

2019

Test #1 - Static & Dynamic Electricity

v3

Name: _____

$\frac{\quad}{34} = \quad\%$

Part 1 - Static electricity

1-8 are multiple choice question - Put answer into box please. 2 marks each

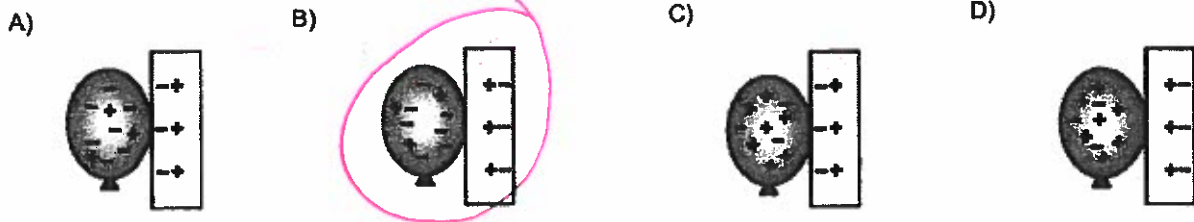
1. When a glass rod is rubbed with a piece of cotton, each object acquires a different charge. The cotton acquires a negative charge, while the glass acquires a positive charge.

Which of the following statements is true?

- A) The cotton gives up electrons to the glass.
- B) The cotton gives up protons to the glass.
- C) The glass gives up electrons to the cotton.
- D) The glass gives up protons to the cotton.

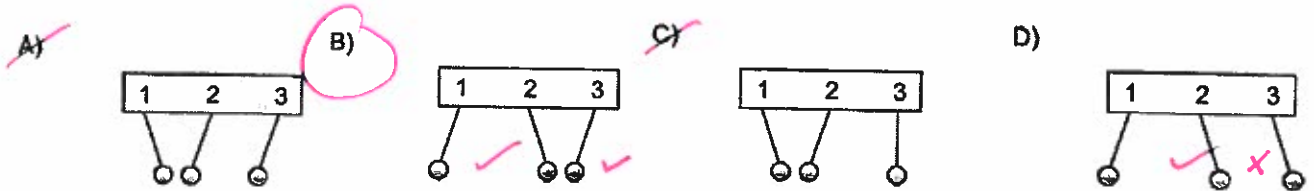
2. At a party, Philip rubbed a balloon on his head in order to stick it on a wall. As he was rubbing the balloon on his head, electrons were transferred from his hair to the balloon. This made it possible for the balloon to stay on the wall.

Which diagram correctly represents this phenomenon?



3. Three uncharged spheres (1, 2 and 3) are suspended side by side.

Which of the following diagrams shows what happens to these three spheres when spheres 1 & 2 are negatively charged? (#3 remains neutral)



Multiple Choice Answers	
1	C
2	B
3	B
4	D
5	C
6	D
7	A
8	D

16

4. An average lightning bolt carries 2.19×10^{21} electrons from the clouds to the ground.

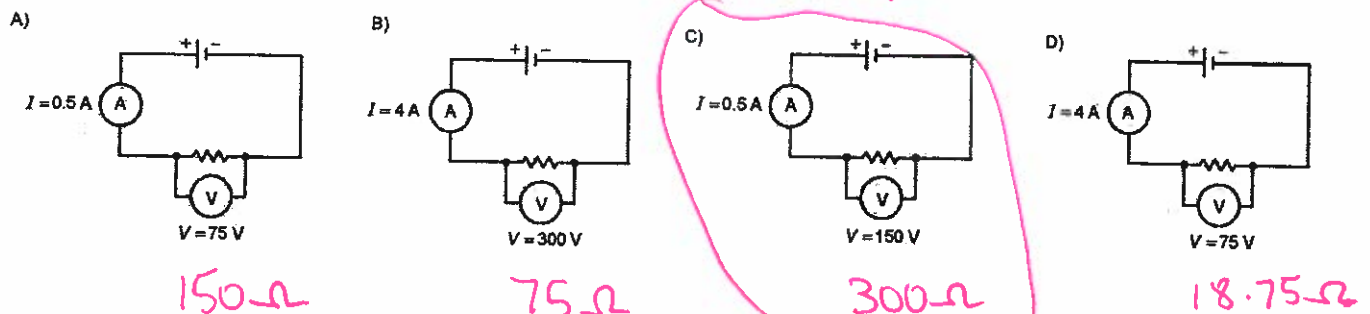
Calculate the charge of the lightning bolt in Coulombs (C).

- A) 0.0285 C
- B) 3.504×10^{38} C
- C) 2.85 C
- D) 390.4 C

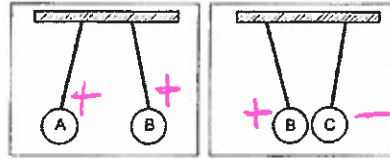
$$1C = \frac{6.25 \times 10^{18}}{2.19 \times 10^{21}}$$

5. Which of the following circuits has a resistance of 300Ω ?

$$V = IR \quad \frac{V}{I} = R$$



6. Consider the pith-balls in the diagram.



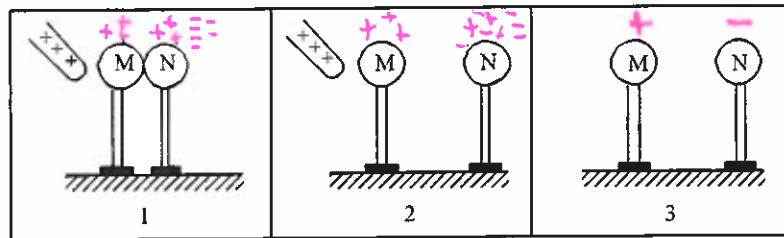
If sphere A is positively charged, what are the charges of spheres B and C?

