



KULLEGG MARIA REGINA
BOYS' SECONDARY MOSTA
HALF-YEARLY EXAMINATIONS 2012/2013



SUBJECT: PHYSICS

Form 3

TIME: 1 HR 30 MIN

NAME : _____

CLASS: _____

INDEX NO : _____



Track 2

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, $g = 10 \text{ m/s}^2$.

Forces	$W = mg$	
Density	$\rho = \frac{m}{v}$	
Pressure	$P = \frac{F}{A}$	$P = h \rho g$
Moments	Moment = Force x perpendicular distance	
Others	Area of rectangle/square: $L \times B$	
	Volume of cuboid/cube: $L \times B \times H$	

For examiner's use:

Number	1	2	3	4	5	6	7	8	Total
Maximum mark	8	8	8	8	8	15	15	15	
Actual mark									

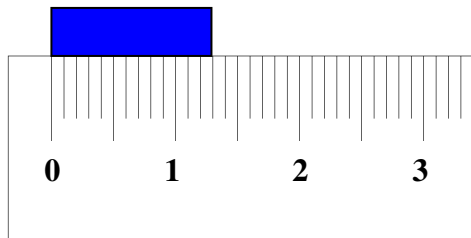
	Total Theory	Total Practical	Final Mark
Actual Mark			
Maximum Mark	85	15	100

SECTION A

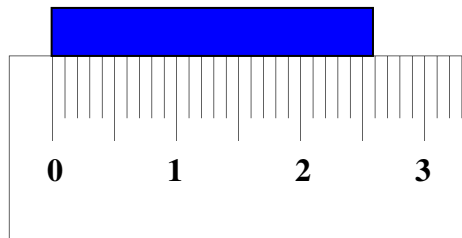
This section carries 40 marks.

1. *This question is about scales and measuring instruments.*

a) Use the scale to read the length of each object.









(i) _____ cm



(ii) _____ cm [2]

b) Jean Claude has the following measuring instruments:

thermometer	metre rule	measuring cylinder	stopwatch	top pan balance	spring balance
					

Which of the following measuring instruments would you use to measure the:

(i) mass of an empty beaker.	
(ii) length of a tennis racket.	
(iii) friction acting on a wooden block.	
(iv) temperature of a hot liquid.	
(v) time taken to run 100 m.	
(vi) volume of water in a container.	

[6]

2. This question is about pressure in gases.

Figure 1 shows air particles moving in a **closed container**.

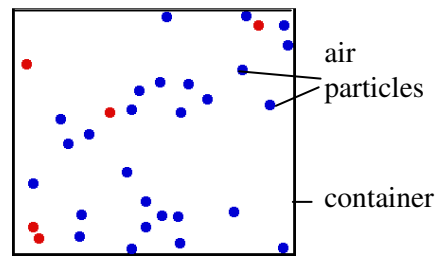


Figure 1

Underline the correct answer:

- a) The air particles move in (different directions, one direction). [1]
- b) At room temperature they move very (slow, fast). [1]
- c) If the container is **heated**, the particles move at (lower, higher) speeds. [1]
- d) If the same number of particles are placed in a **smaller container** they hit the inside of the container (more, less) often. [1]
- e) If some **particles are removed** from the container, the particles collide (more, less) often. [1]

f) In which case (c, d or e) will the pressure **decrease**? Explain.

_____ [3]

3. This question is about scalar and vector quantities.

- a) Physical quantities can be either scalars or vectors.
 - (i) A scalar quantity has _____ only. [1]
 - (ii) A vector quantity has both _____ and _____. [2]

b) The following are six physical quantities:

<i>mass</i>	<i>velocity</i>	<i>time</i>
<i>weight</i>	<i>density</i>	<i>friction</i>

(i) Which **three** of them are scalars?
 _____ [3]

(ii) Which **two** of them are forces?
 _____ [2]

4. This question is about density.

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

b) Andrea wants to know if apples and pears float or sink in water.



He measures the mass and the volume of an apple and a pear.

	Mass (g)	Volume (cm ³)
<i>Apple</i>	145	150
<i>Pear</i>	145	125

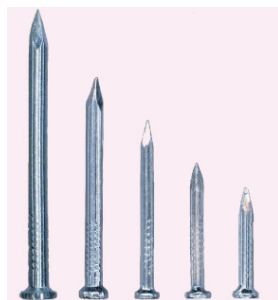
(i) Using the values in the table, work out the density of each fruit in g/cm³.

