Candidate Number	Candidate Number	Candidate Name

NAMIBIA SENIOR SECONDARY CERTIFICATE

DESIGN AND TECHNOLOGY ORDINARY LEVEL 4129/1

PAPER 1 2 hours

Marks 100 **2020**

Additional Materials: A3 drawing paper for Question 11 only
Non-programmable calculator
Standard drawing equipment

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Write your Centre Number, Candidate Number and Name in the spaces at the top of this page and on all separate answer sheets used.
- Write in dark blue or black pen.
- You may use a soft pencil for any rough work, diagrams or graphs.
- Do not use correction fluid.
- Do not write in the margin *For Examiner's Use*.
- You may use blank pages for workings or when answers are crossed out and corrected.
- The number of marks is given in brackets [ ] at the end of each question or part question.
- You may use a non-programmable calculator.

Part A

- Answer **all** questions.
- Write your answers in the spaces provided on the Question Paper
- You should spend about 30 minutes on **Part A**

Part B

- Answer **one** question.
- **Question 11** should be answered on the separate A3 drawing paper.
- At the end of the examination staple your A3 work to this question paper.
- **Question 12 and 13** should be answered in the spaces provided on the question paper.

For Examiner's Use		
Part A		
Part B	**11**	.....
	12	.....
	13	.....
TOTAL		

Marker	
Checker	

This document consists of **25** printed pages and **3** blank pages.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

Section A

1 Fig. 1 shows safety symbols in a workshop.

A

B

C

D

Fig. 1

Give the meaning of each symbol.

A .....

B .....

C .....

D ..... [4]

2 Fig. 2 shows a barbeque grill made from metal.

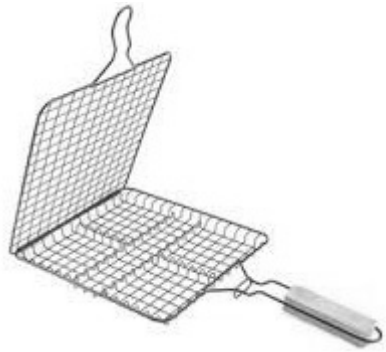

Fig. 2

(a) State **two** properties of metal that makes it suitable to make the barbeque grill.

1 .....

2 ..... [2]

(b) Give **two** features that make the barbeque grill suitable for its purpose.

1 .....

2 ..... [2]

3 Fig. 3 shows a design of a tricycle.

Fig. 3

Give an example of how the designer has considered the following factors when designing the tricycle in Fig. 3:

(a) Function: .....

..... [1]

(b) Appearance: .....

..... [1]

(c) Materials: .....

..... [1]

(d) Market: .....

..... [1]

(e) Construction: .....

..... [1]

4 Electrical energy is converted for the operation of a buzzer.

State the type of energy into which electrical energy is converted in a

Buzzer: ..... [1]

5 Fig. 4 shows a thick sheet material bent to shape.

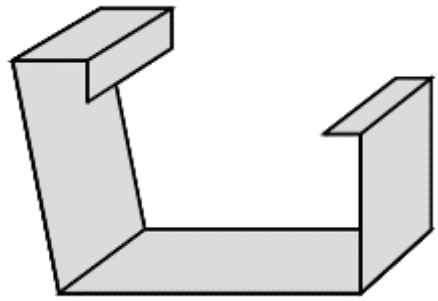

Fig. 4

Use sketches and notes to show how the sheet material could be bent to shape when made from:

(a) 3mm thermo plastic

(3)

(b) 1mm metal

(3)

For Examiner's Use

6 **(a)** Tick (✓) in the box to show the correct ending to each of the following sentences.

(i) A hydroelectric power plant uses

- sun light as a source of energy. ☐
- wind as a source of energy. ☐
- water as a source of energy. ☐
- uranium as a source of energy. ☐ [1]

(ii) The source of energy in (a) (i) is classified as:

- a renewable source of energy. ☐
- an infinite source of energy. ☐
- a finite source of energy. ☐ [1]

(b) Briefly describe how the energy source in (a) (i) is used to generate electricity.

.....

.....

.....

.....

.....

..... [3]

7 The type of plastic used for saw handles could be thermosetting plastic or thermoplastic.

What is meant by the term:

thermosetting plastic?

.....

.....

.....

..... [2]

thermoplastic?

.....

.....

.....

