Physics 202 MWF10:20 Spring 2008 (Ford)

Name (printed)_____

Name (signature as on ID)_____

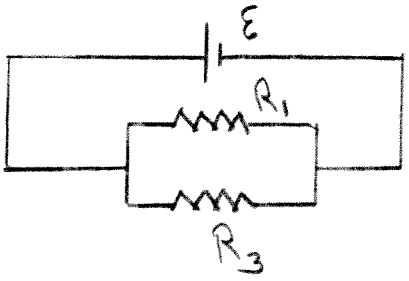
Lab Section_____

Exam II Chapts. 19–21 in Young&Geller

Multiple choice questions. Circle the correct answer. No work needs to be shown and no partial credit will be given.

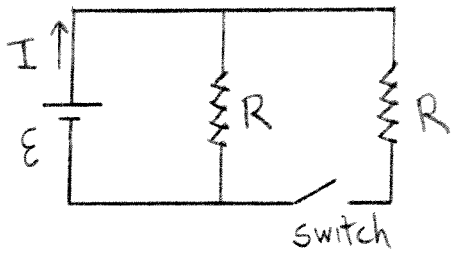
(6 pts) 1. Consider the circuit shown in the sketch. The electrical power consumed in resistor R_1 is 9 W. If $R_3 = R_1/3$, then the electrical power dissipated in resistor R_3 is

(a) zero
(b) 1 W
(c) 3 W
(d) 9 W
(e) 27 W
(f) 36 W



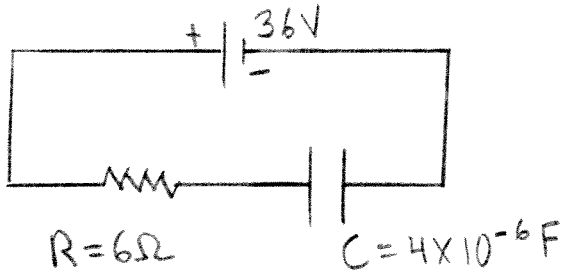
(6 pts) 2. Consider the circuit shown in the sketch. The two resistors have equal values of resistance. When the switch is closed, the current I through the battery,

(a) stays the same
(b) decreases
(c) increases



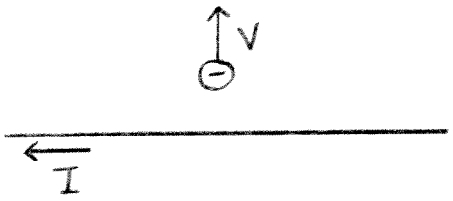
(6 pts) 3. Consider the circuit shown in the sketch. Recall that for a capacitor, $C = Q/V$. At time t after the switch is closed, the current in the resistor is 2.0 A. At that instant the charge on the capacitor is

(a) zero
(b) 4.8×10^{-5} C
(c) 9.6×10^{-5} C
(d) 1.44×10^{-4} C
(e) none of the above answers



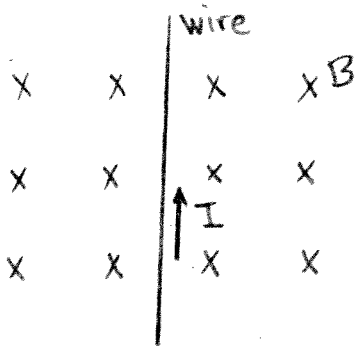
(6 pts) 4. A small particle with negative charge is moving in the vicinity of a long straight wire, as shown in the sketch. The wire carries current I in the direction shown. At the instant that the particle is moving directly away from the wire, what is the direction of the force on it that is due to the current in the wire?

(a) toward the wire
(b) away from the wire
(c) to the right
(d) to the left
(e) into the page
(f) out of the page



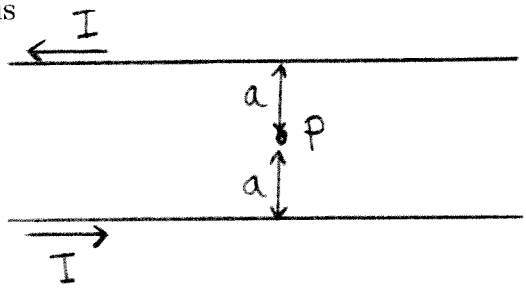
(6 pts) 5. A straight wire carries current in the direction shown in the sketch. The wire is in a magnetic field that is directed into the plane of the paper. The direction of the force that the magnetic field exerts on the wire is

(a) to the left
(b) to the right
(c) into the page
(d) out of the page
(e) toward the bottom of the page
(f) toward the top of the page



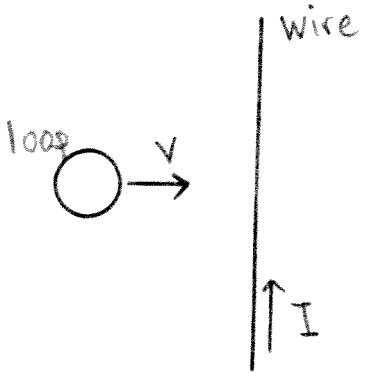
(6 pts) 6. Two long straight parallel wires each carry current I, in the direction shown in the sketch. The distance between the two wires is $2a$. The magnetic field at a point P that is midway between the two wires is

