Code: 17/03/01/2009

Saint Ignatius College
Maria Regina Girls'Junior Lyceum
BLATA L-BAJDA

HALF-YEARLY EXAMINATION 2009

PHYSICS **Form 3** **Time: 1 hr 30 min**

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	**Density = $\frac{\text{mass}}{\text{volume}}$**
Energy	**PE = m g h** **KE = ½ m v^2**
Work	**Work done = F s** **Power = $\frac{\text{work done}}{\text{time}}$**
Force	**Weight = m g**
Motion	**Average speed = $\frac{\text{total distance}}{\text{total time}}$**
Moments	**moment of a force = force x perpendicular distance**
Optics	**m = $\frac{\text{image distance}}{\text{object distance}}$** **m = $\frac{\text{height of image}}{\text{height of object}}$**
	refractive index of glass = $\frac{\text{speed of light in air}}{\text{speed of light in glass}}$
Waves	**frequency = $\frac{\text{number of waves}}{\text{time}}$** **v = f λ**

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. **a.** The mass of a watermelon is 2450 grams. Its mass in kilograms is _____ kg. **1**

b. A table is 1.35 m long. Its length in centimeters is _____cm. **1**

c. It takes Clara 80 minutes to arrive at her friend's house from her own house. The time in seconds is _____ s. **1**

d. The volume of water in a tank is 3000 000 cm^3. **1**
Its volume in cubic meters is ____ m^3.

e. A volume of 25 ml in cm^3 = _____ cm^3. **1**

f. The area of a glass table top is 2500 cm^2. Its area in S.I. units = 0.25 ___. **1**

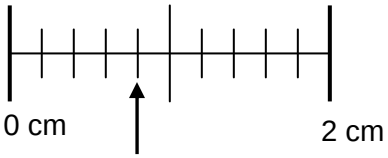
g. 6.7832465 to two decimal places = _____. **1**

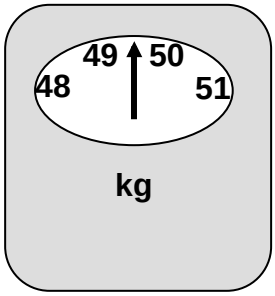
h. 678000 in standard form = _____. **1**

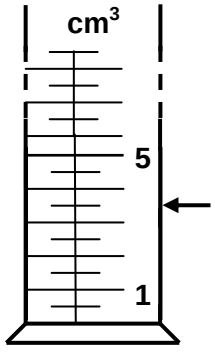
2. **a.** You are supplied with the following list of measuring instruments:
spring balance; micrometer screw gauge; steel tape measure; measuring cylinder; vernier callipers; electronic mass balance; stopwatch; meter ruler.
Complete the following table placing the appropriate measuring instrument from the list above.

Measurement	Instrument	
the **mass** of a rubber tube		**1**
the **thickness** of a white board marker		**1**
the **weight** of a piece of lead		**1**
the **time** taken for a pendulum to complete 10 swings		**1**
the **volume** of oil		**1**

2. **b.** Write down the reading shown by the three measuring instruments below:

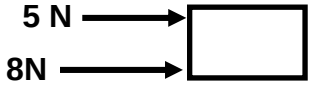
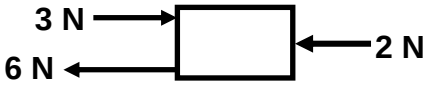






i. _____ cm **ii.** _____kg **iii.** _____cm^3 **3**

3. Complete the following table as shown in part (a) which has been worked out for you.

No.	Diagram	Size of the resultant force	Direction of the resultant force
a.		24 N	to the left
b.			
c.			
d.			
e.			

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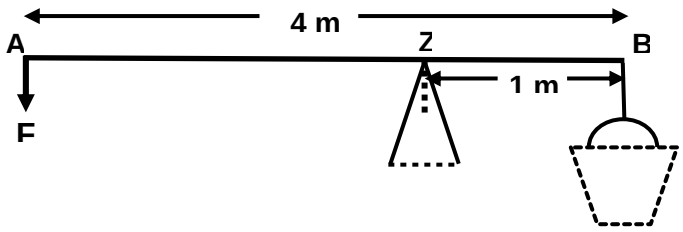
2

2

4. The diagram below shows a downward force **F** applied by John at **end A** of an iron rod **AB** to lift a bucket full of water , from the water reservoir below.



