Centre Number	Candidate Number	Candidate Name

NAMIBIA SENIOR SECONDARY CERTIFICATE

DESIGN AND TECHNOLOGY ORDINARY LEVEL 4129/1

PAPER 1 2 hours

Marks 100 **2018**

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, fasten 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 **27** printed pages and **1** blank page.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

Part A

For Examiner's Use

Answer the questions from **Part A** in the spaces provided.

1 Fig. 1 shows pictures of a circular saw being used.

Fig. 1

(a) List any **three** items of safety wear required when operating a circular saw.

1 .....

.....

2 .....

.....

3 .....

..... [3]

(b) The circular saw is a power tool.

State **two** reasons why moving parts of power tools are safe guarded with machine guards.

1 .....

.....

2 .....

..... [2]

2 Fig. 2 shows stainless steel surgical scissors.

Fig. 2

Explain why stainless steel is suitable for surgical scissors.

.....

.....

.....

..... [2]

3 Fig. 3 shows toothbrushes.

Fig. 3

Ergonomics and aesthetics were two factors that influenced the design of the tooth brushes.

(a) Define the concept *ergonomics.*

.....

..... [2]

(b) Define the terms *shape* and *form* with reference to aesthetics.

Shape .....

.....

Form .....

..... [2]

4 Fig. 4 shows two forms of testing, destructive and non-destructive testing.

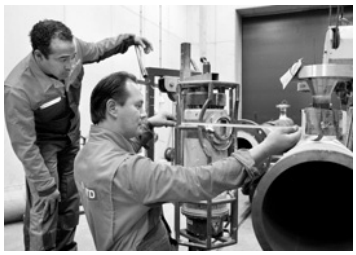


Fig. 4

Define:

destructive testing .....

.....

..... [2]

non-destructive testing .....

.....

..... [2]

5 Define the following properties of materials.

(a) *density*

.....

.....

..... [2]

(b) *thermal conductivity*

.....

.....

..... [2]

For Examiner's Use

6 Fig. 5 shows a blow moulded plastic bottle.

Fig. 5

(a) Name **one** specific plastic that could be used to make the bottle.

..... [1]

(b) Use sketches and notes to describe blow moulding.

[4]

For Examiner's Use

7 Explain the following terms.

(a) renewable energy sources

.....

.....

..... [2]

(b) non-renewable energy sources

.....

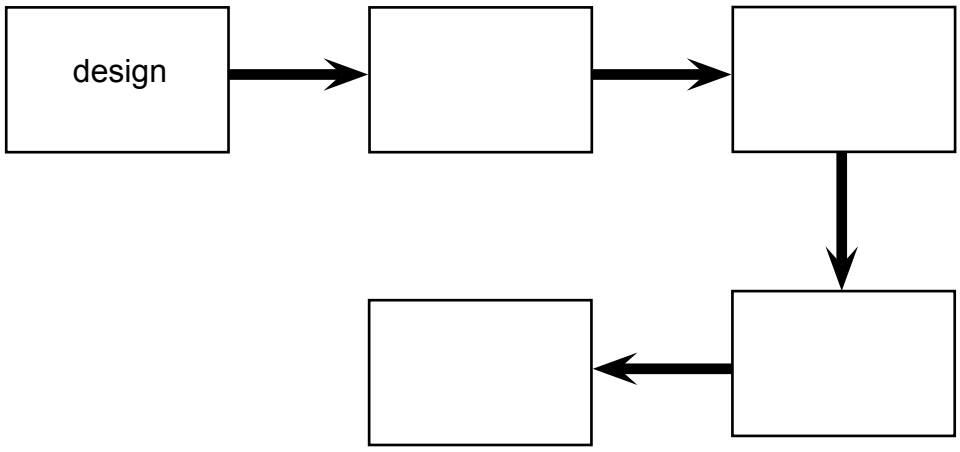
.....

..... [2]

8 Fig. 6 shows a wooden mechanical toy.

Fig. 6

Complete the flow chart to indicate the different stages required to manufacture the mechanical toy.



