



St Margaret's College Boys' Secondary

Verdala, St Nicholas Road, Cospicua

HALF-YEARLY EXAMINATIONS – FEBRUARY 2011

PHYSICS TRACK 3

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**.

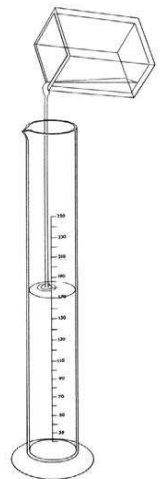
_____ (2)

- 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 cord whose unstretched length is 0.8m is used to secure a bicycle on the roof rack of a car. To do so, the elastic cord 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 cord 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?

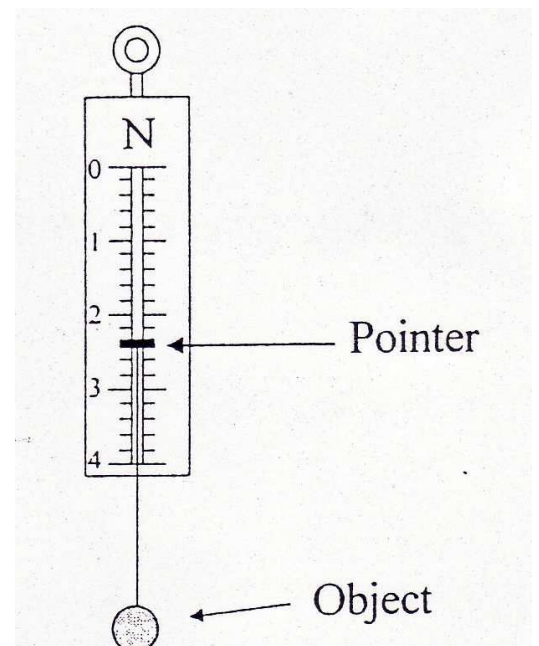
_____ (1)

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?



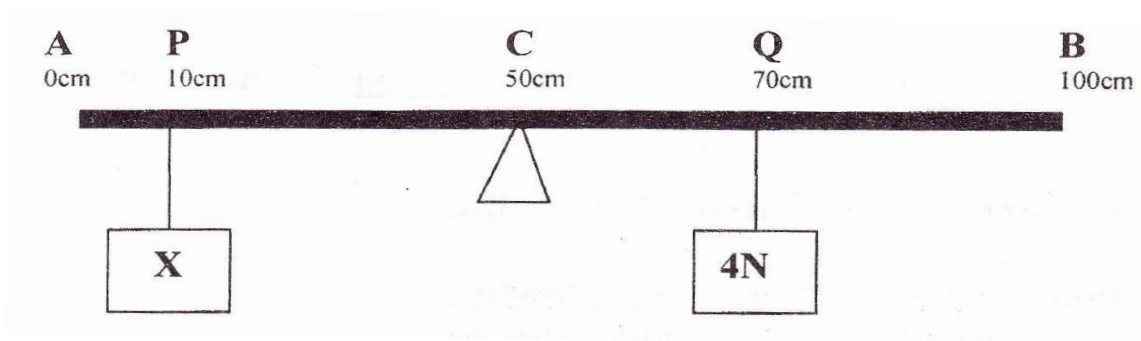
_____ (2)

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)

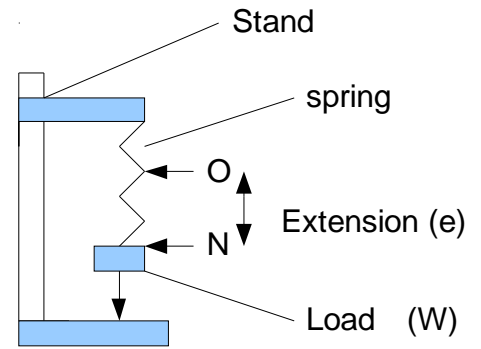
e) The size of X in Newtons is: _____ (2)

f) Total downward forces = _____ N (1)

(___/10 marks)

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

7. A spring is hung on a stand as shown. Maria measures the lengths of the extension for each load.



a) **Complete by filling the blanks:**

(each word may be used more than once)

load	extension	exceeded	elastic
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- i) When a spring is loaded the increase in length is called the _____.
- ii) A spring obeys Hooke's Law if the _____ and the _____ are directly proportional.
- iii) For a load of 10N the spring does not return to its original length when the load is removed. This happens because the _____ limit has been _____.

