Centre Number	Candidate Number

Candidate Name _____

EXAMINATIONS COUNCIL OF ZAMBIA

Joint Examination for the School Certificate and General Certificate of Education Ordinary Level

SCIENCE 5124/2

PAPER 2

(PHYSICS)

Wednesday **7 NOVEMBER 2012**

Additional materials:
Mathematical tables
Graph paper
Answer Booklet
(Do not allow calculators)

Time: 1 hour 15 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number at the top of this page and on any separate Answer Booklet used.

There are **twelve (12)** questions in this paper.

Section A

Answer **all** the questions.

Write your answers in the spaces provided on the question paper.

Section B

Answer any **two** questions.

Write your answers on the Answer Booklet provided.

At the end of the examination

1. Fasten Answer Booklet used securely to the question paper.
2. Enter the numbers of the **Section B** questions you have answered in the grid below.

Candidate's use	Examiner's use
Section A	
Section B	
Total	

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

Cell phones are not allowed in the Examination room.

This question paper consists of 11 printed pages.

Section A

[45 marks]

Answer all questions.

Write your answers in the spaces provided on the question paper.

1 **(a)** **Figure 1.1** below shows part of a Vernier Calliper used to measure a physical quantity.

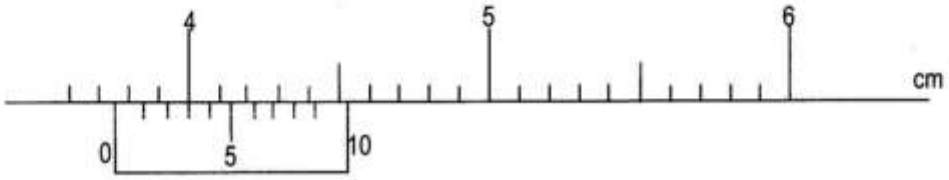

Figure 1.1

(i) What is the reading shown above on the Vernier Calliper?

Reading = _____ [1]

(ii) What physical quantity does the Vernier Calliper measure?

_____ [1]

(b) State **two** precautions that must be taken when taking measurements using a micrometer screw gauge.

_____

_____ [2]

[4]

2 **Figure 2.1** shows a velocity time graph of an object moving along a straight road.

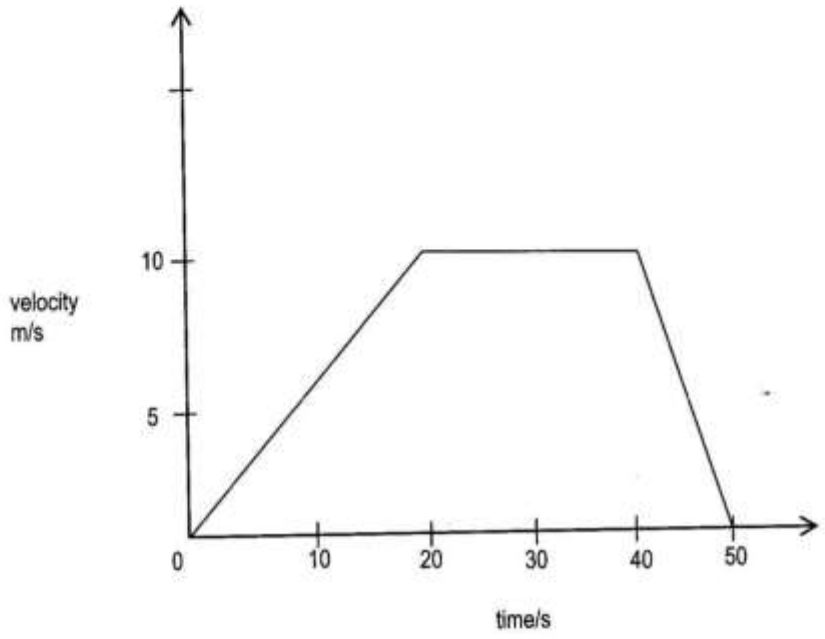

Figure 2.1

(a) What is the total time for the journey?

time = _____ [1]

(b) What is the maximum velocity for the journey?

velocity = _____ [1]

(c) What is the acceleration during the first part of the journey?

acceleration = _____ [1]

(d) Calculate the total distance covered by the car.

distance = _____ [3]

[6]

3 **Figure 3.1** shows an object of mass 0.7kg resting on a horizontal surface.

