

GIRLS' JUNIOR LYCEUM MRIEĦEL
HALF YEARLY EXAMINATIONS 2011/2012

FORM: 3

Physics

Time: 1 ½ hr.

Name: _____

Class: _____

Answer all the questions. Write down your answers in the spaces provided. All working must be shown.

The use of a calculator is allowed.

Whenever necessary take gravitational force g to be 10N/kg .

Formulae that can be used are listed below:

$W = mg$	Density = $\frac{\text{Mass}}{\text{Volume}}$
Pressure = $\frac{\text{Force}}{\text{Area}}$	Pressure = $h\rho g$
Moment of a force = Force x perpendicular distance from the force to the pivot	



Section A: This section carries a total of 55 marks

1. This question is about quantities and units.

Quantity	S.I. Unit
Pressure	
	m
Force	
	kg/m^3
Moment	
	s

[3 marks]

2. This question is about mass and weight

a) An astronaut of mass 60kg will be going on a trip to the moon. Find her weight on Earth if the gravitational force on Earth 'g' is 10N/kg.



[3 marks]

b) When she arrives on the moon will her mass and weight be the same? Why?

[3 marks]

3. This question is about density.

a) John wants to find the density of a keychain to check if it is made of steel. He finds the volume of the keychain using a displacement can.

(i) Describe how he should use this apparatus to find the volume of the keychain.

[3 marks]

(ii) Draw a labelled diagram to show how he sets up the apparatus:

[2 marks]

(iii) If the mass of the keychain is 23g and he finds the volume to be 2.5cm^3 , what is the density of his keychain?

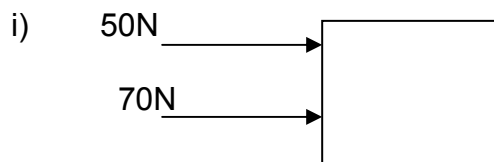
[3 marks]

(iv) Using a physics book John reads that the density of steel is 7.85 g/cm^3 . Is his keychain really made of this material? Why?

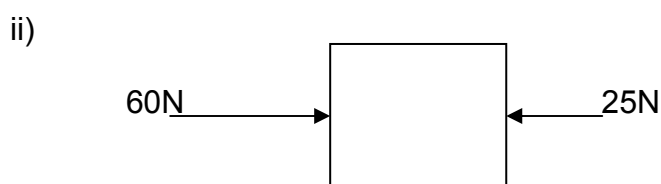
[2 marks]

4. This question is about resultant forces.

a) Paul and Mary are pushing a large box along a corridor. Find the resultant force and its direction, if they push it with the following forces in these directions:

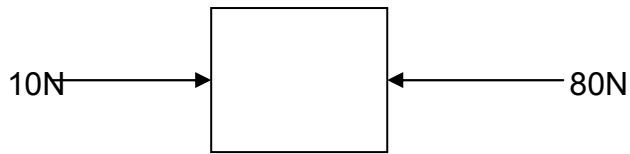


Resultant Force:



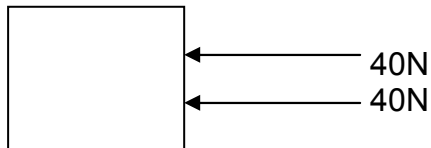
Resultant Force:

iii)



Resultant Force:

iv)



Resultant Force:

[8 marks]

b) (i) Is force a vector or a scalar quantity? Why?

[2 marks]

(ii) Give two examples of vector quantities and two examples of scalar quantities:

Vectors	Scalars

[4 marks]

5. This question is about pressure.

a) A climber uses rock climbing shoes to walk up a mountain. The bottom sole of each shoe has an area of 350cm^2 . If the climber has a weight of 700N , find the pressure exerted on *both* feet.



[3 marks]

b) When the climber reaches the top of the mountain the atmospheric pressure will have changed compared to the bottom of the mountain. How did it change?