- A) Spheres B and C are positively charge. C) Sphere B is negatively charged and sphere C is positively charge.
 B) Spheres B and C are negatively charge. D) Sphere B is positively charged and sphere C is negatively charge.

7. Two conducting spheres M & N, on insulating supports, are in contact with each other. At first they are not charged.

The following three operations are performed:

1. A positively charged rod is brought close to sphere M, without touching it.
2. With the rod close to sphere M, sphere N is moved away from sphere M.
3. The charged rod is moved away.



What are the charges on the spheres M and N after the operations?

- A) Negative for sphere M, positive for sphere N C) Negative for sphere M, no charge for sphere N
 B) Negative for spheres M and N D) Positive for spheres M and N

8. Which wire would have the highest conductance?

	A	B	C	D
Temperature	10°C	90°C	10°C	10°C
Material	Copper	Nichrome	Nichrome	Copper

Make sure that your multiple choice answers are in the table!

9. You have a negatively charged rod and a neutral metal sphere. Consider these two situations. (4)

A) The rod comes close to BUT DOES NOT touch the sphere.	B) The rod comes in contact with the sphere.
What is the charge of the sphere? <u>neutral</u>	What is the charge of the sphere? <u>negative.</u>
This is called charging by: circle one Friction <u>Induction</u> Conduction	This is called charging by: circle one Friction Induction <u>Conduction</u>

10. On a cold autumn day Mrs. I decided to wear her **wool scarf** and a **cotton coat**.
Once at school she notices sparks as she takes off the scarf. (3)

Explain how/why this spark was created?

Friction causes the cotton to gain electrons from the wool
The negative charge builds
When the scarf is removed the electrons jump to the scarf

Which has a negative charge? The **WOOL SCARF** or the **COTTON COAT** (circle one please)

Part 2 – Dynamic electricity Remember to show your work: formula, calculation & answer with units.

11. Your toaster is plugged into a **110 V** outlet and has **13.75 amps** flowing through it. (2)

How much **resistance** is given by the nichrome wire that toasts the bread?

$$V = IR$$

$$R = \frac{V}{I}$$

$$= \frac{110}{13.75}$$

$$R = 8 \Omega$$

12. What **charge** is accumulated by an appliance that uses **15 amps** and runs for **three minutes and 15 seconds**? (2)

$$3 \times 60 = 180s$$

$$180 + 15 = 195s$$

$$I = \frac{q}{\Delta t}$$

$$q = I \Delta t$$

$$= 15 \times 195$$

$$q = 2925C$$

13. The average microwave oven used **10 amps** with a **110 V** outlet.

Determine the **amount of energy** used if you run it for **2 minutes and 34 seconds**? (3)

$$P = VI$$

$$= 110 \times 10$$

$$P = 1100W$$

$$\Delta t = 120 + 34$$

$$= 154s$$

$$E = P \Delta t$$

$$= 1100 \times 154$$

$$E = 169400J$$

other way:

$$49$$

$$59.4$$

$$+ 1210$$

$$1318.4W$$

$$E = P \Delta t$$

$$= P \times 32400$$

$$E = 42716160J$$

14. In a rush to head out the door to catch ~~your~~ ^{the} bus this morning, Callan accidentally left the radio, the hall lights and a nightlight on. Calculate the amount of energy that was consumed during the 9hrs. he was away at school. (4)

Item	Details	
Radio	110 V	49 W
Hall lights	110 V	0.54 A
Bathroom light	110 V	10 Ω

$$\Delta t = 9 \times 60 \times 60 = 32400s$$

$$\text{Radio } E = P \Delta t = 49 \times 32400 = 1587600J$$

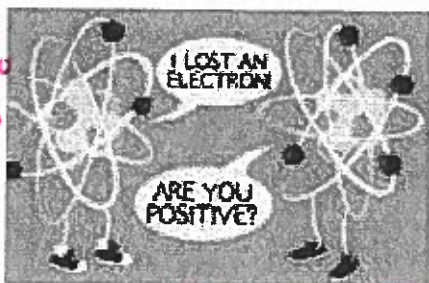
$$\text{Hall Lights } P = VI = 110 \times 0.54 = 59.4W$$

$$E = P \Delta t = 59.4 \times 32400 = 1924560$$

$$\text{Bathroom } I = \frac{V}{R} = \frac{110}{10} = 11A$$

$$P = VI = 110 \times 11 = 1210W$$

$$E = P \Delta t = 1210 \times 32400 = 39204000$$



$$\text{Total } 42716160J$$

11 a k...h

/14

