SECONDARY SCHOOL ANNUAL EXAMINATIONS 2008
DIRECTORATE FOR QUALITY AND STANDARDS IN EDUCATION
Educational Assessment Unit

FORM 4 **PHYSICS** **TIME: 1h 30min**

Name: _____ **Class: _____**

Answer all questions.
All working must be shown. The use of a calculator is allowed.
Where necessary take acceleration due to gravity g = 10m/s^2.

You might find the following list of formulae useful.

Pressure	$P = \rho gh$	$F = PA$
Force	$F = ma$	$W = mg$
Motion	Momentum = mv	$s = \frac{1}{2} at^2$
	Impulse = Change in Momentum	$v = u + at$
Electricity	$Q = It$	$W = QV$
	$V = IR$	$R = R_1 + R_2 + R_3$
	$P = IV = I^2R = \frac{V^2}{R}$	$R \alpha \frac{1}{A}$ $R \alpha L$
Heat	$H = mc\Delta\theta$	$E = Pt$

For office use only.

Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**
Max Mark	**8**	**8**	**8**	**8**	**8**	**15**	**15**	**15**	**85**
Actual Mark									

	Total Theory	**Total Practical**	**Final Mark**
Actual Mark			
Maximum Mark	85	15	100

Section A

Answer ALL questions.

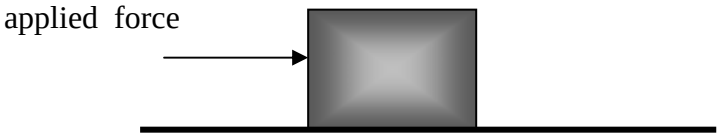
This section carries 40 marks.

1. Fill in the table below:

Quantity (to be measured)	**Unit** (symbols can be used)	**Instrument** (used to measure quantity)
Electrical resistance		Resistance meter
	kg	
	kWh	joulemeter
weight		
atmospheric pressure		barometer
frictional force		air track

[8]

2. An object of mass 3 kg is at rest on a smooth horizontal surface. A force of 15N is applied on the object for 3 seconds.



a. Add to the diagram another force **W** that represents the weight of the object. [1]

b. What is the numerical value of **W** ? _____ [2]

c. What is the initial velocity of the object just before the force is applied ? _____ [1]

d. The applied force causes the object to move with _____ [1]

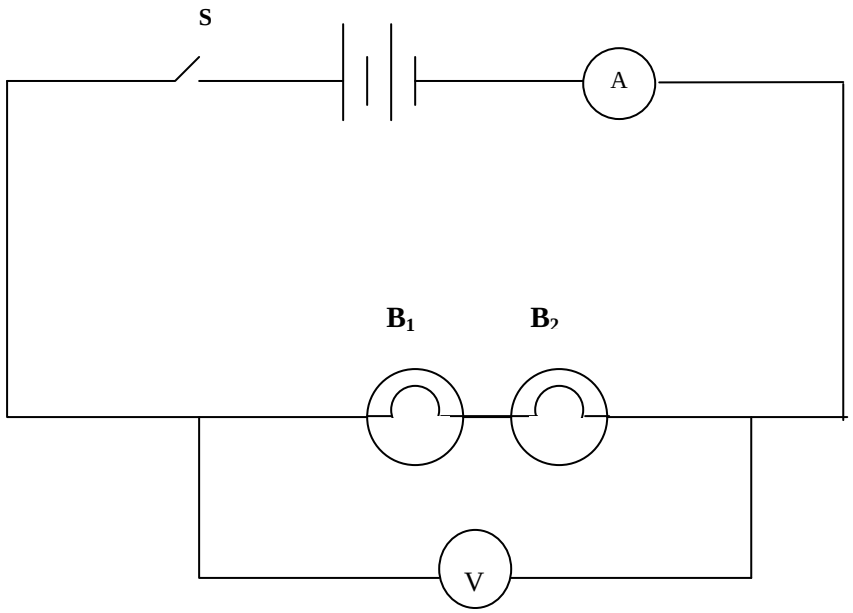
e. Calculate the velocity of the object after 3 seconds.

.....

.....

