Surname	Forename(s)	Centre Number	Candidate Number

For Performance Measurement

ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Ordinary Level

PHYSICS 4023/2

PAPER 2: Theory

SPECIMEN PAPER 2 hours

Additional materials: Electronic calculator and/or Mathematical table
Graph paper

Allow candidates 5 minutes to count pages before the examination

This booklet should not be punched or stapled and pages should not be removed.

TIME: 2 hours

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page and Centre number and candidate number on top of the right corner of every page of this paper.
Check if the booklet has all the pages and ask the invigilator for a replacement if there are duplicate or missing pages.

Section A

Answer **all** questions.
Write your answers in the spaces provided on the question paper.

Section B

Answer any **three** questions.
Write your answers on the spaces provided on the question paper
Do not fasten the booklet

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question paper.
Candidates are reminded that **all** quantitative answers should include appropriate units.
Candidates are advised to show **all** their working in a clear and orderly manner, as more marks are awarded for sound use of Physics than for correct answers.

This question paper consists of 21 printed pages and 3 blank pages.

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Section A

Answer **all** questions from this section.

1 **Figure 1.1** shows an instrument used to measure diameter of a wire.

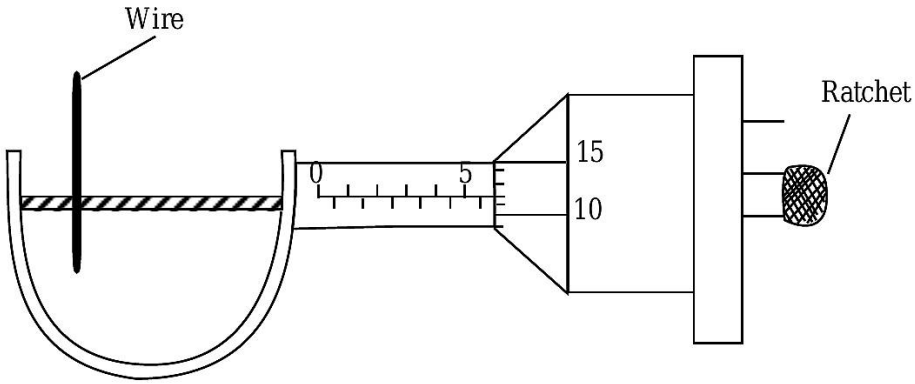


Fig. 1.1

(a) Name the instrument in **Fig. 1.1**.

_____ [1]

(b) State the reading shown on the instrument.

_____ [1]

(c) State **three** precautions which should be taken when using the instrument in **Fig. 1.1** to measure the diameter of the wire.

_____

_____

_____

_____ [3]

2 **(a)** Define velocity.

_____ [1]

(b) A car travels at a constant speed of 10 ms^{-1} for 8.0 s and is then brought to rest in 4.0 s by a constant braking force.

