



St. Ignatius College
Boys Secondary School, Handaq
Half-Yearly Examination 2012

2

Form 3 (Track 2)

Physics

Time: 1 hour 30 minutes

Name: _____

Class: _____

Question No.	1	2	3	4	5	6	7	8	Main Paper	Practical Work	Course Work	Global Mark
Max. Mark	9	9	9	9	9	10	10	10	75	15	10	100
Mark												

Answer all questions.

Where necessary take the acceleration due to gravity to be 10m/s^2 .

All working must be shown. The use of the calculator is allowed.

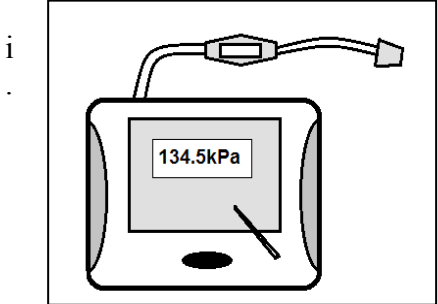
Useful equations:

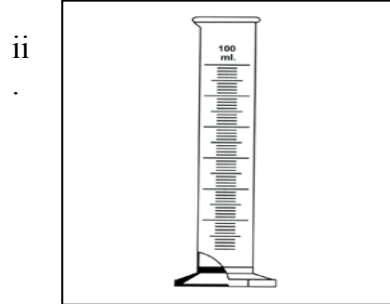
Density	$\rho = \frac{m}{V}$	
Weight	$w = mg$	
Pressure	$P = \frac{F}{A}$	$P = h\rho g$
Energy and Work	$W = Fs$ $KE = \frac{1}{2}mv^2$	$PE = mgh$ $P = \frac{E}{t}$

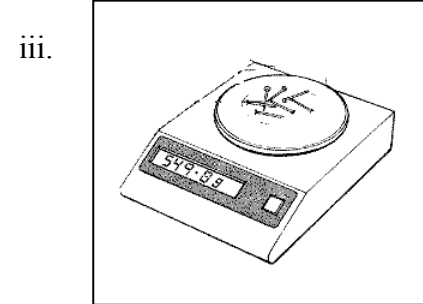
Section A: Answer ALL questions in the space provided.

1. a. **Choose the correct name** for each item from those given below and write the names under each diagram. (3)

Stopwatch	Measuring cylinder	Electronic balance	Data logger	Electronic timer
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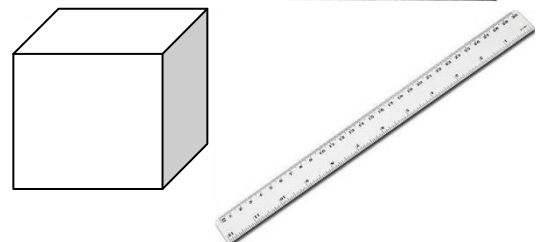


b. **Underline the correct word.** (3)

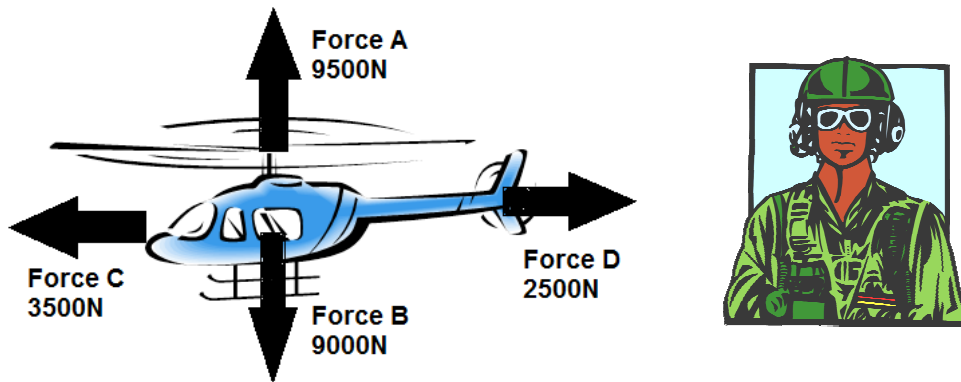
- i. Measurements of **length** should be taken at (the elastic limit , eye level , the zero mark).
- ii. A **spring balance** is used to measure the (length , mass , weight) of an object.
- iii. **Scalars** are quantities that have (only a size , both size and direction , only a direction).

c. Jane wants to measure the **volume** of a block of aluminium.