LAND

WATER RESERVOIR

a. Mark, by means of an arrow, the weight W of the bucket full of water. **1**

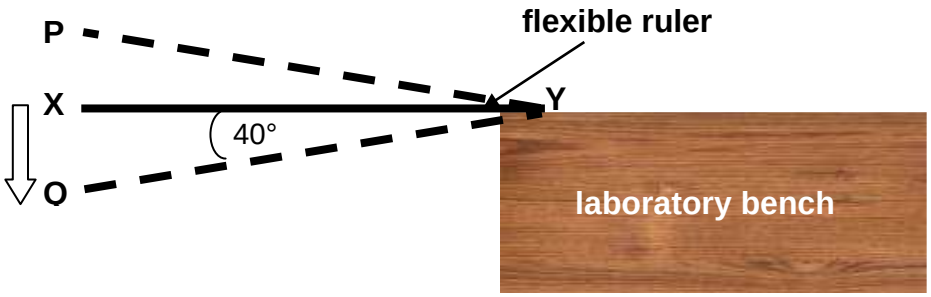
b. Calculate the size of the moment of the bucket full of water about the pivot Z given that the weight of the bucket full of water is 54 N. **2**

c. The distance between the applied force **F** and the pivot **Z** = _____ m **1**

d. When the above system is in equilibrium about the pivot Z, the _____ moment is _____ to the anticlockwise moment. **2**

e. Calculate the size of the force **F** required to lift the bucket full of water. **2**

5. Samantha holds her 30-cm flexible ruler XY from end Y on the laboratory bench. She pushes the ruler downwards from its free end X through an angle of 40° and releases it, as shown in the diagram below. The ruler oscillates about point Y, covering 20 oscillations in 10 seconds.



a. The ruler covers one oscillation when it moves from **X** to **Q** to **P** and back to ___. **2**

b. The angle through which the ruler is pushed down is called the _____. **1**

c. Calculate:

i. the **frequency f in Hz** of oscillation of the ruler XY, **1**

ii. the **periodic time T in s** of the ruler XY. **2**

d. Samantha repeats the experiment using a **shorter ruler AB** instead of ruler XY. Underline the change, which Samantha will notice to:

i. the frequency of the shorter ruler AB (gets smaller/gets bigger), **1**

ii. the periodic time of the shorter ruler AB (gets shorter/gets longer). **1**

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

6. This question is about Hooke's Law.

When various masses are hung to a newton-meter, the spring inside it gets longer. The table shows the extension produced with different masses.

mass **m** /kg	0	0.5	1.0	1.5	2.0	2.5	3.0
weight **W** /N	0	5	10		20	25	30
extension **e** /cm)		1	2	3	4	5	6

a. Fill in the **two** missing values in the table. **2**

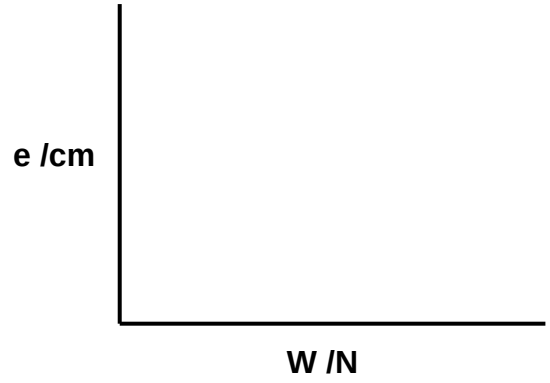
b. Plot a graph of extension e /cm (y-axis) against Weight W /N (x-axis) on the graph paper provided. **5**

c. The graph is a straight line passing through the origin showing that the spring obeys Hooke's Law. This means that the _____ of the spring is directly _____ to the stretching _____. **3**

d. Use your graph to find the extension of the spring when a weight of 22 N is applied to it. _____ cm **1**

e. With use, the spring of the Newton meter is no longer _____ but becomes _____. When this takes place, Hooke's Law is no longer obeyed. **2**

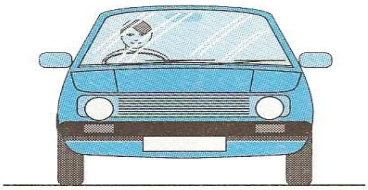
f. **i.** Using the axes below, sketch a graph to show what happens to the spring of the newton-meter when stretched beyond its elastic limit. **1**



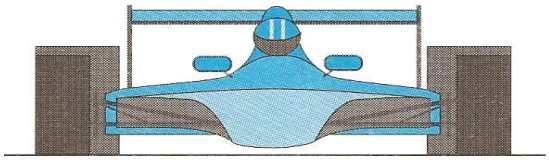
ii. Mark the **elastic limit** with the letter **E** on your sketch in **question f. i.** **1**

7. This question is about Pressure

a. The diagram below shows the front view of a family car and a racing car.



