KULLEGG MARIA REGINA
BOYS' SECONDARY MOSTA
HALF-YEARLY EXAMINATIONS 2010/2011

SUBJECT: PHYSICS **TIME: 1 Hr 30 Min**

NAME : _____ INDEX NO: _____

FORM 3 MARK: _____

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 acceleration due to gravity g = 10 m/s^2.

You may find some of these formulae useful.

Area of a square/rectangle: A = L x B	**Pressure :** P = h x ρ x g P = Force / Area
Volume of a cube/cuboid: V = L x B x H	**Forces :** W = m x g
Moments: M = Force x perpendicular distance	
Speed : Average speed = Total distance / Total time	**Density :** ρ = mass / Volume

For office use only:

Question No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**Total**
Maximum mark	**8**	**8**	**8**	**8**	**8**	**15**	**15**	**15**	**85**
Mark obtained									

	Theory	**Practical** (average mark)	**Final Mark**
Marks obtained			
Maximum mark	**85**	**15**	**100**

SECTION A: This section carries 40 marks.

1. *This question is about Density.*

A piece of plasticine was weighed and found to have a mass of **55 g**. It was then lowered gently into a measuring cylinder filled with water as shown in Figure a.

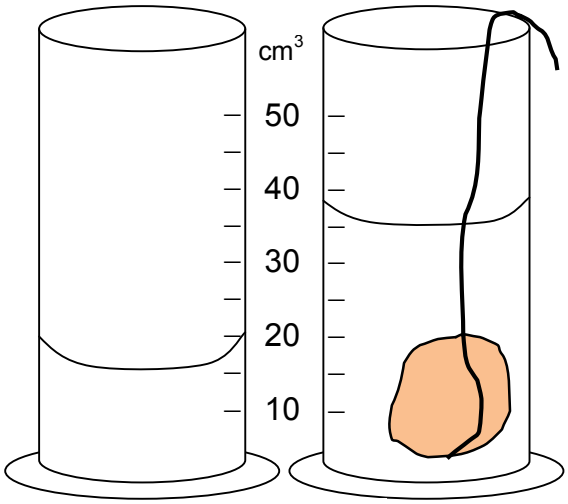


Figure a

(a) Name **one precaution** taken during this experiment. _____

_____ [2]

(b) Why does the plasticine sink in water? _____

_____ [1]

(c) Calculate the **density** of the plasticine in g/cm^3. **Show** the formula and all the working.

_____ [2]

(d) What is the **meaning** of density? _____

_____ [2]

(e) Underline the correct answer: If a **smaller** piece of the same plasticine is used, which of these would **not** change:

(i) mass (ii) volume (iii) density [1]

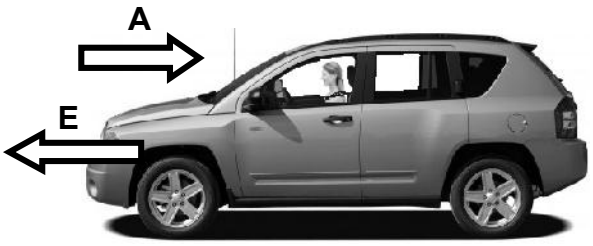
2. *This question is about S.I. units and symbols*

Quantity	***Symbol*** *(abbreviation)*	***S.I. units***	***Other units***
Volume	**V**	**m^3**	
Mass	**m**		**g**
Density		**kg/m^3**	
Area	**A**		**cm^2**
Pressure	**P**	**Pa**	
Force			

[8]

3. *This question is about Forces.*

(a) Fill in the blanks:



(i) The force acting between the **tyres** and the **road** is called _____. [1]

(ii) A force is a vector quantity which means that it has _____ and _____. [1]

(iii) The **force E** driving the car forward is called the _____ force and the force **against** the windscreen is called _____ _____. [1]

(b) Given that the mass of the car is **1400 kg** work out its weight. Show <u>formula</u> and <u>working</u>.

_____ [2]

(c) **Draw an arrow** on the <u>above picture</u> to show the **weight** of the car. [1]

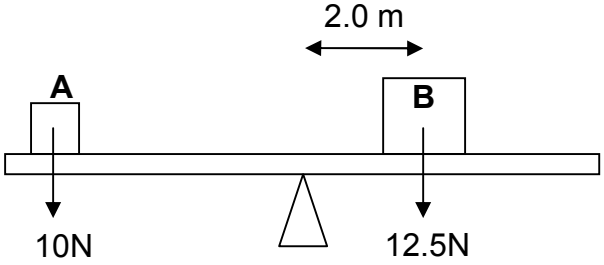
(d) Name **two differences** between <u>mass</u> and <u>weight</u>.

