

Code: 24/2012



GIRLS' JUNIOR LYCEUM BLATA L-BAJDA

HALF-YEARLY EXAMINATIONS 2012
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 $g = 10 \text{ m/s}^2$.
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 | Work Done = F x s |
| Power | $P = \frac{\text{Work Done}}{t}$ |
| Moment of a Force | $M = F \times s$ |
| Motion | average speed = $\frac{\text{total distance}}{\text{total time}}$ |

Marks Grid: For the Examiners' use ONLY

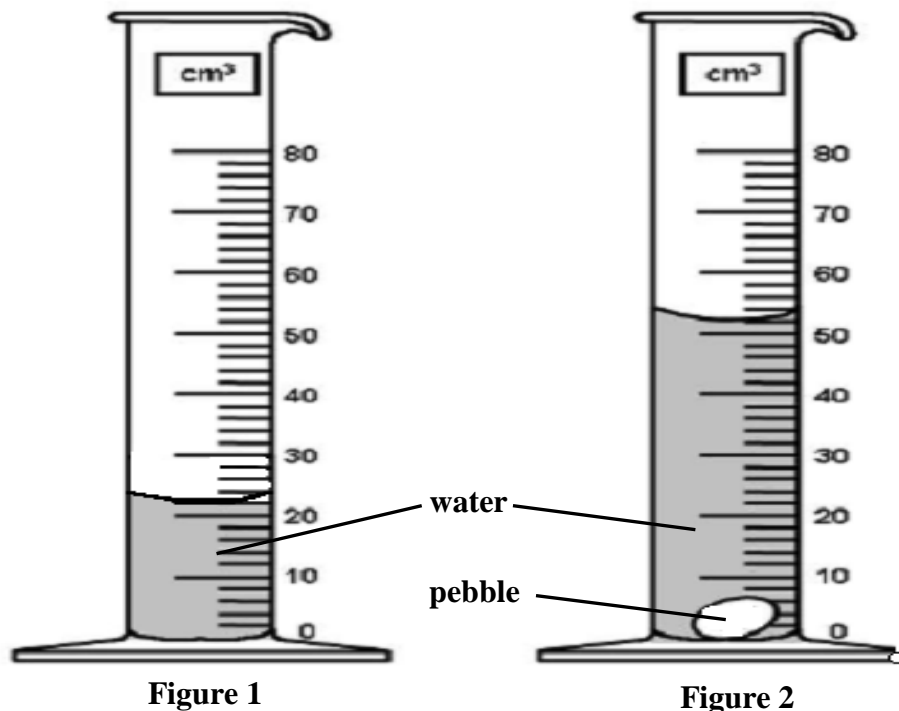
| Question | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Theory | Practical | Total |
|-----------|---|---|---|---|---|----|----|----|--------|-----------|-------|
| Max. Mark | 8 | 8 | 8 | 8 | 8 | 15 | 15 | 15 | 85 | 15 | 100 |
| Score | | | | | | | | | | | |

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

1. Work out the following:

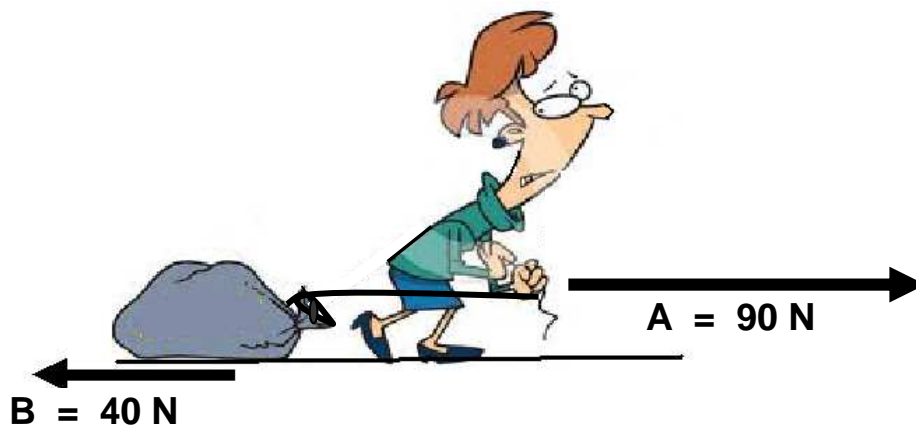
- a. Mario's mass is 73000 g. His mass in kilograms is _____ kg. 1
- b. A stool is 80 cm high. Its height in metres is _____ m. 1
- c. Tina takes 15 minutes to walk from home to school. This time in seconds is _____ s. 1
- d. A pile of 500 sheets of paper has a mass of 2 kg. The pile is 30 cm long, 20 cm wide and 5 cm high. Calculate the:
- i. mass of one sheet of paper in kg, 1
- ii. length of one sheet of paper in m, 1
- iii. area of one sheet of paper in m^2 , 1
- iv. volume of the pile in m^3 . 2

