank, and click OK.
7. Start data collection by pressing **start** icon on bottom left of screen.



We will now check the voltage of the batteries in a series.



8. Place the red terminal on the positive (+) end of the battery and the black terminal on the negative (-) end as shown above. Watch the live voltage read out. When the voltage stabilizes, click the **Keep(camera)** button.
9. You will be prompted to enter a number. Type **1** for the first battery measured, and click **OK**.
 - The voltage measurements have been saved.
10. Place two batteries in a series as shown in figure 1 on the title page. Place the red terminal on the positive (+) end of the battery and the black terminal on the negative (-) end of the other battery.
11. When the voltage stabilizes, click the **Keep** button, and type **2** for the second trial when prompted.
12. Repeat these steps with all batteries. Be sure to record the correct number of batteries you are testing.
13. Stop data collection.

Line'Em Up Student Activity

Name _____
Class _____

14. Select MENU > Graph > Y-axis Columns > Potential.
15. Select MENU > Graph > X-axis column > batteries.
16. Select MENU > Analyze > Curve Fit > Linear.

Move to pages 2.3 through 2.11 and answer the questions

17. What is graphed on your y-axis?
18. What is graphed on your x-axis?
19. What is your m value?
20. What is your b value?
21. What is the general equation for your graph?
22. What are the ordered pairs, data points, that occur where the x and y-axes meet?
Answer in ordered pair format. (#,#)
23. What is the importance of the previous question in regards to your equation?
 - A. Slope
 - B. Y value
 - C. X value
 - D. Y- intercept
24. How is your slope calculated?
 - A. batteries/voltage
 - B. Voltage/batteries
 - C. Batteries x voltage
 - D. Voltage x batteries
25. Using the information from the previous questions. Construct a formula for calculating potential (voltage) of batteries.

Move to pages 3.1 through 3.3. (Show all Work for credit)

25. Predict the voltage of 6 batteries.

26. Predict the voltage of 10 batteries.

27. Predict the voltage of 20 batteries.