

PART A: MULTIPLE CHOICE (10 MARKS)

1	2	3	4	5	6	7	8	9	10
a	c	c	a	b	a	b	c	b	a

PART B: MATCH (5 MARKS)

1	2	3	4	5
C	G	B	H	D

PART C: SHORT ANSWER (45 MARKS)

Answer questions 1 to 6 in the space provided. Answer questions 7 and 8 on the back of this sheet.

(3) 1. State the law of electric charges

- ① like charges repel one another
- ② unlike charges attract one another
- ③ charged objects attract some neutral objects

(3) 2. Consider the following interactions between 3 pith-balls (A,B,C). B is repelled by a positively charged rod; A is attracted to B; and there is no interaction between A and C. Determine the electrostatic charge(s) on each of the spheres.

A ~~is~~ \ominus B \oplus C \ominus

(6) 3. Complete the following chart that summarizes the properties for the 3 atomic particles.

Name	Charge	Location
neutron	0	nucleus
proton	+1	nucleus
electron	-1	orbits nucleus

(4) 4. List 2 ways to (i) charge a neutral object & (ii) discharge a charged object.

- (i) ① friction
- ② contact
- ③ induction
- (ii) ① ground
- ② discharge at pt time, ...

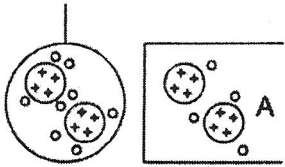
(10) 5.

If the \circ = e's, what charge (# & type) is on the:

(a) pith-ball? \ominus

(b) vinylite? $4+$

Would these objects attract or repel? Explain.
attract - charged objects attract some neutral objects



Redraw the objects after they have touched. What charge (# & type) is now on the:

(a) pith-ball? $2+$

(b) vinylite? $2+$

Do these objects now attract or repel? Explain.
repel - like charges repel

(3) 6. List 3 practical applications of electrostatics. (Recall the reading/note-taking assignment.)

- ① remove pollutants
- ② coat/paint surfaces
- ③ fabric softener sheets

7. Use the electrostatic chart to the right to help answer this question.

(3) (a) A wool sweater is worn under a plastic raincoat. Assuming both objects are neutral to begin with, what charge will appear on the sweater when it rubs against the raincoat? Explain why?

