SECONDARY SCHOOL ANNUAL EXAMINATIONS 2007

EDUCATIONAL ASSESSMENT UNIT- EDUCATION DIVISION

FORM 3	PHYSICS	Time: 1h 30min

NAME:_____ **CLASS:_____**

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.

Area of triangle = $\frac{\text{base} \times \text{height}}{2}$ **area of trapezium = $\frac{h}{2}$ (sum of parallel sides)**

$v = s/t$ **$v = u + at$** **$s = at^2/2$** **$W = mg$** **density = mass/volume**

work done = F s **PE = mgh** **Power = $\frac{\text{work done}}{\text{time}}$** **KE = $\frac{mv^2}{2}$**

moment of a force = Force x perpendicular distance

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

refractive index of glass = $\frac{\text{speed of light in air}}{\text{speed of light in glass}}$

frequency = $\frac{\text{number of waves}}{\text{time}}$ **$v = f\lambda$**

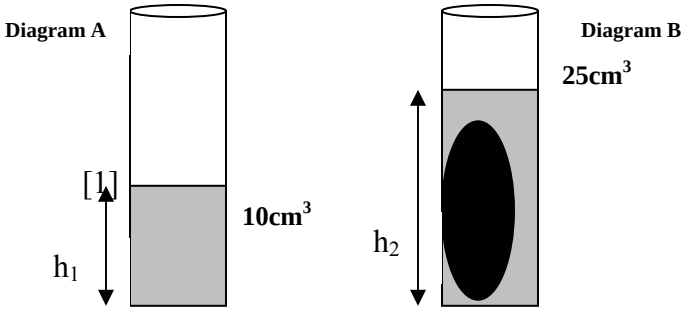
For office use only:

Question	1	2	3	4	5	6	7	8	Total Exam	Practical	Final Mark
Marks											

SECTION A: Answer ALL questions. This section has a total of 40 marks.

1. Diagram A shows a measuring cylinder containing 10 cm^3 of water.
Diagram B shows the same measuring cylinder containing the same volume of water after a stone was placed inside.

a. (i) Use your ruler to measure the height of the water levels.



h_1 .....cm

h_2.....cm

(ii) Calculate the difference in the water levels. ……. [2]

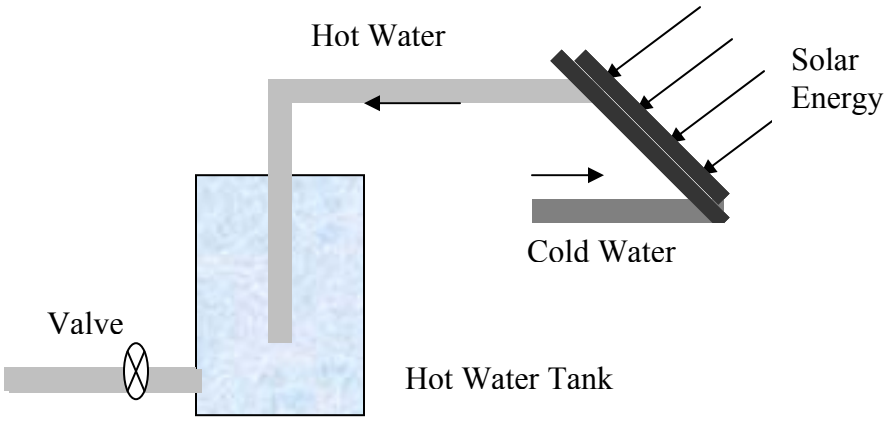
b. (i) Calculate the volume of the stone in cm^3 …….. ….. [2]

(ii) If the mass of the stone is 60g, work out the density of the stone in g/cm^3
…… [2]

2. Fill in using the words below. Each word may be used only once.
inverted, refracts, equal, reflected, transverse, refraction, focus, wavelength.

