11th Physics (2017 – 18)

(3rdQ, #1 Mini Test) 2-16-2018

Class	No.	Name	

TABLE 1–4 Common Prefixes

Power	Prefix	Abbreviation
10^{15}	peta	P
10^{12}	tera	T
10^{9}	giga	G
10^{6}	mega	M
10^{3}	kilo	k
10^{2}	hecto	h
10^{1}	deka	da
10^{-1}	deci	d
10^{-2}	centi	c
10^{-3}	milli	m
10^{-6}	micro	μ
10^{-9}	nano	n
10^{-12}	pico	p
10^{-15}	femto	f

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In calculation problems, describe equations clearly and systematically enough to show how to solve the problems.   If not enough, you won't get any point.

Gravitational acceleration rate	$g = 9.80$ m/s^2
Universal gravitational constant	$G = 6.67 \times 10^{-11}$ N $\cdot$ m^2/kg^2
Coulomb's Law constant	$k = 8.99 \times 10^{9}$ N $\cdot$ m^2/C^2
Elementary Charge	$e = 1.60 \times 10^{-19}$ C
Electron mass	$m_e = 9.11 \times 10^{-31}$ kg
Proton mass	$m_p = 1.673 \times 10^{-27}$ kg
Avogadro's number	$N_A = 6.022 \times 10^{23}$ mol^{-1}

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4 pt/question x 13 questions = 52 pt   Max 50 pt

／[Total 50 pt]

(1) Explain the mechanism how rubbing an electrically neutral glass rod with electrically neutral silk gives the rod a charge?   (2) As the result of being charged, does the mass of the glass rod increase, decrease, or stay the same in principle?   Explain.
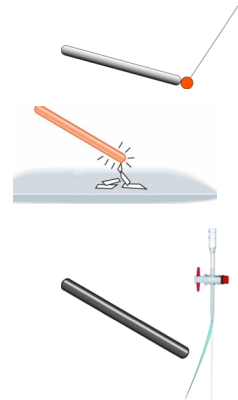
(1-a) Answer

(1-b) Answer

Explain why a PVC rod that has been rubbed with fur attracts small polystyrene balls, small bits of paper or water stream, even though the balls, paper or water are uncharged?

(2) Answer

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(3) **Explain why a glass rod that has been rubbed with silk** attracts small aluminum-coated balls and then repels them, even though the balls are uncharged in the beginning?

(3) Answer

Attract

Repel
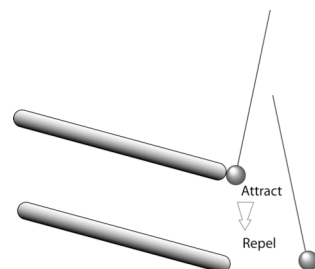
(4) Find the amount of positive electric charge in one mole of chlorine atoms.
(Equations)

| 1																	2
H																	He
3	4											5	6	7	8	9	10
Li	Be											B	C	N	O	F	Ne
11	12											13	14	15	16	17	18
Na	Mg											Al	Si	P	S	Cl	Ar
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr

(4) Answer

(5,6) Two identical point charges hang from threads of ℓ = 5.0 cm and of negligible mass.   Each ball has a mass of m = 7.0 x 10^{-6} kg and a charge of magnitude q.   The balls repel each other, and they are at rest at a distance of 6.0 cm as shown in the figure.

(5) Find the electrostatic force acting on each ball.
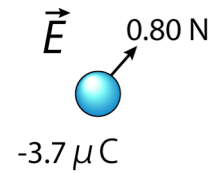
(6) Find the magnitude of the charge, q.

