1) Field lines point away from _____ charge and toward _____ charge.

a) positive, negative
b) negative, positive
c) smaller, larger

2) As two electric charges are moved farther apart, the magnitude of the force between them _____.

a) increases
b) decreases
c) does not change

3) When two positive charges are moved from very far away to close together, their electric potential energy _____.

a) increases
b) decreases
c) does not change

4) If you increase the voltage across a resistor, its resistance _____.

a) increases
b) decreases
c) remains the same

5) In a circuit, capacitors in series have the same _____ them and capacitors in parallel have the same _____ them.

a) potential drop across, charge on
b) charge on, potential drop across
c) potential drop across, potential drop across

6) As you add more resistors in parallel the total resistance of the circuit _____.

a) increases
b) decreases
c) remains the same

7) A charged particle that is moving against a magnetic field (in the opposite direction as the field) will _____.

a) move in uniform circular motion
b) move in a straight line
c) come to rest

8) Two parallel wires with currents running in the opposite direction _____ each other.

a) attract
b) repel
c) exert no force on

9) A loop is turned in a magnetic field to generate electricity. As the loop is rotated faster, the induced voltage _____.

a) increases
b) decreases
c) remains the same

10) At resonance, the power output of the circuit is _____.

a) zero
b) a maximum
c) a minimum

11) In an alternating current RLC circuit, the voltage across the capacitor _____ leads the current through the capacitor.

a) sometimes
b) always
c) never

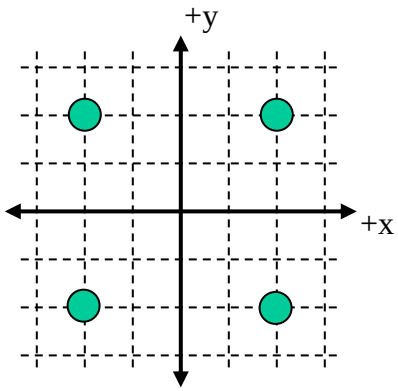
12) The frequency of ultraviolet light is _____ the frequency of infrared light.

a) greater than
b) less than
c) equal to

Four charges are situated as shown in the diagram (each grid line is separated by 1 meter). The two upper charges have a charge of +2 μC ($+2\times10^{-6}$ C). The two lower charges have a charge of -2 μC (-2×10^{-6} C).

13) What is the magnitude of the net electric field at the point (0, 0)?

a) 0 N/C
b) 2,250 N/C
c) 3,182 N/C
d) 6,364 N/C
e) 9,000 N/C



14) What is the net electric potential at the point (0, 2) on the positive y-axis?

a) -19,900 V
b) -9,950 V
c) 0 V
d) 9,950 V
e) 19,900 V

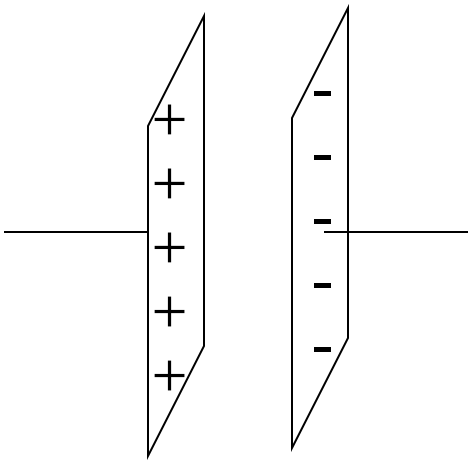
15) How much work would it take to bring a 5th charge of +2 μC from very far away to the origin?

a) 0 J
b) 0.036 J
c) 0.144 J
d) 18,000 J
e) 72,000 J

A capacitor is constructed from two metal sheets placed 3 mm apart. The total capacitance is 13 pF (13×10^{-12} F). A battery is used to charge the capacitor to 7 nC (7×10^{-9} C). The positive and negative plates are shown:

16) What area of plates was needed to construct this capacitor?

a) 0.0014 m^2
b) 0.0024 m^2
c) 0.0034 m^2
d) 0.0044 m^2
e) 0.0054 m^2



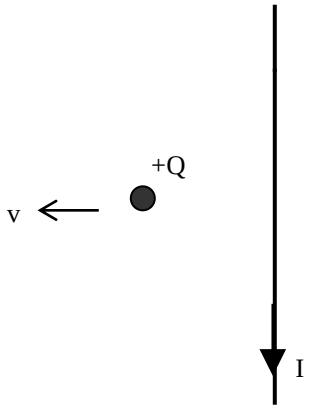
17) What is the strength of the electric field between the plates?

a) 180,000 V/m
b) 280,000 V/m
c) 380,000 V/m
d) 480,000 V/m
e) 580,000 V/m

A positively charged particle (with Q = +5 μC) moves away (with v = 15 m/s) from a wire with current. At the instant shown, the charged particle is 18 cm from the current and the magnetic field there has a strength of 0.19 mT (0.00019 T).

