SECONDARY SCHOOL ANNUAL EXAMINATIONS 2008

DIRECTORATE FOR QUALITY AND STANDARDS IN EDUCATION

Educational Assessment Unit

FORM 3	PHYSICS	TIME: 1h 30min

Answer all questions.
All working must be shown. The use of a calculator is allowed.

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

You may find some of these formulae useful.

Density $\text{Density} = \frac{\text{Mass}}{\text{Volume}}$

Force $W = mg$

Moment of a force = force x perpendicular distance

Energy & Work Work done = F s

$\text{Power} = \frac{\text{Work done}}{\text{Time taken}}$

$PE = m\,g\,h$

$KE = \frac{mv^2}{2}$

Pressure $\text{Pressure} = \frac{\text{Force}}{\text{Area}}$

$\text{Pressure} = \rho\,h\,g$

Waves $v = f\,\lambda$

$\text{Frequency} = \frac{\text{number of waves}}{\text{time}}$

$$\text{Refractive Index of glass} = \frac{\text{speed of light in air}}{\text{speed of light in glass}}$$

$$\text{Magnification} = \frac{\text{height of image}}{\text{height of object}} = \frac{\text{image distance}}{\text{object distance}}$$

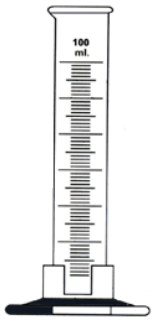
For office use only:

Question No.	1	2	3	4	5	6	7	8	Total Mark	Practical Mark	Final Mark

SECTION A: Answer all questions in the space provided. This section has a total of 40 marks.

1. (a) Isaac and Nicole use the apparatus below to find the density of a small quantity of cooking oil.

A 

B 

(i) Name the above apparatus:

A = _____ B = _____

[2]

(ii) They find that 35g of oil has a volume of 38cm^3. Calculate its density.

_____

_____

[2]

(b) Isaac and Nicole calculate the density of three different solids A, B and C as shown in the table below.

Solid	Density
A	1.6 g/cm^3
B	2.7 g/cm^3
C	0.6 g/cm^3

(i) Which solid A, B or C **floats** over water? (Density of water is 1.0g/cm^3) Give a reason for your answer.

_____

[2]

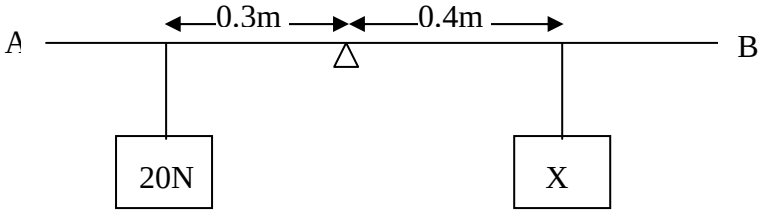
(ii) If solid A is broken into two smaller pieces, would its density change? Explain your answer.

_____

_____

[2]

2. The diagram shows a metre rule AB resting at its centre on a pivot. A weight of 20N is placed 0.3m away from the pivot. Another weight X is placed 0.4m away from the pivot on the opposite side to keep the rule in balance.



(a) Underline the correct answer in each of the following:

(i) The direction of the weight X is (upwards, downwards).

(ii) The direction of the moment of the weight X is (clockwise, anticlockwise).

(iii) The direction of the moment of the 20N weight is (clockwise, anticlockwise).

(iv) The sum of the clockwise moments is (greater than, equal to, smaller than) the sum of anticlockwise moments.

[4]

(b) Calculate the size of weight X.

_____

_____

[2]

(c) Calculate the size of the reaction force at the pivot.

_____

[2]

3.(a) Elisa has a mass of 50kg. When she stands with both feet flat on the ground, the total surface area in contact with the ground is $0.2m^2$. Calculate:

(i) Elisa's weight _____

_____

[2]

(ii) her pressure on the ground.

_____

_____

[2]

(b) She wears a pair of shoes with high heels as shown in the diagram.

(i) How will her pressure on the ground change?

_____

[1]

(ii) Give **one** reason for your answer.

_____

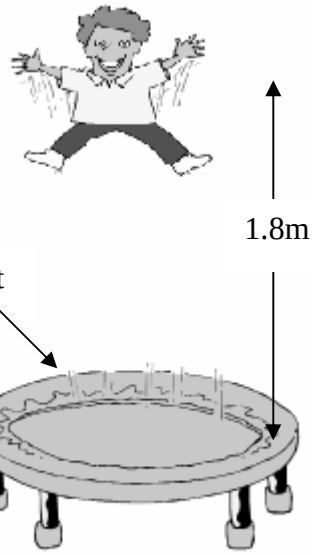
[2]

(iii) It is not allowed to walk with high heels on the marble floor of St. John's Cathedral at Valletta. Explain why.