[4]

9 Fig. 7 shows a mild steel plate, a hole needs to be drilled in the centre.

Fig. 7

Use sketches and notes to show the correct procedure to mark the centre and drill the hole in the plate.

[4]

10 Fig. 8 shows one of the negative environmental effects of product manufacture.

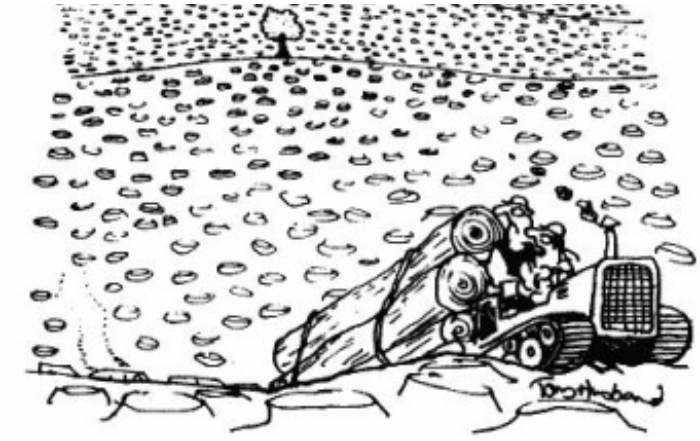


Fig. 8

Give **two** other negative environmental effects of product manufacture.

1 .....

.....

2 .....

..... [4]

[40]

Part B

Answer **one** question from **Part B**.

11 Design Communication (from page 8 to page 9 of this booklet)

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

(a) Fig. 9 shows a truncated cone used to protect small sensitive plants against excessive sunlight.

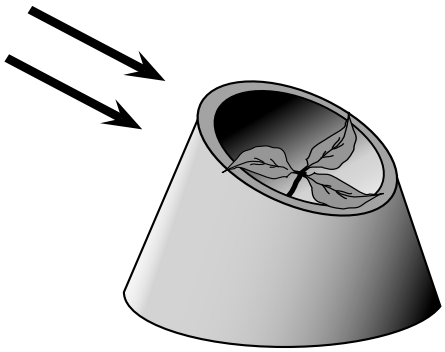


Fig. 9

Fig. 10 shows the front view of the truncated cone.

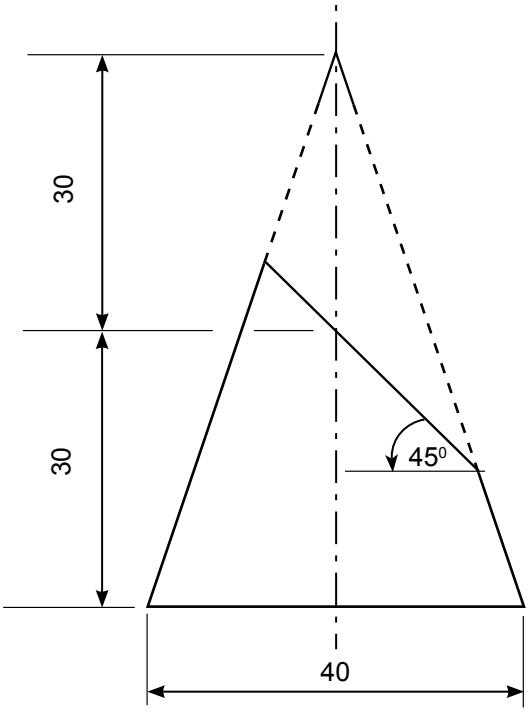


Fig. 10

Draw to **scale 1:1**, in third angle orthographic projection, the

(i) front view [5]

(ii) top view [8]

(iii) left view [10]

(iv) development of the truncated cone. [8]

(b) Fig. 11 shows a water hose on a reel which is fixed to a structure.

If the hose is unreeled from the position **P**, the locus follows a certain path for **one** revolution which is called the involute.

