Saint Theresa College
PARVA PARVORUM PULCHRA

BOYS' SECONDARY SCHOOLS

HALF YEARLY EXAMINATIONS 2009/2010

FORM: **3**	**Physics**	Time: **1½ hrs**

Name:_____ Class:_____

- **Use the following formulas where necessary**

$\rho = m/v$ $W = m \times g$ **Moment = F x s**

- **Take value of the acceleration due to gravity "g" as 10m/s^2.**
- **Show all your working**
- **Answer all the questions in this paper.**
- **The use of calculator is allowed at all times.**

Exam mark	Practical mark	Total mark

1. *This question is about measurements and density*

a. Complete the following table using the help below.

(mass, N, s, Kg/m^3, t, time, m^3, N, ρ, m)

Quantity	Symbol	Unit
		s
distance		m/s
Force	F	
Density		
		Kg
Weight	W	
Volume	v	

(10 marks)

2. *Fill in the following sentences*:

a. The apparatus required to measure the length of your bike is a _____. **(1 mark)**

b. The _____ of some water can be found using a measuring cylinder. **(1 mark)**

c. The weight of some flour can be found using a _____. **(1 mark)**

d. The time taken for John to walk to the swings can be measured using a _____. **(1 mark)**

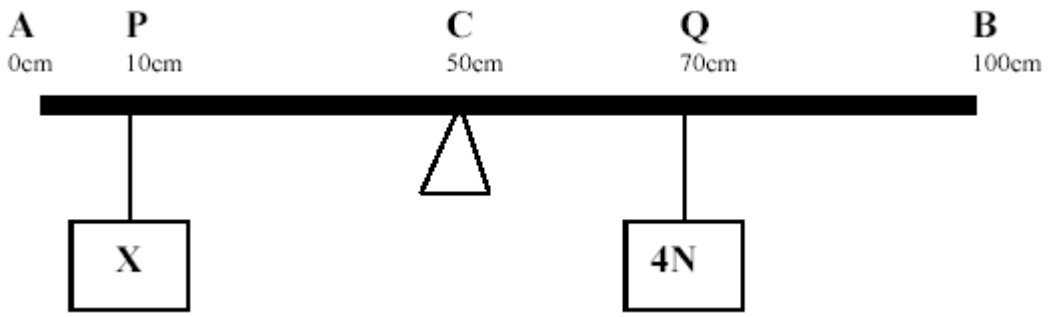
e. John takes 7 minutes to walk this distance. The time in seconds is _____ s. **(2 marks)**

f. The mass of some tomatoes is 1700 g. Its mass in kilograms is _____ kg. **(2 marks)**

g. An aquarium is 250cm long. Its length in metres is _____ m. **(2 marks)**

3. *This question is about moments.*

a. The diagram shows a metre rule AB pivoted at its centre C. An object X is suspended from the 10cm mark. When a 4N weight is suspended from the 70cm mark, the rule is in equilibrium.



i) When the rule is in equilibrium: clockwise moments = _____

(1 mark)

ii) PC = ____cm = ____m

(4 marks)

QC = ____cm = ____m

iii) Calculate the moment of the 4N weight about C

_____

_____

(2 marks)

iv) What is the moment of the force X if the system is in equilibrium? State the law that you have used.

_____

_____

(2 marks)

v) Calculate the Force X acting downwards.

_____

_____

(2 marks)

vi) Support S is the _____ of the system.

(1 mark)

4. *This question is about Hook's law*

In a spring experiment, the results were as follows:

Load (N)	0	1	2	3	4	5	6	7
Length of spring (mm)	50	58	70	74	82	90	102	125
Extension (mm)								

a) What is the length of the spring when unstretched?

_____

(1 mark)

b) Copy and complete the table. **(4 marks)**

c) Plot a graph of extension against load. **(6 marks)**

d) One of the results is wrong. Which is it?

_____

(1 mark)

e) Mark the elastic limit on your graph. **(2 marks)**

f) What load would give an extension of 30mm?

_____

(1 mark)

g) What would be the spring length for a load of 4.5N?