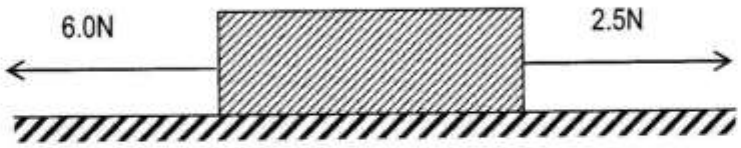

Figure 3.1

If the object is pulled to the left by a force of 6.0N and to the right by a force of 2.5N and assuming that no other forces act on the object.

(a) calculate;

(i) the resultant force.

Resultant force = _____ [1]

(ii) the acceleration produced by the resultant forces in (i).

Acceleration = _____ [2]

(b) Explain why in practice the actual acceleration for the object may be lower than your answer to **(a) (ii)** above.

_____

_____

_____

_____ [1]

[4]

4 (a) Define **work** and **power.**

Work:_____

_____

Power:_____

_____ [2]

(b) A pupil of mass 50kg runs up a flight of 20 stairs each 25cm high in a time of 20 seconds. [Take g = 10N/kg]

Calculate,

(i) the pupil's gain in potential energy.

Potential energy = _____ [2]

(ii) the useful power developed by the pupil in climbing the stairs.

power = _____ [2]

[6]

5 **Figure 5.1** shows a laboratory thermometer.

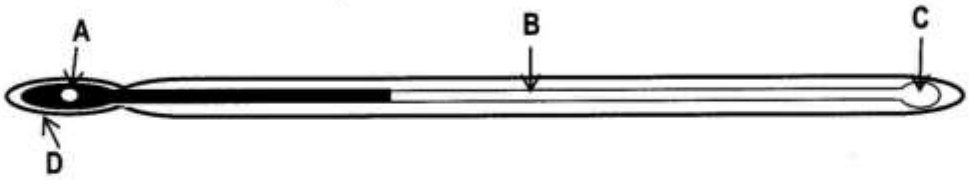

Figure 5.1

(a) Name the substance labelled **A**. [1]

_____

(b) Name the section labelled **B**. [1]

_____

(c) Why is part **B** narrow? [1]

_____

(d) Explain why the wall of the thermometer bulb marked **D** is thin. [1]

_____

(e) Give two advantages of a thermocouple thermometer compared with a mercury thermometer for measuring temperature.

_____

(i) _____

_____

(ii) _____

_____ [2]

Total: [6]

6 **(a)** Light and gamma rays are both examples of electromagnetic radiation.

(i) Name two other types of electromagnetic radiation.

_____ [2]

(ii) State two differences between light and gamma rays.

_____

_____

_____ [2]

(b) The speed of light is 3×10^{8}m/s. Calculate the frequency of yellow light of wavelength 6×10^{-7}m.

Frequency = _____ [3]

[7]

7 **Figure 7.1** shows a ray of light from air to water. The diagram is **not** drawn to scale.