(i) _____ [1]

(ii) _____ [1]

4. *This question is about Moments.*

(a) The see-saw shown below is in balanced by 2 boxes, one on each side as seen.



(i) Find at what **distance** from the pivot is **box A**

_____

_____

_____

_____ [3]

(ii) Draw an **arrow** to show the **reaction force** at the **pivot**. [1]

(b) What is the **S.I. unit** of moment ? _____

[1]

(c) What do you understand by **moment of a force** ? _____

_____ [2]

(d) You are provided with a **long spanner** and a **short spanner**. Which spanner would you use to loosen a very tight nut ? _____ [1]

5. *This question is about Pressure in Liquids .*

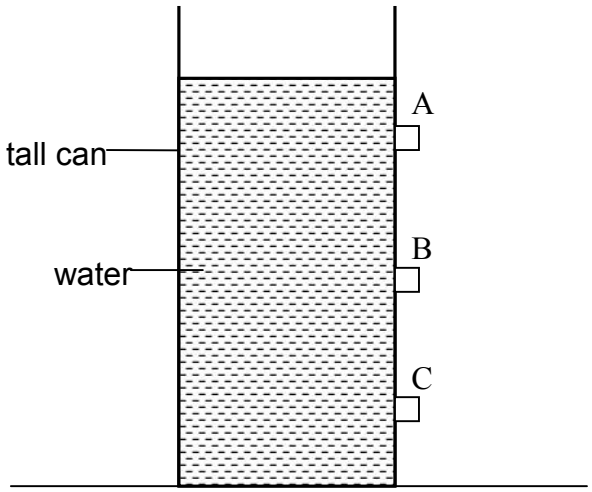
(a) The pressure in a liquid depends on three things. Name **two** of them.

_____ [2]

(b) The diagram shows a tall can filled with water.

(i) Show by drawing on the diagram, how the water flows out of the nozzles A, B and C.

[2]



(ii) If a <u>wider</u> can is used, does it affect the way the water will come out of the nozzle? Explain.

_____

_____ [2]

(c) A diver is diving at a depth of 14 m. If the density of sea water is 1050 kg/m^3, and the atmospheric pressure is equal to 100, 000 Pa, find the:

(i) pressure of the **water only** acting on the diver.

_____ [1}

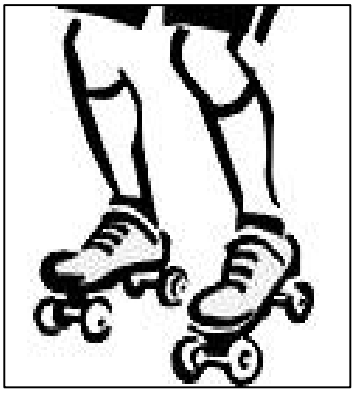
(ii) **total pressure** acting on the diver.

_____ [1}

SECTION B: This section carries 45 marks.

6. *This question is about Pressure.*

(a) Trevor uses a pair of roller blades to go roller skating on a Sunday afternoon. Each roller blade has **four** small wheels. While roller skating, the **area** of **each wheel in contact** with the ground is **0.02 m x 0.02 m**.



(i) What is the meaning of pressure? _____

_____ [2]

(ii) Work out the **area** of contact of **one** wheel. _____ [1]

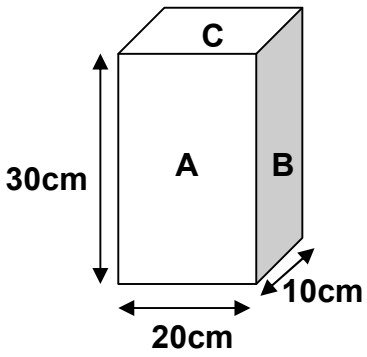
(iii) What is the **total area** in contact with the ground when Trevor stands on **one leg**?

_____ [1]

(iv) Trevor has a weight of **525 N**. Calculate the **pressure** he exerts on the ground when standing on **both legs.**

_____ [2]

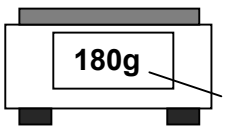
(b) Trevor decides to remove his roller skates and play with his wooden block shown in the Diagram.



He wants **to test on which area** the block must rest to exert the **greatest** pressure. He uses a ruler and a balance to obtain the readings shown in the diagrams.

(i) **Use the diagrams** to fill in the tables below : [2]

Mass (g)	Mass (kg)	Weight = mg (N)
180		



	Surface A	Surface B	Surface C
A= L x B (cm^2)	600		
P = F/A (N/cm^2)			

[2]

[3]

(ii) The **greatest** pressure is exerted on surface ____ , while the **least** pressure is exerted on surface ___.

