



St Margaret's College Boys' Secondary

Verdala, St Nicholas Road, Cospicua

HALF-YEARLY EXAMINATIONS – FEBRUARY 2011

PHYSICS TRACK 2

TIME: 1 hr and 30 mins

Mark:

____ /100

NAME AND SURNAME: _____

CLASS: _____

INDEX NUMBER: _____

INSTRUCTIONS TO CANDIDATES:

Read all the questions carefully before you start answering.

Practical Work	Exam Mark

This paper carries a total of 85 marks

Where necessary take acceleration due to gravity to be 10 m/s².

You may find some of these formulae useful:

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

$$\text{Weight} = \text{Mass} \times \text{Gravity}$$

$$\text{Moment} = \text{Force} \times \text{Perpendicular distance from pivot}$$

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}}$$

$$\text{Pressure} = \text{height} \times \text{density} \times \text{gravity}$$

Section A: Answer ALL questions. This section carries 40 marks.

1. Complete:

- a) The three states of matter are solid, _____ and _____.
- b) All matter is made up of _____ which are moving all the time since they have internal energy.
- c) When a solid is _____, its particles vibrate more frequently and more violently, until the solid normally changes to a _____ and later to a _____.

(___/6 marks)

- 2.** A plastic container has a mass of 20g when empty and 60g when some liquid is poured into it up to a height of 20cm.

The volume of the liquid is 0.00004m³.

Calculate:

- a) the **height** of the liquid in the plastic container in m.

_____ (1)

- b) the **mass** of the liquid in **kg**.

_____ (2)

- c) the **density** of the liquid in **kg/m³**.

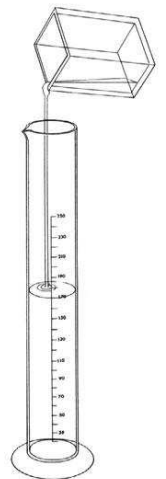
_____ (2)

- d) the **pressure** of the liquid at the bottom of the container.

_____ (2)

- e) the **total pressure**, in Pascal, on the bottom of the plastic container, if the atmospheric pressure is 100 000 Pa.

_____ (1)



(___/8 marks)

3. An elastic spring whose unstretched length is 0.8m is used to secure a bicycle on the roof rack of a car. To do so, the elastic spring is stretched to a length of 1.2m when a pulling force of 100N is applied.



a) What is the force in a stretched elastic spring usually called?

_____ (1)

b) What is the **extension** when this 100N force is applied?

_____ (1)

c) If the pull on the elastic is increased to 150N, find:

i) the **new extension**.

_____ (2)

ii) the **new length**.

_____ (1)

(___/5 marks)

4. The diagram shows an object hanging on an apparatus which measures weight.

a) What is the name of the apparatus?

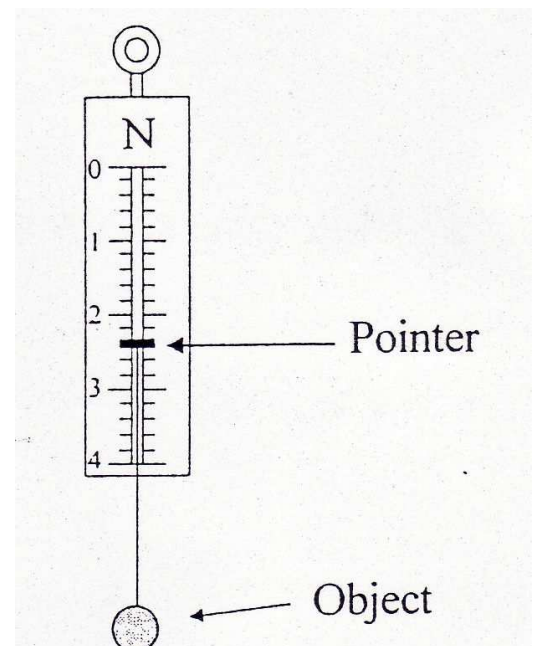
_____ (1)

b) What is the weight of the object shown by the pointer in the diagram?

_____ (1)

c) Calculate the **mass** of the object?

_____ (2)



(___/4 marks)

5. a) In solids, pressure depends on _____ and _____. (2)

b) When you do a handstand, the pressure on your hands is greater than the pressure on your feet when you stand upright. Why?