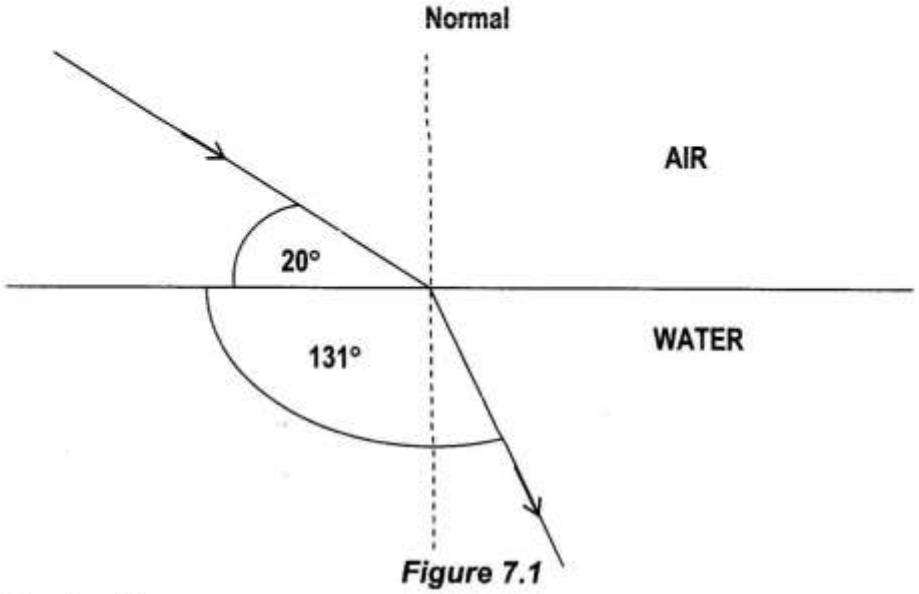

Figure 7.1

(a) Determine the:

(i) angle of incidence.

Angle of incidence = _____ [1]

(i) angle of refraction.

Angle of refraction = _____ [1]

(b) Calculate the refractive index.

Refractive index = _____ [1]

[3]

8 **Figure 8.1** shows a boat which uses ultrasonic waves to calculate the depth of the sea.

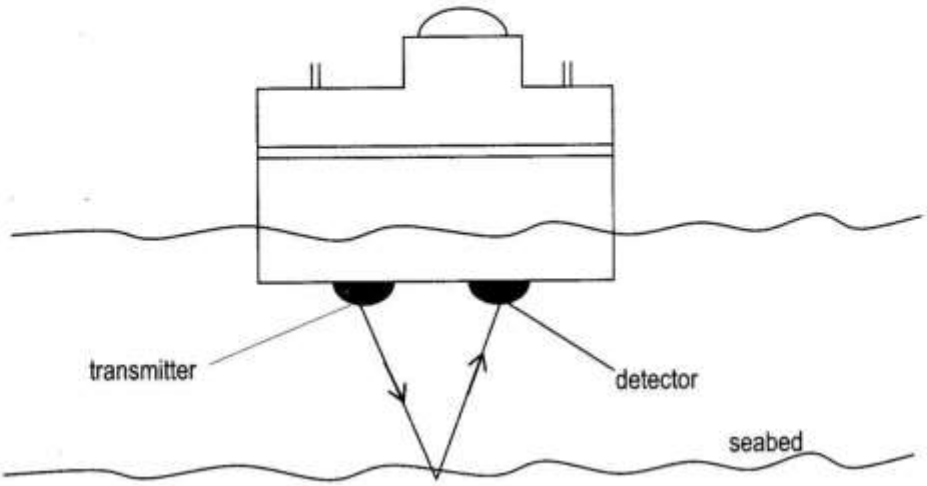

Figure 8.1

The speed of sound in water is 1400m/s and an ultrasonic wave has a frequency of 28000 Hz.

(a) Calculate the wavelength of the ultrasonic wave in water.

wavelength = _____ [2]

(b) The pulse takes 0.2s to travel from the transmitter to seabed and back to the detector. Calculate the distance to the seabed.

distance = _____ [2]

[4]

9 **Figure 9.1** shows a simple transformer which can be used to light a bulb. The bulb is labelled.