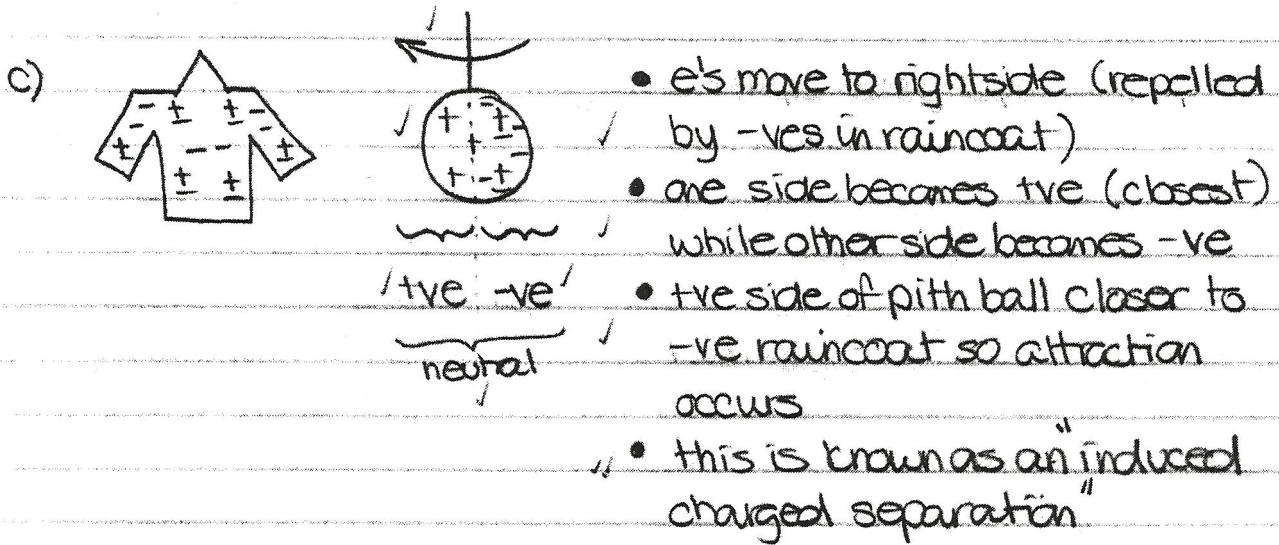
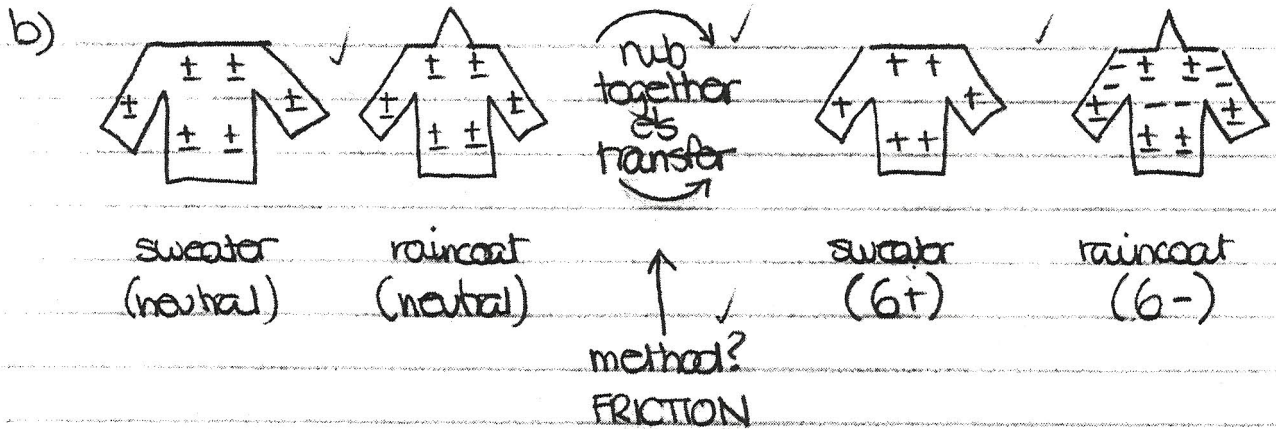
(4) (b) With the aid of properly labelled diagrams explain how (a) occurs. What method of charging is used?

(5) (c) The raincoat is now brought near but not touching a neutral pith ball. With the aid of properly labelled diagrams explain what will happen? What is this called?

(4) 8. What makes oil refineries and gas stations among the most dangerous places to work? What precautions are taken? Why?

Weak hold on e's	\oplus	acetate
↓ increasing ↓		wool
↓ tendency ↓		fur/hair
↓ to gain ↓		silk
↓ electrons ↓		cotton
		ebonite
Strong hold on e's	\ominus	plastic
		rubber

7) a) When a wool sweater is worn under a plastic raincoat, the wool sweater will get a positive charge because of friction. This is because the plastic raincoat has a stronger attraction for electrons than the wool sweater (ie plastic is more "electronegative" than wool).



- 8)
- fumes are explosive ✓
 - any static charges (sparks, shocks) could ignite fumes ✓
 - refineries/gas stations are "grounded" so any excess charge is immediately neutralized ✓

PART A: MULTIPLE CHOICE (10 MARKS)

1	2	3	4	5	6	7	8	9	10
b	b	c	b	c	b	a	a	c	a

PART B: MATCH (5 MARKS)

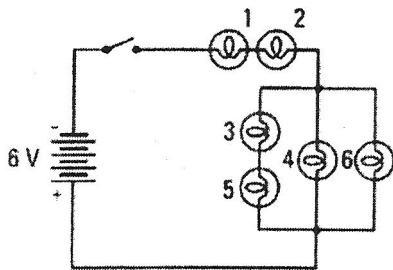
1	2	3	4	5
I	B	A	E	J

PART C: SHORT ANSWER (40 MARKS)

Answer questions 1 to 5 in the space provided. Answer questions 6 and 7 on the back of this sheet.