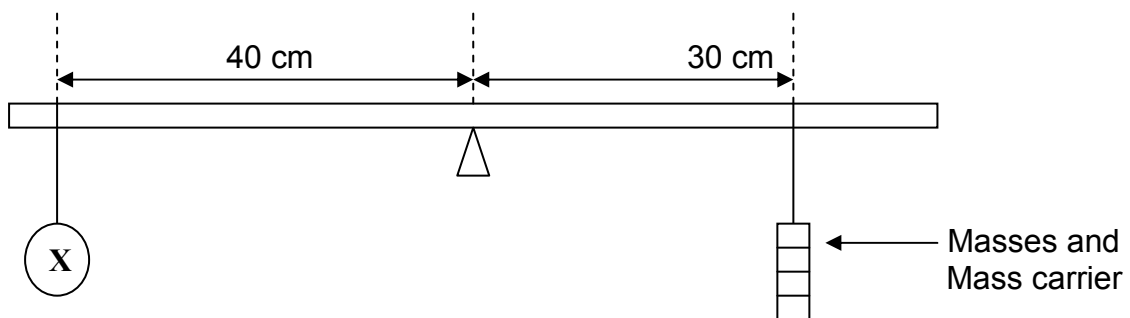
[1 mark]

6. This question is about the principle of moments.

a) State the principle of moments

[2 marks]

b) Janice wants to find the weight of object X and sets up the apparatus shown below to find it.



(i) Describe how she can find the weight of X using the above apparatus.

[3 marks]

(ii) If the weight of the masses is 8N, use the distances shown in the diagram to find the weight of X when the ruler is balanced.

[4 marks]

b) Mark with C the centre of gravity of the ruler on the diagram

[1 mark]

c) Draw the only upward force on the ruler and find its size.

[2 marks]

7. This question is about force diagrams.

Add forces to the following diagrams, including the name of the forces and their direction:



A floating boat



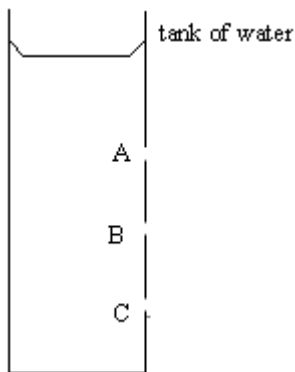
Skiing down a hill

[6 marks]

Section B: This section carries 45 marks

8. This question is about pressure.

The diagram below shows a container filled with water. Three holes were punctured in the container at different heights.

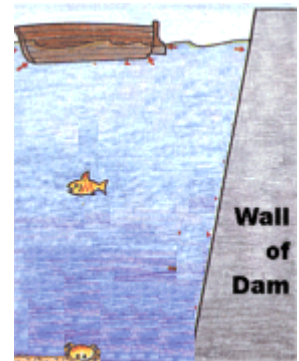


a) Draw how water comes out of these 3 holes on the above diagram.

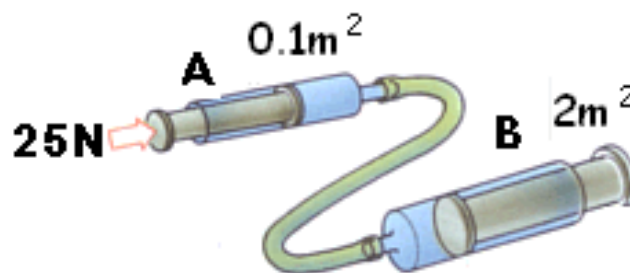
[3 marks]

b) With reference to the above diagram explain why dams are built with a wide base.

[2marks]



c) The diagram below shows a hydraulic machine where a force of 25N is applied to the small area A of 0.1m^2 . The large piston has an area of 2m^2 .



(i) Calculate the pressure exerted by the small piston.

[3 marks]

(ii) What is the pressure transmitted through the liquid?

[1 mark]

(iii) Assuming no friction, calculate the force exerted on the large piston.

[3 marks]

(iv) Why must the fluid in the hydraulic machine be a liquid and not a gas?

