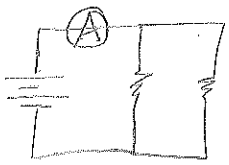
337. Calculate the resistance of a 900.-watt toaster operating at 120 volts. [Show all work, including the equation and substitution with units.]

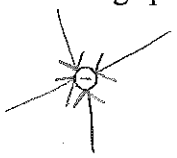
$P = 900\,W$
$V = 120\,V$
$R = ?$

$P = V^2/R$ $\quad R = V^2/P = \frac{(120\,V)^2}{900\,W} = \frac{14400\,V^2}{900\,W} = 16\,\Omega$

338. In the space below, draw a diagram of an operating circuit that includes:
a battery as a source of potential difference
two resistors in parallel with each other
an ammeter that reads the total current in the circuit



339. On the diagram below, sketch *at least four* electric field lines with arrowheads that represent the electric field around a negatively charged conducting sphere.



What would ⊕ do?

340. Two oppositely charged parallel metal plates, 1.00 centimeter apart, exert a force with a magnitude of 3.60×10^{-15} newton on an electron placed between the plates. Calculate the magnitude of the electric field strength between the plates. [Show all work, including the equation and substitution with units.]

$F_e = 3.6\times10^{-15}\,N$
$q = 1.6\times10^{-19}\,C$
$E = ?$

$E = F_e/q = \frac{3.6\times10^{-15}\,N}{1.6\times10^{-19}\,C} = 2.25\times10^{4}\,N/C$

Base your answers to questions **341** through **343** on the information below.

A 5.0-ohm resistor, a 10.0-ohm resistor, and a 15.0-ohm resistor are connected in parallel with a battery. The current through the 5.0-ohm resistor is 2.4 amperes.

341. Calculate the amount of electrical energy expended in the 5.0-ohm resistor in 2.0 minutes. [Show all work, including the equation and substitution with units.]

$t = 2\,min = 120\,s$

$W = ?$

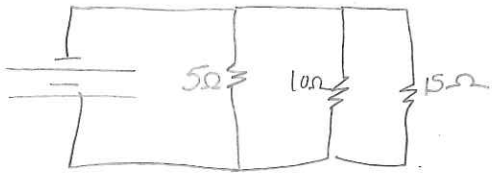
$I = 2.4\,A$

$R = 5\,\Omega$

$W = I^2Rt$

$W = (2.4A)^2(5\Omega)(120s) = 3456\,J$

342. Using the circuit symbols found in the *Reference Tables for Physical Setting/Physics*, draw a diagram of this electric circuit.



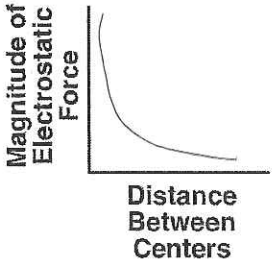
343. A 20.0-ohm resistor is added to the circuit in parallel with the other resistors. Describe the effect the addition of this resistor has on the amount of electrical energy expended in the 5.0-ohm resistor in 2.0 minutes.

Adding a Resistor in parallel has no impact on the circuit.

Base your answers to questions **344** through **346** on the information below.

The centers of two small charged particles are separated by a distance of 1.2×10^{-4} meter. The charges on the particles are $+8.0 \times 10^{-19}$ coulomb and $+4.8 \times 10^{-19}$ coulomb, respectively.

344. On the axes below, sketch a graph showing the relationship between the magnitude of the electrostatic force between the two charged particles and the distance between the centers of the particles.



$F_e = \frac{kq_1q_2}{r^2}$

$r = 1.2 \times 10^{-4}\,m$

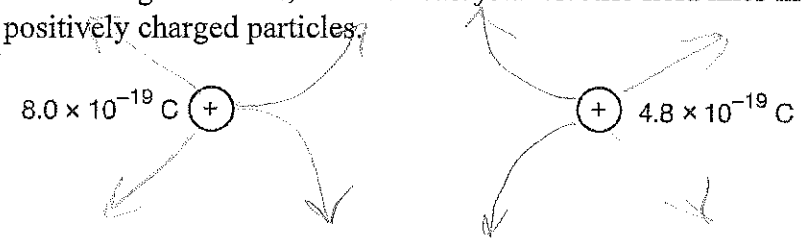
$q_1 = 8 \times 10^{-19}\,C$

$q_2 = 4.8 \times 10^{-19}\,C$

345. Calculate the magnitude of the electrostatic force between these two particles. [Show all work, including the equation and substitution with units.]

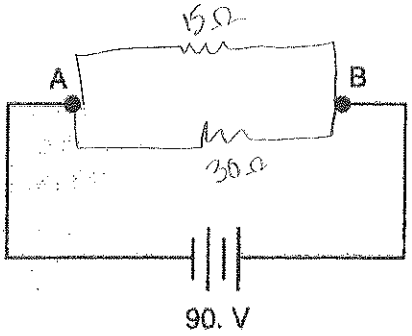
$$F_e = \frac{k q_1 q_2}{r^2} = \frac{(8.99\times10^9\ N\cdot m^2/C^2)(8\times10^{-19}\ C)(4.8\times10^{-19}\ C)}{(1.2\times10^{-4}\ m)^2} = 2.4\times10^{-19}\ N$$

346. On the diagram below, draw *at least four* electric field lines in the region between the two positively charged particles.



