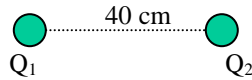


Two charges are spaced by 40 cm as shown in the diagram. The left charge is $Q_1 = -3 \mu\text{C}$ ($-3 \times 10^{-6} \text{ C}$). The right charge is $Q_2 = -5 \mu\text{C}$ ($-5 \times 10^{-6} \text{ C}$).



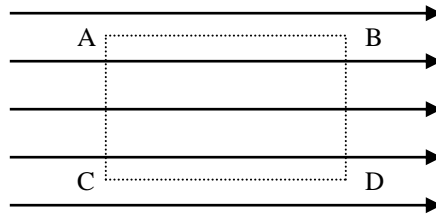
- 1) If field lines were drawn in the picture, which charge would have more field lines going into it?
 - a) the right charge, Q_2
 - b) the left charge, Q_1
 - c) they would have the same amount

- 2) The net electrical potential energy of the system is:
 - a) positive
 - b) negative
 - c) zero

- 3) What is the magnitude of the electric field half-way between the two charges?
 - a) 0 N/C
 - b) 90,000 N/C
 - c) 360,000 N/C
 - d) 450,000 N/C
 - e) 1,800,00 N/C

- 4) What is the change in potential energy of the system if the spacing between the charges is doubled (from 40cm to 80cm)?
 - a) +0.51 J
 - b) +0.17 J
 - c) 0
 - d) -0.17 J
 - e) -0.51 J

A uniform electric field of strength $E = 18,000 \text{ V/m}$ is shown below. Four points (vertices of a rectangle) labeled A, B, C, and D are situated in the electric field as shown. Length AB of the rectangle is 0.28 m and length AC of the rectangle is 0.19 m.

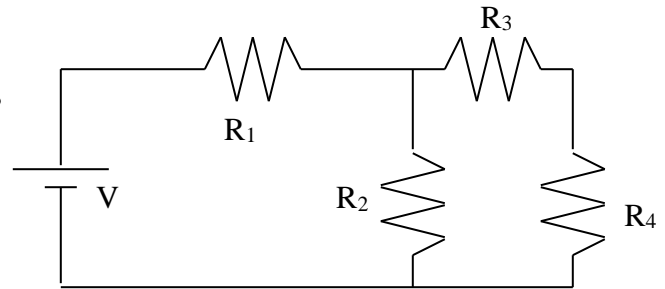


- 5) How does the electric potential change moving from point A to point B?
- a) there is an increase in electric potential
 - b) there is a decrease in electric potential
 - c) there is no change in electric potential
- 6) How does the electric potential change moving from point A to point C?
- a) there is an increase in electric potential
 - b) there is a decrease in electric potential
 - c) there is no change in electric potential
- 7) What is the magnitude of the change in electric potential moving from point C to point D?
- a) 0 V
 - b) 3420 V
 - c) 5040 V
 - d) 64,300 V
 - e) 94,700 V
- 8) What is the magnitude and direction of the force on a -18 mC ($-18 \times 10^{-3} \text{ C}$) charge placed at point A?
- a) 324 N to the right
 - b) 162 N to the right
 - c) 0 N
 - d) 162 N to the left
 - e) 324 N to the left
- 9) How much work does the electric field do if this same charge moves all the way around the rectangle?
- a) positive work
 - b) negative work
 - c) no work

The following circuit has the values: $V = 9\text{ V}$,
 $R_1 = 1.2\ \Omega$, $R_2 = 2.3\ \Omega$, $R_3 = 3.4\ \Omega$, $R_4 = 4.5\ \Omega$.

10) What is the total equivalent resistance of the circuit?

- a) 1.98 ohms
- b) 2.98 ohms
- c) 3.98 ohms
- d) 4.98 ohms
- e) 5.98 ohms



11) What is the net power dissipated in the circuit?

- a) 17 W
- b) 27 W
- c) 37 W
- d) 47 W
- e) 57 W

12) What is the current flowing in resistor R_4 ?

- a) 0.68 A
- b) 1.68 A
- c) 2.68 A
- d) 3.68 A
- e) 4.68 A

13) What is the potential difference between the left side of R_1 and the right side of R_3 ?

- a) 1.94 V
- b) 2.94 V
- c) 3.94 V
- d) 4.94 V
- e) 5.94 V

14) Every resistor in this circuit is replaced with a resistor that is twice as long as the current one. How will the total resistance of the circuit change?