Describe how Jane could measure the volume of the block. (3)



2. Steve is a pilot and notices that there are a number of forces acting on his helicopter.



a. Draw lines to **match the correct name** of each force. (2)

- | | |
|----------------|-----------------------|
| Force A | Air resistance |
| Force B | Lift force |
| Force C | Weight |
| Force D | Force forward |

b. The weight of the helicopter acts from the (centre of gravity, elastic limit, engine force). (1)

c. Calculate the **horizontal resultant force** on the helicopter. (2)

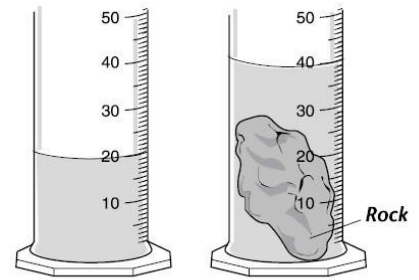
d. Calculate the **vertical resultant force** on the helicopter. (2)

e. Steve thinks that the helicopter will move as shown by the arrow below. **Explain why he is correct.** (2)



3. Maria is a scientist who studies different materials.

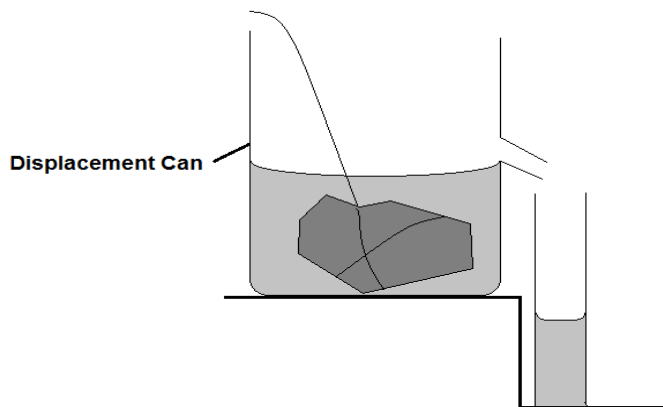
a. She wants to find the volume of a **small rock**. Use the diagram to **calculate the volume of the small rock**. (1)



b. Maria found that the mass of the rock was 50g. **Calculate the density of the rock**. (2)

c. Water has a density of 1g/cm^3 . **Explain why the rock will not float on water**. (2)

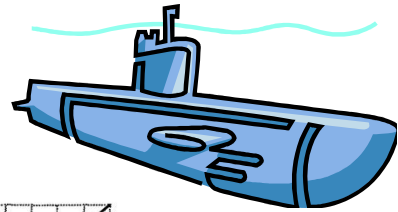
d. Maria found a **large rock** and used a displacement can to find its volume.



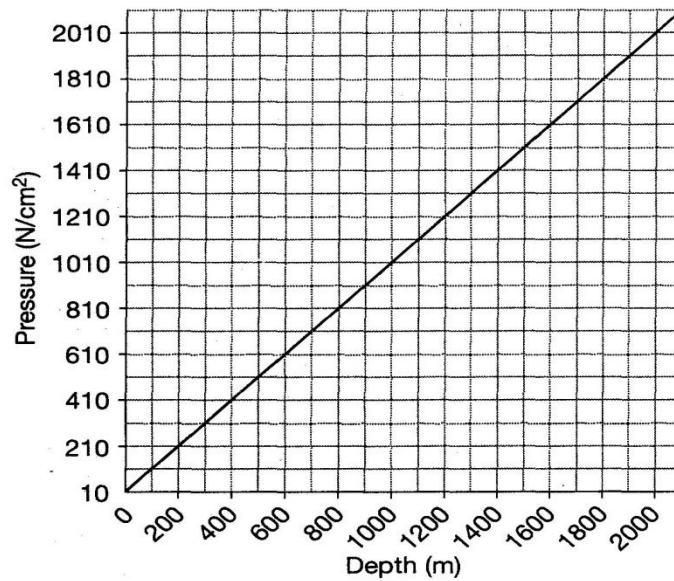
I. The stone had a density of 2.5g/cm^3 . **Calculate the mass of the stone** if the volume of the stone was found to be 3000g. (2)

II. Explain why **the small stone** and **the large stone** are made from the same material. (2)

4. A submarine can travel very deep under the sea.



The graph below shows how the pressure under the sea changes with depth.



a. Use the graph to:

i. Find the **pressure** at a depth of 1000m. _____ (1)

ii. Find the **depth** when the pressure is 1610N/cm². _____ (1)

iii. Calculate the **density** of sea water. (Hint: Use $P = h \rho g$). (3)

iv. Explain why the pressure at the water surface (0m) is **not** 0 N/cm². (2)

b. The submarine can travel up to a depth of 3000m. Explain in terms of pressure what can happen to the submarine if it reaches a depth that is more than 3000m. (2)