Apple _____ [1]

Pear _____ [1]

(ii) Water has a density of 1 g/cm³. When he places the apple and the pear in a sink filled with water, he notices that only the _____ floats because its density is _____ than that of water. [2]

c) Andrea finds five iron nails of different size. Underline the correct answer.



The iron nails have :

(i) (the same, a different) mass. [1]

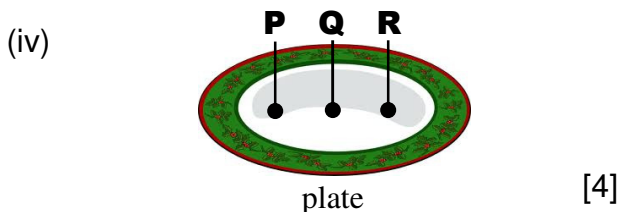
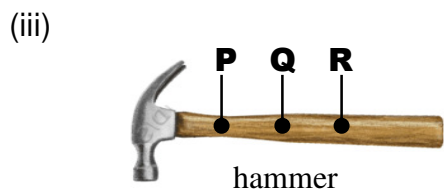
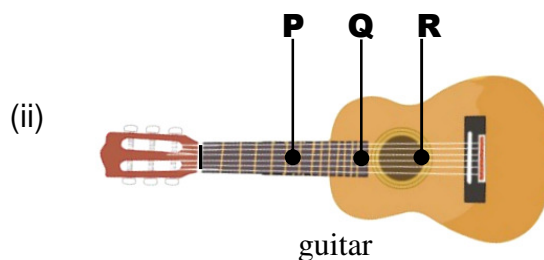
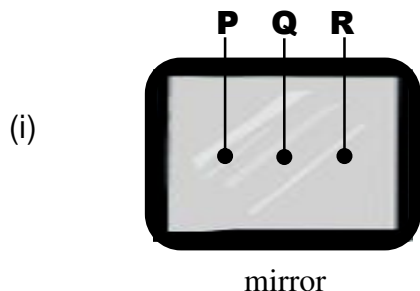
(ii) (the same, a different) volume. [1]

(iii) (the same, a different) density. [1]

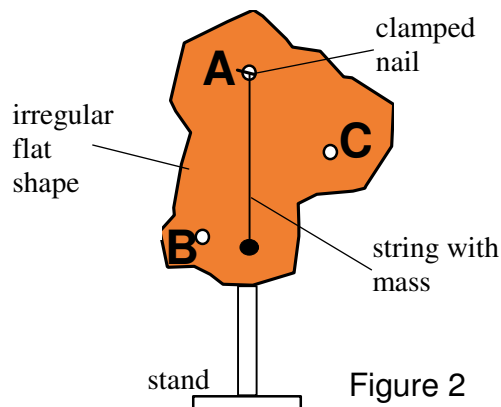
5. This question is about the centre of gravity.

a) The centre of gravity of an object is the point where the _____ of an object seems to act. [1]

b) Circle ONE of the letters P, Q or R showing the correct position of the centre of gravity of each object:



c) Figure 2 shows the apparatus used to find the centre of gravity of an irregular flat shape. List in order (e.g. 1, 2, 3 and 4) the steps to find the centre of gravity of the irregular flat shape. The first one is done for you.



<ul style="list-style-type: none"> This is repeated for holes B and C. 	
<ul style="list-style-type: none"> Three holes A, B and C are punched in the flat shape. 	1
<ul style="list-style-type: none"> A string with a mass is suspended from the nail and its position is noted. 	
<ul style="list-style-type: none"> The shape is suspended freely from hole A using a clamped nail. 	

[3]

SECTION B

This section carries 45 marks.



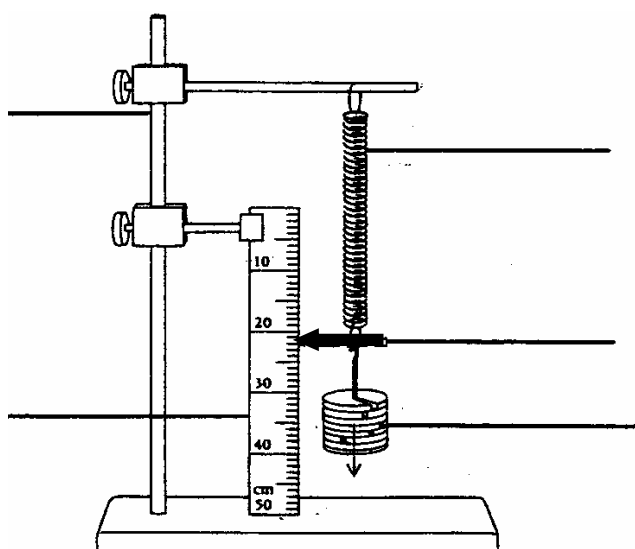
Robert Hooke
(1635-1703)

6. This question is about Hooke's law.

a) Fill in :

Hooke's law states that the _____ is directly proportional to the _____ unless the elastic limit is exceeded. [2]

b) Label the following setup used to investigate Hooke's law.