_____

[1]

4. Ganni jumps on a mat, until he is jumping high and reaching a height of 1.8m. His mass is 60kg.



(a) Mark on the diagram, where Ganni has

(i) maximum K.E. with letter **X**

(ii) maximum P.E. with letter **Y** [2]

(b) Calculate his potential energy at a height of 1.8m.

_____

_____

[2]

(c) With what speed must he leave the mat to reach a height of 1.8m?

_____

_____

_____

[2]

(d) Eventually Ganni slows down his movements and stops. Describe the energy changes that occur.

_____

_____

[2]

5. Fill in the missing words from the lists provided.

(a) **planets, stars, red shift**

_____ give out light but _____ only reflect light.

[2]

(b) **orbit, monitoring, communication**

Thousands of artificial satellites orbit the Earth. _____ satellites orbit the earth once every 24 hours. _____ satellites rotate in low orbit and are used for weather forecast.

[2]

(c) **same size, larger, smaller**

The bigger the masses of the planets, the _____ is the gravitational force between the planets. The further away the masses are from each other, the _____ is the gravitational force between them.

[2]

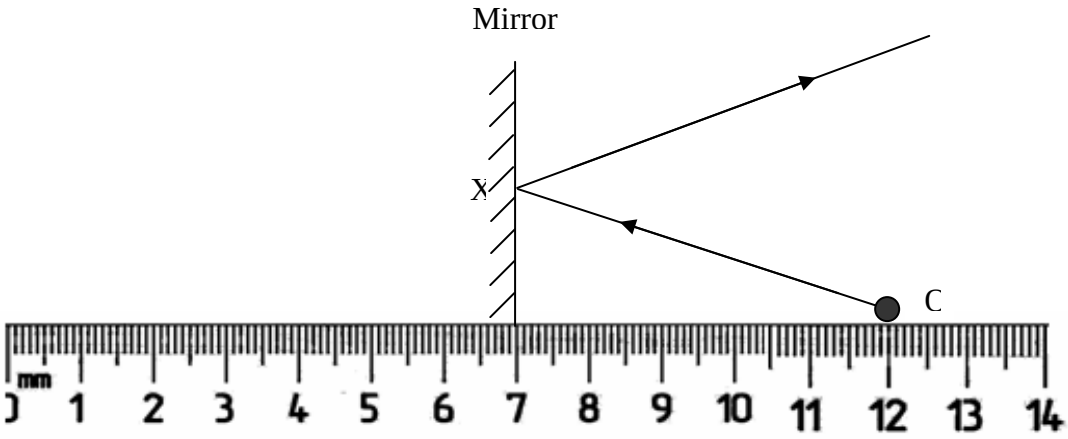
(d) **universe, galaxy, solar system**

The _____ consists of a large number of galaxies. Our galaxy is called the Milky Way. The _____ is a system of planets orbiting around a sun.

[2]

SECTION B: Answer ALL questions. This section has a total of 45 marks.

6. (a) Jacob and Louise investigate the image produced in a plane mirror by an object O. They set the object 5cm in front of the mirror as shown below.



(i) Complete the ray diagram to show how an image is formed. Mark the position of the image as I. [2]

(ii) Draw the **normal** at position X on the mirror. [1]

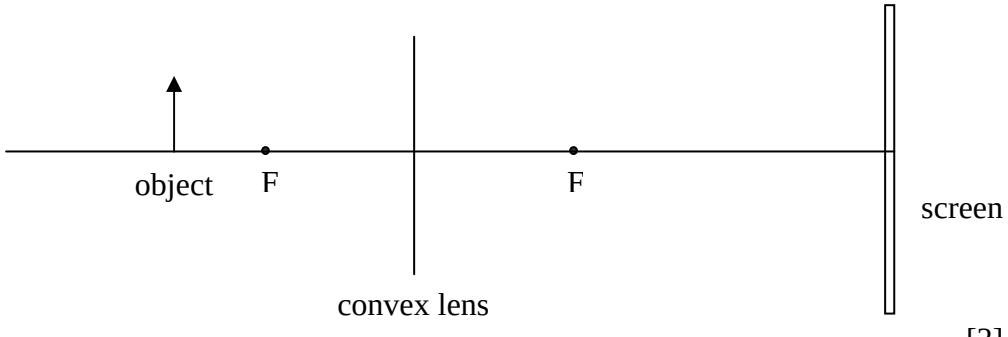
(iii) Mark clearly the angle of incidence and the angle of reflection at position X on the mirror. [2]

(iv) What is the horizontal distance of image from the mirror?

_____ [1]

(b) The lens of a projector is used to put an image on a screen.

(i) Draw **two** rays on the diagram to show how the image is produced.



[3]

(ii) Is the image produced:

- real or virtual? _____
- inverted or upright? _____
- reduced or magnified? _____

[3]

(iii) Measure the object height and the image height. Calculate the magnification of this lens.