18) What is the current in the wire?

a) 91 A
b) 111 A
c) 131 A
d) 151 A
e) 171 A



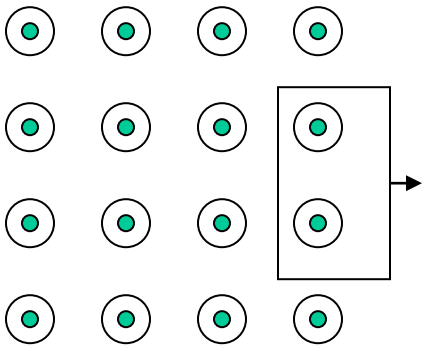
19) What is the magnitude of the magnetic force on the charged particle.

a) 1.4×10^{-8} N
b) 2.4×10^{-8} N
c) 3.4×10^{-8} N
d) 4.4×10^{-8} N
e) 5.4×10^{-8} N

A loop with a length of 8 cm and a width of 3 cm is moving (with a speed of v = 17 m/s) out of the magnetic field (with strength of 2.05 T) as shown below. The total resistance of the loop is 0.03 ohms.

20) What is induced emf in the loop?

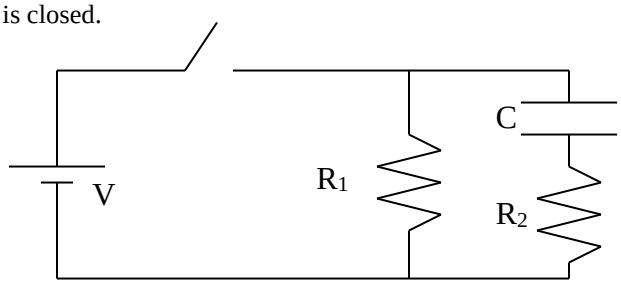
a) 1.788 V
b) 2.788 V
c) 3.788 V
d) 4.788 V
e) 5.788 V



You are given the following circuit with V = 9 V, R_1 = 5 Ω, R_2 = 10 Ω, and C = 2 μF (the switch has been opened for a long time):

21) Calculate the current through the battery right after the switch is closed.

a) 0 A
b) 0.6 A
c) 0.9 A
d) 1.8 A
e) 2.7 A



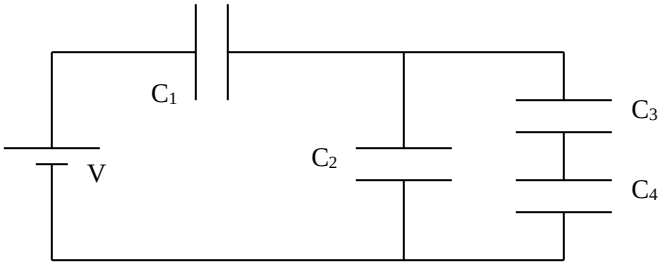
22) Calculate the current through the battery after the switch has been closed a long time.

a) 0 A
b) 0.6 A
c) 0.9 A
d) 1.8 A
e) 2.7 A

The following circuit has the values: V = 9 V, C_1 = 1 μF, C_2 = 2 μF, C_3 = 3 μF, C_4 = 4 μF.

23) What is the charge on capacitor C_1?

a) 1.09 μC
b) 3.09 μC
c) 5.09 μC
d) 7.09 μC
e) 9.09 μC

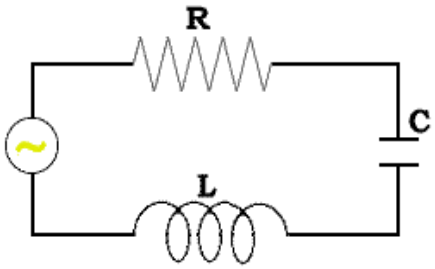


24) What is the potential difference across capacitor C_3?

a) 1.09 V
b) 2.09 V
c) 3.09 V
d) 4.09 V
e) 5.09 V

A simple RLC series circuit is connected to a generator with frequency 60 Hz. The maximum voltage across each element (the resistor, inductor, and capacitor) is measured along with the maximum current in the circuit. It is found that: V_{Rmax} = 22 V, V_{Lmax} = 35 V, V_{Cmax} = 27 V and I_{max} = 0.72 A.

25) What is the maximum voltage across the generator?



(a) 13.4 V
(b) 23.4 V
(c) 33.4 V
(d) 43.4 V
(e) 53.4 V

26) What is the inductance of the inductor?

(a) 99 mH
(b) 129 mH
(c) 159 mH
(d) 189 mH
(e) 219 mH

27) What is the average power dissipated in the circuit?

