223 Which of the following charges could NOT be found on an object?
Convert to e

A $3.2 \times 10^{-19}$C 2e
B $4.0 \times 10^{-19}$C 2.5e
C $4.96 \times 10^{-18}$C 31e
D $8.0 \times 10^{-19}$C 5e

224 How many elementary charges are found on an object with a charge of $5.4 \times 10^{8}$C?
$5.4\times10^{8}C \times \frac{1e}{1.6\times10^{-19}C} = 3.37\times10^{27}e$

A $8.6 \times 10^{-11}$
B $8.6 \times 10^{27}$
C $6.25\times10^{18}$
D $3.4 \times 10^{27}$

225 What is the charge in coulombs for an object with an excess of $5.2\times10^{20}$ electrons? $5.2\times10^{20}e \times \frac{1.6\times10^{-19}C}{1e} = 8.32\times10^{1}C = 82C$

A $3.25\times10^{39}$C
B 83C
C $6.25 \times 10^{18}$C
D $1.6 \times 10^{-19}$C

226 36 C of charge move through a wire in 3 seconds. What is the current in the wire?
$I = \frac{q}{t} = \frac{36C}{3s} = 12A$

A 12 A
B 0.083A
C 108A
D 1.2A

227 A 24 ohm resistor is connected to a potential difference of 48 V. What is the current in the circuit?
$R = 24\Omega$, $V = 48V$, $I = \frac{V}{R} = \frac{48V}{24\Omega} = 2A$

A 5A
B 0.5 A
C 1150A
D 2A

228 A device operating at 20V draws a current of 5 amperes. How much energy is used in the circuit in 4 seconds?
$V = 20V$, $I = 5A$, $t = 4s$, $W = VIt$

A 16J
B 25J
C 400J
D 100J

229 How much energy is required to move 4 μC through a potential difference of 6V
$W = Vq = (6V)(4\times10^{-6}C) = 24\times10^{-6}J$

A $2.4 \times10^{4}$J
B 24J
C $1.5\times10^{6}$J
D $2.4 \times 10^{-5}$J

230 Find the electrostatic force between two electrons separated by a distance of 2 micrometers.
electron $= q_e = 1.6\times10^{-19}C$

A $1.3 \times 10^{-32}$N
B $5.8 \times 10^{-17}$N
C $2 \times10^{-6}$N
D $5.8 \times 10^{-23}$N

$F_e = k\frac{q_1 q_2}{r^2} = \frac{(8.99\times10^{9}\,N\cdot m^2/C^2)(1.6\times10^{-19}C)(1.6\times10^{-19}C)}{(2\times10^{-6}m)^2} = 5.75\times10$

231 An electrostatic force of 20N acts on a charge of 4C. What is the strength of the electric field? $E = \frac{F_e}{q} = \frac{20N}{4C} = 5N/C$

A 5N/C
B 4N/C
C 80N/C
D 100N/C

232 A field with a strength of 420N/C acts on a charge of 4C. What is the force that acts on the charge?
$E = 420N/C$, $q = 4C$, $F_e = Eq = (420N/C)(4C) = 1680N$

A 1680N
B 105N
C 84N
D 2100N

233 For a fixed potential difference if the resistance in a circuit is increased, the current
$V, R, I$ ?
$I = \frac{V}{R}$ Inverse

A Increases
B decreases
C Remains the same

234 An electric appliance draws a current of 8 Amperes when connected to 120V. What is the total power dissipated by the appliance?
$I = 8A$, $V = 120V$, $P = ?$, $P = VI = (120V)(8A) = 960W$

A 960 W
B 15W
C 7680W
D 96W

235 If the temperature in a wire increases the resistance of the wire
The hotter the wire the more resistance because internal motion of molecule

A Increases
B decreases
C Remains the same

236 The diameter of a wire is doubled, the resistance of the wire will be

A Doubled
B halved
C Quadrupled
D Quartered

diameter is direct to radius
$R = \frac{\rho L}{\pi r^2}$ R is inverse to r
r x 2 R ÷ 4

237. 80 J of work are done to move 4 coulombs of charge through two points in an electric field. What is the potential difference between the points?

| | | | |
|---|---|---|---|
| A | 320V | C | 0.05V |
| B | 20V | D | 2V |

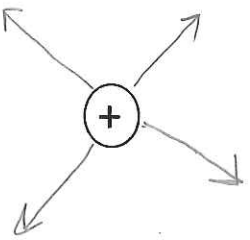
$V = ?$
$W = 80J$
$q = 4C$
$W = Vq$
$V = \frac{W}{q} = \frac{80J}{4C} = 20V$