[5]

c) After carrying out the investigation, the following results are obtained:

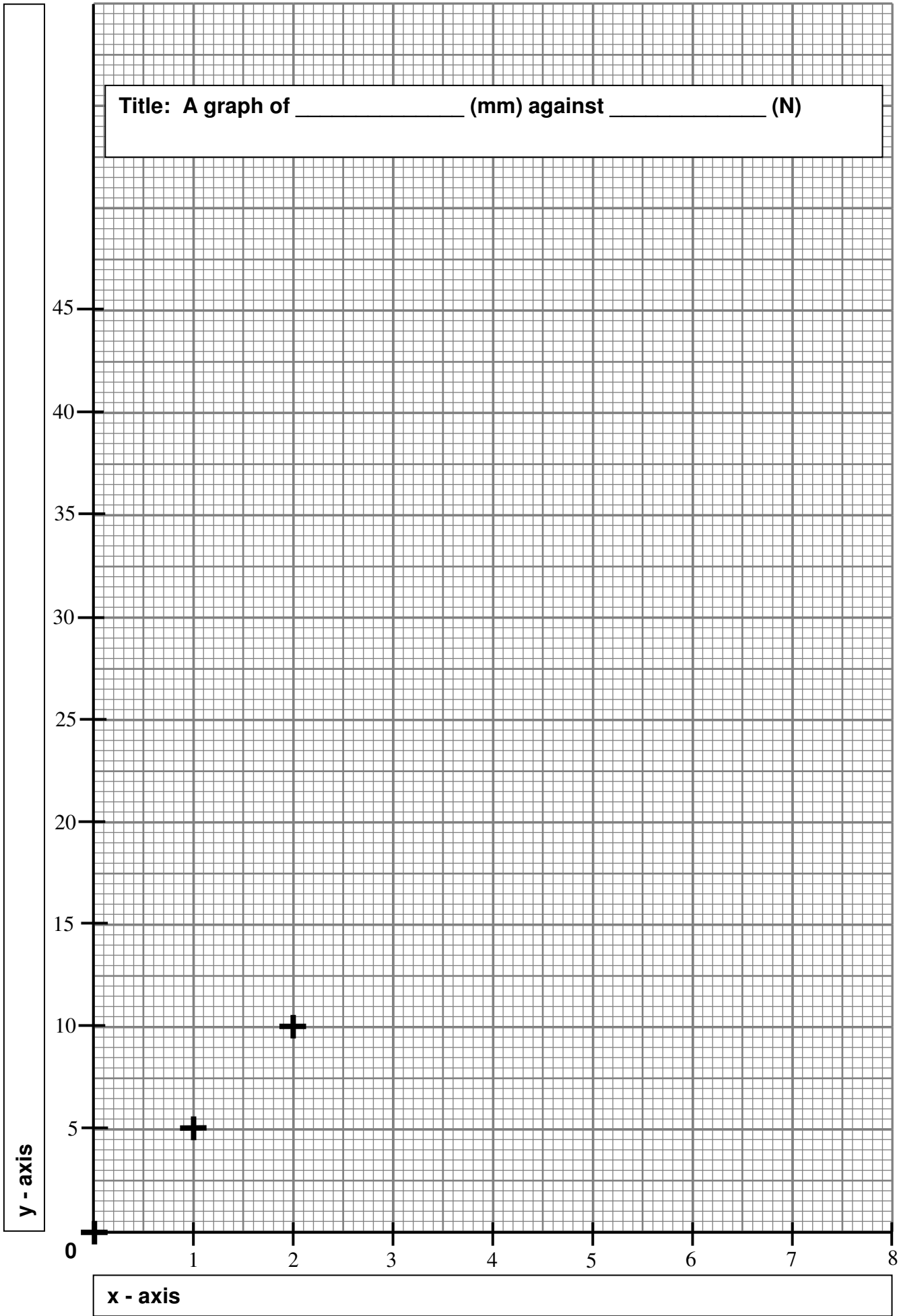
Load (N)	0	1	2	3	4	5	6	7	8
Length of spring (mm)	35	40	45	50	55	60	65	70	75
Extension	0	5	10		20		30	35	45

(i) The length of the unloaded spring is _____ mm. [1]

(ii) Complete the missing values by calculating the extension in each case. [2]

(iii) Continue plotting the graph of Extension (mm) on the y-axis against Load (N) on the axis. Write the title of the graph and label each axis. [5]

Title: A graph of _____ (mm) against _____ (N)



7. This question is about pressure.

a) Ryan is lifting his younger brother Isaac on his shoulders. Ryan has a mass of 60 kg while Isaac has a mass of 30 kg.