(a) 4.92 W
(b) 7.92 W
(c) 10.92 W
(d) 16.92 W
(e) 20.92 W

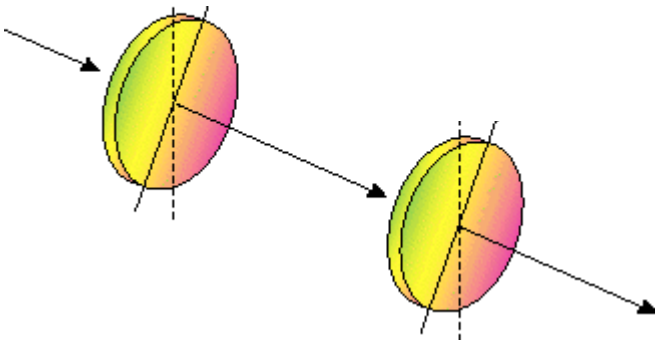
28) What is the resonance frequency of this RLC circuit?

(a) 13 Hz
(b) 33 Hz
(c) 53 Hz
(d) 73 Hz
(e) 93 Hz

Unpolarized light with a wavelength of 400 nm (400×10^{-9} m) and an intensity of 4.6 W/m^2 is incident on two linear polarizers.

29) What is the frequency of this radiation?

(a) 3.5×10^{14} Hz
(b) 5.5×10^{14} Hz
(c) 7.5×10^{14} Hz
(d) 9.5×10^{14} Hz
(e) 11.5×10^{14} Hz



30) If the intensity after the second polarizer is 0.9 W/m^2, what is the angle between the transmission axes of the two polarizers?

(a) 31°
(b) 41°
(c) 51°
(d) 61°
(e) 71°

Online Physics 122 Formulas

$$F = ma \qquad F = \frac{kq_1q_2}{r^2} \qquad E = \frac{F}{q_o} \qquad E = \frac{kq}{r^2}$$

$$U = \frac{kq_1q_2}{r} \qquad V = \frac{U}{q_o} \qquad V = \frac{kq}{r} \qquad E = \frac{V}{d}$$

$$C = \varepsilon_o \frac{A}{d} \qquad C = \frac{Q}{V} \qquad U = \frac{1}{2}QV \qquad I = \frac{Q}{t}$$

$$C_p = C_1 + C_2 \qquad \frac{1}{C_s} = \frac{1}{C_1} + \frac{1}{C_2} \qquad R_s = R_1 + R_2 \qquad \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$R = \rho \frac{L}{A} \qquad V = IR \qquad P = IV \qquad Q = Q_o e^{\frac{-t}{RC}}$$

$$Q = Q_o\left(1 - e^{\frac{-t}{RC}}\right) \qquad F = qvB\sin\theta \qquad F = ILB\sin\theta \qquad B = \frac{\mu_o I}{2\pi r}$$

$$B = \mu_o nI \qquad r = \frac{mv}{qB} \qquad \Phi_B = BA\cos\phi \qquad emf = vBL$$

$$emf = -N\frac{\Delta\Phi_B}{\Delta t} \qquad U = \frac{1}{2}LI^2 \qquad \frac{V_s}{V_p} = \frac{N_s}{N_p} \qquad V_{rms} = I_{rms}Z$$

$$Z = \sqrt{R^2 + \left(X_L - X_C\right)^2} \qquad X_c = \frac{1}{2\pi fC} \qquad X_L = 2\pi fL$$

$$\overline{P} = V_{rms}I_{rms}\cos\phi \qquad \tan\phi = \frac{X_L - X_C}{R} \qquad f_o = \frac{1}{2\pi\sqrt{LC}} \qquad c = \lambda f$$

$$c = \frac{1}{\sqrt{\varepsilon_o\mu_o}} \qquad U = \frac{1}{2}\varepsilon_o E^2 + \frac{1}{2\mu_o}B^2 \qquad E = cB$$

$$I = I_o\cos^2\theta$$

$$k = 8.99\times10^9\, Nm^2/C^2$$
$$\varepsilon_o = 8.85\times10^{-12}\, C^2/m^2N$$
$$q_e = 1.60\times10^{-19}\, C$$
$$\mu_o = 4\pi\times10^{-7}\, Tm/A$$
$$c = 3\times10^8\, m/s$$

ON-LINE PHYSICS 122
EXAM #1
MR. POTTER

Name: _____ Date: _____

1) Bubble in the ID number section of the scantron.

2) This Exam is 90 min long - 30 multiple-choice questions. Choose the one BEST answer for each question. You are not penalized for guessing. Watch your time! (Answer all questions.)

3) You may use only a pencil and calculator. (Formula sheet is provided.)

4) Use the test as scratch paper (or the paper provided by the testing center). Hand EVERYTHING back in or you will receive a 0 on the exam!

5) Scoring: all 5 answer choice questions are 6 pts. each, all 3 answer choice questions are 3 pts. each, all 2 answer choice questions are 2 pts. each. Total possible points = 144 pts.

6) This is test form __A__. Be sure to FILL THIS IN on your scantron form. All forms are "equivalent" tests (only numbers have been changed.)

7) Also, write your name, the class, the date, and my name on the scantron form.

Good Luck!

DID YOU BUBBLE IN AN ID NUMBER AND TEST FORM ON THE SCANTRON?

(see front page for instructions)