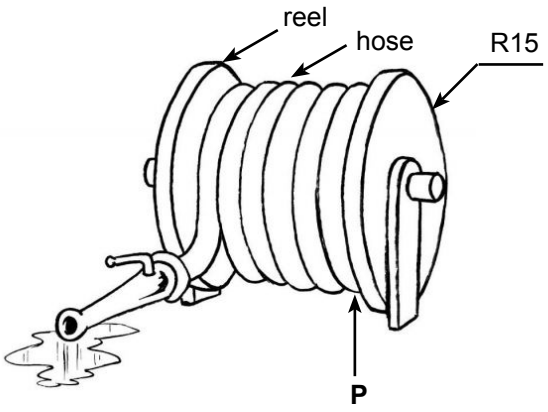


Fig. 11

Use a radius of 15 mm for the reel and construct and draw the involute to **scale 1:1**. Do not consider the diameter of the hose. [14]

(c) Fig. 12 shows a view of a wooden seedling tray which is joint by finger joints at the corners.

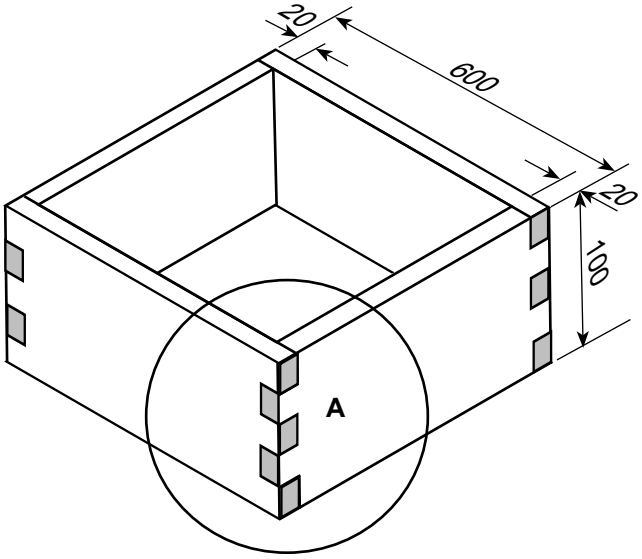


Fig. 12

Draw by estimation and proportion to a **scale 1:1**

(i) an isometric freehand sketch of joint **A** in exploded view. [13]

(ii) print write the title, “SEEDLING TRAY,” below your drawing. [2]

[60]

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12 Resistant Materials (from page 10 to page 19 of this booklet)

Write your answers in the spaces provided.

Fig. 13 shows a leisure shed (relaxation area in the garden). It can have a wooden or metal frame and a corrugated iron roof.

leisure shed

chair

acrylic table

plastic bucket

keys

Fig. 13

Some items found in the shed are also shown. It includes an acrylic table, with a bunch of keys on it, two chairs and a plastic bucket.

(a) (i) Natural timber is used for the structure of the shed.

Complete the table by naming **two** properties of the following timbers.

Name	Properties
Teak	1..... ..... 2..... .....
Oak	1..... ..... 2..... .....

[4]

(ii) After conversion, timber has to be seasoned.

(aa) Give **one** method of seasoning timber.

..... [1]

(bb) Give **one** reason why timber is seasoned.

……..

……..... [1]

(cc) Give **two** ways of caring for timber during storage.

1 ……

.....

2 .....

..... [2]

(b) Fig. 14 shows the framework and seat for a garden bench.