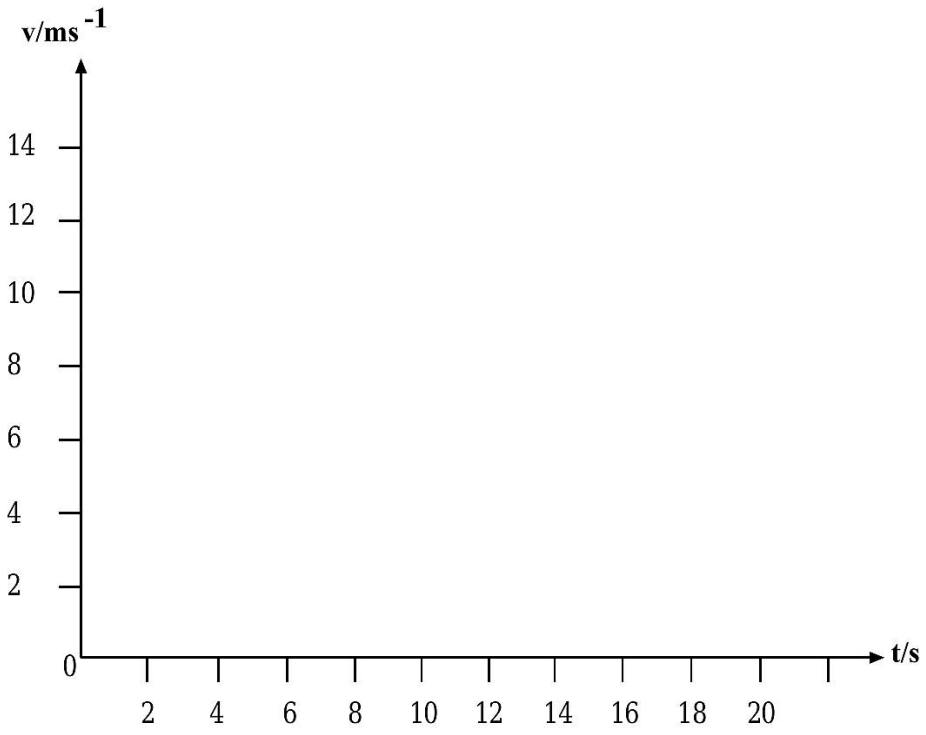


Fig. 2.1

(i) Draw a graph on **Fig. 2.1** to represent the car's motion. [2]

(ii) Determine the total distance travelled by the car.

_____

_____

_____

_____ [2]

3 **(a)** **(i)** State **one** non-renewable source of energy.

_____ [1]

(ii) Explain why charcoal is a renewable source of energy.

_____

_____ [1]

(iii) Describe the main energy conversions which occur at Hwange Thermal Power Station.

_____

_____

_____ [3]

4 **(i)** State any **two** renewable resources.

_____

_____

_____ [2]

(ii) State the advantage of using multiple cylinders in an engine.

_____ [1]

(iii) Explain the effect of worn out fuel jets on the efficiency of an engine.

_____

_____

_____ [2]

5 **Figure 5.1** shows an electric circuit.

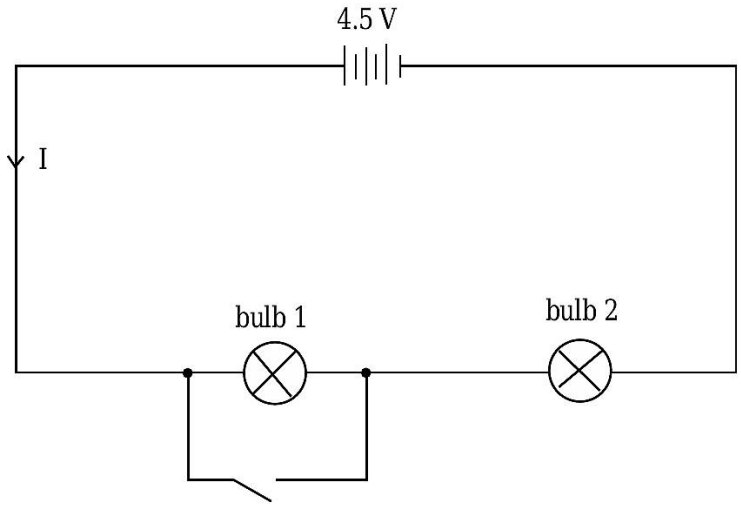


Fig. 5.1

Each bulb has a resistance of 5Ω.

(i) Calculate the current I when the bulbs are at maximum brightness.

[2]

(ii) The switch is then closed. Deduce what happens to:

1. the current I,

_____

2. bulb 1,

_____

3. bulb 2.

_____ [3]

6 **Fig. 6.1** shows an incomplete ray diagram to show the image formed by a plane mirror.

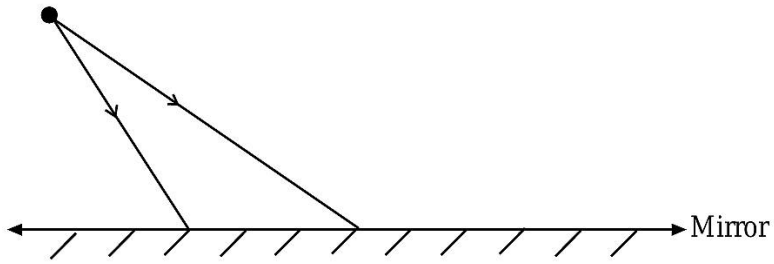


Fig. 6.1

(i) Complete the rays to show the position of the image. [3]

(ii) State the properties of the image in **Fig. 6.1**.

_____

_____

_____

_____ [2]

7 **(a)** Define the term radioactive decay.

_____

_____

_____ [2]

(b) An isotope has a mass of 64mg and a half life of 4 days.

(i) Calculate the mass of the isotope that remains after 16 days.

mass ..... [2]

(ii) Suggest a reason why radioactive isotopes of very short half lives are used in medicine.