..... [3]

3. The diagram shows a simple electrical circuit:



a. —(A)— is an _____and measures current in _____ .

b. **B_1** and **B_2** are _____ connected in _____ .

c. **S** is a switch that allows a _____to pass through the circuit when it is _____ .

d. —(V)— is a _____ and measures the potential difference in _____ across the ends of **B_1** and **B_2** . [8]

4. An aluminium container without a lid contains boiling water.

a. Heat is transferred from the water through the aluminium by _____ . [1]

b. In the water, heat is transferred by _____ . [1]

c. The water cools from 100 ^{o} C to 60 ^{o} C in 10 minutes.

(i) what is the temperature change ? _____ [2]

(ii) if 600 kJ (600 000 J) of heat are lost in 10 minutes, how much heat is lost in one second? _____ [2]

(iii) state two ways to reduce heat losses.

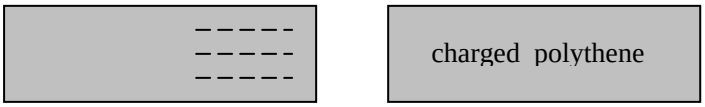
_____ _____ [2]

5. a. An uncharged polythene rod contains an _____ amount of negative and positive charges. [1]

b. The polythene rod becomes _____ charged when rubbed against a woollen duster. [1]

c. If the charged polythene rod is earthed, _____ charges flow to earth so that the polythene rod becomes again _____ . [2]

d. A negatively-charged rod is brought **near** the charged polythene rod .



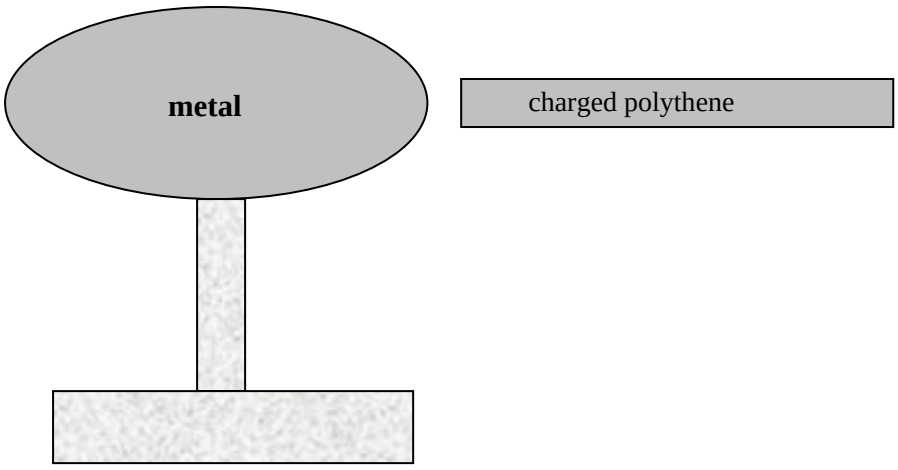
Tick the box next to the correct statement.

(i) There is no force at all. ☐

(ii) There is a force of repulsion. ☐

(iii) There is a force of attraction. ☐ [1]

e.



positively charged metal conductor on insulating base

Put + and − signs to show the charge on the :

(i) positively-charged metal conductor.

(ii) charged polythene rod. [2]

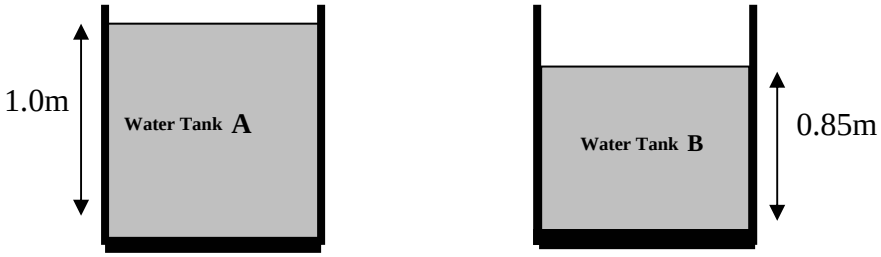
f. The diagram in question e above shows that _____ charges attract. [1]

Section B

Answer ALL questions.

This section carries 45 marks.