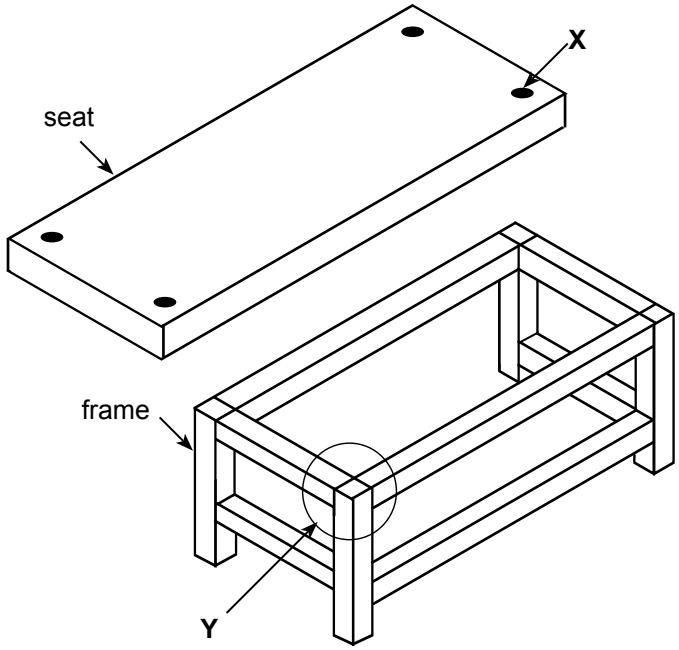

Fig. 14

(i) Use sketches and notes to show how the holes marked **X** on the bench seat could be measured, marked out and drilled.

[3]

(ii) Use sketches and notes to draw a suitable joint for the part marked **Y** on the frame.

[3]

(iii) The frame is glued together.

Define what is meant by *curing time* of a glue.

.....

.....

.....

..... [2]

(c) Fig. 15 shows a metal framed chair, with a plywood seat and back rest.

Fig. 15

Outline **two** advantages of plywood over natural timber.

1 .....

.....

2 ..... [2]

(d) Fig. 16 shows the acrylic table.

Fig. 16

Acrylic is a thermoplastic.

(i) Compare thermoplastics to thermosetting plastics.

.....

.....

.....

..... [2]

(ii) Use sketches and notes to show how the acrylic table could be manufactured in a school workshop.

The sketches and notes should include measuring and marking, cutting and bending and the development (net).

[4]

(iii) Describe how the edges of the acrylic table could be polished to enhance their appearance.

.....

.....

.....

..... [2]

(iv) Describe the term *plastic memory* and its significance to bending.

.....

.....

.....

.....

.....

..... [3]

(v) Describe a process to make the bucket in Fig. 13.

.....

.....

.....

.....

.....

..... [3]

(e) Fig. 17 shows the keys (on the table).

For Examiner's Use

Fig. 17

Use sketches and notes to design a plastic key holder for the keys.

[3]

For Examiner's Use

(f) Fig. 18 shows part of the structure of the leisure shed.

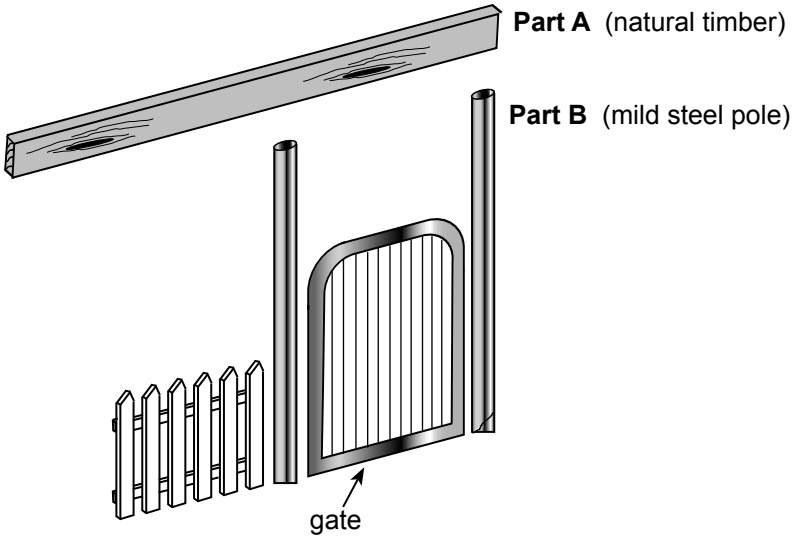

Fig. 18

(i) Show **one temporary** and **one permanent** method to secure Part **A** to Part **B**.