7. *This question is about Hooke's Law.*

Robert Hooke
(1635-1703)

(a) Robert Hooke discovered the law of elasticity in the 17th century.

(i) State Hooke's Law:

_____

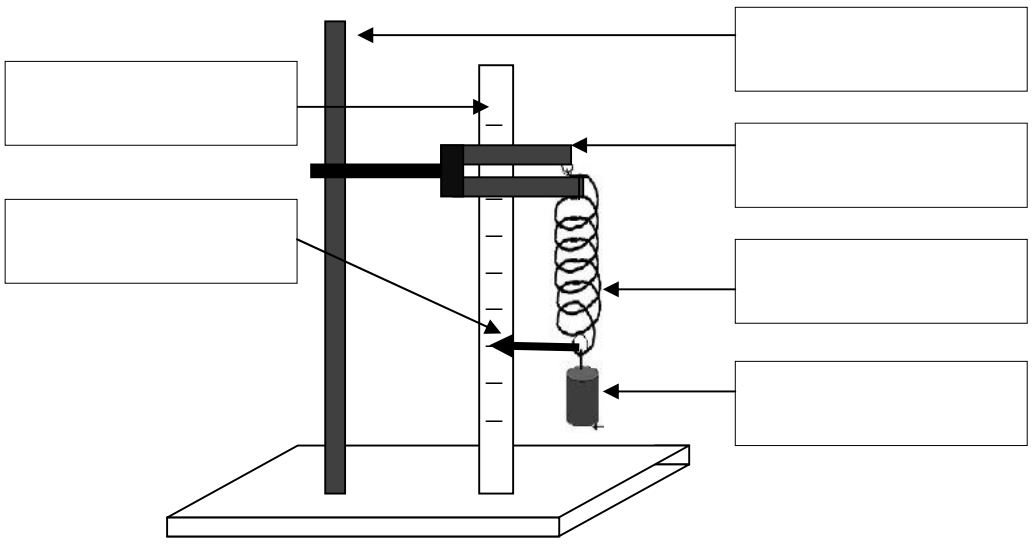
_____ [2]

(ii) What happens to the spring when the elastic limit is exceeded?

_____

_____ [1]

(iii) Label the diagram of the following apparatus used to investigate Hooke's law.



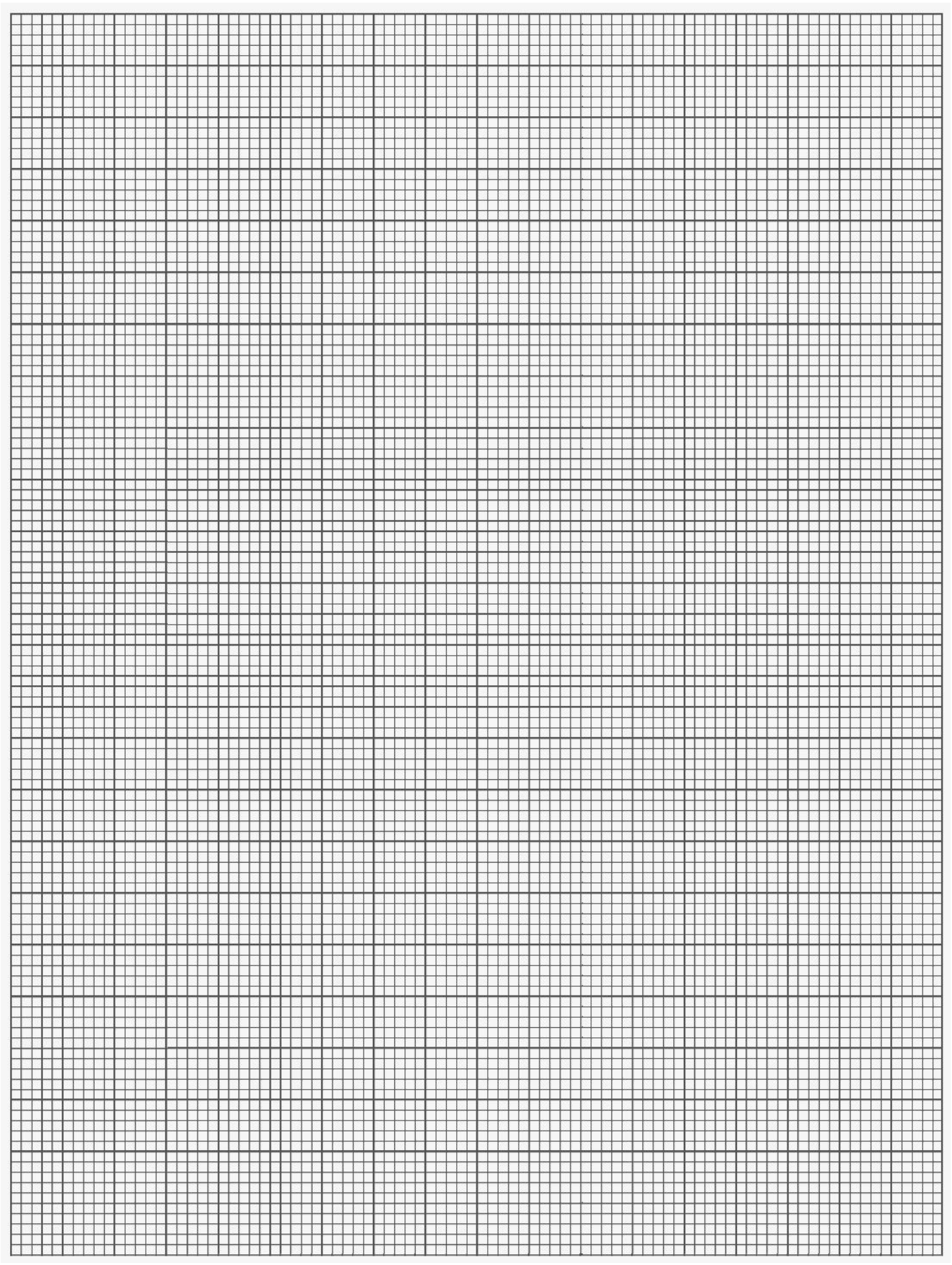
[3]