- (4) 1. What 4 basic parts are found in any simple electric circuit.
- ① switch ③ connectors
 ② source ④ load
- (1) 2. Which of the components above could a circuit do without and still operate? switch
- (3) 3. What kind of electric charges move through solids to form an electric current? electrons/negative
 Why is it that only this kind of charge moves in solids?
protons + neutrons are fixed in place (bound to nucleus)

- (5) 4. What would happen in the circuit diagram given below if each of the following were done separately:



- (a) the switch is closed. 1 to 6 on
- (b) the switch is closed and light bulb 2 is unscrewed. 1 to 6 off
- (c) the switch is closed and light bulb 3 is unscrewed. 1, 2, 4, 6 on, 3 & 5 off
- (d) the switch is closed and light bulb 4 is unscrewed. 1 to 3, 5, 6 on, 4 off
- (e) the switch is closed, and light bulb 6 is removed and replaced by a copper wire. 1, 2 on, 3 to 6 off "short circuit"

- (6) 5. Label each of the following electrical components. Be sure to use their correct name!



- (a) ground (b) fuse (c) ammeter (d) switch (e) battery (f) lightbulb

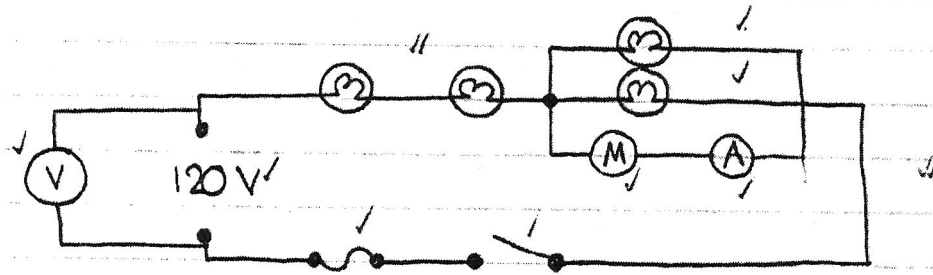
- (6) 6. Draw a schematic circuit diagram showing a 120 V source of electrical energy and two light bulbs connected in series, which in turn are connected to two light bulbs and a motor which are all connected in parallel with each other. The complete circuit is controlled by a switch and is protected by a fuse (~). An ammeter is connected to measure the current through the motor and a voltmeter measures the 120 V supply.

7. Use GRESS and the formula triangle to answer the following questions. Be sure to express the your final answers to one decimal place each!



- (5) (a) 2.3 A is required to operate a coffee grinder. What is its resistance if the supply voltage is 110 V?
 (5) (b) Calculate the current flowing through a 250 Ω resistor that is connected to a 120 V source.
 (5) (c) A light bulb has 2.4 A flowing through it. The resistance of the bulb is 14.2 Ω. Calculate the voltage drop across the light bulb.

6.)



7.) a) $I = 2.3\text{A}$ ✓, $R = V/I$ ✓ $R = 47.8\ \Omega$ //

$V = 110\text{V}$ ✓

$= 110\text{V} / 2.3\text{A}$

$= 47.82\dots$ ✓

b) $R = 250\ \Omega$ ✓, $I = V/R$ ✓ $I = 0.5\text{A}$ //

$V = 120\text{V}$ ✓

$= 120\text{V} / 250\ \Omega$

$= 0.48$ ✓

c) $I = 2.4\text{A}$ ✓, $V = IR$ ✓ $V = 34.1\text{V}$ //

$R = 14.2\ \Omega$ ✓

$= (2.4\text{A})(14.2\ \Omega)$

$= 34.08$ ✓