Use sketches and notes to propose possible solutions.

temporary method

[3]

permanent method

[3]

(ii) Use sketches and notes to propose a possible solution for a closing mechanism for the small gate at Part **B**.

[3]

(g) Fig. 19 shows the eye bolt used to secure the gate against the upright.

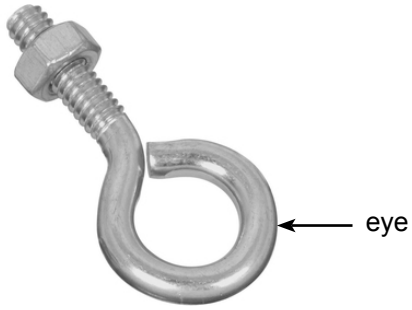

Fig. 19

(i) Use sketches and notes to show how the eye of the eye bolt could be formed.

[3]

(ii) Describe an appropriate screw cutting method to cut the thread of the eye bolt by hand.

.....

.....

.....

.....

.....

.....

..... [4]

(h) The corrugated roof of the shed is made of 0.4 mm thick sheet metal.

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Fig. 20

(i) Use sketches and notes to show how the corrugated roof sheets could be manufactured.

[5]

(ii) Describe a finishing process for the wooden frame(hardwood) and for the mild steel roof sheets.

wooden frame(hardwood) .....

.....

.....

.....

roof sheets .....

.....

.....

..... [4]

[60]

13 Technology (from page 20 to page 27 of this booklet)

For Examiner's Use

Write your answers in the spaces provided.

(a) Fig. 21 shows a garden house.

Fig. 21

Fig. 22 shows a line diagram of one of the roof trusses subjected to a point load of 12 kN.

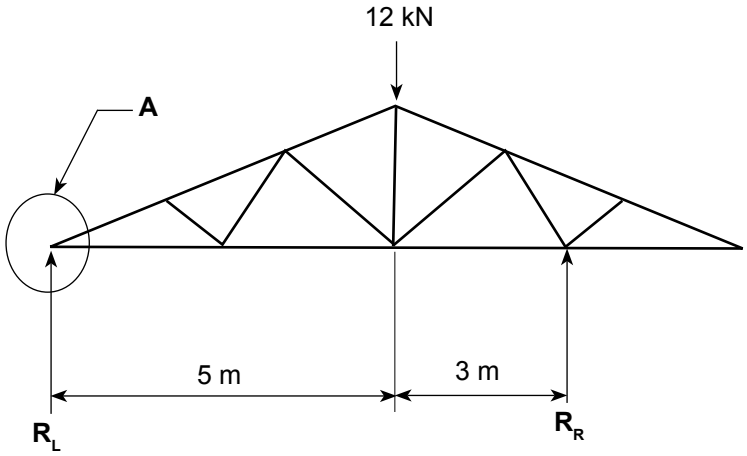

Fig. 22

$\mathbf{R_L}$ and $\mathbf{R_R}$ indicate the left and right hand reactions or the upward forces that support the roof truss.

(i) Classify the roof truss as a frame or shell structure.

..... [1]

(ii) On Fig. 22, label a cantilever. [1]

(iii) Explain the difference between a tie and a strut.

tie .....

.....

strut .....

..... [2]

(iv) Calculate the reactions at $\mathbf{R_L}$ and $\mathbf{R_R}$.

.....

.....

.....

.....

.....

..... [4]

(v) Use a labelled sketch to show how a gusset plate can be used for joint **A** in the roof truss.

[3]

(b) Briefly explain the use of a strain gauge.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) Fig. 23 shows security lights to be installed at the garden house door.

Fig. 23

The light **(Z)** will be switched on only when both the light sensor **(A)** and the motion sensor **(B)** are activated simultaneously.

(i) Complete the truth table to show how the light circuit **(Z)** will operate for all the possible inputs from the light sensor **(A)** and the motion sensor **(B)**.

