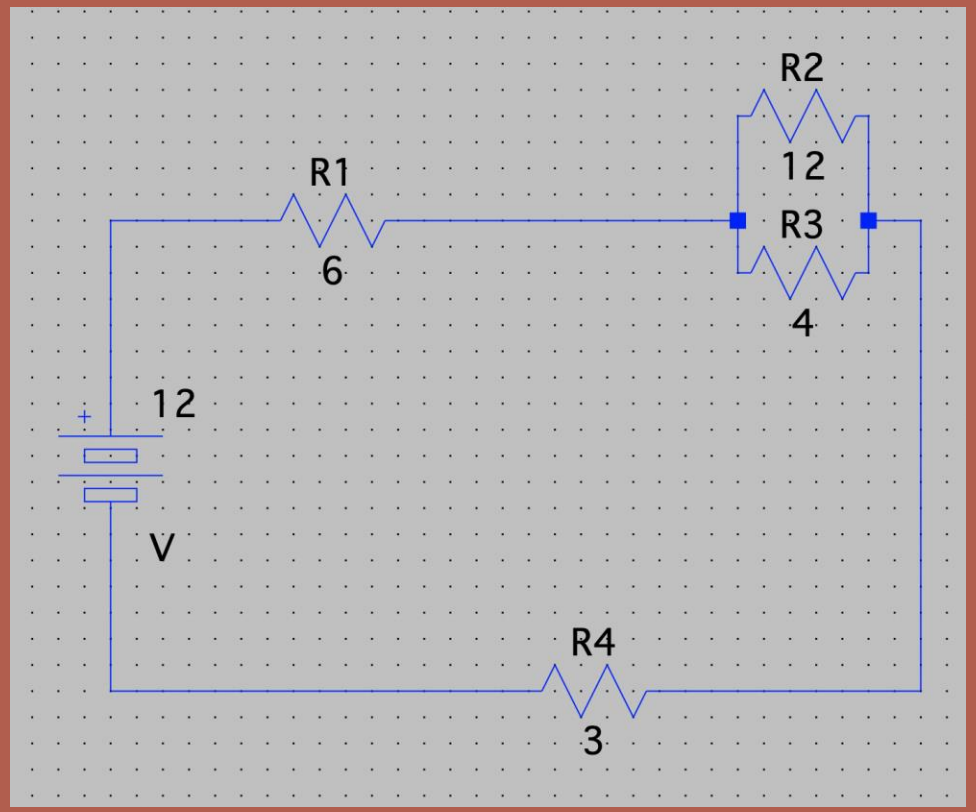
PHYS 1502

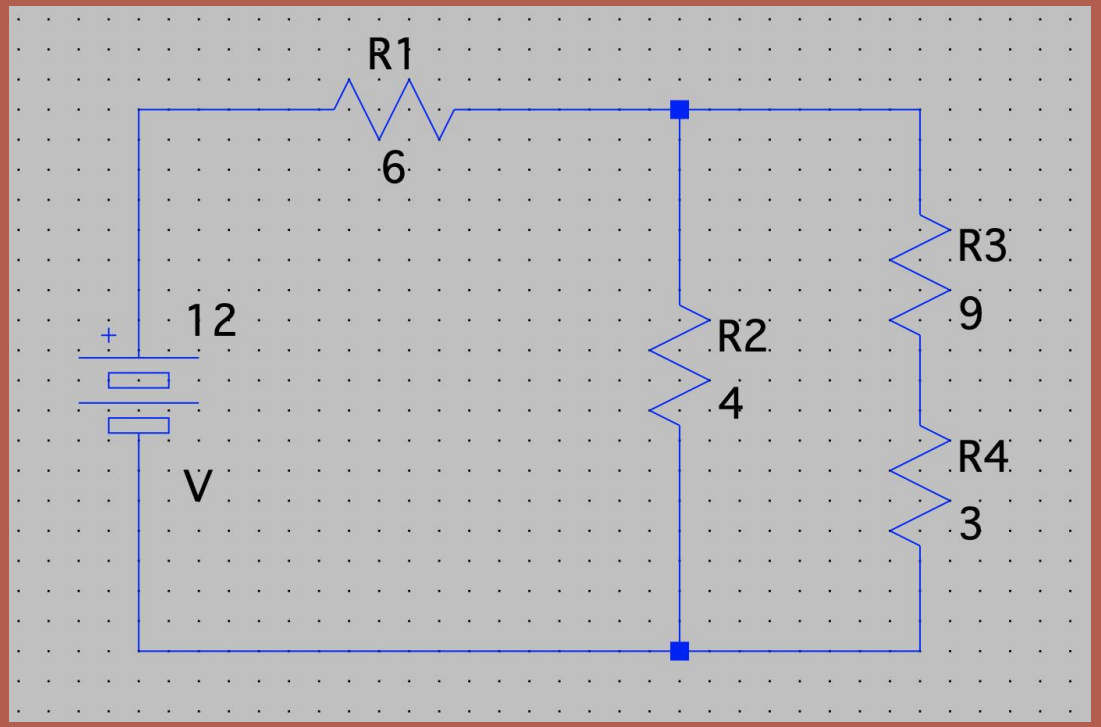
Exam 2

Ohms Law



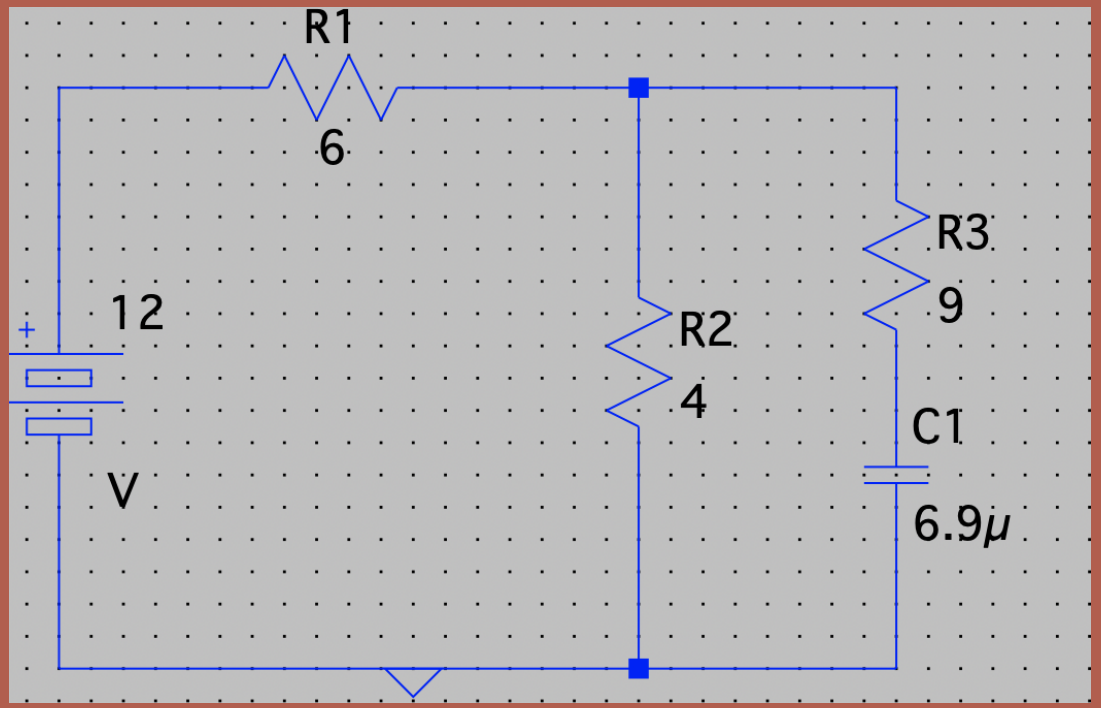
- Find the voltage drop across each resistor

Kirchoff's Current Law



- Find I1,I2,I3

RC Circuits



a) What is the voltage drop across R3 at t=0(capacitor is uncharged)

b) What is the voltage drop across R3 at t=inf

Magnetic Forces

Balancing the Gravitational and Magnetic Forces on a Current-Carrying Wire