- a) it will increase
- b) it will decrease
- c) it will stay the same

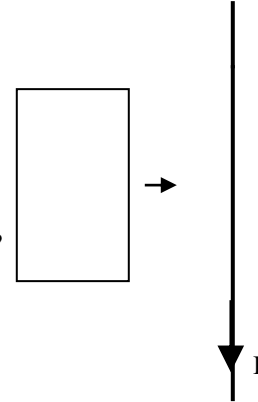
A rectangular loop is moving toward a long straight vertical wire as shown. The current in the long straight wire is 18 A and the loop has dimensions of 7 cm by 16 cm. At the instant shown, the loop is 8 cm from the long straight vertical wire and a 1.78 A current is being induced in the loop.

15) What is the direction of the current induced in the loop?

- a) clockwise
- b) counter clockwise
- c) neither

16) What is the direction of the net force on the loop due to the long straight wire?

- a) up
- b) down
- c) left
- d) right
- e) into the page



17) What is the magnitude of the force on the loop due to the long straight wire?

- a) 1.98×10^{-6} N
- b) 2.98×10^{-6} N
- c) 3.98×10^{-6} N
- d) 4.98×10^{-6} N
- e) 5.98×10^{-6} N

18) If the loop is kept moving at a constant velocity, how will the induced current change as the loop gets closer to the long straight wire?

- a) the induced current will be greater
- b) the induced current will be less
- c) the induced current will be constant

19) What is the direction of the magnetic field that the long straight vertical wire creates on the right side of the long straight wire?

- a) left
- b) up
- c) out of the page

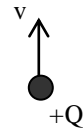
20) What is the magnitude of the magnetic field that the long straight vertical wire creates 1 cm to the right of the long straight wire?

- a) 0.16 mT
- b) 0.26 mT
- c) 0.36 mT
- d) 0.46 mT
- e) 0.56 mT

A positively charged particle (with $Q = +8 \mu\text{C}$) moves upward through a magnetic field (with $v = 20 \text{ m/s}$) and begins to curve out of the page. The magnetic field is a uniform field with a strength of 0.15 mT (0.00015 T) and the mass of the particle is 0.28 g .

21) What is the radius of curvature the charged particle will have?

- a) 1700 km
- b) 2700 km
- c) 3700 km
- d) 4700 km
- e) 5700 km



22) What is the force on the charged particle?

- a) $2.4 \times 10^{-8} \text{ N}$
- b) $3.4 \times 10^{-8} \text{ N}$
- c) $4.4 \times 10^{-8} \text{ N}$
- d) $5.4 \times 10^{-8} \text{ N}$
- e) $6.4 \times 10^{-8} \text{ N}$

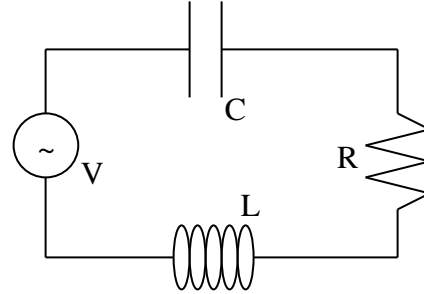
23) What is direction of the magnetic field?

- a) left
- b) down
- c) into the page

Shown below is an LRC circuit connected to an AC generator with $L = 385 \text{ mH}$, $C = 23 \text{ }\mu\text{F}$, and $R = 49 \text{ }\Omega$. The maximum generator voltage of 120 V oscillates at its resonant frequency.

24) What is the resonant frequency of the circuit?

- a) 18.7 Hz
- b) 53.5 Hz
- c) 96.1 Hz
- d) 123 Hz
- e) 185 Hz



25) What is the maximum current in the circuit?

- a) 0.45 A
- b) 1.45 A
- c) 2.45 A
- d) 3.45 A
- e) 4.45 A

26) What is the maximum voltage across the inductor?