..... [2]

8 Copper could be alloyed with an element to produce an alloy with improved properties suitable for specific uses.

(a) What is meant by *alloy*?

.....

.....

.....

..... [2]

(b) Name **one** copper alloy.

.....

..... [1]

(c) Give **one** use for the copper alloy in (b).

.....

..... [1]

9 Fig. 5 shows a gear system that would change the input axis through 90° for the output axis.

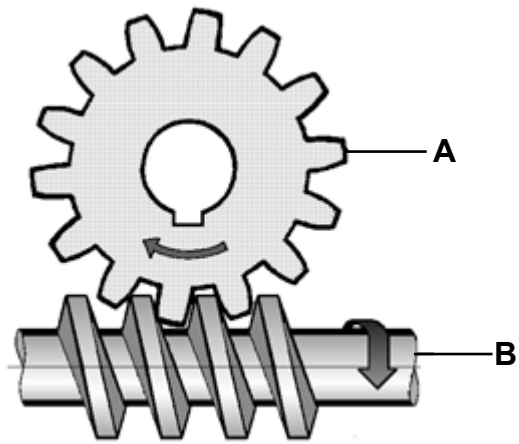

Fig. 5

(a) Name, by labelling on the diagram in Fig. 5, the gears in the gear system. [2]

(b) Name **one** other gear system that could be used to change the input axis through 90° for the output axis.

..... [1]

For Examiner's Use

10 The natural environment is being seriously affected by global warming and deforestation. Explain clearly what is meant by:

Global warming:

.....

.....

.....

..... [2]

Deforestation:

.....

.....

.....

..... [2]

[40]

Part B

Answer **one** question from Part B.

11 Design Communication (pages 8 to 10 of this booklet)

Answer the whole of this question on the separate A3 drawing paper.

(a) Fig. 6 shows the plan of a large garden.

The garden is: 145 metres from **A** to **B**

135 metres from **A** to **E**

80 metres from **E** to **D**

138 metres from **D** to **C**

125 metres from **B** to **C**

- The lawn is three-quarters of an ellipse, major axis 124 metres, minor axis 80 metres.
- The pathway is 5 metres wide and parallel to the ellipse.
- The patio is a regular pentagon.
- The pond is circular, 2 metres diameter with its centre on the bisector of the angle **BCD** and 1.75 metres from **C**.
- Angle BAE = 20 degrees.

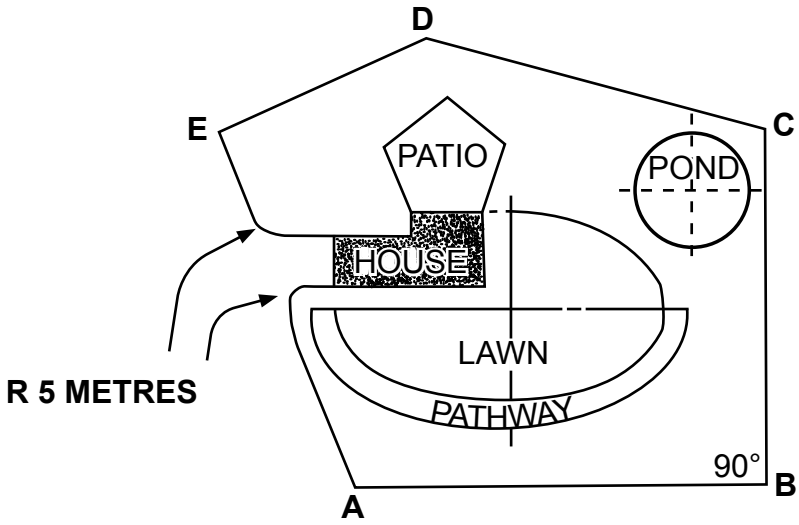

Fig. 6

Use geometrical constructions to complete to the scale of 1:100 the plan of the garden. The side **AB**, the outline of the house and the centre lines of the ellipse are given. [30]

(b) Fig 7 shows one end of an device to help people with a disability to pick small items from the floor.

