Saint Theresa College
PARVA PARVORUM PULCHRA

SECONDARY SCHOOL - IMRIEĦEL

HALF-YEARLY EXAMINATIONS 2016/2017

Track 2

FORM: 3 **PHYSICS** Time: **1½ hrs**

Name:_____ Class:_____

- Answer all the questions.
- Write down your answers in the spaces provided.
- The use of a calculator is allowed.
- Whenever necessary take g to be 10N/kg.

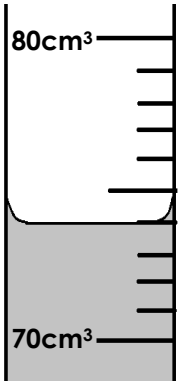
Formulae that can be used are listed below:

Density	$\rho = \frac{m}{V}$
Force	W = mg
	Moment = Force x perpendicular distance
Pressure	$P = \frac{F}{A}$
	P = hρg

Question	1	2	3	4	5	6	7	8	9	10	Total Marks	Practical Mark	Final Mark
Mark	5	6	7	3	6	7	6	15	15	15	85	15	100
Score													

SECTION A. This section carries 40marks

1. This question is about Measurements.



(a) Read the volume of the liquid in the measuring cylinder:

_____

[1 mark]

(b) Fill in the following table:

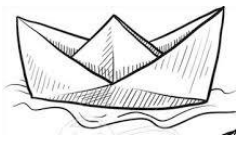
Quantity	Symbol	S.I. Unit
	l	m
Mass		kg
Density		kg/m^3
Time	t	
Force	F	
	P	Pa
Volume		

[4 marks]

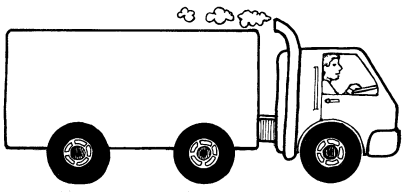
2. ***This question is about Forces***

(a) **Draw** and **label** the forces acting on the following diagrams:

Girl sitting on a pile of books



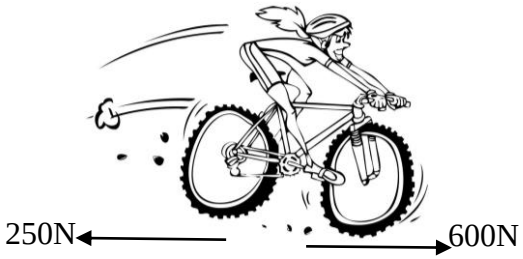
Paper boat floating on water



A moving truck

[3 marks]

(b) Find the **resultant force** acting on the following objects stating both the **size** and **direction**



i. Resultant Force =

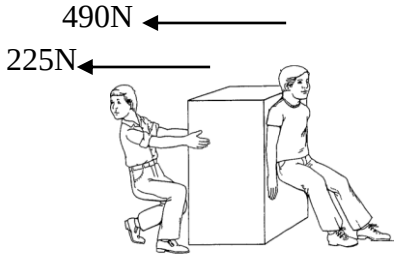
_____

_____

ii. Resultant Force =

_____

_____



iii. Resultant Force =

_____

_____

[3 marks]

3. ***This question is about Weight***

(a) Sky the dog has a mass of 25kg.

i. Calculate the **weight** of the dog here on *Earth*

_____

_____

[2 marks]

ii. Sky was taken to the Moon where gravity is 1.62N/kg. Calculate the **weight** of Sky on the *Moon*.

_____

_____

[1 mark]

iii. Why does the *weight* of Sky change on the Moon?

_____

_____

[1 mark]

iv. Will the *mass* of the dog change on different planets?

_____

[1 mark]

(b) <u>*Circle*</u> the **vectors** from the following list of quantities:

Time, weight, friction, volume

[2 marks]

4. ***This question is about Centre of Gravity***

On the diagrams below **mark** and **label** the centre of gravity as **c.g**.

[3 marks]

5. This question is about Pressure

Julia has a formal ceremony at the St John's Co-Cathedral in Valletta. She decides to wear heels for the occasion.

(a) Julia's mass is 60 kg. Find her **weight**.

_____ [1 mark]

(b) The area of one shoe is 0.02m^2. Calculate the **area** as Julia stands on *both feet*.

_____

_____[1 mark]

(c) Find the **pressure** which Julia exerts on the ground when standing on both feet.

_____

_____ [2 marks]

(d) As soon as she arrived at the cathedral, Julia was **not** allowed to enter because of her shoes. Explain **why**.