238 A plastic toy is attracted to a negatively charged rod. The charge on the toy must be

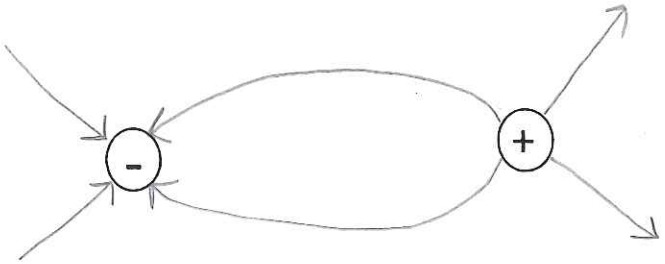
A. Negative
B. Positive
C. Negative or neutral
D. Positive or neutral

239. Draw the electric field for each of the following scenarios (Show at least 4 lines for each particle)

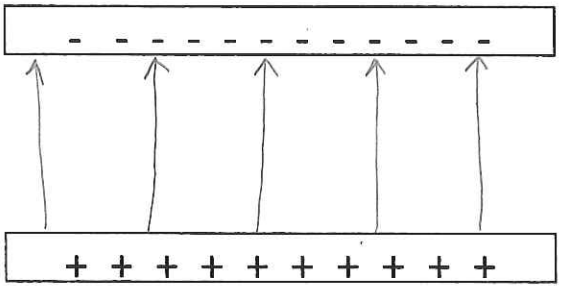
a)




b)




c)




Electric Field line point away from positive & toward negative

Field lines show what (+) test charges would do

Conduction

240. An object with a charge of + 2C is brought in contact with and object of -4C. What will be the charge on each of the objects after they are separated?

$$q_f = \frac{q_1 + q_2}{2} = \frac{+2C + -4C}{2} = \frac{-2C}{2} = -1C$$

241. Three wires of equal length and cross-sectional area are coiled up to be used as a source of resistance in a circuit. The wire options are aluminum, copper and tungsten. Which of these wires will have the least resistance?

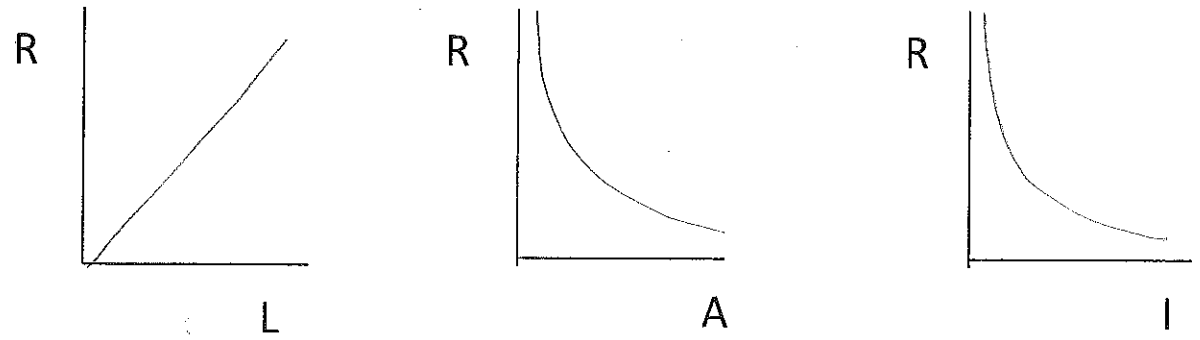
$2.82\times10^{-8}\,\Omega m$; $1.72\times10^{-8}\,\Omega m$ $5.6\times10^{-8}\,\Omega m$

$R = \frac{\rho L}{A}$ Lowest resistivity will produce lowest R.

lowest $\rho = 1.72\times10^{-8}\,\Omega m$

242. Draw the basic graph shape for each of the following relationships

$R = \frac{\rho L}{A}$ $R = \frac{V}{I}$




243. Find the power dissipated by a simple circuit with a current of 3A and resistance of 20 ohms? (Show your work including equation, substitution and units)

$P = ?$
$I = 3A$
$R = 20\Omega$

$P = I^2R$
$= (3A)^2(20\Omega)$
$= (9A^2)(20\Omega)$
$= 180W$