Practice problems from 18.1 - Current, Voltage, Power

1

a) How much current flows if you connect a 56.4 Ω resistor to a 12.0 volt battery? (0.213 A)
b) If 0.129 amps of current flow through a 13.7 Watt heater. What is its resistance? (823 Ω)
c) In what time will a 563 mA current carry 2.15 C of charge? (3.82 s)
d) An 85 Ω heating element is connected to 120 volts. What will be the final temperature of 3.78 kg of water initially at 21.0 °C if it heats the water for 27.1 minutes? (The specific heat of water is 4186 J/kg°C) (Assume 100% efficiency) (38 °C)
e) A 340 Ω heater is connected to an alternating current with a peak voltage of 670 V. What is the power dissipated? (660 W)

2

a) How much current flows if you connect a 1.78 Ω resistor to a 9.0 volt battery? (5.1 A)
b) A 500. W heater plugs into a 120 V source. What must be its resistance? (29 Ω)
c) If a current of 140 mA flows, what time will it take to put 5.6 C of charge on a capacitor? (40. s)
d) You want your electric go-cart to accelerate from rest to 4.7 m/s in 5.0 seconds. If it has a mass of 92 kg, what current does the motor need to draw on the average from the 24.0 V battery? (Assume 100% efficiency) (8.5 A)
e) A heater runs on alternating current. The peak voltage across the heater is 153 V, and the peak current through the heater is 1.67 A. What is the power consumption of the heater? (128 W)

3

a) What resistor must you use if you want to limit the current to 0.150 A from a 5.0 V source? (33 Ω)
b) Your hair dryer is 1200 Watts, and operates on 117 Volts. What must be the current flowing in it? (10. A)
c) If a current of 250 mA flows, how much charge will pass by in 4.0 minutes? (60. C)
d) A winch motor can draw 27 A from a 12 V battery. What vertical distance can it raise a 2130 kg car in 5.0 minutes? (Assume 100% efficiency) (4.7 m)
e) A heater operates with a peak current of 22.79 A and has a resistance of 5.76Ω. What is its power? (1496 W)

4

a) A 340 Ω resistor has 0.238 A of current flowing through it. What must be the voltage across it? (81 V)
b) If 0.783 amps of current flow through a heater connected to 48 V, what is the power dissipated? (38 W)
c) If a current of 212 mA flows, how much charge will pass by in one (1.00) hour? (763 C)
d) A motor runs on 240 V. If it can lift a 560 kg elevator 12 meters in 15 seconds, what current does it draw? (Assume 100% efficiency) (18 A)
e) A 670 Watt heater runs on alternating current at 120 V (RMS). What is the peak current flowing through it? (7.9 A)

5

a) A 150 Ω resistor has 0.518 A of current flowing in it, what is the potential across the resistor? (78 V)
b) A 52 W heater has a resistance of 67 Ω. At what voltage must it operate? (59 V)
c) 4.51 C of charge passes in 3.5 minutes. What is the current? (0.021 A)
d) A 12 V motor can draw an average of 67 A from the battery. In what time can it accelerate an 82 kg cart from rest to 3.7 m/s? (Assume 100% efficiency) (0.70 s)
e) A 450 Ω heater is dissipating 210 W of power. What must be the peak voltage if it operates on an alternating current source? (430 V)