_____

_____

_____ [1]

8 **Fig 8.1** shows the symbol of a logic gate.

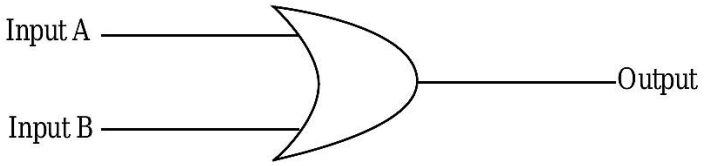


Fig. 8.1

(a) Name the logic gate shown in **Fig. 8.1**

_____ [1]

(b) Construct a truth table for this logic gate.

[1]

(c) Fig 8.2 shows a system designed to warn an owner if someone tries to steal his/her TV set.

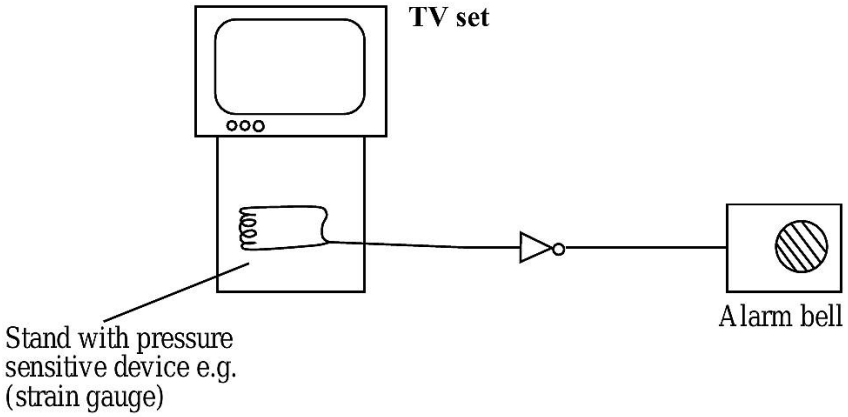


Fig 8.2

Suggest how the system works.

_____

_____

_____

_____

_____

_____ [3]

SECTION B

Answer any **three** questions.

9 **(a)** Two boats start together and race across a 20km wide lake and back. Boat **A** goes across at 20kmh^{-1} and returns at 20kmh^{-1}. Boat **B** goes across at 40 kmh^{-1} and returns at10 kmh^{-1}.

(i) Deduce the average speed of Boat **A**.

_____ [1]

(ii) Explain your answer in **(i).**

_____ [1]

(iii) State **two** similarities between distance and displacement.

_____

_____

_____ [2]

(b) **Fig 9.1** shows the motion of a car.