Object height = _____

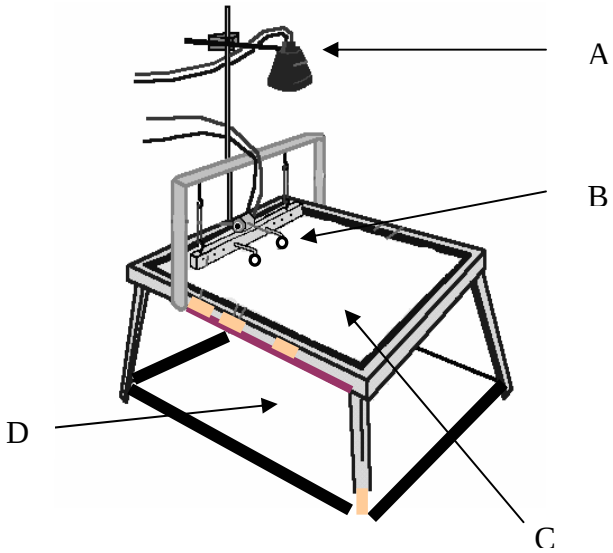
Image height = _____

Magnification = _____

_____

[3]

7. (a) Water waves in the school laboratory are produced in a ripple tank.



Label the parts A, B, C and D on the ripple tank.

A = _____

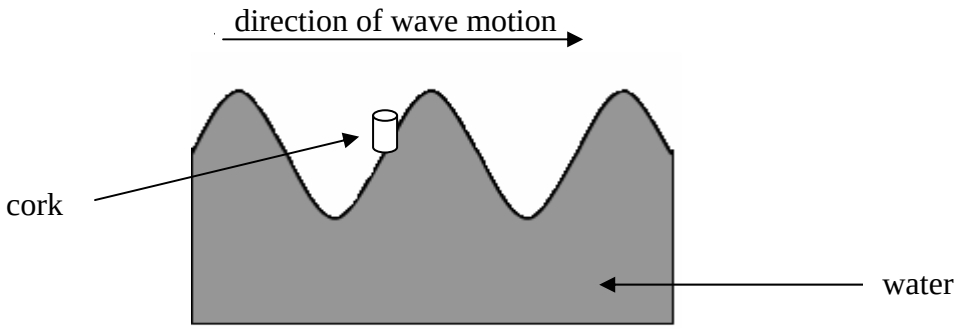
B = _____

C = _____

D = _____

[4]

(b) Water waves are produced in a glass-sided water tank. Viewed from the side at a particular instant, the waves appear as shown below. A small cork floats on the water.



(i) Mark on the above diagram

- a crest with a letter C
- a trough with a letter T
- the length of one wavelength, using λ
- the amplitude of the wave, with the letter A.

[4]

(ii) On the above diagram, draw arrows to show how the cork moves.

[1]

(iii) Are water waves transverse or longitudinal?

_____

[1]

(iv) It was observed that 12 waves passed a particular point every 4s. Calculate the frequency of these waves. Give the correct units of frequency.

_____

_____

[3]

(v) Calculate the speed of the water waves if their wavelength is 0.3m

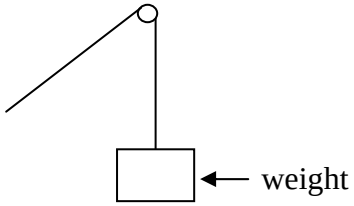
_____

_____

[2]

8. Roberta and Kieran investigate the work done in pulling a weight up different heights using a pulley as shown in the diagram below.

(a) Draw on the diagram, the **<u>two</u>** forces acting on the weight. Name **<u>each</u>** force.



[4]

(b) The children calculate the work done by the weight when they lift it through different heights. The results are shown below.

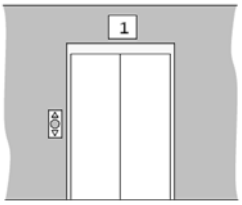
Height (m)	Work done (J)
0.5	10
1.0	20
1.5	30
2.0	40
2.5	50
3.0	60

(i) On the graph paper provided, plot a graph of **work done** on the *y-axis* against **height** on the *x-axis*. [4]

(ii) Use your graph to find:

- the work done when the weight moves 1.25m. _____ [1]
- the height when 35J of work has been done. _____ [1]

(c) A lift in a hotel moves 3.5 m from floor to floor. The weight of the lift is 12,000N.



(i) Calculate the work done when the lift moves up one floor.

_____

_____ [2]

(ii) Change your answer into kilojoules (kJ) _____ [1]

(iii) Use the following equation to help you answer this question.

$$\text{Power} = \frac{\text{Work done}}{\text{Time taken}}$$

Calculate the power needed to move the empty lift up one floor in 10s.

_____ [2]