5. Julie and Tom are two engineers who are studying about the best ways of using **renewable energy sources** in Malta.



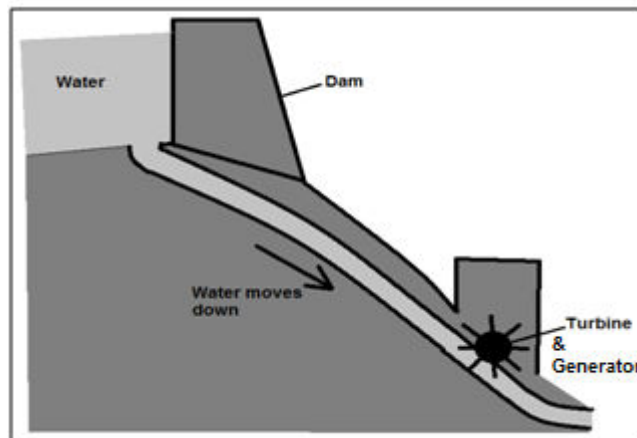
a. They are planning to use the equipment below to generate electricity. **Name the energy sources used in each situation.** (2)



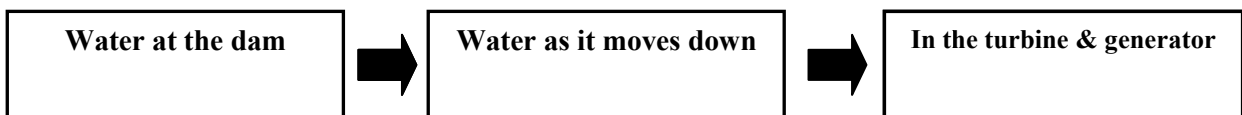
b. Explain the meaning of **renewable energy sources**. (2)

c. Julie suggested that the equipment mentioned in (a) could be used to give enough electrical energy to our school. Mention **one point in favour** and **one point against** using this equipment in our school. (2)

d. Tom worked in a hydroelectric power station in Italy. The diagram below shows how this power station works.

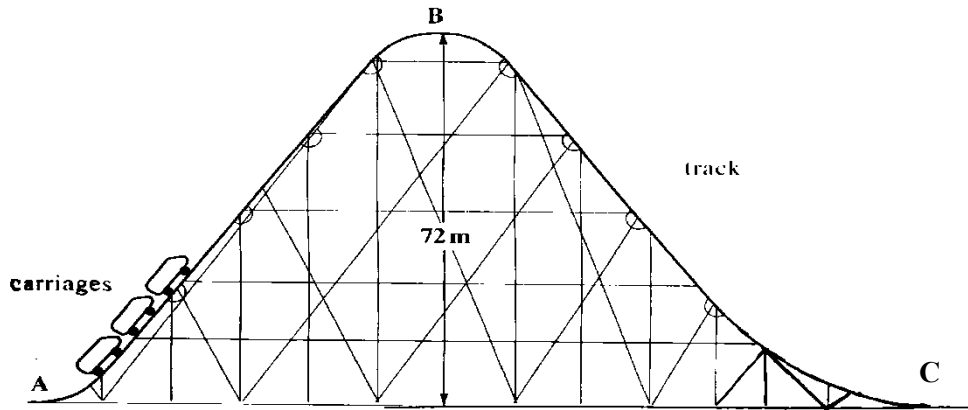


Complete the energy flow diagram below to show how energy is transferred. (3)



Section B: Answer ALL questions in the space provided.

6. The diagram shows part of a roller coaster in an amusement park. The carriages travel up from Point A to Point B and then down from Point B to Point C.



- a. **Underline the correct word:**

As the carriage moves up it gains (Kinetic , Elastic, Potential) energy and this changes to (Kinetic , Elastic , Potential) energy when it travels fast at point C. Energy is also changed to (sound and heat, sound and light, light and heat) because of friction with the track. (3)