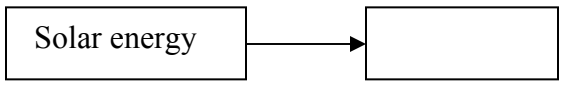
a. A ray of light that hits a plane mirror is mostly …….
b. After passing through a converging lens, parallel rays meet at the ……
c. A real image formed by a converging lens is always ……..……
d. When a ray light passes from air into water, it ……...…….towards the normal.
e. Refraction always involves a change in wave velocity and …….…….
f. When total internal reflection occurs in an optical fibre, the angle of incidence is ……..……to the angle of reflection.
g. In a ripple tank, …….takes place when waves pass from deep into shallow water.
h. Sound waves are longitudinal but water waves are ……..…. [8]

3. On a particular day, a solar panel absorbed an average of 1 MJ (1 000 000 J) of solar energy every hour. When joined to a hot water tank, this solar panel was found to be 40% efficient.



a. Is solar energy renewable or non-renewable? …… [1]

b. Complete the energy flow diagram below



[1]

c. Calculate in J how much energy every hour is actually used to heat the water, if this solar panel is **40% efficient**.

…… [2]

d. The principle of energy conservation states…….

…… [1]

e. Keeping in mind your answer to question d, say what may have happened to the unused solar energy.

…… [1]

f. Name one advantage and one disadvantage of heating water using solar energy over using electricity.

Advantage ……. [1]

Disadvantage ……. [1]

4.

Gamma rays	**X-rays**	**Ultraviolet**	**Visible light**	**Infrared**	**Micro waves**	**Radio waves**

a. (i) All electromagnetic waves travel in a vacuum with the same …….[1]

(ii) The electromagnetic waves above are arranged in order of increasing ……. [1]

(iii)Ultra violet rays can cause ……. [1]

(iv)X-rays pass through human tissues but are absorbed by the ……. [1]

b. A radio transmitter encodes ('changes') sound waves into radio waves which are then transmitted to radio receivers.

(i) Give one advantage of transmitting radio waves rather than sound waves. …… [1]

(ii) In a radio receiver, a radio wave is …… into a sound wave. [1]

c. A radio station transmits at a frequency of 100 MHz (1.0×10^8 Hz). Find the wavelength of the waves if the velocity of electromagnetic waves in air is 3.0×10^8 m/s.

…… [2]

5.

The speed of sound in air is 330 m/s.

Sound produced at **A** reaches a wall at **B** in 2.5 seconds.

a. Calculate the distance from **A** to **B**. ……..... [2]

b. After hitting the wall, the sound returns to **A**.

(i) At **B** the sound is …….. [1]

(ii) The same sound heard again at **A** is called an …….. [1]

(iii) The total time taken by the sound to reach **A** again is ……seconds. [1]

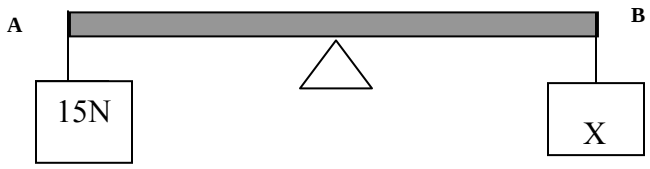
c. As the sound at **A** is produced, a light is flashed.

(i) From **B**, is the light seen before or after the sound is heard? …….. [1]

(ii) Give a reason for your answer …… [2]

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

6. The diagram shows a uniform ruler balanced on a pivot at its mid-point. Weights hang at A and B.



a. The centre of gravity of this uniform ruler acts through its

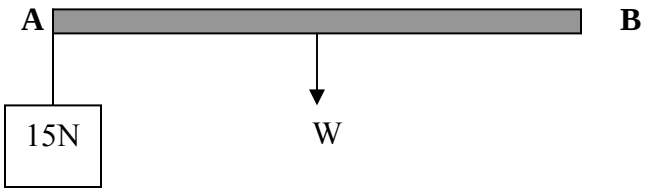
…… [1]

b. When the ruler is balanced: (i) X = …… N. [2]

c. X is removed so that the ruler loses equilibrium. In which direction does it turn, clockwise or anticlockwise? …… [1]

d. When X is removed, the ruler was balanced again by moving the pivot towards one end.
(i) **Tick the correct option**.

Pivot moved towards end A ☐ Pivot moved towards end B ☐ [1]



(ii) Add the **pivot** to the diagram above. [2]

(iii) What does W represent? …….. [2]

(iv) The distance between end A and the pivot is d_1 . Mark this on your diagram. [1]

(v) The distance between W and the pivot is d_2. Mark this on your diagram. [1]

(vi) If $d_1 = 0.2$m, and $d_2 = 0.3$m, find the value of W.