A	B	Z
0		
1		
0		
1		

[8]

(ii) Draw the symbol for the logic gate represented by the truth table in **(c) (i)**.

[2]

(d) Fig. 24 shows an umbrella and a mechanism that could be used to open and close the umbrella.

umbrella mechanism

Fig. 24

(i) Name the mechanism in Fig. 24.

..... [1]

(ii) Give **one** benefit of using this type of mechanism.

.....

..... [1]

(iii) Determine the velocity ratio of the mechanism from Fig. 25.

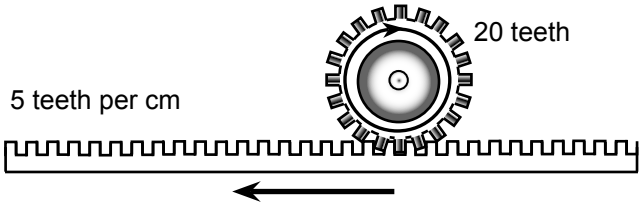

Fig. 25

.....

.....

.....

..... [4]

(e) Fig. 26 shows three tools being used in the garden.

A B C

Fig. 26

(i) For each tool, identify the class of lever applicable.

A .....

B .....

C ..... [3]

(ii) Draw a line diagram, indicating the load, fulcrum and effort for each lever.

A

B

C

[3]

(iii) Fig. 27 shows children on a see-saw. The see-saw is in equilibrium.

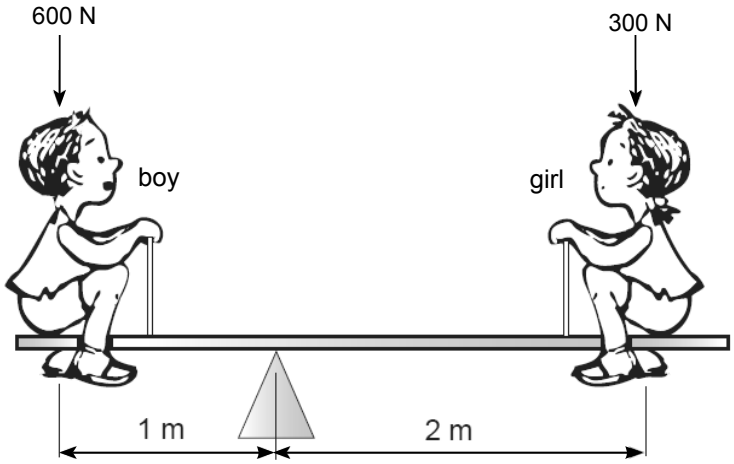

Fig. 27

Explain why this see-saw is in equilibrium.

.....

.....

.....

..... [3]

(iv) Explain what will happen when the girl moves 1m forward (to the left).

.....

..... [2]

(f) Fig. 28 shows different structural members that could be used in the construction of garden houses.

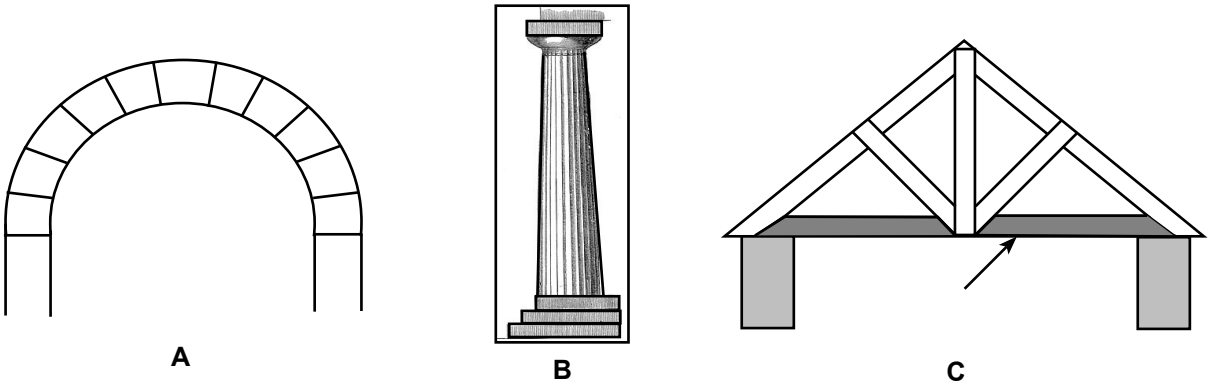

Fig. 28

Identify each member.