_____

_____

_____ [2 marks]

6. This question is about Density.

a) **Density** is the *mass* per unit _____ [1 mark]

b) Gregory had an Olympic medal and wanted to find its density. He found its mass to be **116g**.

Then he immersed it in a measuring cylinder, and the reading of the water level increased from **60cm³** to **71cm³**.

(i) Calculate the **volume** of the Olympic medal.

_____ [1 mark]

(ii) Hence calculate the **density** of the Olympic medal.

_____

_____

_____ [3 marks]

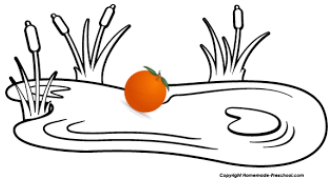
c) The table on the right gives the densities of some materials. From which **material** do you think the medal is made of?

_____ [1 mark]

Material	Density g/cm³
Bronze	7.6
Silver	10.5
Gold	19.3

d) One day, while jogging, Gregory noticed an orange floating in a pond. Given that the density of water is 1g/cm³, *suggest a value* for the **density** of an orange.

_____ [1 mark]



7. This question is about moments

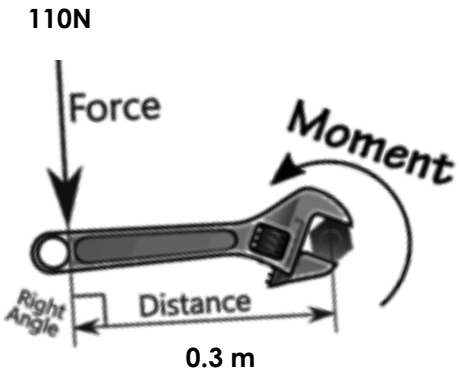
a) Moment of a force can be found by multiplying the _____ with the perpendicular _____ from the force to the pivot

[2 marks]

b) Jean and Sarah are repairing an old bicycle.

i. On the diagram, **mark the pivot** with an (**x**) [1 mark]

ii. If the perpendicular distance from the force to the pivot is 0.3m and the <u>maximum</u> force Jean and Sarah exert is that of 110N, calculate the **moment** produced.



_____

_____

_____[2 marks]

iii. The maximum force exerted by Jean and Sarah <u>was not enough</u> to turn the nut. Since they cannot increase the force, suggest another way how to **increase the moment**.

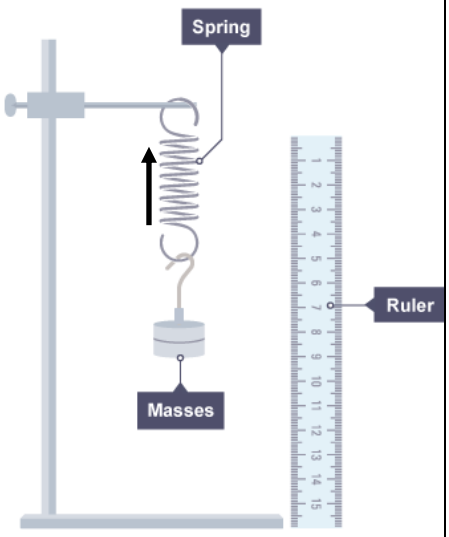
_____

_____[1 mark]

SECTION B. This section carries 45marks

8. This question is about Hooke's Law

John found three different springs. He wanted to investigate whether all springs extend in the same way when equal masses are attached to each spring using the set up as shown.



a) The table shows the different lengths at which each spring extends when the same mass was added.

SPRING	LENGTH OF SPRING (CM)
A	7
B	10
C	5

i. Which spring is the *stiffest* out of all three? **Why**?

_____

_____ [2 marks]

ii. **Underline** the upward force which the spring must exert to support the masses attached:

weight, tension, friction [1 mark]

b) John takes spring A and attaches different weights to it. He records the different extension in a table below.

Load (N)	0	1	2	3	4	5	6	7
Length of spring (cm)	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
Extension (cm)		0.5	1.0		2.0		3.0	

i. What is the **original length** of the spring when it is unloaded?

_____ [1 mark]

ii. **Complete** the missing values in the table. [2 marks]

iii. Plot a graph of **Extension (cm)** *on the y-axis* against **Load (N)** *on the x-axis.*

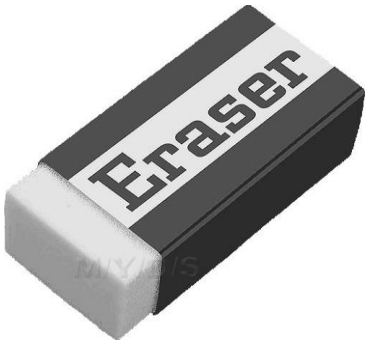
Scale: Take **4cm to represent 0.5cm on y-axis** and **2cm to represent 1N on x-axis.** [5 marks]

iv. **Hooke's Law states that** the _____ is directly proportional to the _____ applied unless the _____ limit is not exceeded. [3 marks]

v. From the graph determine the **Extension** of the spring produced with a force of 3.5 N.