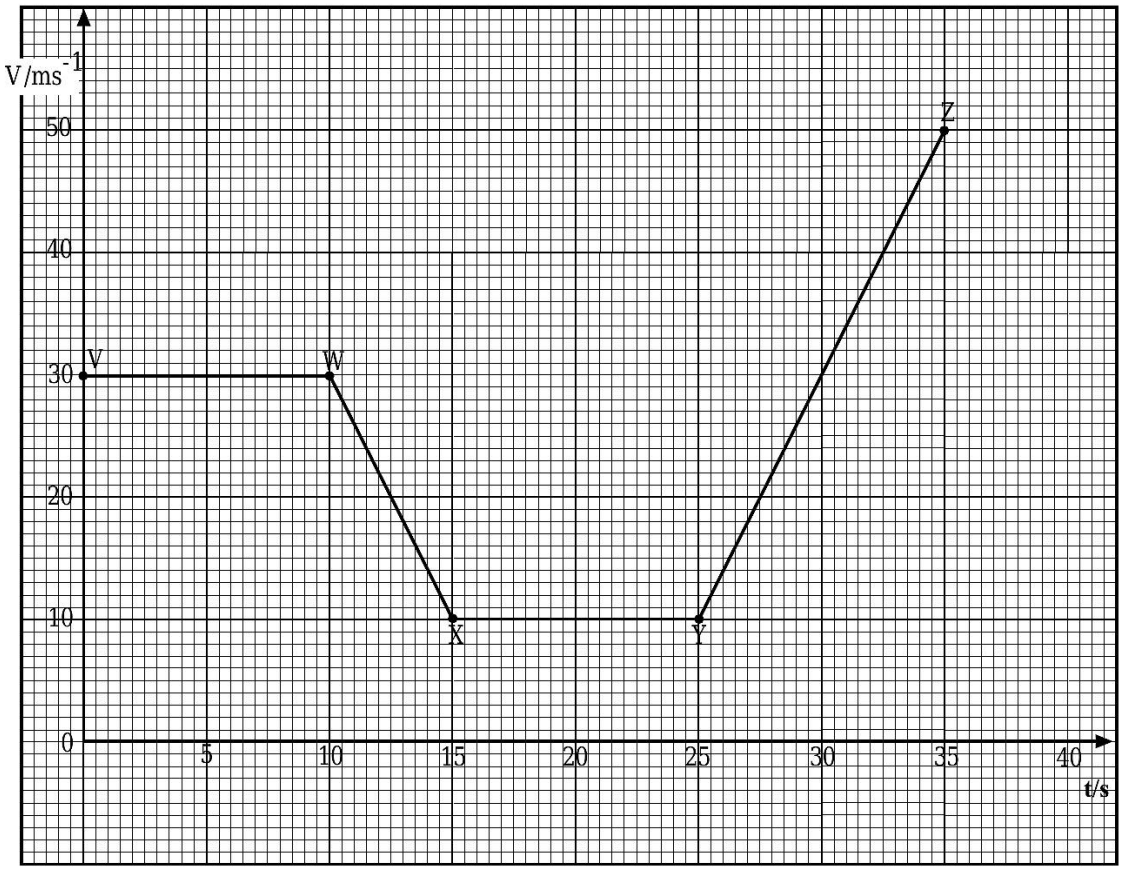


Fig 9.1

(i) Calculate the distance between X and Y.

_____

_____

_____

_____ [2]

(ii) Calculate the acceleration of the car between Y and Z.

_____

_____

_____

_____ [2]

(iii) Calculate the car's average speed from V to X.

_____

_____

_____

_____ [3]

(iv) Describe the car's motion from W to Z.

_____

_____

_____

_____ [3]

(v) Use **Fig 9.1** to show that the deceleration of the car has the same numerical value as its acceleration.

_____

_____

_____ [2]

(c) Explain why an object going round a circle cannot have constant velocity even though the speed is constant.

_____

_____

_____ [2]

(d) A parachutist falls from an aircraft which is flying. The parachute opens sometime after the start of the fall and attains terminal velocity. Explain how terminal velocity is attained.

_____

_____

_____

_____ [2]

10 **(a)** **(i)** Distinguish between a petrol and a diesel engine.

_____

_____

_____ [4]

(ii) Describe the operation of a four stroke petrol engine in relation to the movement of position and condition of valves.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ [8]

(b) **(i)** State the role of the carburetor.

_____

_____ [2]

(ii) Explain what you understand by the efficiency of an engine.

_____ [1]

(iii) Suggest **two** ways in which the efficiency of a petrol engine may be reduced.

_____

_____ [2]

(c) Describe the economic implication of using fuels.

_____

_____

_____

_____

_____

_____ [3]

11 **(a)** **(i)** Define refractive index.

_____

_____ [1]

(ii) **Fig 11.1** shows a ray of light entering a glass block of refractive index 1.5.

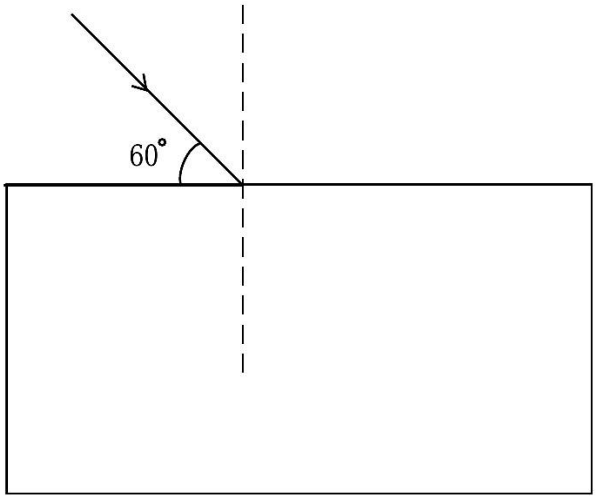


Fig. 11.1

Complete **Fig 11.1** to show the path followed by the ray **in** and **out** of the block. [2]

(iii) Calculate the **1.** angle of refraction,

[2]

2. speed of light in glass if the speed of light in air is 300 000 km/s.

[2]

(iv) Explain what causes refraction of light.

