Chapter 22 – Physics 11 - Answers

11) A potential difference is felt over the entire circuit as soon as the battery is connected to the circuit. The potential difference causes the charges to begin to flow. Note: The charges flow slowly compared to the change in potential difference.

12) By touching the fence and the ground, the cow encounters a difference in potential and conducts current, thus receiving a shock.

13) No potential difference exists across the wires, so no current flows.

14) either increase the voltage or decrease the resistance 15. 50 W. P

15) 50 W. P = IV, so higher P has higher I. R = V/I, so with the same V, larger I means lower R.

16) If the resistance is doubled, the current is halved.

17) No effect. V = IR, so I = V/R, and if the voltage and the current are both doubled, the current will not change.

18) No. If it obeyed Ohm's law, the resistance should not change. Math stuff:
   a. V = IR, so R = V/I.
   b. At 1.5 V, R = 1.5 V/($45*10^{-6}$) ⇒ R = $3.3*10^4$ Ω
   c. At 3.0 V, R = 3.0 V/($25*10^{-3}$)⇒ R = 120 Ω

19) Yes, because the current is the same everywhere in this current

20) The wire with the smaller resistance. P = IV, where V is the same. V = IR, and I = V/R, so larger R has lower I, and thus lower P.

21) 9.6 X 10^2 W

22) 1.4 X 10^2 W

23) a) 6.0 X 10^1 W b)1.8 X 10^4 J

24) a) 2.5 X 10^3 J/s b)2.5 X 10^3 W

25) 20 A

26) a) 4.5 W b) 3.0 X 10^3 J

27) 24 V

28) 6.0 V

29) 1.2 X 10^2 V

30) 5.0 A

31) 1.50 A

32) 48 mA

33) a)1 X 10^2 V b)70 mA, near where death may occur c)1.5 V, or between 1 and 2 V

34) a) No b) 0.40 W c)0.68 W

35) 9.5 X 10^4 J

36)
   a. R = 143 02, 148 Ω, 150 Ω, 154 Ω, 154 Ω, 143 Ω, 143 Ω, 154 Ω, 157 Ω, 156 Ω;
   b. Refer to Problems and Solutions Manual.
   c. Ohm's law is obeyed when the resistance of a device is constant and independent of the potential difference. The resistance of the nichrome wire increases somewhat as the magnitude of the voltage increases, so the wire does not quite obey Ohm's law.

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37) a) $3.0 \times 10^2\ \Omega$ b) $6.0 \times 10^1\ \Omega$ c) 2.0 A

38) a) $32\ \Omega$ b) $1.2 \times 10^2\ \Omega$ c) No. Resistance depends on voltage

39) Refer to Problems and Solutions Manual.

40) Refer to Problems and Solutions Manual

41) 0.15A

42) a) 34 W b) 2.0×10^4 J

43) 2.2×10^4 K

44) a) 2.5 A b) 2.3×10^4 J

45) 1.2×10^6 J

46) a) 5.0 A b) 39%

47) a) \$7.00/kWh b) 1 cent

48) a) 3.0×10^1 A b) 1.1×10^6 J c) \$4.40

49) a) 9.5×10^5 J b) 8˚C c) \$7.20