Code: 24/2011

GIRLS' JUNIOR LYCEUM BLATA L-BAJDA

HALF-YEARLY EXAMINATIONS 2011
St Ignatius College

Subject: Physics **Form: 3** **Time: 1 hour 30 minutes**

Name & Surname: _____ **Class: _____**

Answer ALL questions in the spaces provided on the Exam Paper.
All working must be shown. The use of a calculator is allowed.
Where necessary take the acceleration due to gravity g = 10 m/s^2.
Good Luck!

Equations for Half-Yearly Exam Physics

Volume	**Volume = length x breadth x height**
Density	$\rho = \frac{m}{V}$
Force	**W = m g**
Work Done	**WD = F x s**
Power	$P = \frac{WD}{t}$
Moment of a Force	**M = F x s**
Motion	**Average speed =** $\frac{\text{total distance}}{\text{total time}}$

Marks Grid: For the Examiners' use ONLY

Question	1	2	3	4	5	6	7	8	Theory	Practical	Total
Max. Mark	8	8	8	8	8	15	15	15	85	15	100
Score											

Section A **This Section carries 40 marks.**

1. The list below shows some of the apparatus that you would normally find in a physics laboratory:

electronic mass balance, spring balance, measuring cylinder, beaker, displacement can, stop watch

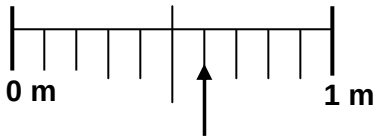
a. State which apparatus you would use to find the:

i. time taken for Maria to cover a distance of 30 m, _____ **1**

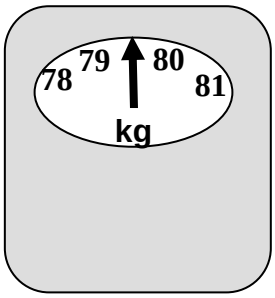
ii. volume of oil. _____ **1**

b. The figures below show three **measuring instruments** found in a laboratory.

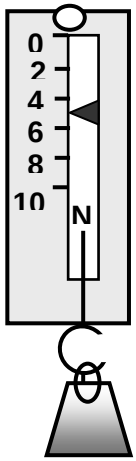
i.



ii.



iii.



Complete the missing data in the table below for the above figures i, ii, and iii.

Figure	Instrument	Physical Quantity	S.I. Symbol of Physical Quantity	Reading in S.I. Units	
i.	meter ruler	length			**2**
ii.	mass balance	mass		79.5 kg	**1**
iii.			W		**3**

2. **a.** The length of a plastic pipe is 265 cm. Its length in metres is _____ m. **1**

b. The mass of 3500 g of apples in kilograms is _____ kg. **1**

c. A flight to London takes 3 hours. This time in seconds is _____ s. **1**

d. The floor area of a small storeroom is 45000 $cm^{2.}$
This area in square metres is _____ m^2. **1**

e. The volume of a metal tank is 5000000 cm^3.
This volume in cubic metres is _____ m^3. **1**

f. The density of a brass frame is 8.86 g/cm^3.
Calculate the density of brass in kg/m^3. **1**

g. $8.0 \times 10^3 =$ _____. **1**

h. 74600 in standard form is given as _____ . **1**

3. The list below includes some of the physical quantities and terms used in Physics:

density, area, scalars, weight, direction, length, time, moment of a force, volume, vectors, size

a Complete the following statements using the appropriate word from the above list:

i. _____ are physical quantities having size and direction. **1**

ii. _____ are physical quantities having size only. **1**

b. From the above list choose:

i. one vector quantity. _____. **1**

ii. one scalar quantity. _____. **1**

c. In the morning, Martha walks to school covering a distance of 60 m. It takes her 30 s to arrive at the school gate.