(i) Calculate their total mass.

_____ [1]

(ii) Calculate their total weight in Newtons.

_____ [2]

(iii) The total area of contact of Ryan's shoes while standing on both legs is 360 cm². Calculate the total pressure on the ground in N/cm².

_____ [2]

(iv) Ryan then stands on **one leg** with Isaac still on his shoulders.

Underline the correct words:

- Their weight (remains the same, increases, decreases).
- The area in contact with the ground (remains the same, increases, decreases).
- The pressure exerted on the ground (remains the same, increases, decreases). [3]

b) Ryan's favourite hobby is scuba diving.

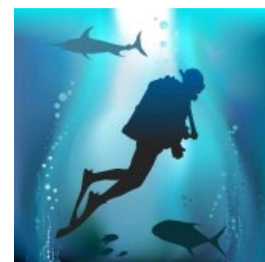
Pressure in liquids is calculated by: $P = h \rho g$

(i) What do the following symbols mean?

$h =$ _____

$\rho =$ _____

$g =$ _____ [3]



(ii) If the density of sea water is 1050 kg/m³, calculate the pressure caused by sea water on Ryan at a depth of 14 m.

_____ [2]

(iii) What happens to the pressure on Ryan when he starts to rise to the surface?

_____ [2]

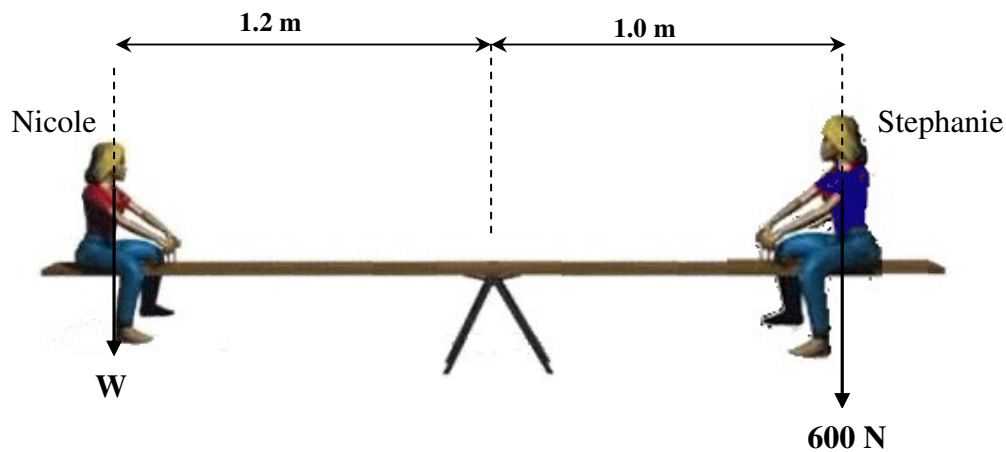
8. This question is about moments.

a) Fill in the law of moments.

When an object is _____ (in equilibrium), the sum of the _____ is equal to the sum of the _____.

[3]

b) Nicole is playing with her friend Stephanie on a see-saw.



(i) Calculate Stephanie's moment.

_____ [2]

(ii) What is Nicole's moment if the see-saw is balanced?

_____ [1]

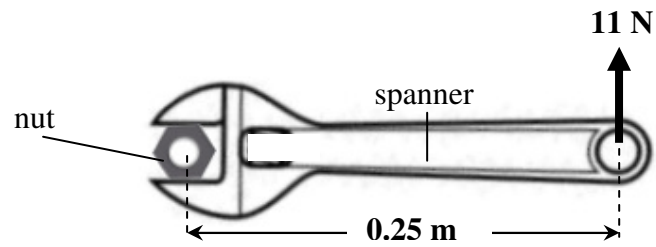
(iii) Calculate Nicole's weight.

_____ [2]

(iv) What happens if Nicole moves towards the pivot?

_____ [2]

c) Andrew needs to loosen a nut by using a spanner.



(i) Calculate the resulting moment in Nm.

_____ [2]

(ii) State the direction of the moment.

_____ [1]

(iii) The nut did not become loose with the moment applied.

Give **two** ways how Andrew could increase the moment.

_____ [2]

END OF PAPER