……. [4]

7. The last minute of a race can be divided into 3 parts.

Part 1: Joseph ran with constant speed for 20 seconds.
Part 2: Joseph sprinted forward for 30 seconds.
Part 3: Joseph slowed down for 10 seconds until he came to rest.

Tick the correct option in questions a, b and c.

a. While sprinting forward, Joseph ran with

constant speed. ☐

acceleration. ☐

deceleration. ☐ [1]

b While slowing down, Joseph ran with

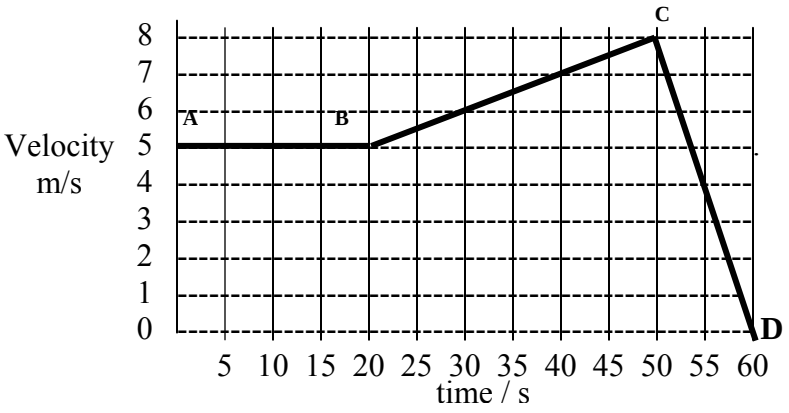
constant speed. ☐

acceleration. ☐

deceleration. ☐ [1]

c. In the diagram below, BC is the velocity – time graph for one part of this section of the race.

BC represents: Part 1 ☐ Part 2 ☐ Part 3 ☐ [1]



d. (i) From the graph, write down the velocity of Joseph at:

A …….. B …….. C …… D ……. [4]

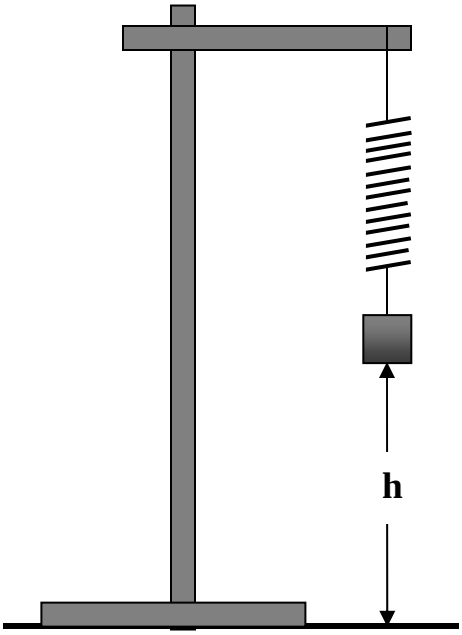
(ii) Find the velocity of Joseph after 40 seconds……. 55 seconds……. [2]

e. The distance covered can be worked out by finding the area under the graph. Use this fact to calculate the distance covered by Joseph

(i) between A and B ……... [3]

(ii) between C and D ……..... [3]

8. A spring is mounted vertically as shown in the diagram below. The height **h** is the distance between the bottom of the load and the bench.
Maria measures values of **h** for different loads and tabulated her results.



Load in N	Height **h** in mm
0	90
1	80
2	70
3	60
4	50
5	40

a. When a spring is loaded, the increase in length is called the …… [1]

b. A spring obeys Hooke's Law if the …….. and the ……. are directly proportional. [2]

c. On the graph paper on Page 8 of this answer paper, plot a graph of **h** in mm on the y-axis against Load in N on the x-axis. [6]

d. Use your graph to fill the table below:

Load in N.	Height in mm.
1.5	
4.2	
	65
	52

[4]

e. For a load of 10 N, the spring does not regain its original length when the load is removed. This means that the …… ……. has been exceeded. [2]