_____

_____

_____ [2]

(b) **(i)** Define the term critical angle.

_____

_____ [2]

(ii) **Fig 11.2** shows an optical fibre used in telecommunications.

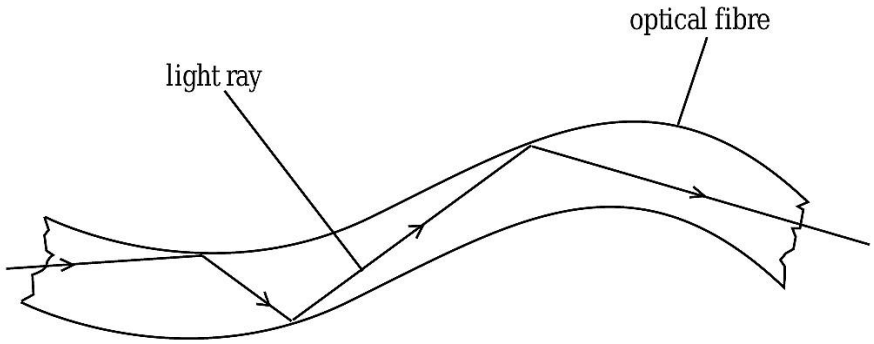


Fig 11.2

(iii) 1. Explain what happens to the ray in the fibre.

_____ [1]

2. State **one** advantage of using optical fibres over radio waves in telecommunications.

_____

_____

_____ [1]

(c) **(i)** Distinguish between a real and virtual image formed by a lense.

_____

_____

_____ [2]

(ii) 1. Illustrate with the aid of a diagram the term long sight.

_____

_____

_____

_____

_____ [3]

2. Explain how long sight can be corrected.

_____

_____

_____

_____ [2]

12 **(a)** **Fig 12.1** shows a transformer.

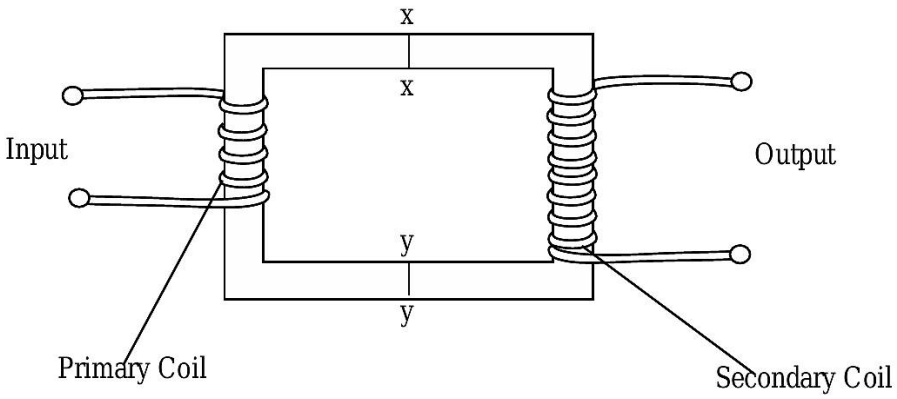


Fig 12.1

(i) Explain how the transformer works.

_____

_____

_____

_____

_____

_____ [5]

(ii) Suggest what could be done to **Fig 12.1** to make the output voltage smaller than the input voltage.

_____ [1]

(iii) Name the type of transformer in **(a)**.

_____ [1]

(iv) Suggest with reasons, what will happen to the working of the transformer if the core is split at xx and yy then separated by 35cm.

_____

_____

_____

_____

_____ [3]

(v) Suggest why the core is made of soft iron.

_____ [1]

(b) An ideal transformer is used to step up the voltage supply from 200 V to 400 V. A resistor is connected to the output. The current in the primary coil is 3A.

Calculate the current in the secondary coil.

[3]

12 (c) **Fig 12.2** shows a model generator.

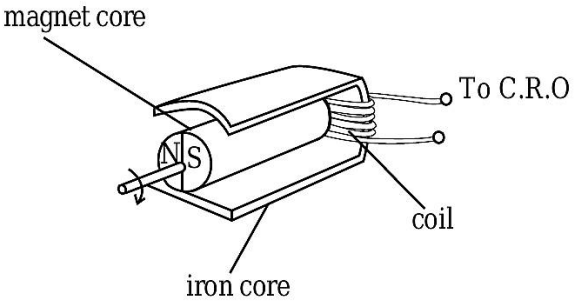


Fig 12.2

Fig 12.3 shows a trace on the C.R.O. as the magnet rotates.