(b) Fill in the following table:

Mass (kg)	0	10	20	30	40	50	60
Stretching force (N)	0	100		300			600
Length of spring (cm)	100	120	140	160	180	200	240
Extension (cm)	0	20			80	100	

[3]

(c) **Plot a graph** of **Extension (y-axis)** against **Stretching force (x-axis).** [6]



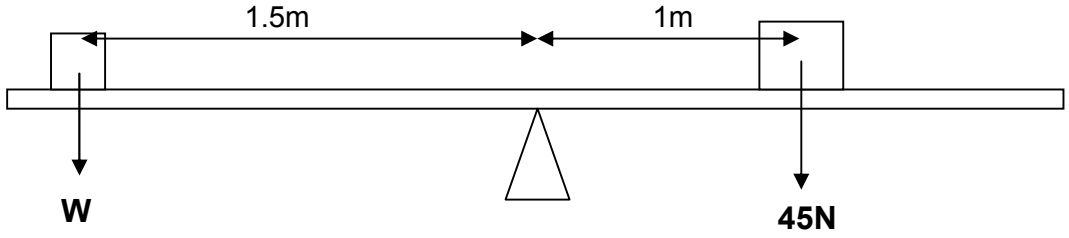
8. *This question is about Moments.*

(a) State the **law of Moments**:

_____

_____ [3]

(b) The diagram shows a see-saw pivoted at its **centre**.



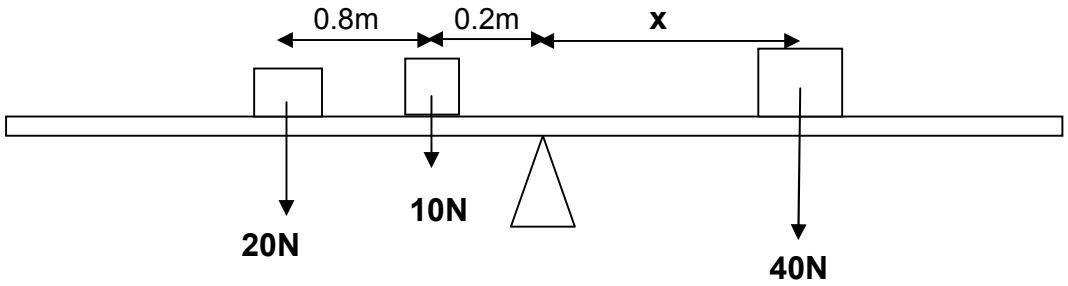
Calculate the weight 'W' of the box in order for the see-saw to balance. Show <u>all</u> working.

_____

_____

_____ [3]

(c) Three boxes are now placed as shown in the diagram below and the see-saw **balances** once again.



(i) Calculate the **distance** 'x' at which the 40 N box is placed.

_____

_____

_____

_____ [4]

(ii) Given that the **weight** of the see-saw is **30N**, what is the total downward force?

_____ [3]

(iii) What is the value of the reaction force at the pivot? _____ [2]

END OF PAPER