A .....

B .....

C ..... [3]

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(g) Fig. 29 shows a man with a wheelbarrow.

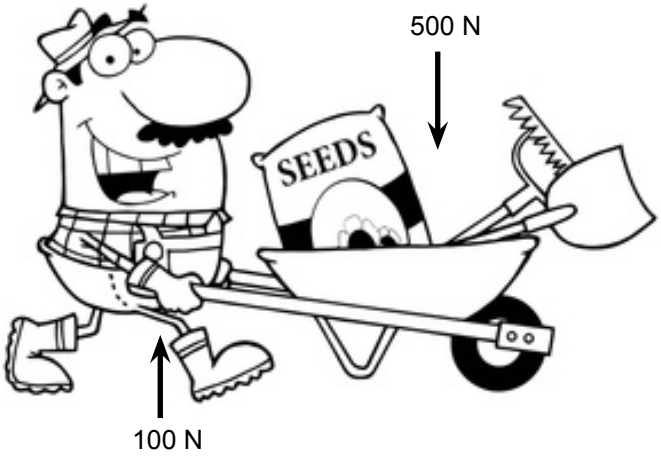


Fig. 29

Calculate the mechanical advantage if an effort of 100 N was used to lift the load of 500 N.

.....

.....

.....

.....

.....

..... [4]

(h) Fig. 30 shows part of a circuit for a garden watering system.

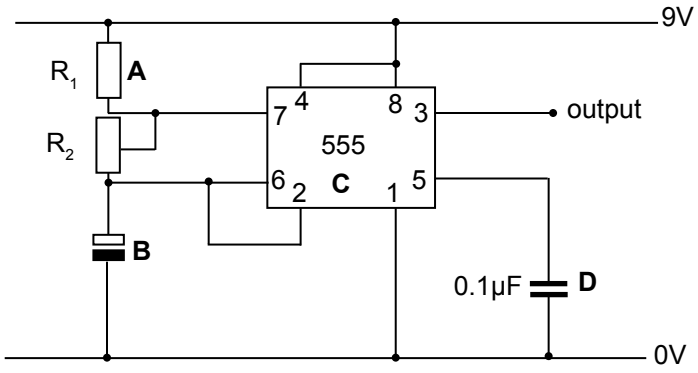


Fig. 30

(i) Identify the different electronic symbols in Fig. 30.

A .....

B .....

C .....

D ..... [4]

(ii) The resistance of R_1 is 4 Ω and R_2 is 2 Ω.

Calculate the total resistance for this part of the circuit.

.....

.....

.....

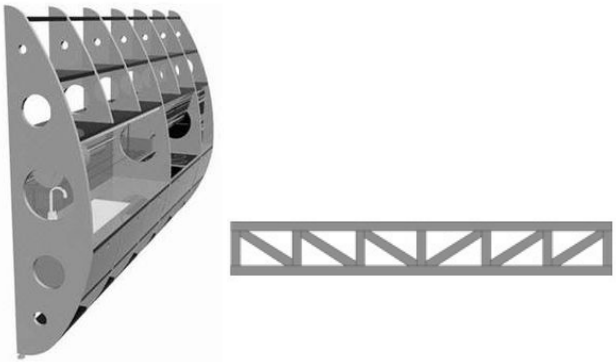
.....

.....

.....

..... [5]

(i) Fig. 31 shows reinforcement methods for structures.



A **B**

Fig. 31

Identify each reinforcement method.

A .....

B ..... [2]

[60]

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