2. Figure 1 below represents a measuring instrument containing some water. A pebble is gently lowered into the water in this measuring instrument and the water level rises as shown in figure 2.



- a. Name the measuring instrument shown in figures 1 and 2. _____ **1**
- b. The measuring instrument in Figure 1 and Figure 2 is used to measure the _____ of a liquid in cm^3 . **1**
- c. The reading of the water level in Figure 1 is _____ cm^3 . **1**
- d. The reading of the water level in Figure 2 is _____ cm^3 . **1**
- e. The reading in Figure 2 gives the volume of water and the volume of the _____. **1**
- f. Calculate the volume of the pebble in cm^3 **1**
- g. Give two precautions that need to be taken when reading the water levels represented in Figures 1 and in Figure 2 **2**

3. Mary pulls a bag with a horizontal force A of 90 N.

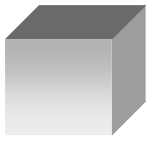


- a. Force _____ is the opposing force due to friction between the bag and the ground. **1**
- b. Calculate the resultant force acting on the bag. **2**
- c. State the direction of this resultant force _____ **1**
- d. The list below includes some of the physical quantities:
vector, scalar, size, direction

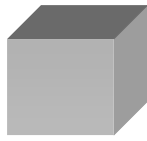
Complete the following statements using the appropriate word from the above list:

- i. Force is a physical quantity having size and _____. **1**
- ii. Force and velocity are two examples of _____ physical quantities. **1**
- iii. Time is a physical quantity having _____ only. **1**
- iv. Time and speed are two examples of _____ physical quantities. **1**

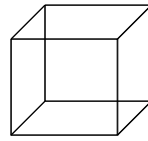
4. Martha examines four **equally** sized solid cubes made up of different materials as shown below.



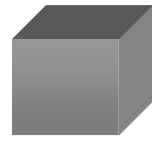
aluminium



tin



glass



lead

The density of the material of each cube is given in the table below:

- a. i. Which cube has the greatest mass?

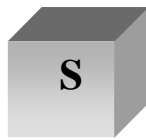
- ii. Give a reason for your answer.

| Material | Density ρ in g/cm^3 |
|-----------|-----------------------------------|
| Aluminium | 2.7 |
| Tin | 7.3 |
| Glass | 3.6 |
| Lead | 11.4 |

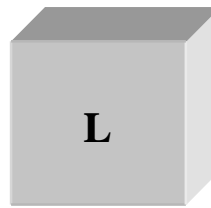
1

1

- b. Maria brings another aluminium cube larger than that of Martha's. Maria and Martha stick the letter **S** on the smaller cube and the letter **L** on the larger cube as shown below.



aluminium



aluminium

- i. The density of the larger aluminium cube is:

greater than 2.7 g/cm^3 smaller than 2.7 g/cm^3 equal to 2.7 g/cm^3

Tick the box (\checkmark) near the correct answer:

1

- ii. Explain your answer to question 4.b. i.

