

KNOWLEDGE PROBE 1: PORTABLE POWER TECHNOLOGY

Review of Battery Basics

Learning Objectives

1. Distinguish between battery and cell components.
2. Determine voltage output for batteries connected in series or parallel.
3. Determine current for batteries connected in series or parallel.
4. Identify the following terms as they apply to batteries: capacity, density, internal resistance, shelf life, and cycle life.
5. Differentiate between end point, nominal, theoretical, and working voltage.
6. Determine the discharge rate for batteries when given the battery capacity.

1. Batteries are a source of
 - a. Chemical energy
 - b. Mechanical energy
 - c. Nuclear energy
 - d. Solar energy
2. The name given to the material between the anode and cathode of a battery that produces the chemical action is called the
 - a. Catalyst
 - b. Dielectric
 - c. Electrolyte
 - d. Insulator
3. Which electrode in a cell is the positive terminal?
 - a. Anode
 - b. Cathode
4. What determines the voltage produced by a cell?
 - a. Electrolyte material
 - b. Materials used in the electrodes and electrolyte
 - c. Quantity of materials in the electrodes and electrolyte
 - d. Temperature of the materials
5. What determines the current capacity of a cell?
 - a. Electrolyte material
 - b. Materials used in the electrodes and electrolyte
 - c. Quantity of materials in the electrodes and electrolyte
 - d. Temperature of the materials



6. A cell is
 - a. A specific type of battery
 - b. The basic building block of a battery
 - c. The housing of a battery
 - d. Two or more batteries connected in series or parallel
7. A battery is
 - a. A specific type of cell
 - b. The basic building block of a cell
 - c. The housing of a cell
 - d. Two or more cells connected in series or parallel
8. What is the voltage produced by a battery made up of five 1.2 volt cells in series?
 - a. 1.2 volts
 - b. 2.4 volts
 - c. 6 volts
 - d. 7.2 volts
9. A battery is made up of five 1.5 volt cells in series. One of these cells is connected backward with the wrong polarity. What is the output voltage?
 - a. 1.5 volts
 - b. 4.5 volts
 - c. 6 volts
 - d. 7.5 volts
10. Which type of cell can be recharged?
 - a. Primary
 - b. Secondary
11. Four 12 volt car batteries are connected in parallel. What is the output voltage?
 - a. 12 volts
 - b. 24 volts
 - c. 36 volts
 - d. 48 volts
12. What unit is used to express battery capacity?
 - a. Ampere hours
 - b. Current
 - c. Volts
 - d. Watt hours
13. Which battery has the best or most desirable energy density?
 - a. 50 Wh/kg
 - b. 125 Wh/kg
 - c. 270 Wh/kg
 - d. 350 Wh/kg



14. What voltage determines the end of a battery's life or when it needs to be recharged?
 - a. End point voltage
 - b. Nominal voltage
 - c. Theoretical voltage
 - d. Working voltage

15. A battery with a 175 Ah rating of has a current load of 15 amperes. How long will it take to discharge the battery?
 - a. 8 hours
 - b. 11.66 hours
 - c. 17.5 hours
 - d. Cannot be determined

16. For a given type of battery, the greater the Ah capacity of a battery, the larger its size.
 - a. True
 - b. False

17. Which of the following determine the internal resistance of a battery?
 - a. Electrode resistance
 - b. Electrolyte resistance
 - c. Terminal connections
 - d. All of the above
 - e. None of the above

18. The discharge C-rate of a battery load is C/5. The Ah capacity of the battery is 1500 mAh. What is the load current?
 - a. 300 mA
 - b. 500 mA
 - c. 600 mA
 - d. 7500 mA

19. The self discharge rate determines a battery's
 - a. Recharge time
 - b. Shelf life
 - c. Trickle charge
 - d. Useful life

20. The cycle life of a battery indicates the number of times a battery can be
 - a. Discharged completely
 - b. Recharged
 - c. Replaced
 - d. Reused