A wire of length 50 cm and mass 10 g is suspended in a horizontal plane by a pair of flexible leads (Figure 11.13). The wire is then subjected to a constant magnetic field of magnitude 0.50 T, which is directed as shown. What are the magnitude and direction of the current in the wire needed to remove the tension in the supporting leads?

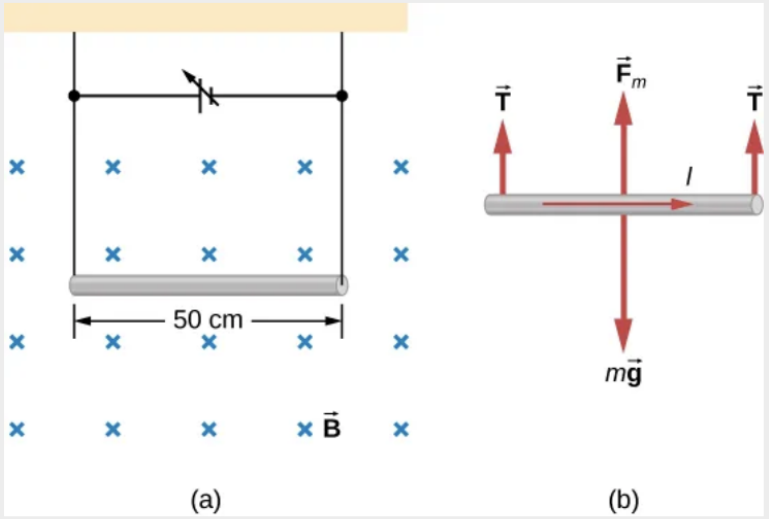


Figure 11.13 (a) A wire suspended in a magnetic field. (b) The free-body diagram for the wire.