_____ [1 mark]

9. *This question is about Density*



At the beginning of a scholastic year, Julia bought a new rubber whose dimensions were found to be **0.06 m** by **2.5 cm** by **1 cm**.

a. Change: 0.06 m = _____cm [1 mark]

b. Calculate the **volume** of the block in **cm^3**.

_____

_____

_____ [2 marks]

c. Given that the rubber has a mass of 16.5g, calculate the **density** of the rubber.

_____

_____

_____ [2 marks]

d. After using this rubber for 3 months, Julia's rubber was no longer regular in shape and much smaller. She wanted to calculate the density of the rubber.

Complete the **method** of the experiment carried out by using some of the words below.

subtract, add, electronic balance, mass, volume, rubber, measuring cylinder

i. Place the rubber on an _____ and read its mass.

ii. Fill the _____ with water and read its _____.

iii. Gently lower the _____ in the measuring cylinder and read the new volume.

iv. Then _____ the two volumes.

[5 marks]

e. Write down **2 precautions** needed to obtain an accurate result during this experiment.

_____

_____

_____[2 marks]

f. **Underline** the correct statement:

- The **mass** of the rubber (*increases, remains the same, decreases*).
- The **volume** of the rubber (*increases, remains the same, decreases*).
- The **density** of the rubber (*increases, remains the same, decreases*).

[3 marks]

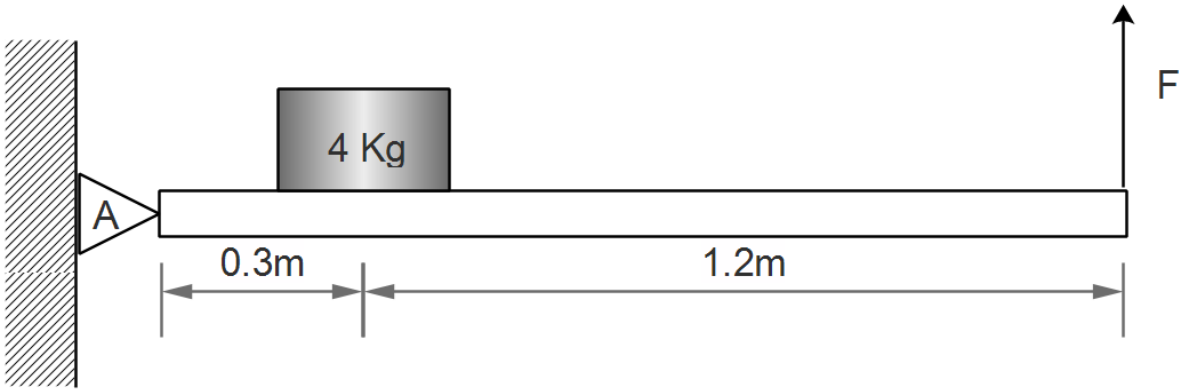
10. This question is about Moments

a. *Fill in the blanks:* **The Principle of Moments states that** when the system is in equilibrium, the total _____ moment is equal to the total _____ moment. [2 marks]

b. Equilibrium occurs when the total _____ forces is equal to the total _____ forces. [2 marks]

c. The **S. I. unit** of moments is _____. [1 mark]

d. A wooden shelf of mass 2kg and 1.5m long is attached to the wall by a hinge. A mass of 4kg is placed at 0.3m from pivot A as shown in the diagram.



i. On the diagram mark the **weight** of the wooden shelf with an (**x**)

[1 mark]

ii. Calculate the **weight** of the wooden shelf.

_____

_____[1 mark]

iii. Calculate the **weight** of the 4 kg mass.

_____

_____[1 mark]

iv. Calculate the **distance** between the *weight of the shelf* and the *pivot*

_____

_____[1 mark]

v. Calculate the **moment** produced by the wooden shelf

_____

_____[1 mark]

vi. Calculate the **moment** produced by the 4 kg mass

_____

_____[1 mark]

vii. What is the **total clockwise moment**?

_____[1 mark]

viii. Given the system is in equilibrium, what is the **anti-clockwise moment?**

_____ [1 mark]

ix. Find the **force F** in order for the system to be in equilibrium.

_____

_____ [2 marks]