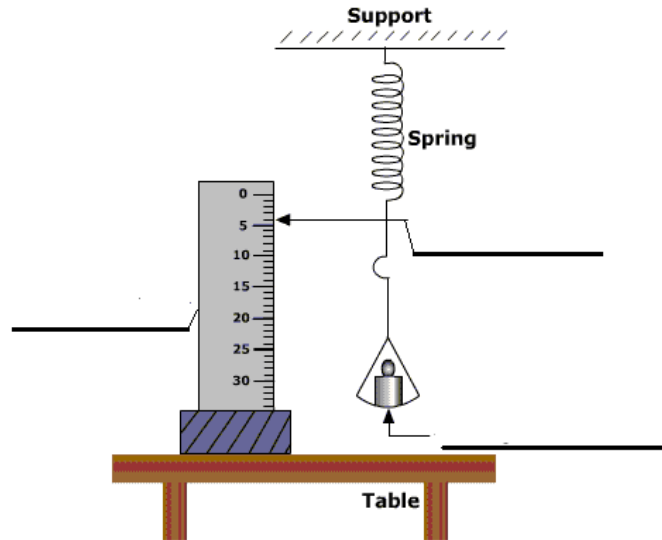
- b. The mass of the carriage is 3100Kg. Calculate the **work done** by the carriage to move from A to B. (3)

- c. How much **potential energy** will the carriage have gained at Point B? (1)

- d. Calculate the **velocity** of the carriage at point C, assuming there is no friction with the track. (3)

7. A student performed the experiment to determine Hooke's Law.

a. The diagram show the apparatus used during the experiment. **Label the missing apparatus.** (3)



b. As loads were added, the student obtained the following readings.

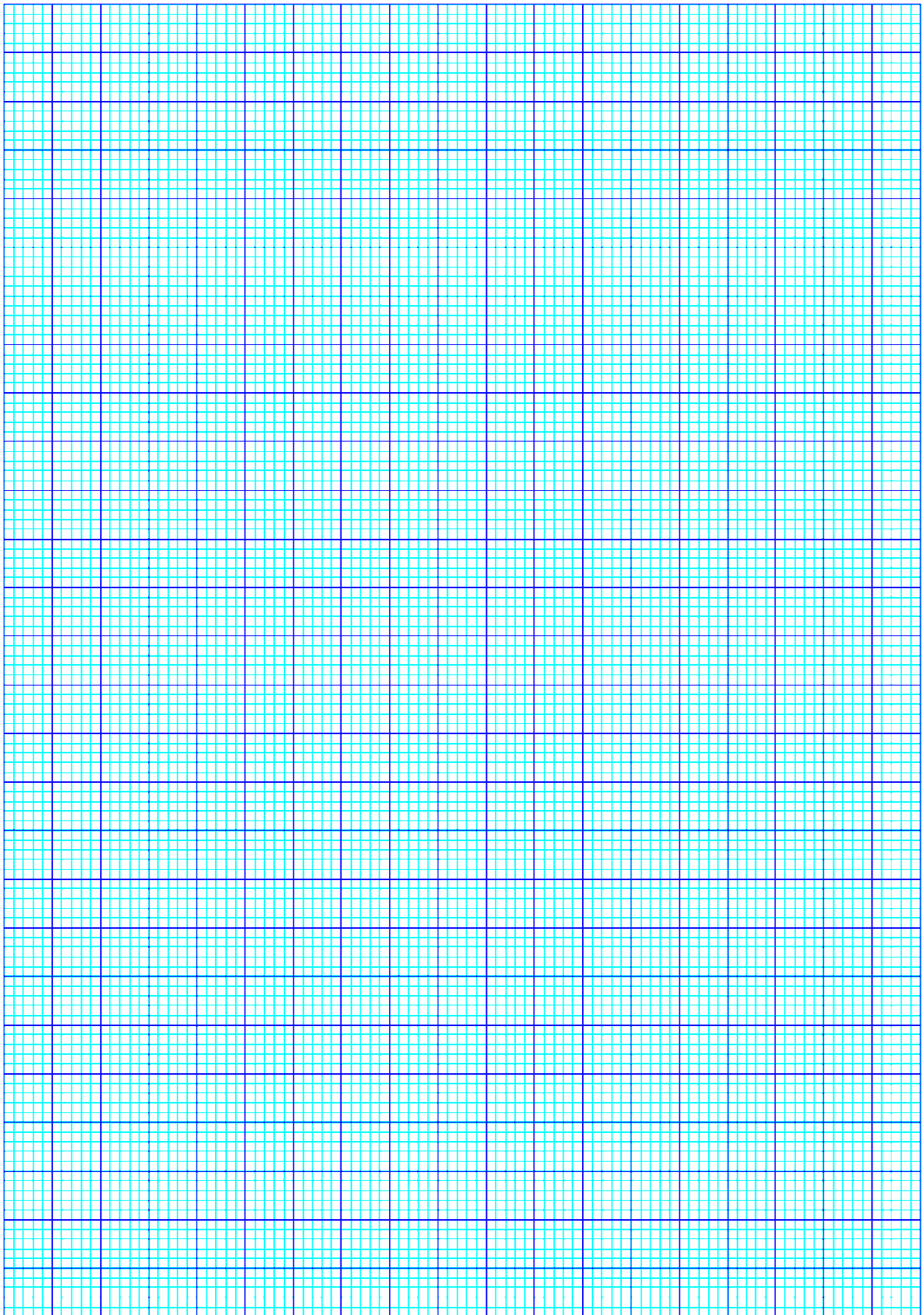
Load /N	0	2	4	6	8
Extension /mm	0	5	10	15	22

i. Plot the graph of **Load** (x - axis) against **Extension** (y – axis) on the graph paper. (4)

