KulleġġSanta Tereża
PARVA PARVORUM PULCHRA

GIRLS' JUNIOR LYCEUM – L-IMRIEĦEL
HALF YEARLY EXAMINATIONS 2010/2011

FORM: 3	**Physics**	Time: 1 ½ hr.

Name:_____ Class:_____

Answer all the questions. Write down your answers in the spaces provided.
The use of a calculator is allowed.
Whenever necessary take g to be 10N/kg.

Formulae that can be used are listed below:

W = mg	Density = $\dfrac{Mass}{Volume}$
Pressure = $\dfrac{Force}{Area}$	Pressure = hρg

Moment of a force= Force x perpendicular distance from the pivot

SECTION A.   This section carries 55marks.

1) This question is about Measurements and Units.

a) Complete the following table:

Quantity	Symbol	S.I.Unit
Volume		m^3
	A	
Density		
	t	s
Mass		

[4 marks]

b) You are provided with the following list of measuring instruments:

[Lever balance; metre ruler; measuring cylinder; stopwatch; spring balance]

Complete the table below by writing down the correct instrument from the above list

Measurement	Measuring Instrument
i) volume of a shampoo bottle	
ii) mass of a box of rice	
iii) time taken for a girl to cover a 100m race	
iv) weight of a bag of apples	
v) length of a piece of cloth	

[5 marks]

2) This question is about mass and weight.

a) John wants to find the weight of his school bag. What instrument should he use?

_____

[1 mark]

b) He finds that the weight of his bag is 100N. What is the mass of the bag?

_____

_____

[2 marks]

c) Read these statements and write if they are **TRUE** or **FALSE**:

Mass is the amount of matter in an object	
Mass is a force	
The SI unit of mass is N	
Weight is the pull of gravity on an object	
Mass is different on the Earth and on the moon	
Mass has a downward direction	
An object in outer space is weightless	

[7 marks]

3) This question is about Forces.

a) What do you understand by the term *vector quantity*?

_____

[1 mark]

b) State whether the following quantities are vectors or scalars by rewriting them under their appropriate column.

[FORCE, TIME, LENGTH, VELOCITY]

Scalars	Vectors

[2 marks]
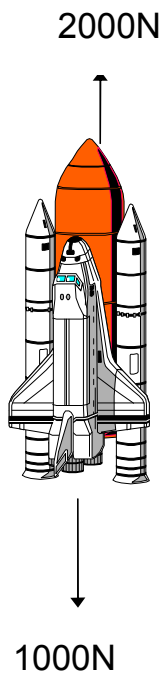
c) Find the **resultant force** acting on the following objects. State both the size as well as the direction of the resultant force.

i)

→ 5N

→ 9N

Resultant Force =

_____

_____

_____

ii)

2000N

1000N

Resultant Force = _____
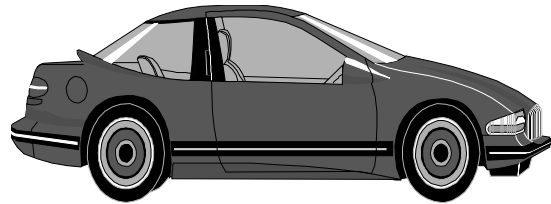
_____

_____

iii)

20N ←   → 20N

Resultant Force = _____

_____

_____

[6 marks]

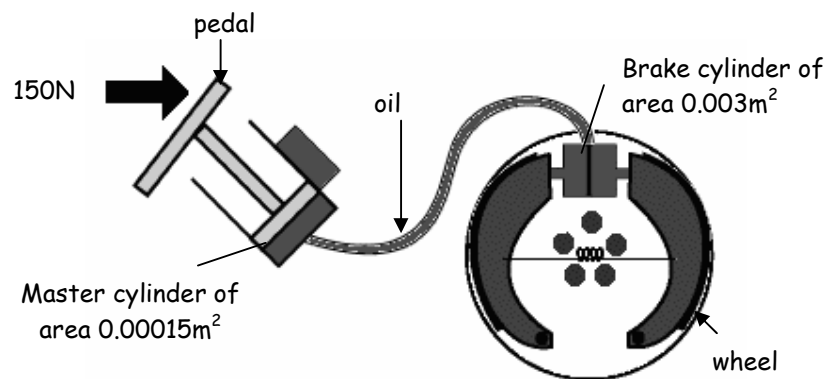d) Draw the **forces** that are present in the following diagrams:

i) A hot-air balloon

ii) a car moving

[5 marks]

4) This question is about Pressure.

The diagram shows a car's hydraulic braking system.

150N

pedal

oil

Brake cylinder of
area 0.003m^2

Master cylinder of
area 0.00015m^2

wheel

a) Why are liquids used in hydraulic machines?

_____

[1 mark]

b) Calculate the **pressure** exerted by the master cylinder.

_____

_____

[2 marks]

c) What is the **pressure** exerted throughout the oil and on the brake pad?

_____

[1 mark]

d) Calculate the **force** exerted on the brake pad.
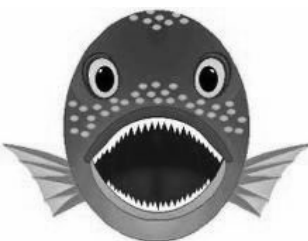
_____

_____

[2 marks]

5) *This question is about liquid and atmospheric pressure.*

A scuba diver dives in the sea at Wied iz-Zurrieq.

a) If the density of sea water is 1150kg/m^3, calculate the pressure when she is at a depth of 10m under the surface of the sea.

_____

_____

_____

_____

[3marks]

b) How would you expect the pressure to change if she dives deeper in the sea?