1

- c. Martha and Maria carry out an experiment to find the density of two balls A and B made up of different material. They enter the data obtained during their experiment in the table as shown below.

| Reading | Mass m in g | Volume V in cm^3 | Density ρ in g/cm^3 |
|---------|---------------|-----------------------------|-----------------------------------|
| Ball A | 14 | | 0.81 |
| Ball B | 50 | 31.6 | |

1

1

- i. Complete the missing data in the above table.

- ii. Martha and Maria pour some water in a shallow basin and place the two balls A and B into the water. The density of water is 1 g/cm^3 .

Complete:

Ball _____ sinks in water because _____

2

5. a. Complete:
The principle of conservation of energy states that energy can neither be created nor destroyed but can be _____ from one form to another. 1

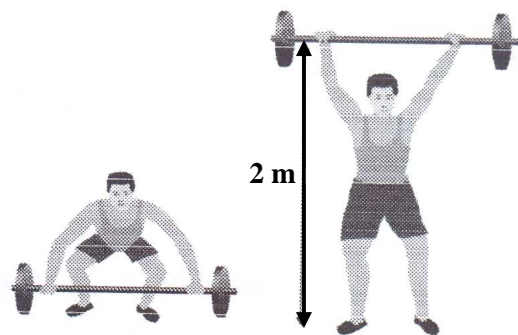
b. Complete the following table to show the **main** energy changes from one form to another.

| Energy IN | Energy Converter | Main Energy OUT |
|------------|------------------|-----------------|
| | light bulb | light and heat |
| electrical | radio | |
| | human body | kinetic |
| chemical | gas heater | |

c. Mario is a weight lifter. He lifts a total mass of 50 kg above his head as shown in the figure below. Calculate the: 1

i. total weight in N lifted by Mario,

ii. work done by Mario when lifting the total weight through a height of 2 m. 2



Section B

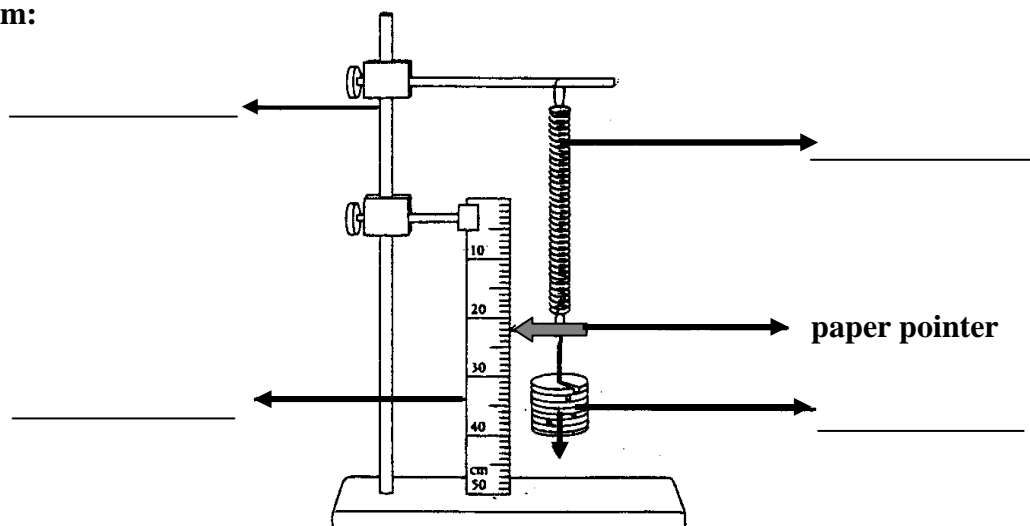
This Section carries 45 marks.

6. This question is about the elastic limit of a spring

Amy and Valentina are asked to find the elastic limit of a spring. They carry out the experiment and record their findings in their laboratory book as shown below.

a. Amy draws the diagram of the experimental set-up. Complete the missing labels.

Diagram:



- b. Valentina records the experimental procedure as shown below. However, she does not record the steps in order. Indicate the order using numbers **2** to **5** in which the steps of the experiment have to be performed. Step 1 is indicated as shown.