(a) zero
(b) $\mu_0 I/(2\pi a)$, into the page
(c) $\mu_0 I/(2\pi a)$, out of the page
(d) $\mu_0 I/(\pi a)$, into the page
(e) $\mu_0 I/(\pi a)$, out of the page



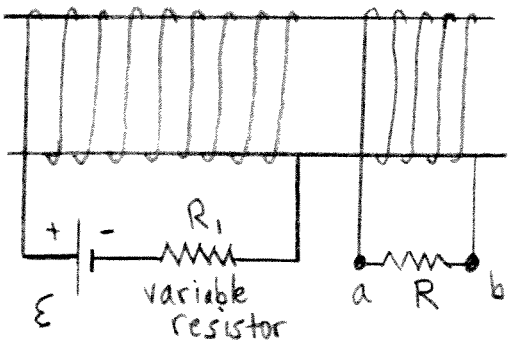
(6 pts) 7. A long straight wire carries constant current I, in the direction shown in the sketch. A metal loop is moving at constant speed v toward the wire. The current induced in the loop is

(a) zero
(b) clockwise
(c) counterclockwise



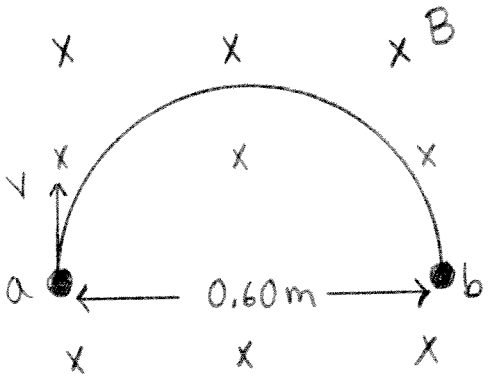
(6 pts) 8. Two coils are wound near each other on the same cylindrical form. If the resistance R_1 of the variable resistor is increased at a constant rate, the induced current in the other circuit

(a) is zero
(b) flows through R from a to b
(c) flows through R from b to a



Show all your work for partial credit. Write your answers in the blanks provided.

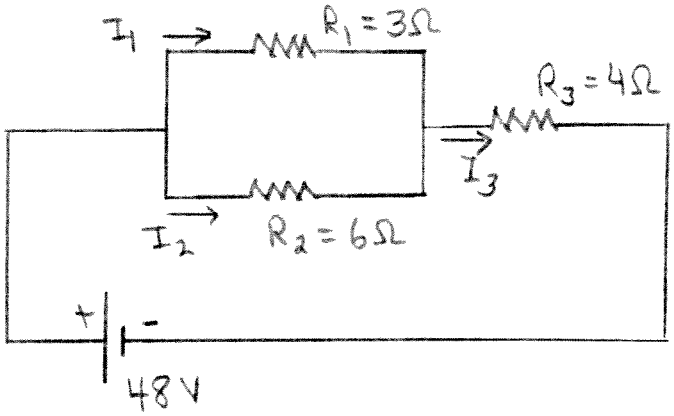
(16 pts) 9. A charged particle with mass 5.0×10^{-9} kg moves from point a to point b along a semicircular path, as shown in the sketch. There is a uniform magnetic field $B = 4.0$ T directed into the plane of the paper. At point a the particle has speed $v = 2.0 \times 10^5$ m/s and velocity in the direction shown in the sketch. What are the magnitude and sign (positive or negative) of the charge of the particle?



Ans. $|q|$= _____

sign _____

(18 pts) 10. Consider the circuit shown in the sketch.



(a) What is the current through each resistor?

Ans. $I_1 =$ _____

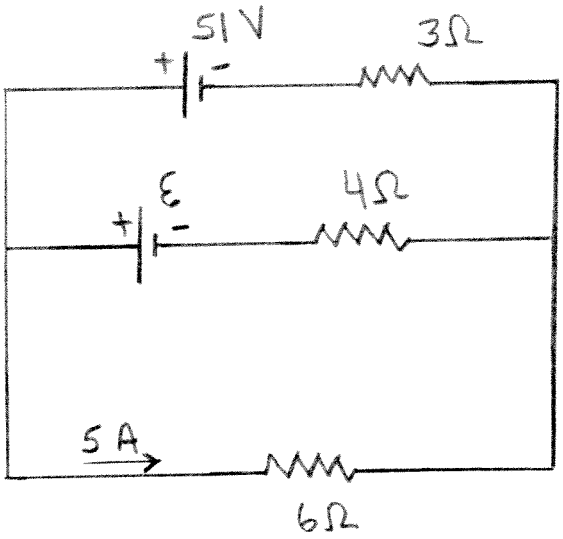
$I_2 =$ _____

$I_3 =$ _____

(b) What is the rate at which the emf is supplying electrical energy to the circuit?

Ans. _____

(16 pts) 11. Consider the circuit shown in the sketch. The current through the 6 Ω resistor is 5.0 A, in the direction shown. What is the emf $\mathcal{E}$?



Ans. _____