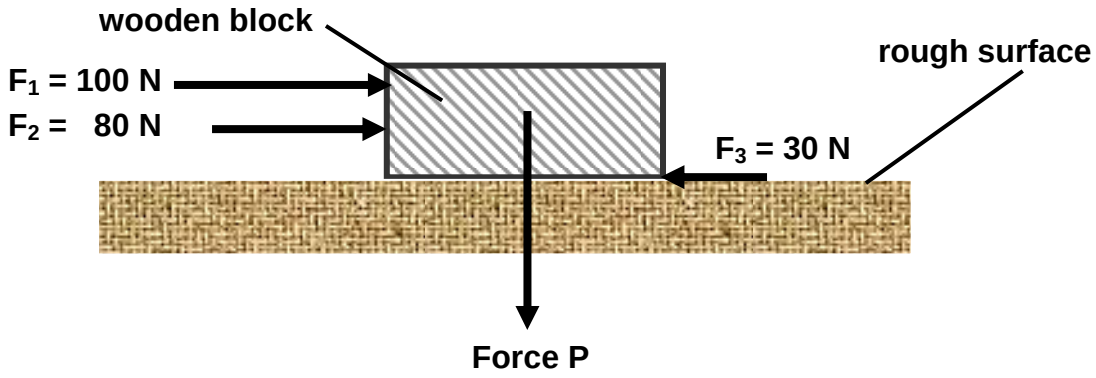
i. Calculate her average speed in m/s. **1**

ii. Martha takes the same time to return home from school in the afternoon.
Does she walk with the same average speed? _____. **1**

iii. Does Martha's velocity change while returning home from school? _____. **1**

iv. Explain your answer to question c. iii. **1**

4. Peter and Andrew push a wooden block forwards over a rough surface. Peter pushes the block with a force F_1 of 100 N, while Andrew pushes the block with a force F_2 of 80 N as shown in the diagram below.



a. On the above diagram, mark by the letter '**G**' the centre of gravity of the wooden block. **1**

b. Force P is the _____ of the wooden block acting vertically downwards. **1**

c. Calculate the:

i. size of Force P in Newtons given that the mass of the block is 20 kg. **1**

ii size of Force P acting on the moon given that the acceleration due to the force of gravity on the moon is1.6 N/kg. **1**

iii. difference between the size of Force P on Earth and that on the moon. **1**

d. Calculate the size of the total **forward force**. **1**

e. A third horizontal force, F_3, directly opposes the forces F_1 and F_2. This force is the force of friction acting between the wood block and the rough surface. **2**
Calculate the horizontal resultant force acting on the wooden block.

5. Energy is required for work to be done.

a. Complete the missing words in the Law of Conservation of energy:

Energy cannot neither be created nor _____ but it can only be _____ from one form to another. **2**

b. Complete the following table:

No.	Energy Converter	Input Energy	Output Energy	
i.	A turned on television		Heat, light and sound	**1**
ii.	Running up the stairs	Chemical Potential Energy		**1**
iii.	Burning gas in an oven	Chemical Potential Energy		**1**

c. Jake pushes a small table over a distance of 3 m in 6 s with a constant force of 20 N. Calculate the:

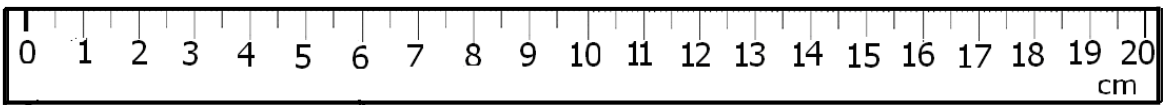
i. **work done** by Jake in Joules (J) in pushing the table, **1**

ii. **power** Jake develops while pushing the table. **2**

Section B **This Section carries 45 marks.**

6. This question is about Balancing Forces

a. Marija is trying to balance her 20-cm uniform ruler on the tip of her finger.



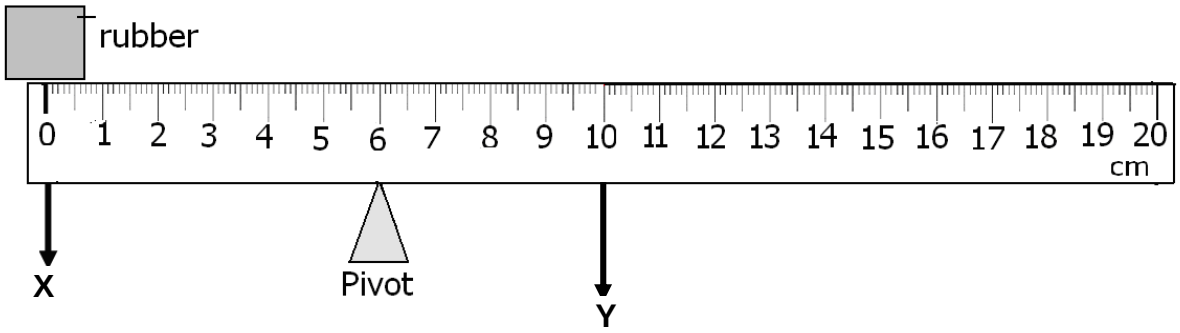
i. At which point on the ruler should she place her finger in order to balance it? **1**