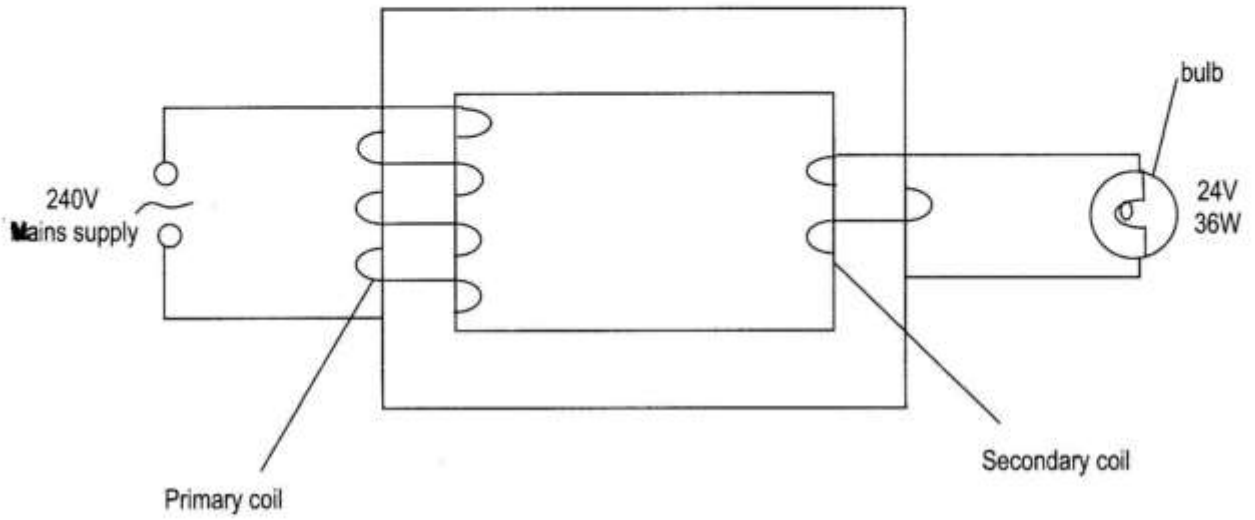

Figure 9.1

When the mains supply is switched on, the bulb is very bright.

(a) State one way in which the potential difference across the bulb can be decreased without changing the mains supply.

_____

_____ [1]

(b) For the lamp operating at the correct brightness, calculate:

(i) the current in the secondary coil,

current = _____ [2]

(ii) the current in the primary coil, assume that the transformer is 100% efficient.

current = _____ [2]

[5]

Section B

[20 marks]

Answer any **two (2)** questions from this section.
Use the **Answer Booklet** provided.

10 The ratemeter (counter) was used at intervals of 10 minutes to measure the activity of a radioactive source and the following results were obtained.

Time (minutes)	0	10	20	30	40	50	60	70
Count rate (counts per second)	650	520	416	333	300	213	170	136

(a) Plot a graph of count rate against time. [5]

(b) What count rate appears to have been misread and should therefore be ignored? [1]

(c) At what time was the count rate 250 counts per second? [2]

(d) What is the half-life of the source? [2]

Total: [10]

11 **(a)** Describe an experiment you would carry out to determine the density of an irregularly shaped object which floats on water. [5]

(b) **Figure 11.1** shows a uniform meter rule balanced horizontally on a knife-edge placed at the 58cm mark when a mass of 20g is suspended from the end.

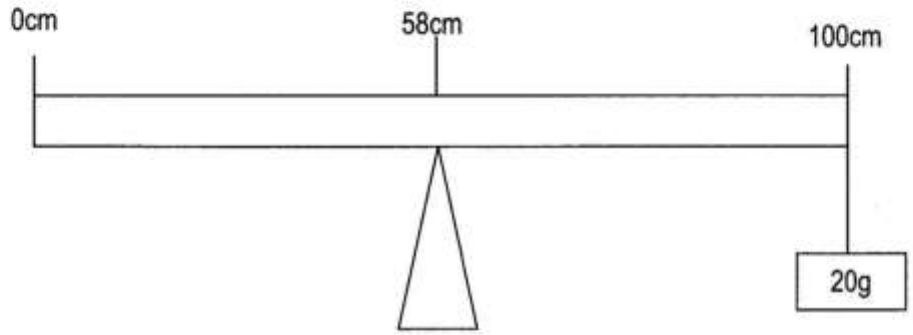

Figure 11.1

(i) Find the mass of the rule. [2]

(ii) What is the weight of the rule. (taking g = 10m/s^2)? [2]

(c) A candle stand has a wide heavy base. Explain why the base has both heavy mass and wide area. [1]

Total: [10]

12 A 4Ω DVD, 6Ω shaving machine and a 12Ω radio cassette are connected at the same time in parallel across 24V power supply.

(a) Draw a circuit diagram to represent this connection. [2]

(b) Find the total resistance in the circuit offered by all the three appliances. [2]

(c) Calculate the current in each appliance. [6]

Total: [10]