Force on a Current Loop

Forces and Torques on Current-Carrying Loops

A circular current loop of radius 2.0 cm carries a current of 2.0 mA. (a) What is the magnitude of its magnetic dipole moment? (b) If the dipole is oriented at 30 degrees to a uniform magnetic field of magnitude 0.50 T, what is the magnitude of the torque it experiences and what is its potential energy?

Biot-Savart Law

Calculating Magnetic Fields of Short Current Segments

A short wire of length 1.0 cm carries a current of 2.0 A in the vertical direction (Figure 12.3). The rest of the wire is shielded so it does not add to the magnetic field produced by the wire. Calculate the magnetic field at point *P*, which is 1 meter from the wire in the *x*-direction.

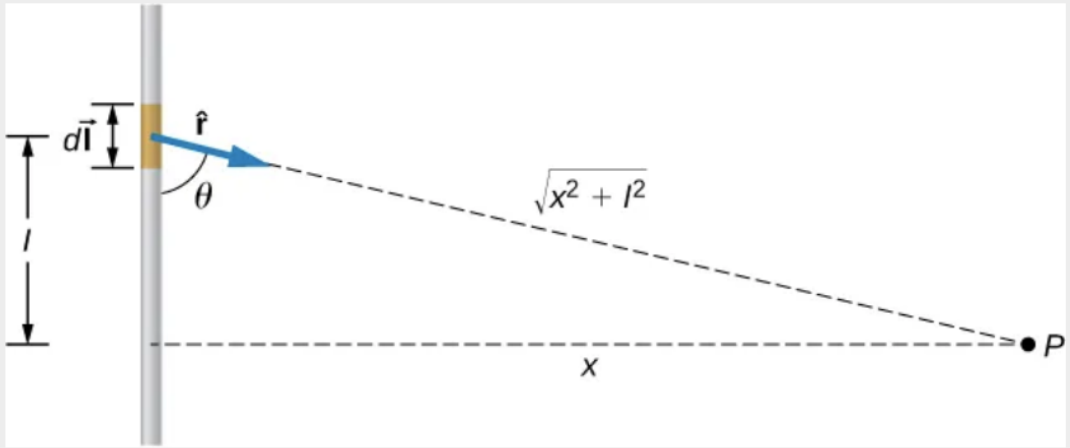


Figure 12.3 A small line segment carries a current *I* in the vertical direction. What is the magnetic field at a distance *x* from the segment?

Magnetic Fields of Current Loops

Magnetic Field between Two Loops

Two loops of wire carry the same current of 10 mA, but flow in opposite directions as seen in Figure 12.13. One loop is measured to have a radius of $R = 50\ \text{cm}$ while the other loop has a radius of $2R = 100\ \text{cm}$. The distance from the first loop to the point where the magnetic field is measured is 0.25 m, and the distance from that point to the second loop is 0.75 m. What is the magnitude of the net magnetic field at point *P*?

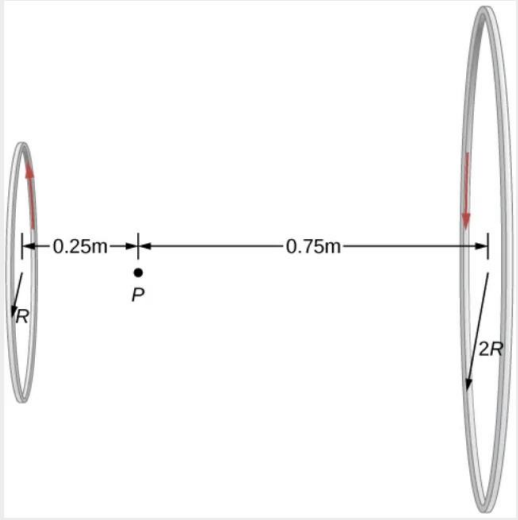


Figure 12.13 Two loops of different radii have the same current but flowing in opposite directions. The magnetic field at point *P* is measured to be zero.

Ampere's Law

Calculating the Magnetic Field of a Thick Wire with Ampère's Law

The radius of the long, straight wire of Figure 12.16 is *a*, and the wire carries a current I_0 that is distributed uniformly over its cross-section. Find the magnetic field both inside and outside the wire.

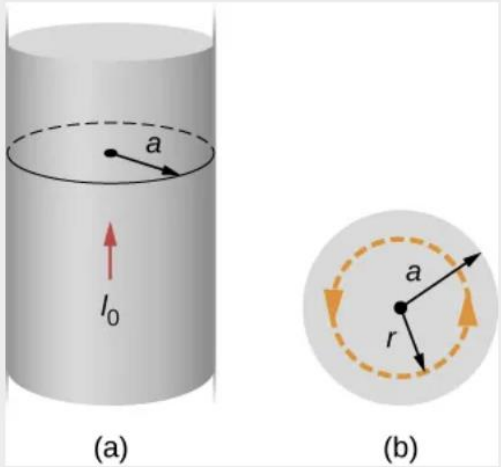


Figure 12.16 (a) A model of a current-carrying wire of radius *a* and current I_0. (b) A cross-section of the same wire showing the radius *a* and the Ampère's loop of radius *r*.

You Got This!