_____

(1 mark)

5. *This question is about **Forces**.*

a) An astronaut visits the three nearest planets on a mission to collect rock samples. On his way back some information is lost. Fill in the table to recover the information lost using the appropriate formula.

Planet	Gravitational Pull	Mass of rock sample	Weight of object
Venus	8.87	2.6	
Mars	3.77		7.16
Mercury		0.8	20.76

(6 marks)

b) While on the moon the astronaut decides to measure his own weight using Newton balance. The weight of the astronaut on the moon was 134N.

i. What is his mass if the gravitational pull of the moon is equal to 1.67N/Kg?

_____

(2 marks)

ii. Find the weight of the same astronaut on Earth?

_____

_____

(2 marks)

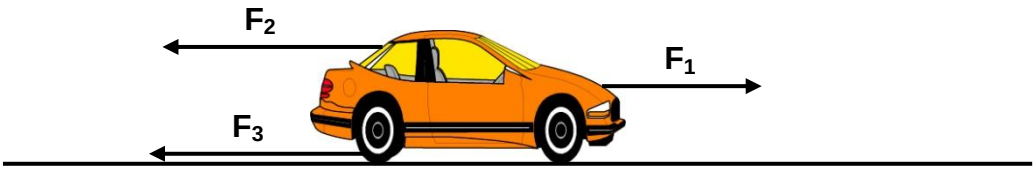
iii. Why is the gravitational pull of the Earth much bigger than that of the moon?

_____

_____

(1 mark)

c) The diagram below shows three forces on a car while it is traveling from one place to another. Force $\mathbf{F_1}$ is the forward force of the car.



i. $\mathbf{F_2}$ is the _____. **(1 mark)**

ii. $\mathbf{F_3}$ is the force of _____ between the tires of the car and the road.

(1 mark)

iii. Calculate the size of the resultant force **F** acting on the car given that F_1 = 3000N F_3=500N and F_2 = 1000N.

_____

_____

(3 marks)

iv. Which force will not exist if the surface S is a smooth surface?

_____

(1 mark)

6. *This question is about density.*

a) In an experiment to measure the density of stone Luca placed a piece of stone in a container filled with some water as shown in figure A.

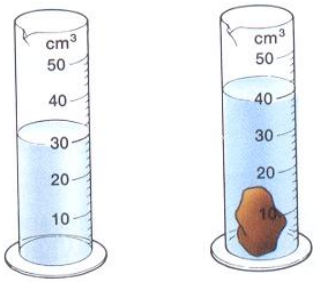


Figure A **Figure B**

i. What is the above container called? _____ **(1 mark)**

b) By looking at the above figures find:

i. The volume of the water alone. _____ **(1 mark)**

ii. The volume of the water and the marble. _____ **(1 mark)**

iii. The volume of the marble alone. _____ **(1 mark)**

c) The stone was later measured to have a mass of 25 grams.

i. What instrument did Luca use to get this measurement _____ **(1 mark)**

ii. Calculate the density of the stone in g/cm^3.

_____

_____

(2 marks)

d) IF the stone is cut in half… what happens to its density? (Increases, decreases, remains the same).

(1 mark)

e) Mention two precautions that Luca had to take in order to get the best results possible.

_____

_____

(2 marks)

7. *This question is about the Universe*.

a) The diagram shows the Sun, Earth and Saturn. Earth is closer to the Sun than Saturn in our solar system.

i. In the above diagram, mark with an 'X' the position of Earth six months later.

(1 mark)

ii. In the above diagram, draw the Earth's orbit.

(1 mark)

iii. Which planet experiences the largest gravitational pull by the Sun? Explain why.

_____

_____

(2 marks)

iv. Which of the two planets, Earth or Saturn has the largest gravity? Explain why.

_____

_____

(2 marks)

v. How long does it take the Earth to make one complete revolution around the Sun?

_____

(1 mark)

vi. How long does it take the Earth to make on complete revolution on its own axis?

_____

(1 mark)

vii. Underline the correct:

A distant Sun is called a (star, galaxy, planet), and a large group of solar systems is called a (star, Sun, galaxy).

(2 marks)