Method:

| | | |
|----------|--|---|
| | The position of the paper pointer on the metre ruler is noted. | 1 |
| 1 | The apparatus is set up as shown in ‘ Diagram ’ | |
| | A graph of extension [y-axis] against the load [x-axis] is plotted. | 1 |
| | The extension e produced when different slotted masses are added to the mass hanger, is recorded in the table of results. | 1 |
| | The extension e produced by the mass hanger is recorded in the table of results. | 1 |

- c. Complete the missing data left out by Amy in the table below

Results:

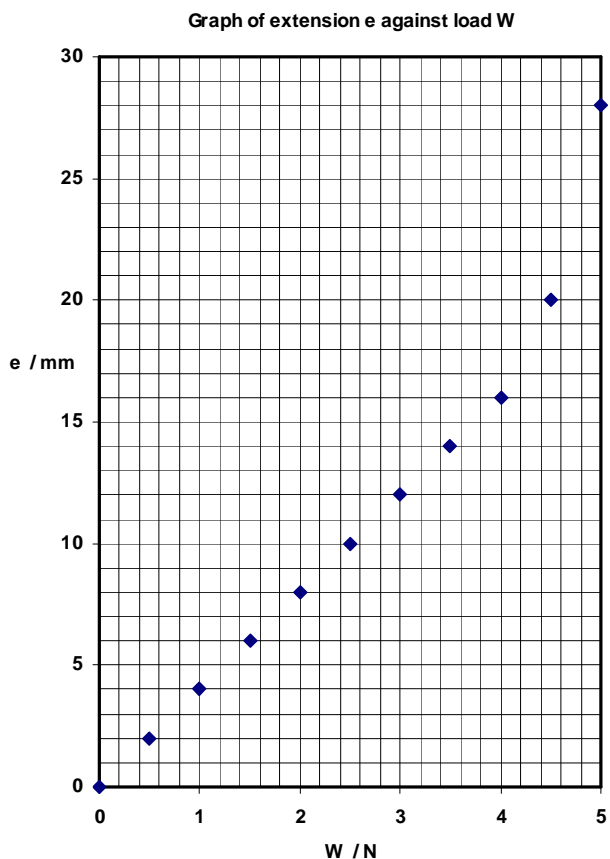
| Reading | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|------------------------|---|------|------|------|------|------|------|------|-----|------|------|
| mass m /kg | 0 | 0.05 | 0.10 | 0.15 | 0.20 | 0.25 | 0.30 | 0.35 | 0.4 | 0.45 | 0.50 |
| weight W /N | 0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | | 4 | 4.5 | 5.0 |
| extension e /mm | 0 | 2 | 4 | | 8 | 10 | 12 | 14 | 16 | 20 | 28 |

- d. Valentina and Amy plot the points for the graph of extension **e** against load **W** as shown below.

- i. **Draw the graph** for the plotted points on the adjacent graph of extension **e** against the load **W**.

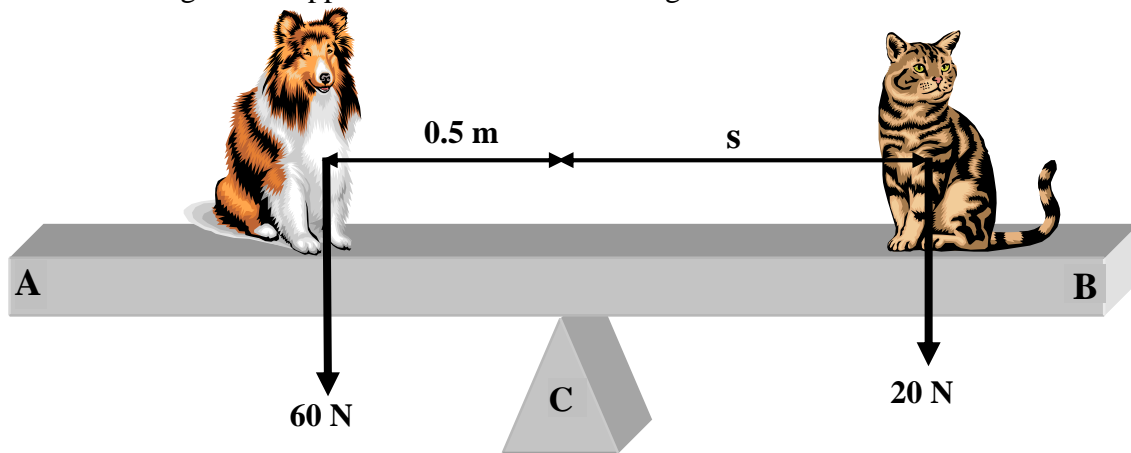
- ii. Explain the term ‘elastic limit’.