Base your answers to questions **347** and **348** on the information and diagram below.

A 15-ohm resistor R_1, and a 30-ohm resistor, R_2, are to be connected in parallel between points *A* and *B* in a circuit containing a 90-volt battery.



347. Complete the diagram above, to show the two resistors connected in parallel between points *A* and *B*.

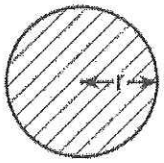
348. Calculate the current in resistor R_1. [Show all work, including the equation and substitution with units.]

$$I = V/R = \frac{90V}{15\Omega} = 6A$$

Base your answers to questions **349** and **350** on the information and diagram below.

A 10.0-meter length of copper wire is at 20°C. The radius of the wire is 1.0×10^{-3} meter.

Cross Section of Copper Wire



$r = 1.0 \times 10^{-3}$ m

349. Determine the cross-sectional area of the wire.

$A = \pi r^2 = \pi (1 \times 10^{-3}\,m)^2$

$= 3.14 \times 10^{-6}\,m^2$

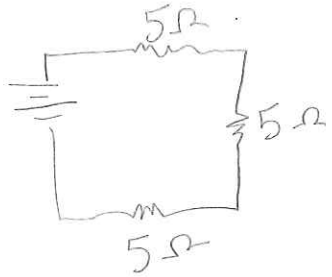
350. Calculate the resistance of the wire. [Show all work, including the equation and substitution with units.]

$R = \frac{\rho L}{A} = \frac{(1.72 \times 10^{-8}\,\Omega m)(10\,m)}{3.14 \times 10^{-6}\,m^2}$

$= .055\,\Omega$

---

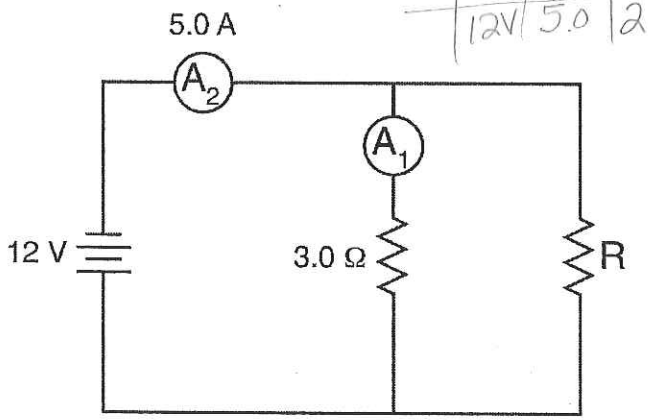
351. An electric circuit contains a source of potential difference and 5-ohm resistors that combine to give the circuit an equivalent resistance of 15 ohms. Draw a diagram of this circuit using circuit symbols given in the *Reference Tables for Physical Setting/Physics*. [Assume the availability of any number of 5-ohm resistors and wires of negligible resistance.]



Base your answers to questions **352** through **354** on the information below.

A 3.0-ohm resistor, an unknown resistor, *R*, and two ammeters, A_1 and A_2, are connected as shown with a 12-volt source. Ammeter A_2 reads a current of 5.0 amperes.

V	I	R
12V	4	3Ω
12V	1	12
12V	5.0	2.4



352. Calculate the current measured by ammeter A_1. [Show all work, including the equation and substitution with units.]

$I = \frac{V}{R} = \frac{12V}{3\Omega} = 4A$

353. Determine the equivalent resistance of the circuit.

$R_{eq} = \frac{V_T}{I_T} = \frac{12V}{5A} = 2.4\,\Omega$

OR $\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{3\Omega} + \frac{1}{12\Omega} = \frac{5}{12\Omega} = 2.4\,\Omega$

354. Calculate the resistance of the unknown resistor, *R*. [Show all work, including the equation and substitution with units.]

$R = \frac{V}{I} = \frac{12V}{1A} = 12\,\Omega$

355. A light bulb attached to a 120.-volt source of potential difference draws a current of 1.25 amperes for 35.0 seconds. Calculate how much electrical energy is used by the bulb.[Show all work, including the equation and substitution with units.]

$W = ?$
$t = 35s$
$V = 120V$
$I = 1.25A$

$W = VIt$
$= (120V)(1.25A)(35s)$
$= 5250J$

356. Base your answer to the following question on the following information:

A toaster having a power rating of 1050 watts is operated at 120. volts.

Calculate the resistance of the toaster. [Show all work, including the equation and substitution with units.]

$P = 1050W$
$V = 120V$
$R = ?$

$P = \frac{V^2}{R}$

$R = \frac{V^2}{P} = \frac{(120V)^2}{1050W}$

$= 13.7\Omega$