[2 marks]

(v) Give one use of a hydraulic machine.

[1 mark]

9. This question is about density.

The density of wine helps the manufacturer to decide if the wine is ready for bottling or not. Luca working in such a factory has to find the density of wine.



a) Name the apparatus used to measure:

(i) the mass of wine _____ [1 mark]

(ii) the volume of wine _____ [1 mark]

b) **Underline** the correct answer.

Density is a (**vector**, **scalar**) quantity.

[1 mark]

c) Describe how the mass of wine should be obtained.

[3 marks]

d) What calculation must Luca do to obtain the density of wine?

[1 mark]

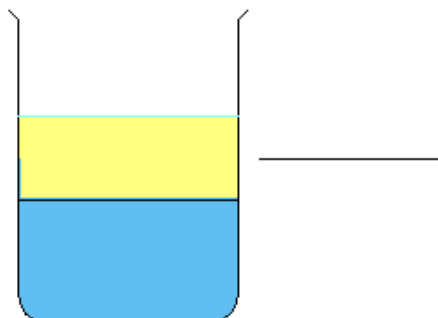
e) Describe **one** precaution taken during the experiment.

[1 mark]

f) A sample of wine of mass 375g has a volume of 250cm^3 . Calculate the density of wine.

[3 marks]

g) In a beaker Luca poured some wine and oil (of density 0.920g/cm^3) and the liquids settled as shown below:

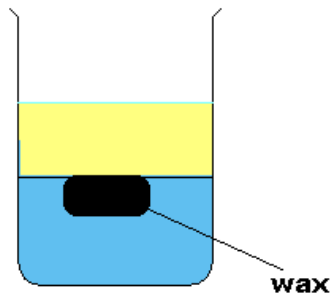


(i) On the above diagram, **label** the liquid found **at the surface**. [1 mark]

(ii) Give a reason for your answer.

[2 marks]

(iii) A piece of wax was placed in the beaker and it settled as shown below.



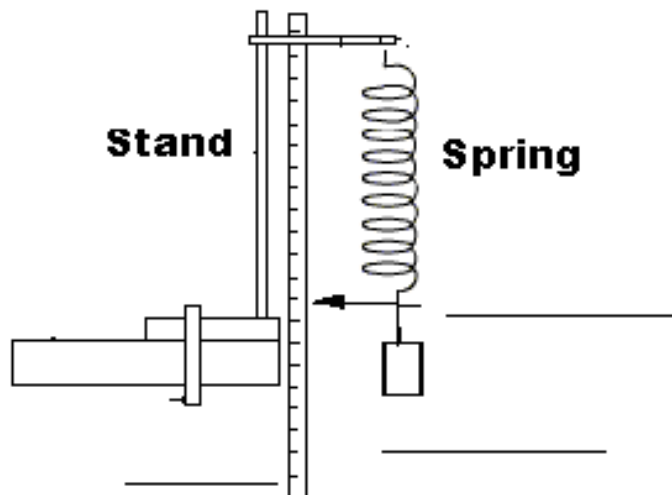
A possible value for the density of wax is

_____ g/cm³.

[1 mark]

10. This question is about the properties of elastic materials.

During a laboratory session, Josef and Jessica had to set up the following experiment to investigate the relationship between the extension and the force applied to a spring.



a) **Label** the above diagram.

[3 marks]

b) The following results were obtained.

Force (N)	0	1	2	3	4	5	6
Extension (cm)	0	4	8	12	16	20	28

(i) Draw a graph of **extension** (y-axis) against **force** (x-axis)

[5 marks]

(ii) From the graph find the extension that would be produced if a force of 3.5N is hanged to the spring.

[1 mark]

(iii) On the graph **mark** the elastic limit.

[1 mark]

(iv) Explain what would be observed after unloading the 6N load.

[2 marks]

(v) The graph plotted verifies _____ law which states that:
provided the _____ limit is not exceeded,
extension is _____ to force.

[3 marks]



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