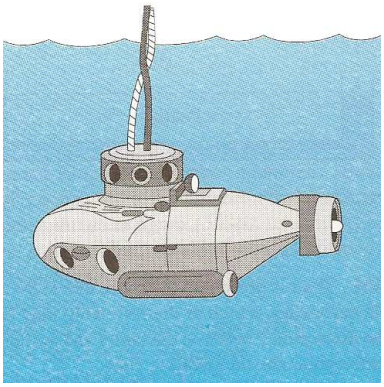
family car



racing car

Give a reason why the family car causes a bigger pressure on the ground even though they have the same weight. **2**

b. The underwater exploration vessel shown is lowered into the sea in order to study plants and fish at the bottom of the ocean.



i. State what happens to the water pressure on the vessel as it gets deeper into the water. _____ **1**

ii. *Fresh water is less dense than seawater.*
Another exploration vessel is lowered into a deep freshwater lake. At equal depths, will the pressure on this vessel be the same/greater/less? (Underline the correct answer.) **2**

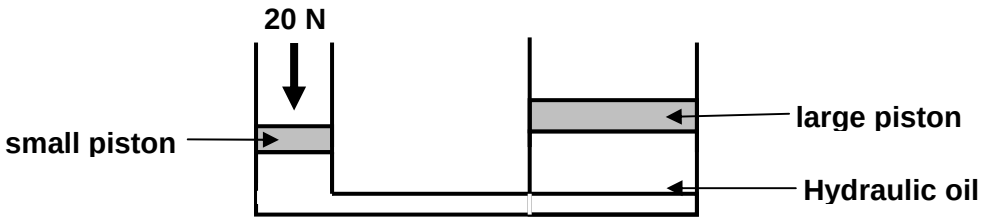
c. Pamela noticed that on all the canisters of deodorants and sprays she found at home there was written:

"Do not expose to direct sunlight.
Avoid exposure of can to temperatures above 50 °C."

i. What happens to the can if this message is not followed? **1**

ii. Explain in terms of pressure, why pressurised canisters should always be stored in a cool place. **1**

d. The diagram below shows a model of a hydraulic machine where a force of 20 N is applied to the small piston of area 0.25 m^2. The area of the larger piston is 2 m^2.



i. Calculate the pressure exerted by the small piston. **2**

ii. What is the value of the pressure is transmitted throughout the liquid? **1**

iii. Calculate the force with which the larger piston is pushed upwards. **2**

iv. Why must the hydraulic machine be filled with a liquid not a gas? **2**

v. Give one important use of a hydraulic machine in every day life. **1**

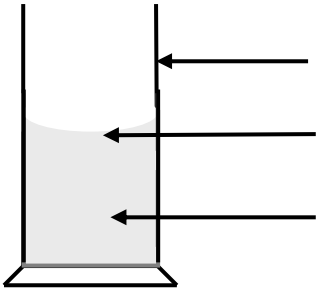
8. This question is about density and its measurement:

Brenda wants to find the density of a transparent liquid.
She is provided by an electronic mass balance and a measuring cylinder.

a. What is the SI Unit for density? _____ **1**

b. Describe briefly how Brenda finds the mass of the transparent liquid. **3**

c. Label the diagram below: **3**



d. How can Brenda find the volume of the transparent liquid? **2**

e. Name one precaution when pouring the transparent liquid into the measuring cylinder **1**

f. Brenda finds that the mass of the transparent liquid is 36.85 g and its volume is 50 cm^3. Calculate the density of the transparent liquid in:

i. g/cm^3 **1**

ii. kg/m^3 **1**

g. **i.** A different mass of the transparent liquid is poured into the measuring cylinder. Would the value for the density of the transparent liquid be different from the answer obtained above? **1**

ii. Explain your answer **1**

h. Brenda refers to the densities of different liquids given in the table in her Physics textbook.

Liquid	**Density /kg/m^3**
Sunflower oil	920
Sea water	1025
Petrol	737
Iodine	4927
Milk	1040

The transparent liquid could be _____ **1**