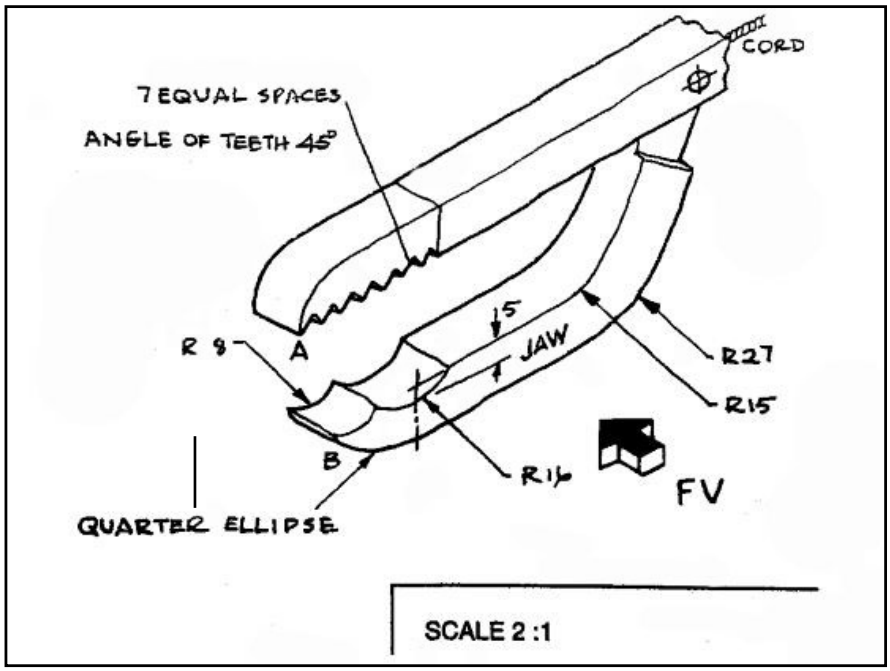

Fig. 7

- An incomplete view FV of the device, drawn to a scale of 2:1 is given:

  Use geometrical constructions to complete the view. [23]

  In use, when a lever oat the other end of the aid is pulled, a cord attached to put it pulls the jaw upwards until points A and B are touching.

  Whenever the lever is released, the jaw returns to the position as shown. Use freehand sketches to show how this could be made to work. Minor alterations and additions could be made to the aid device.

  Do not draw either the other end of the aid or the lever. [7]

[30]

[60]

For Examiner's Use

12 Resistant Materials (from page 10 to page 17 of this booklet)

Write your answers in the spaces provided.

(a) Fig. 8 shows a protective hard hat made of high density polythene.

Fig. 8

(i) List **two** properties of high density polythene that makes it suitable for the protective hat shown in Fig. 8.

1 .....

.....

2 .....

..... [2]

(ii) State a production method used to make the protective hat shown in Fig. 8.

..... [1]

(iii) Describe how to carry out the production method in (ii) for the protective hat.

.....

.....

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.....

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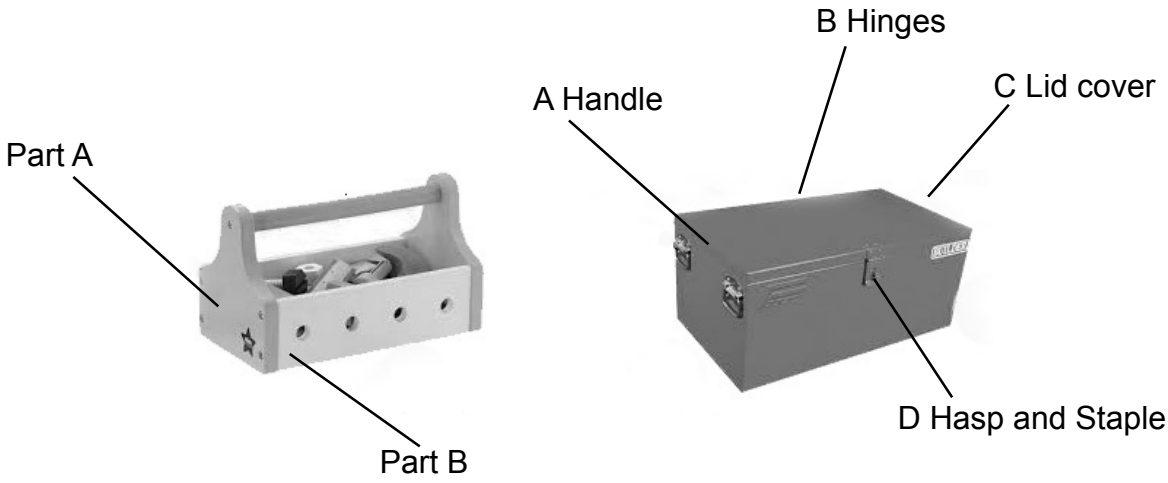
.....