- a) 17 V
- b) 117 V
- c) 217 V
- d) 317 V
- e) 417 V

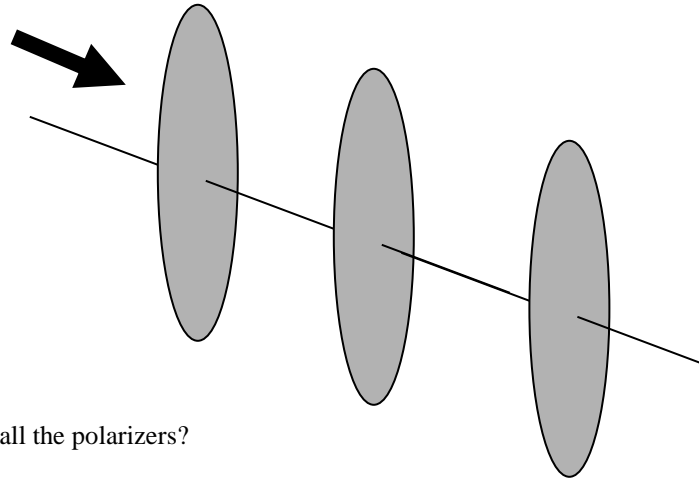
27) If the frequency is decreased, the current through the resistor will _____ the voltage across the resistor.

- a) lead
- b) lag
- c) be in phase with

28) If the frequency is decreased, the current through the generator will _____ the voltage across the generator.

- a) lead
- b) lag
- c) be in phase with

Unpolarized light with initial intensity of 38 W/m^2 goes through three linear polarizers. The first polarizer has a transmission axis at an angle of 0° with respect to the vertical, the second polarizer has a transmission axis at an angle of $+45^\circ$ with respect to the vertical, and the third polarizer has a transmission axis at an angle of $+75^\circ$ with respect to the vertical.



29) What is the intensity of light after all the polarizers?

- a) 38 W/m^2
- b) 19 W/m^2
- c) 9.5 W/m^2
- d) 7.1 W/m^2
- e) 4.75 W/m^2

30) What angle (with respect to the vertical) should the last polarizer be at to make the final intensity of light $1/8$ the original intensity?

- a) $+15^\circ$
- b) $+30^\circ$
- c) $+45^\circ$
- d) $+60^\circ$
- e) $+90^\circ$

Online Physics 122 Formulas

$F = ma$	$F = \frac{kq_1q_2}{r^2}$	$E = \frac{F}{q_o}$	$E = \frac{kq}{r^2}$
$U = \frac{kq_1q_2}{r}$	$V = \frac{U}{q_o}$	$V = \frac{kq}{r}$	$E = \frac{V}{d}$
$C = \epsilon_o \frac{A}{d}$	$C = \frac{Q}{V}$	$U = \frac{1}{2}QV$	$I = \frac{Q}{t}$
$C_p = C_1 + C_2$	$\frac{1}{C_s} = \frac{1}{C_1} + \frac{1}{C_2}$	$R_s = R_1 + R_2$	$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$
$R = \rho \frac{L}{A}$	$V = IR$	$P = IV$	$Q = Q_o e^{-\frac{t}{RC}}$
$Q = Q_o \left(1 - e^{-\frac{t}{RC}}\right)$	$F = qvB \sin \theta$	$F = ILB \sin \theta$	$B = \frac{\mu_o I}{2\pi r}$
$B = \mu_o nI$	$r = \frac{mv}{qB}$	$\Phi_B = BA \cos \phi$	$emf = vBL$
$emf = -N \frac{\Delta \Phi_B}{\Delta t}$	$U = \frac{1}{2}LI^2$	$\frac{V_s}{V_p} = \frac{N_s}{N_p}$	$V_{rms} = I_{rms} Z$
$Z = \sqrt{R^2 + (X_L - X_C)^2}$		$X_c = \frac{1}{2\pi f C}$	$X_L = 2\pi f L$
$\bar{P} = V_{rms} I_{rms} \cos \phi$	$\tan \phi = \frac{X_L - X_C}{R}$	$f_o = \frac{1}{2\pi \sqrt{LC}}$	$c = \lambda f$
$c = \frac{1}{\sqrt{\epsilon_o \mu_o}}$	$U = \frac{1}{2} \epsilon_o E^2 + \frac{1}{2} \mu_o B^2$		$E = cB$
$I = I_o \cos^2 \theta$			

$$k = 8.99 \times 10^9 \text{ Nm}^2 / \text{C}^2$$

$$\epsilon_o = 8.85 \times 10^{-12} \text{ C}^2 / \text{m}^2 \text{ N}$$

$$q_e = 1.60 \times 10^{-19} \text{ C}$$

$$\mu_o = 4\pi \times 10^{-7} \text{ Tm} / \text{A}$$

$$c = 3 \times 10^8 \text{ m} / \text{s}$$

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)