_____

_____

Why?

_____

[2 marks]

c) Mount Everest is the highest mountain in the world. Last May, Gregory Attard, Marco Cremona and Robert Gatt were the first Maltese to ever reach the highest peak of this mountain.

(i) How do you expect the pressure due to the atmosphere to have changed as they climbed further up the mountain?
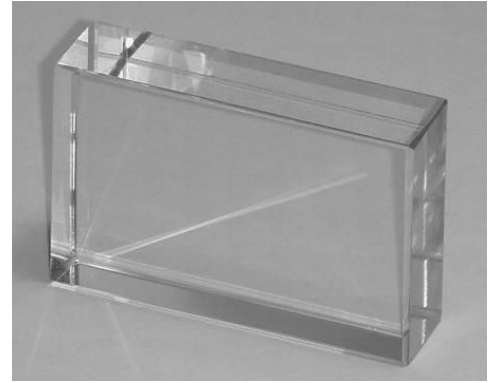
_____

_____

_____

[2 marks]

(ii) What **instrument** is used to measure atmospheric pressure?

_____

[1 mark]

6) This question is about Density.

Tiffany is curious to find the density of a regularly shaped glass block of sides 2cm by 3cm by 4cm and that of oil.

a) Calculate the **volume** of the glass block.

_____

_____

_____

_____

[2 marks]

b) Complete the table below by filling in the missing information.

Object	Mass (g)	Volume (cm³)	Density (g/cm³)
Glass block			2.5
Oil	460		0.92

[3 marks]

c) Would the glass block float or sink in oil?

_____

[1 mark]

d) Give a reason for your answer.

_____

[2 marks]

7) This question is about Hooke's Law

Melissa wanted to investigate how the extension of a spring varies when loads are added to the spring. She conducted the experiment and got the following results:

Load (N)	0	1	2	3	4	5	6
Length of spring (cm)	30	32	34	36	38	42	48
Extension (cm)	0						

a) Fill in the table above by finding the **extension** of the spring for each load. [3 marks]

b) Plot a graph of **Load (N)** on the y-axis against **extension (cm)** on the x-axis. [6 marks]

c) *Fill in the blanks:*

Hooke's law states that the extension is _____ _____ to the Load as long as the _____ _____ is not exceeded.

[2 marks]

d) Does the graph obey *Hooke's Law*? How can you tell from the graph?

_____

_____

[2 marks]

e) From the graph find the extension produced when a load of 2.5N are put on the spring._____   [1 mark]

f) From the graph find the force that should be put on the spring to get an extension of 9cm. _____   [1 mark]

8) This question is about Density.

a) During a practical session, Sophia was asked to find the density of a particular tweezers.

   (i)   What **instrument** should she use to find its mass?
   _____   [1 mark]

(ii)   In the space below include a labelled diagram.

[2 marks]

Explain how she can find the **volume** of the tweezers.

_____

_____

_____

_____

_____

_____

_____

_____

[3 marks]

(iii)   What calculations does she need to do in order to find its density?

_____

_____

[1 mark]

(iv)   Name **two** precautions she needs to take to find the volume of the tweezers.

_____

_____

_____

[2 marks]

b) From the experiment she found that its mass is 30g and it has a volume of $3.8cm^3$. Calculate its **density**.

_____

_____

_____

_____

[3 marks]

c) The table below shows the density of different materials.

Metal	Density (g/cm^3)
Carbon steel	7.9
Aluminium	2.7
Silver	10.5

(i)   Using the above table, what is the **material** of the tweezers?

_____

[1 mark]

(ii)   *Underline the correct one:*
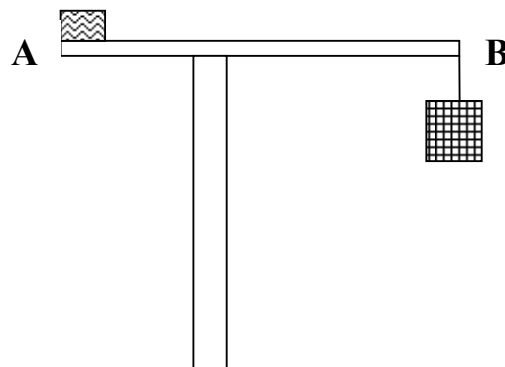
 A smaller tweezers has (*a smaller, a larger, the same*) density as the one

found in question (b).   [1 mark]

(iii)   Give a reason for your answer.

_____

[1 mark]

9). This question is the Turning effect of a Force.

A   B

A tower crane is used to lift a number of bricks at end B as shown in the diagram. Weights are placed at the opposite end A to enable the crane to remain balanced.

a) The distance from A to the main column is 4m and the distance from B to the main column is 8m. **Mark** these distances on the diagram above.

[1 mark]

b) If the weights used at end A have a mass of 1000kg, find the **weight** at end A. **Mark** this weight using an arrow labelled **W1** on the diagram.

_____

_____

_____

_____

[3 marks]

c) Find the **moment** due to this weight at end A. State its **direction**.

_____

_____

_____

_____

_____

[2 marks]

d) State the **Principle of Moments**.

_____

_____

_____

_____

[2 marks]

e) Find the **weight** of bricks that can be lifted safely at end B if the crane is to remain balanced. Mark this weight with an arrow labelled **W2** on the diagram.

_____

_____

_____

_____

_____

_____

_____

_____

[4 marks]

f) What is the total downward **force** on the tower crane?

_____

[1 mark]

g) What is the **total** upward force?

_____

[1 mark]

h) On the diagram use an **arrow** labelled **R** to show where this upward force acts.

[1 mark]

The
End