 _____ (2)

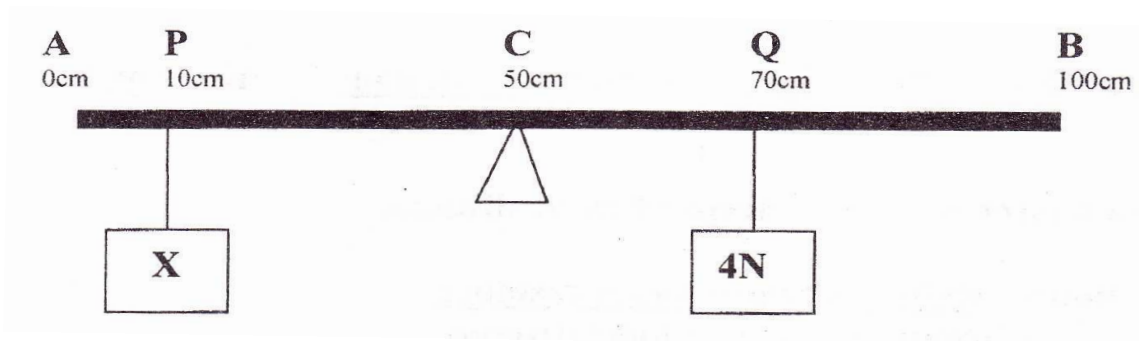


c) The wind pressure on the wall is 100Pa. If the wall has an area of 6m², what is the **force** on it?

 _____ (3)

(___/7 marks)

6. The diagram shows a meter ruler AB pivoted at its centre C. An object X is suspended from the 10 cm mark. When a 4N weight is suspended from the 70 cm mark, the ruler is in equilibrium.



a) When the ruler is in equilibrium:

total clockwise moments = _____ (1)

b) PC = _____ cm = _____ m **and** QC = _____ cm = _____ m (4)

c) The moment of the 4N weight about C is: _____ Nm (1)

d) The moment of X about C is: _____ Nm (1)

e) The size of X in Newtons is: _____ (2)

f) Total downward forces = _____ N (1)

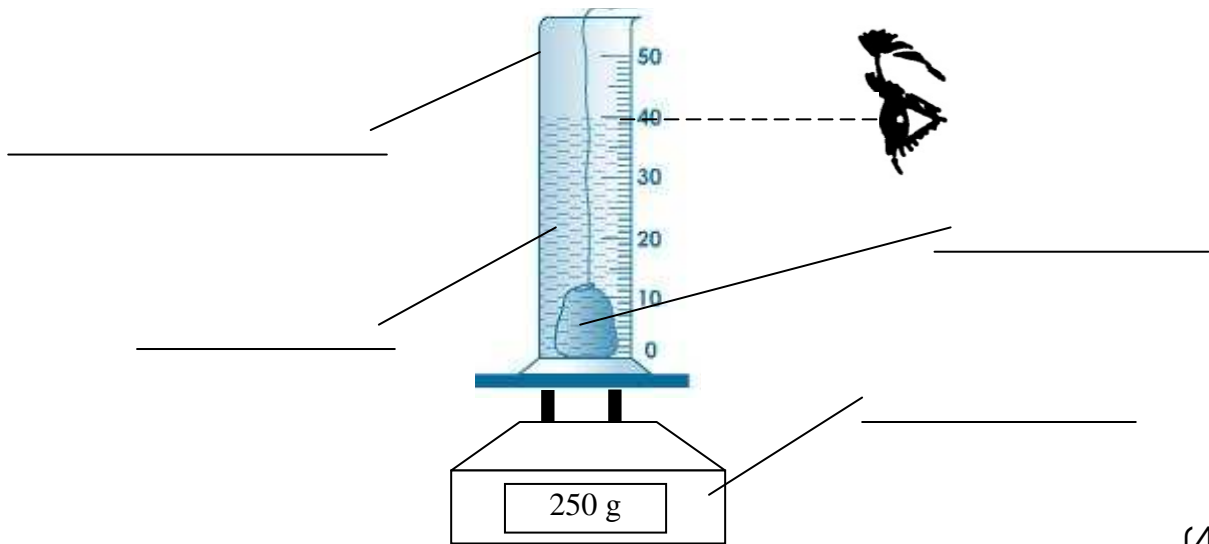
(___/10 marks)

Section B: Answer ALL questions. This section carries 45 marks.