ii. What is this point called? **1**

iii. Marija's finger, about which the ruler balances, acts as a _____ **1**

iv. Name of the downward force acting at this point. _____ **1**

b. Marija decides to place her rubber of weight 0.2 N at one end of the ruler at the 0 cm mark as shown in the diagram below.
She realises that she has to move her finger to the 6 cm mark in order to keep the ruler balanced.



i. Force X is the weight of the _____. **1**

ii. Force Y is the weight of the _____. **1**

iii. State the direction of the turning effect (moment) of Force X. _____ **1**

iv. Calculate the size of the turning effect of force X about the pivot.

2

v. Determine the distance between force Y and the pivot.

1

vi. State the direction of the moment of force Y. _____

1

vii. What is the moment of force Y?

2

viii. Calculate the size of force Y.

2

7. This question is about Density

Martina found two small dolls, A and B, at Aunt Zara's house. While she was washing them in a basin of water, one of the dolls floated whilst the other sank. She wanted to find the density of the materials that the dolls were made up of.

a. She first began by measuring the mass of each doll.

i. Name the apparatus Martina used to find the mass of each doll. _____. **1**

ii. State the S.I. unit for the mass of each doll. _____ **1**

b. Describe how Martina measured the volume of the doll that sank in water. **3**

c. Martina found that the volume of doll A was 25 cm^3 and its mass was 116 g. Calculate its density in g/cm^3. **1**

d. The mass of doll B is 85 g and its density is 0.9 g/cm^3.
Calculate the volume of doll B in cm^3. **1**

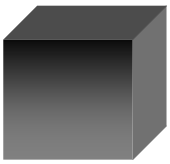
e. The density of water is 1 g/cm^3.

i. Which doll sank in water? _____ **1**

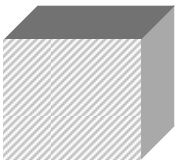
ii. Explain your answer to question e.i. **1**

iii. Suggest a **material** of which the doll that floated on water might be made of? **1**

f. Martina's younger brother, Mark, was playing with a wooden block and an aluminium block shown below.



aluminium block



wooden block

Martina notices that both blocks have the **same volume**. When finding their mass, Martina noted that the aluminium block has greater mass than the wooden block.

i. Which block has the greater density? _____ **1**

ii. Give a reason for your answer to question f.i. **2**

iii. Explain **briefly** why an iron ship floats on water while an iron nail sinks in water. **2**

8. This question is about Hooke's Law.

A steel spring is 50 mm long. The incomplete table below shows the extension produced to the steel spring when Alexia loads it with different weights.

extension / mm	0	8	16	24		40		56
weight / N	0	1	2		4	5	6	7

a. Complete the above table of results. **3**

b. Plot a graph of extension (y-axis) against weight (x-axis) on the graph paper provided. **4**

c. From your graph find the:

i. extension of the spring in mm when the weight is 1.5 N, _____ **1**

ii. weight in N causing an extension 20 mm, _____ **1**

iii. mass in kg causing an extension of 16 mm, **1**

iv. the length of the steel spring in mm when the load of 7 N is attached to it. **1**

d. The teacher asks Alexia to unload the spring at the end of the experiment.

i. What is the expected length of the steel spring in mm after Alexia removes all the loads from the spring? **1**

ii. On what assumption did you base your answer to question d.i. above? **1**

e. Complete the following statement:

According to Hooke's law, the extension of a spring is directly proportional to the weight attached to it provided that the attached load is not greater than the _____ limit of the spring. **1**

f. State one precaution Alexia takes during the experiment in order to obtain such accurate results. **1**