.....

..... [4]

(b) Fig.9 shows two types of toolboxes.



Wooden Toolbox A **Metal Toolbox B**

Fig. 9

(i) **(aa)** Describe a step by step procedure to make wooden toolbox in a school workshop. Use the structure below.

Step one:

wasting of materials.....

.....

..... [1]

tools/equipment .....

.....

..... [2]

safety measures. .....

.....

..... [1]

Step two:

smoothing and refining .....

.....

..... [1]

tools/equipment .....

.....

..... [2]

safety measures .....

.....

..... [1]

Step three:

finishing .....

.....

..... [1]

equipment/material .....

.....

..... [1]

safety measures .....

.....

..... [2]

[12]

(ii) State **three** advantages of using manufactured board for toolbox A instead of solid timber.

1 .....

.....

2 .....

.....

3 .....

..... [3]

(iii) Draw an approximate exploded isometric view of part A and B to show the construction detail for the joints attaching part A and B.

[6]

For Examiner's Use

(bb) Toolbox B is made of metal.) Suggest and describe a suitable finishing for the metal toolbox so that the appearance is aesthetically pleasing.

Use the following structure

finishing method .....

..... [1]

surface preparation.....

.....

.....

..... [2]

tools / equipment .....

.....

.....

..... [2]

safety .....

.....

.....

..... [2]

procedure.....

.....

.....

..... [4]

(cc) Fig 10 shows the handle of the metal toolbox.

Fig. 10

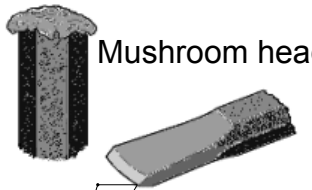
Use sketches and notes to show the processes of manufacturing the handle for the toolbox.

[5]

Draw the development (net) of the toolbox and indicate where the soldering tabs would be used.

[6]

(c) Fig 11 shows two tools in the toolbox.



Tool A: Cold chisel

Tool B: A pair of Pliers

Fig. 11

(i) State the manufacturing process of the cold chisel.

.....

.....

.....

..... [2]

(ii) Describe the heat treatment process carried out to harden the point of the cold chisel.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(iii) Explain why the process in **(ii)** should be carried out.

.....

.....

..... [2]

For Examiner's Use

(iv) Describe the process of applying the plastic finish on the handles of the pliers.

.....

.....

.....

..... [2]

[60]

13 Technology

Write your answers in the spaces provided.

(a) The lever system in Fig. 12 is used to operate the jack.

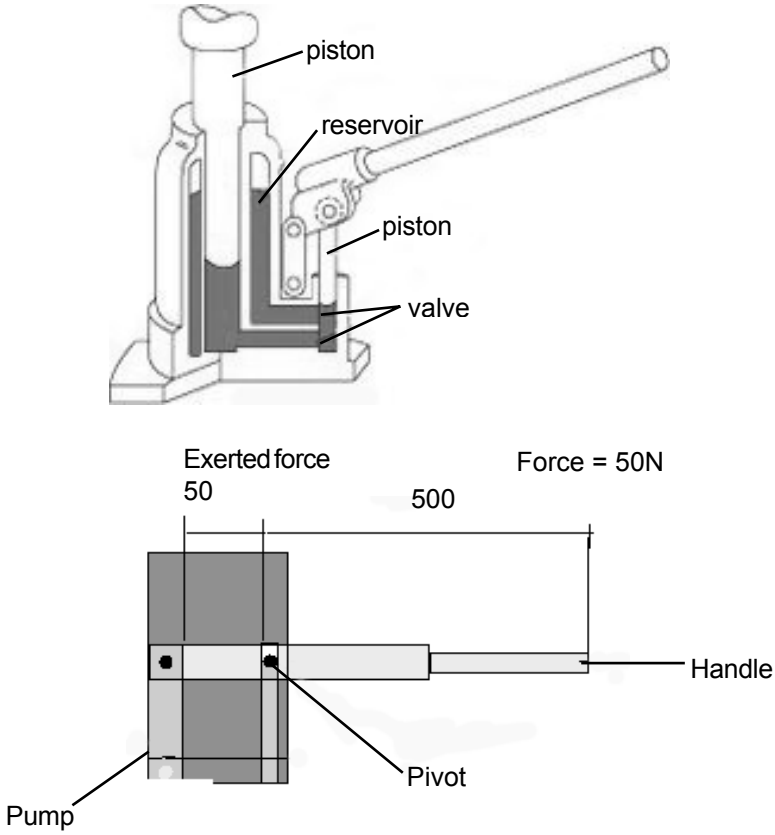


Fig. 12

(i) State the main difference in operation between a pneumatic system and a hydraulic system.