7. John and Mark investigate the density of a stone. They measure the mass and the volume of the stone.



a) **Label** the diagram below:



(4)

b) **Number** the following sentences in the correct order needed to find the volume of the stone. (1)

	The two readings are subtracted to find the volume of the stone only.
	Some water is poured into the measuring cylinder and its volume is read.
	The stone is placed gently in the measuring cylinder and the new volume is read.

c) John and Mark find that the volume of the stone is 15cm^3 and its mass is 90g . Calculate its **density**.

(2)

d) **Complete:**

- i) During the experiment Mark and John make sure that they are accurate and they take readings from the measuring cylinder at _____.
- ii) They tie the stone to a _____ and lower it _____ into the water to avoid loss of water.

(3)

- e) After the experiment, John breaks the stone into three pieces of different sizes. Will the density of each piece be different from that of the original stone?

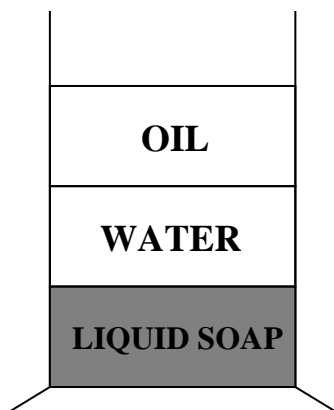
_____ (1)

- f) Mark pours some liquid soap, water and oil in a container and notices that they do not mix. John explains that this happens because the three liquids have different densities. **Match** each liquid to its correct density by choosing from the values below.

1 g/cm³

1.6 g/cm³

0.9 g/cm³



Density of **Oil**: _____ g/cm³

Density of **Water**: _____ g/cm³

Density of **Liquid Soap**: _____ g/cm³

(3)

- g) Some more oil is poured in the container. Will it still float on water?

YES

NO

(Tick (✓) the correct answer)

(1)

(___/15 marks)

8. In a spring experiment, the results were:

Load (N)	0	1	2	3	4	5	6
Length (mm)	40	48	56	64	72	80	88
Extension (mm)	0						

- a) What is the **original length** of the spring? _____ (1)
- b) Complete the table by finding the extension for each load. (3)
- c) Plot a **graph** of extension (y-axis) against load (x-axis). (4)
- d) Use your graph to answer the following questions:
- i) What **load** would give an extension of 28 mm? _____ N
- ii) What would be the **extension** for a load of 4.5 N? _____ mm (2)
- e) i) **Complete:**
- Hooke's Law states that when an object is stretched, the extension is directly _____ to the stretching force provided that the _____ limit is not exceeded. (2)
- ii) Does the spring obey **Hooke's Law**? _____ (1)
- iii) How can you tell from the graph?
_____ (1)
- f) Was the **elastic limit** of the spring exceeded in this experiment?
_____ (1)

(___/15 marks)

9. a) Fill in the blanks using the following words:

newton	area	pressure	pascal	oil
--------	------	----------	--------	-----

- i) The unit for pressure is the _____.
- ii) The liquid used in hydraulic machines is _____.
- iii) The smaller the _____ of contact of an object with a surface the larger the pressure exerted by the object.
- iv) The deeper you go into a liquid the larger the _____.
- v) The unit for force is the _____ (5)

b) Paul of mass 90 kg sits on a sofa of mass 20 kg. The sofa has 4 legs **each** of area 0.005 m² in contact with the floor.

- i) What is the **total mass** of Paul and sofa? _____ (1)
- ii) What is the **total weight** of Paul and sofa? _____ (1)
- iii) What is the **total area** of the four legs of the sofa?
 _____ (1)
- iv) What is the **pressure** on the ground when Paul sits on the sofa?

 _____ (2)

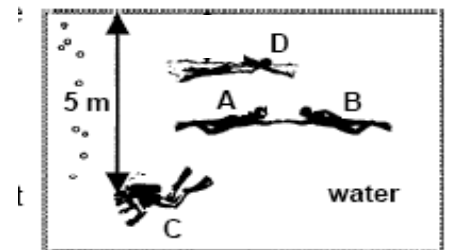
c) The figure shows an underwater photograph of four divers:

- i) Which two divers are under the **same pressure**?

_____ and _____ (1)

- ii) Who has the **greatest pressure**?

_____ (1)



- iii) Calculate the **pressure** due to the water on diver C, given that the density of water is 1000 kg/m³.

 _____ (3)

(___/15 marks)