- iii. Use the graph to determine the approximate value of the elastic limit of the spring.
The elastic limit of this spring is equal to _____



7. This question is about the turning effect of forces.

Thunder the dog and his friend Marmalade the cat are sitting on a see-saw AB. Thunder weighs 60 N, and is sitting 0.5 m away from the pivot C, which is at the centre of the see-saw. Marmalade sitting on the opposite side of Thunder weighs 20 N.



- a. Explain briefly, what you understand by the term 'pivot'. 1
- b. State the direction of the moment about the pivot C due to:
- i. Thunder's weight _____ 1
- ii. Marmalade's weight _____ 1
- c. Complete the following:
- i. The direction of Thunder's and Marmalade's weight is vertically _____ towards the centre of Earth. 1
- ii. The Law of Moments states that for a system of forces in _____, the sum of the _____ moments about the pivot is equal to the sum of _____ moments about the same _____. 1
2
1
- d. Calculate the:
- i. distance s from the pivot C where Marmalade must sit so that the see-saw remains balanced, 4
- ii. **length** of the see-saw given that distance between end A of the see-saw and Thunder is 1.5 m and the distance between end B of the see-saw and Marmalade is 0.5 m, 1
- iii. total **weight** supported by the pivot C given that the weight of the see-saw is 40 N. 1
- e. Marmalade wants to go down from the see-saw but is afraid to jump. In what direction must Thunder move so that the see-saw turns slowly towards the ground on Marmalade's side? 1

8. This question is about find the average speed and the plotting of a graph.

a. Rita and Angie are asked to find Nadia's average speed **S** as she walks along the corridor from her classroom to Jolene's classroom, which is at the end of the corridor.

i. Name the two **measurements** Rita and Angie have to take in order to find the Nadia's average speed **S** as she walks along the corridor to her friend's classroom. **2**

ii. Name the two **instruments** required by Rita and Angie to take the measurements referred to in question a.i. **2**

iii. Write down the **equation** Rita and Angie use to find Nadia's average speed as she walks along the corridor to Jolene's classroom. **1**

iv. The distance between Nadia's classroom and Jolene's classroom is 30 m. Nadia takes one minute to cover this distance. Calculate her average speed. **2**

b. Rita, Angie and Nadia watch their friend Jolene during the school-racing event. The straight racing track is 300 m long with distance markers at 20 m intervals. Rita holds the timing instrument while Angie reads the time taken by Jolene every time she covers a distance of 20 m. Nadia writes down the results in the table shown below.

| | | | | | | | |
|---------------|---|----|----|----|----|-----|-----|
| s in m | 0 | 20 | 40 | 60 | 80 | 100 | 120 |
| t in s | 0 | 10 | 20 | 30 | 40 | 50 | 60 |

i. Plot a graph of distance **s** (y-axis) against the time **t** (x-axis) on the graph paper provided. **4**

ii. Use your graph to find the **distance covered** by Jolene after 35 s. _____ **1**

iii. Use your graph to find the **time taken** by Jolene to cover 110 m. _____ **1**

iv. Calculate Jolene's **speed** during the first 60 s of the race. **1**

c. Explain why distance is plotted on the y-axis and **NOT** on the x-axis. **1**