Pneumatic system: .....

.....

Hydraulic system: .....

..... [2]

(ii) List **three** advantages of the system in fig 12 .

.....

.....

.....

.....

.....

..... [3]

For Examiner's Use

(iii) Explain the operation of the hydraulic system at the hand of the illustration.

.....

.....

.....

.....

.....

.....

.....

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.....

..... [5]

(iv) Calculate the magnitude of the force exerted on fig 12 .

[3]

(b) Fig. 13 shows a roof truss made from softwood.

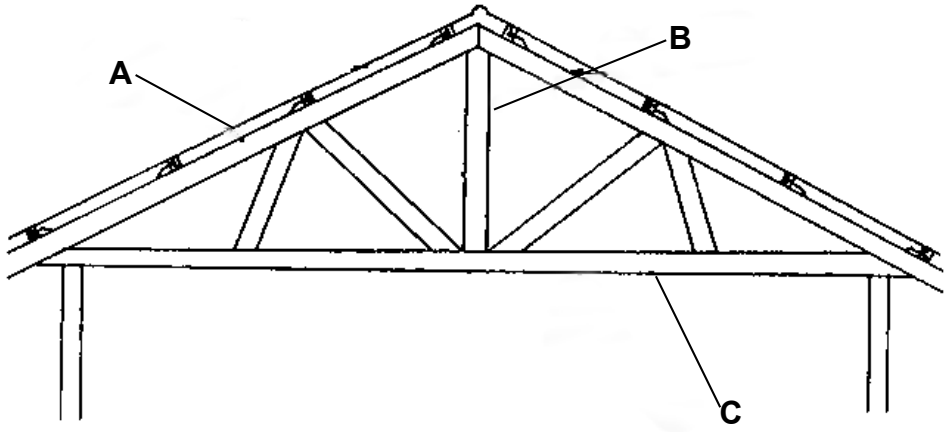

Fig. 13

Indicate the force acting at points **A**, **B** and **C** in fig 13.

A: .....

B: .....

C: ..... [3]

(c) Fig 14 shows a chain and sprocket system in a bicycle.

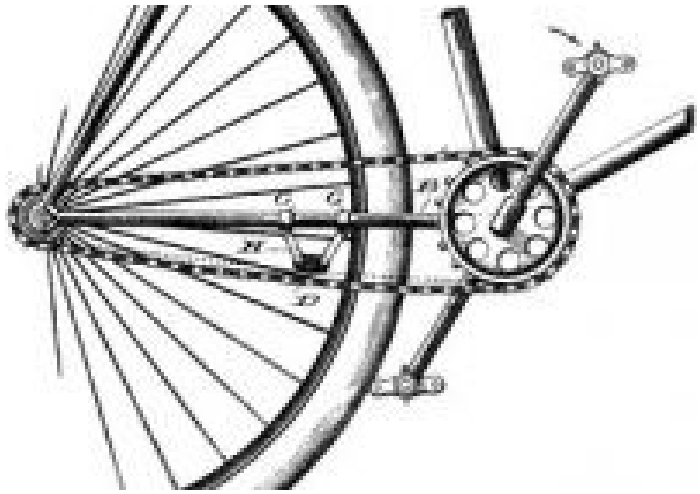

Fig. 14

(i) Add arrows to Fig. 14 to show two places where friction is encountered on the bicycle. [2]

(ii) Explain why friction is an advantage to the cyclist on two areas or parts of the bicycle.

.....

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.....

.....

.....

.....

.....

..... [4]

(iii) A bicycle frame could be made from metals but also from composite materials. Give **two** reasons for using composite materials like carbon fibre for the bicycle frame.

.....

.....

.....

..... [2]

(iv) Use sketches and notes to describe **four** different mechanisms that will convert rotary motion to linear motion or vice versa.

[4]

(d) (i) Fig. 15 shows a switch.