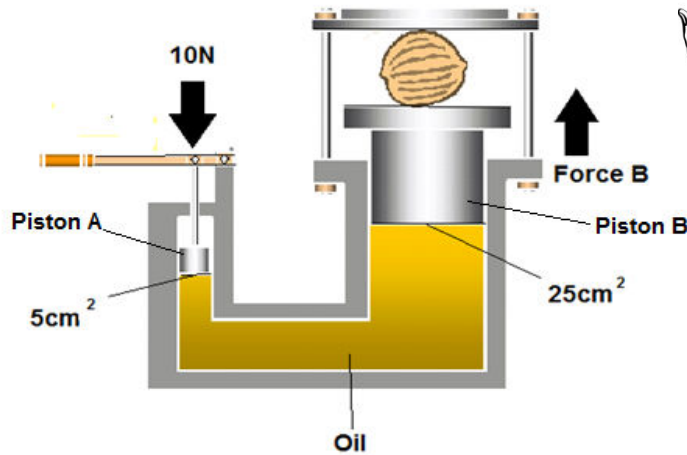
ii. Label the **elastic limit** of the spring on your graph. (1)

iii. Fill in the blanks:

Hooke's Law suggests that the _____ is directly proportional the _____ if the elastic limit is not exceeded. (2)



8. A baker uses the nut cracker shown below to crush walnuts.



a. A force of 10N is applied on Piston A.

i. Calculate the **pressure on Piston A**. (2)

ii. What is the **pressure on Piston B**? (1)

iii. Calculate the **value of Force B**. (2)

b. **Underline the correct word**: (5)

i. Over a **small surface area** there is (a smaller pressure, a larger pressure, no change in pressure).

ii. Using a **smaller force** produces (a smaller pressure, a larger pressure, no change in pressure).

iii. The pressure under **Piston A** is (smaller , bigger , equal) to the pressure under **Piston B**.

iv. The force produced on **Piston A** is (smaller , bigger , equal) to the force produced by **Piston B**.

v. **Oil** is used in a hydraulic system since oil is (compressible, incompressible, extendable).

Half yearly Examination 2010/2011

Form 4 Track 1 Marking Scheme

Question	Answer	Mark	Guidelines
1a	i) filament lamp ii) Circuit board iii) spring balance iii) metre ruler iv) data logger	5	1 mark each
1b	current, voltage, variable resistor	3	1 mark each
2a	i) 0.02m^2 ii) 0.08m^2	2	1 mark each
2b	16000N	1	
2c	20,000Pa	2	1 mark working 1 mark answer
2d	i) large, less iii) large (accept any reasonable answer)	3	1 mark each
3a	smaller, bigger	1	$\frac{1}{2}$ mark each
3b	i. 0.04m^2	1	
	ii. 600N	2	1 mark working 1 mark answer
	iii. 15000Pa	3	1 mark equation 1 mark working 1 mark answer
3c	A, B	1	$\frac{1}{2}$ mark each
4a	57500Pa	2	1 mark working 1 mark answer
4b	115000Pa	2	1 mark working 1 mark answer
4c	increases, density	1	$\frac{1}{2}$ mark each

4d	i. Correct drawing	2	No marks if one part is wrong
	ii. pressure	1	
5a	air	1	
5b	i. D, B ii. A, C	2	½ mark each
5c	i. increases	1	
	ii. 102000Pa	2	1 mark working 1 mark answer
	iii. weather	1	
6a	repulsion, attraction, repulsion, attraction	2	½ mark each
6b	Mark + and - correctly	6	2 mark each
7a	bulb, battery	2	1 mark each
7b	3,5,2,4,1	2	½ mark each
7c	conductor, insulator, insulator, conductor	2	½ mark each
7d	conductor, insulator	2	1 mark each
8	1. Complete 2. Fixed resistor 3. Variable resistor 4. LED 3. voltmeter 5. Ammeter 6. series 7. Diode 8. switch	9	1 mark each