6a. The diagram shows two similar water tanks A and B. Tank A contains water to a depth of 1m while Tank B contains only 0.85m depth of water.
(Density of water = 1000 kg/m^3).



i) The pressure at the surface of the water is known as _____. [2]

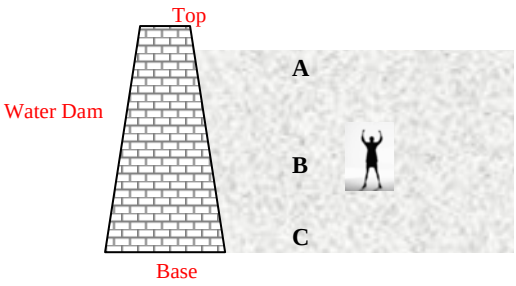
ii) Use the formula P = density x gravity x depth to calculate the pressure exerted by the water only on the base of each tank.

Tank A _____

Tank B _____ [6]

iii) The pressure on the base of tank A is greater than the pressure on the base of tank B.
This proves that pressure and depth are _____ _____ [2]

b. The diagram shows a water dam and a diver swimming below the surface of the water.



i) Why is the dam wide at the base but narrow at the top ?

_____ [3]

ii) Where does the diver experience the biggest pressure : at A ☐
at B ☐
at C ☐ [2]

7. Emma conducted an experiment to show that different lengths of similar wire have different resistance. She put the results in a table as shown below.

Length of wire (m)	0	0.20	0.40	0.60	0.80	1.00
Resistance (ohms)	0	1.20	2.40	3.60	4.80	6.00

a. On the graph paper on page 7 of this question paper, plot a graph of resistance on the y-axis against length on the x-axis.

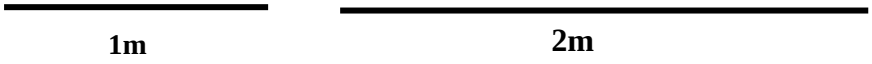
[6]

b. From your graph find:

i) the length of wire that has a resistance of 1 ohm. _____ [2]

ii) the resistance of a wire of length 0.5m. _____ [2]

c. The graph shows that the _____of a wire and its length are directly proportional. [1]

d. 

The diagram above shows two lengths of wire of the same thickness.
Fill in the missing space in the table below:

Length of wire	**Resistance**
1m	5 ohms
2m	

[2]

e. 

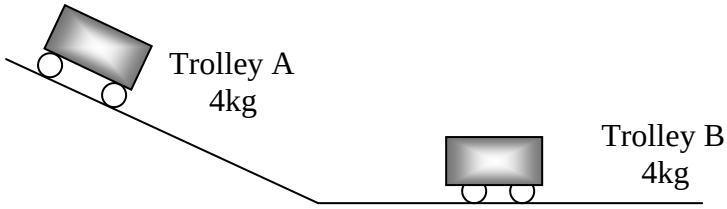
The diagram above shows two equal lengths of wire of different thickness or diameter.
Fill in the missing space in the table below:

Thickness / Diameter of wire	**Resistance**
2mm	6 ohms
4mm	

[2]

Use a graph paper for this page

8. In an experiment about momentum, a trolley A of mass 4kg is allowed to roll down a ramp. When its speed is 5m/s, it collides with a stationary trolley B also of mass 4kg.



a. i) Momentum = _____ x velocity. [1]

ii) Which of the following is the unit of momentum ?

N/kg ☐ kgm/s☐ N/s ☐ kg/s^2 ☐ N/s^2 ☐ [1]

b i) Fill in the empty spaces in the table below :

Just BEFORE the collision

	Mass	**Velocity**	**Momentum**
Trolley A		**5m/s**	
Trolley B		**0**	

[1, 2]

[1, 2]

ii) Total momentum before the collision is

☐ + ☐ = ☐ [2]

c. On collision , the trolleys stick together and move forward with an initial velocity of 2.5m/s.

Fill in the empty spaces in the table below :

Just AFTER the collision

	Mass	**Velocity**	**Momentum**
Trolley A + Trolley B		**2.5m/s**	

[1, 2]

d. This experiment shows that :

Total momentum before the collision = Total _____ [2]