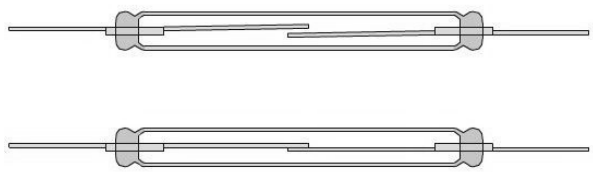

Fig. 15

(i) Name the switch in Fig. 15.

..... [1]

(ii) Describe the operation of the switch in **(i)**.

.....

.....

.....

.....

.....

..... [3]

(iii) Use sketches and notes to describe how you would arrange electronic components to construct a basic timer.

[5]

(e) Draw and complete the diagram given in fig 16 to show how lever Y move inwards the same distance as lever X., when X is pushed inwards.

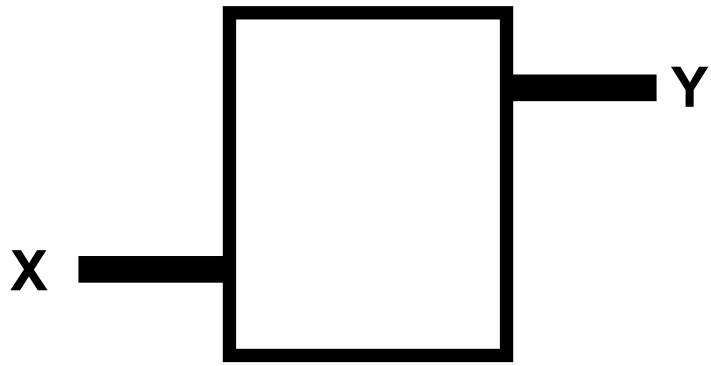

Fig. 16

[4]

(f) The lamp-dimming circuit in fig. 17 is connected to a 12V - 20 volts supply.

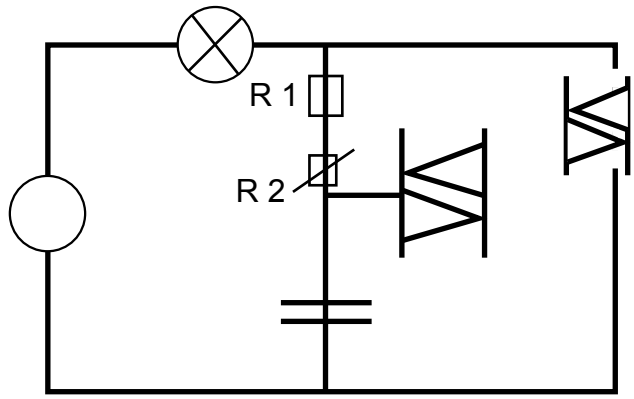

Fig. 17

(aa) (i) Name the components marked 1 and 2.

.....

..... [2]

(ii) If the value of R2 is decreased, the brightness of the lamp will increase. Explain how this occurs.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

(iii) Explain the function of R1.

.....

.....

.....

..... [2]

(bb)(i) A light dependent resistor (LDR) and a thermistor are restive components found in most electrical circuit. Shortly explain the difference between a LDR and a thermistor.

LDR: .....

..... [1]

Thermistor: .....

..... [1]

(ii) Draw the correct symbol for:

LDR: [1]

Thermistor: ..... [1]

(iii) Write down the equation that derived from Ohm's law.

.....

.....

.....

.....

.....

..... [3]

(iv) Using Ohm's law, calculate the current in fig 18.

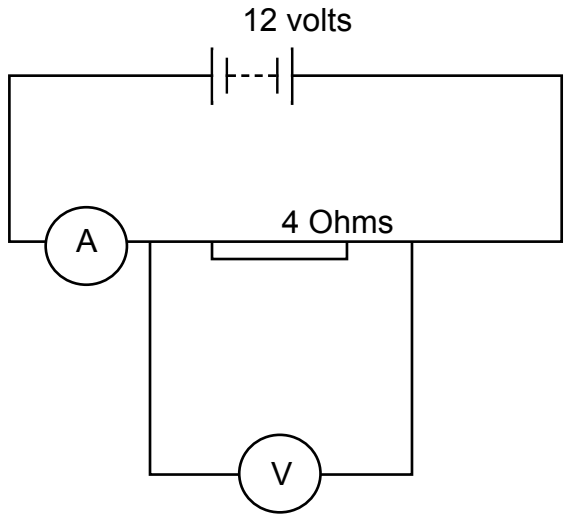

Fig. 18

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..... [3]

[60]

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