

PHYZ SPRINGBOARD: CURRENT AND VOLTAGE



It is often difficult to distinguish current from voltage when first learning about electric circuits. The following exercise uses analogies to develop a conceptual distinction between the two. The analogies are neither perfect nor complete, but they should help you understand these otherwise abstract quantities.

Definitions

The rate at which charge flows, or the amount of charge that passes a point in a specific interval of time is _____.

The amount of energy stored in a specific amount of charge is _____.

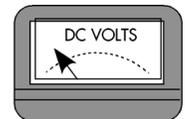
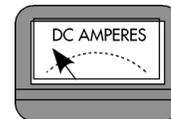
Analogies

In each case described below, characterize the "current" and "voltage." Draw a pointer needle on the ammeter to indicate the current and another on the voltmeter to indicate the voltage.

1. One dynastride dudette walking along as shown.

___small current ___LARGE CURRENT

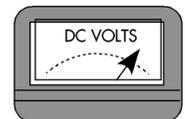
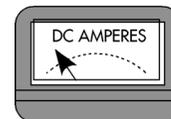
___small voltage ___LARGE VOLTAGE



2. One circus dudette fired from a cannon.

___small current ___LARGE CURRENT

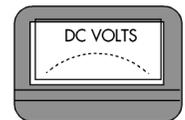
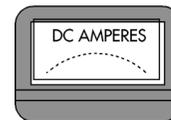
___small voltage ___LARGE VOLTAGE



3. A large group of dynastride dudes walking along as shown.

___small current ___LARGE CURRENT

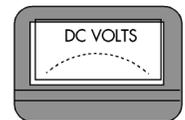
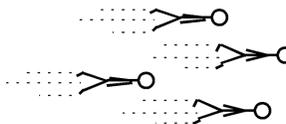
___small voltage ___LARGE VOLTAGE



4. A fleet of circus dudes fired from multiple cannons.

___small current ___LARGE CURRENT

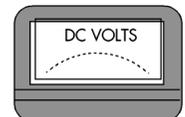
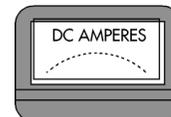
___small voltage ___LARGE VOLTAGE



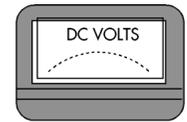
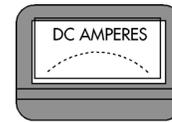
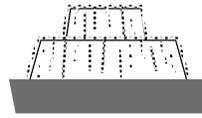
5. A high-pressure, narrow stream of water is used to cut through concrete.

___small current ___LARGE CURRENT

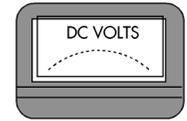
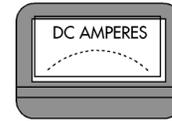
___small voltage ___LARGE VOLTAGE



6. Water gently cascades over a large, stepped fountain.
 ___small current ___LARGE CURRENT
 ___small voltage ___LARGE VOLTAGE

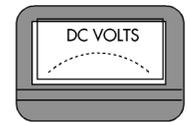


7. Water crashes into the base of Niagara Falls.
 ___small current ___LARGE CURRENT
 ___small voltage ___LARGE VOLTAGE

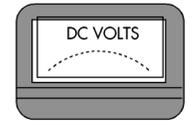
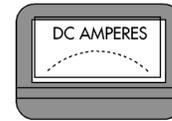


Make Your Own Analogies:*

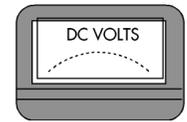
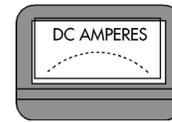
8.
 ___small current ✓ ___LARGE CURRENT
 ✓ ___small voltage ___LARGE VOLTAGE



9.
 ✓ ___small current ___LARGE CURRENT
 ___small voltage ✓ ___LARGE VOLTAGE



10.
 ___small current ✓ ___LARGE CURRENT
 ___small voltage ✓ ___LARGE VOLTAGE



Changes

11. Suppose a trickle of water were coming out of a hose. If the faucet controlling the flow of water to the hose were then “cranked up,” what—if anything—would change in terms of current and voltage?

12. Suppose one spillway gate of a large dam were open. If a second were then opened, what—if anything—would change in terms of current and voltage?

13. Suppose an adjustable shower head were configured to give a low-pressure flow. If it were then adjusted to give a high-pressure spray (without changing the rate of water usage), what—if anything—would change in terms of current and voltage?

*Hint: consider automobile traffic, for example.