(Equations)

ℓ = 5.0 cm ℓ = 5.0 cm

q   q

r = 6.0 cm

m = 7.0 x 10^{-6}kg m = 7.0 x 10^{-6}kg
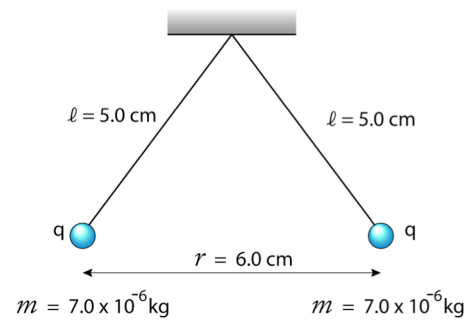
(5) Answer

(6) Answer

(7) A = -3.7 μ C charge experiences a force of 0.80 N due to an electric field.   What is the direction and magnitude of the electric field?
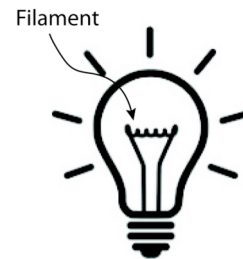(Equations)

$\vec{E}$ 0.80 N

-3.7 μ C
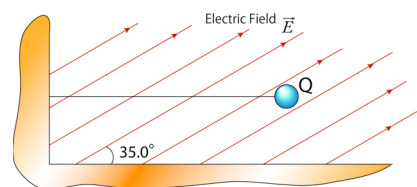
(7) Answer
Direction
Magnitude

(8) The tungsten filament of a light bulb has a resistance of 0.070 Ω.
If the filament is 27 cm long, what is its diameter?
[The resistivity of tungsten: 5.6 x 10^{-8} $\Omega \cdot$ m]
(Equations)

Filament

(8) Answer

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(9) An object of mass m=3.10 g and Q=+48.0 μ C is attached to a string and placed in a uniform electric field that is inclined at an angle of 35.0° with the horizontal.   The object is in static equilibrium when the string is horizontal. Find the magnitude of the electric field.
(Equations)

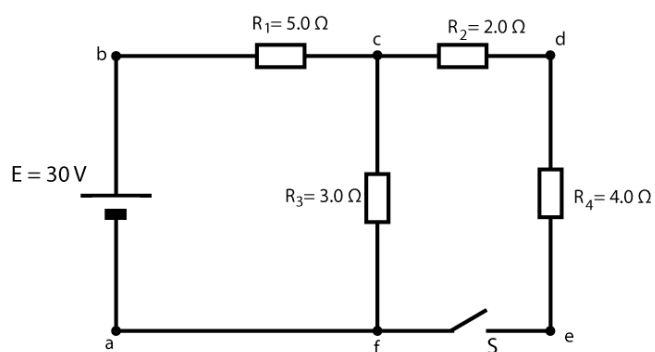Electric Field $\vec{E}$

35.0°

Q

(9) Answer

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(10~13) Consider the circuit shown, where the potential at the point "a" is assumed as 0 V.
When the switch S is <u>open</u>, determine the followings:

	Switch: open	Equations	Answer
(10-a)	The current at the point "**f**"		
(10-b)	The potential difference between "**c**" and "**f**"		
(11-a)	The potential at the point "**f**"		
(11-b)	The power produced at the **battery**		
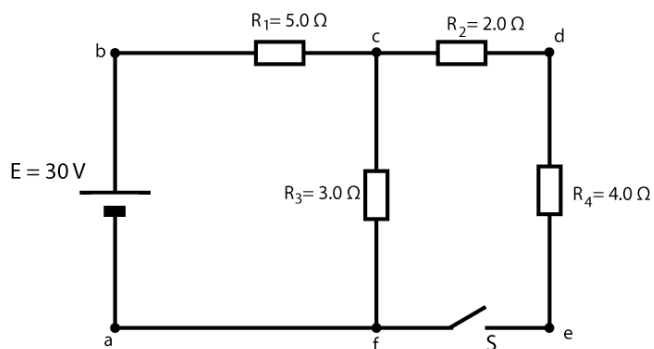
When the switch S is <u>closed</u>, determine the followings:

	Switch: closed,	Equations	Answer
(12-a)	The current at the point "**e**"		
(12-b)	The potential difference between "d" and "e"		
(13-a)	The potential at the point "**e**"		
(13-b)	The power consumed at the 3.0 Ω resistor R₃.		

Opinions

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