(5)

b) The table shows the readings that are recorded:

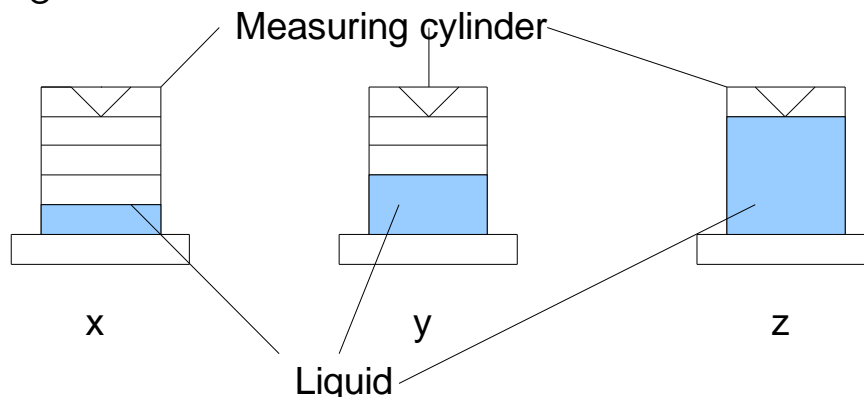
Load (N)	0	1	2	3	4	5
Extension(mm)	0	10	20	30	40	50

- i) On the graph paper provided **plot a graph** of the extension (*y-axis*) against the load (*x-axis*). (6)
- ii) Use the graph to find the missing values in the following table. (4)

Load (N)	1.2	4.5		
Extension(mm)			35	45

(___ /15 marks)

8. The three measuring cylinders **X**, **Y** and **Z** each have a different mass of the same type of liquid. Each empty measuring cylinder has a mass of 100g.



John is asked to carry out an experiment to find out if the density of the liquid depends on its mass.

a) i) What additional apparatus is needed to measure the mass of the liquid? _____ (1)

ii) Two measurements are needed for calculating density. Which are they? _____ and _____ (2)

iii) Complete by filling in the headings and the values of the following table. (5)

Measuring cylinder	_____ (g)	_____ (cm ³)	Density (_____)
X	12.0	10.0	1.2
Y	24.0	20.0	
Z	36.0	30.0	

iv) Would you expect the values of the densities of the liquid in the measuring cylinders **X**, **Y** and **Z** to be **different** or **the same**?

_____ (1)

b) John buys a bottle of this liquid from the local shop. The density of the liquid is 1200 kg/m^3 .

i) Find the **mass** of the liquid in the bottle if its volume is 0.001 m^3 .

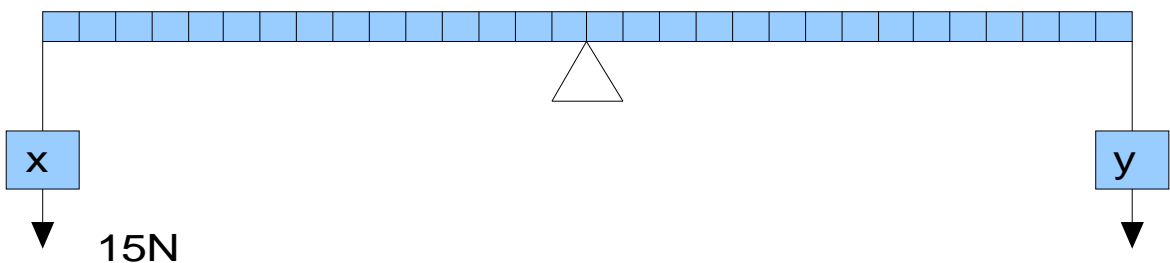
_____ (3)

ii) Calculate the **weight** of the liquid in Newtons.

_____ (3)

(____/15 marks)

9. The diagram shows a uniform metre ruler balanced at the 50cm mark. Weight **X** and weight **Y** are set at the very end points.



a) Where does the centre of gravity of the uniform metre ruler act?

_____ (1)

b) When the ruler is balanced, the value of the weight **Y** is = _____ N

(1)

c) **Y** is removed so that the ruler loses its balance. In which direction will the metre ruler turn, clockwise or anticlockwise?

_____ (1)

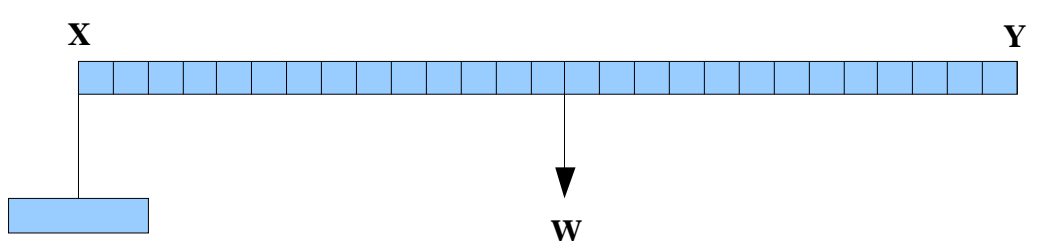
d) When **Y** is removed, the ruler is balanced again by moving the pivot towards one end.

i) In order for the ruler to be balanced again, the pivot should be moved:

Choose the correct option by marking with a (✓).

towards **X** towards **Y** (1)

ii) **Draw** the pivot on the diagram below. (1)



iii) What does **W** stand for? _____ (1)

iii) The length between end **X** and the pivot is **0.2m**.
Mark this on the diagram above. (1)

iv) The length between **W** and the pivot is **0.3m**.
Mark this on the diagram above. (1)

v) The direction of the moment created by **X** is _____, while the direction of the moment created by force **W** is _____. (2)

vi) Find the value of **W**. (Remember **X** = 15 N)

_____ (5)

(___/15 marks)