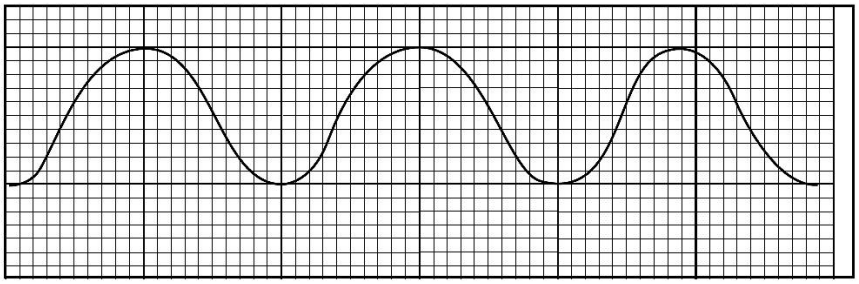


Fig 12.3

On **Fig 12.3b, 12.3c** and **12.3d,** draw new traces produced for each of the following changes.

(i) Magnet rotates at the same speed but in the opposite direction.

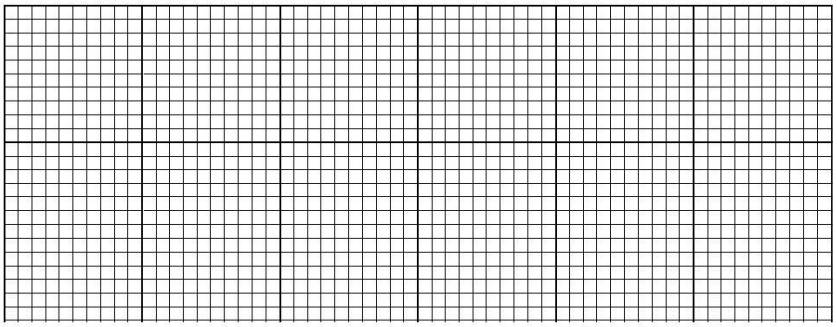


Fig. 12.3b

[1]

(ii) The magnet rotates at the same speed, in the same direction as the original, but the number of turns of the coil is doubled.

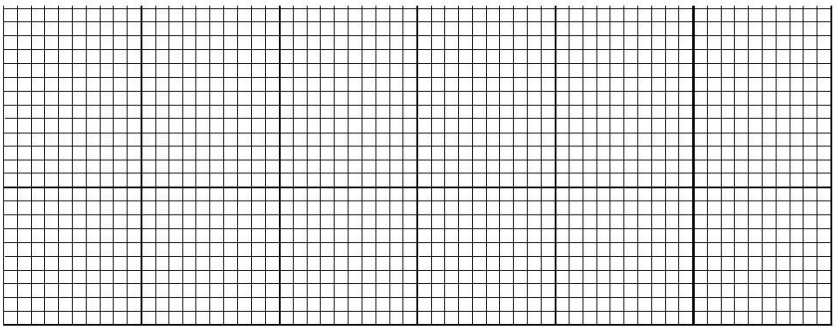


Fig 12.3c [1]

(iii) The magnet rotates at twice the speed, in the same direction, with the original number of turns of the coil.

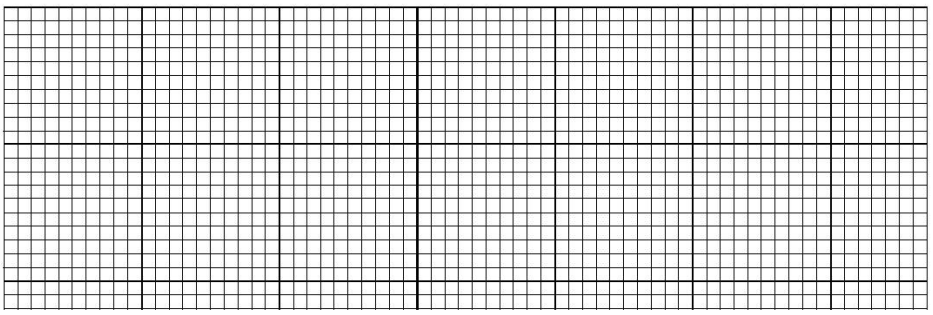


Fig 12.3d [1]

(iv) Suggest three reasons why the power input is greater than the power output in practical transformers.

_____

_____

_____

_____ [3]

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