Centre Number	Candidate Number	Candidate Name

NAMIBIA SENIOR SECONDARY CERTIFICATE

DESIGN AND TECHNOLOGY ORDINARY LEVEL 4129/1

PAPER 1 2 hours

Marks 100 **2019**

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 **31** printed pages and **1** blank page.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

Part A

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

1 Fig. 1 shows a picture of an aerosol can.

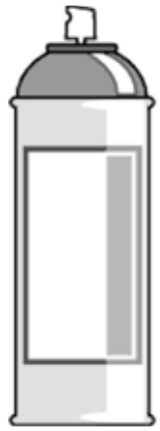


Fig. 1

(a) Explain why a pressurised aerosol can must have a strong seam where it is joined together.

.....

.....

.....

..... [2]

(b) True or False: It is safe to burn (incinerate) aerosol cans in open fires. Mark your answer with a cross (**X**)

True	
False	

[1]

(c) Give a reason for your answer to part **1(b)**.

.....

.....

.....

..... [1]

For Examiner's Use

2 Fig. 2 shows a shampoo bottle.

Fig. 2

State **four** factors that should be considered when designing the shampoo bottle in Fig.2.

1.....

.....

2.....

.....

3.....

.....

4.....

..... [4]

3 Fig. 3 shows a signboard manufactured out of 0,8 mm mild steel.

Fig. 3

Name **four** tools needed to measure and cut the mild steel signboard to correct size.

1.....

2.....

3.....

4..... [4]

4 Fig. 4 shows a wooden pigeonhole cabinet for children to store their bags.

Fig. 4

Outline the procedure to be followed when painting the cupboard.

.....

.....

.....

.....

.....

..... [4]

For Examiner's Use

5 Steel is a non renewable natural resource.

Evaluate how the environment is affected by production of steel.

.....

.....

.....

.....

.....

..... [4]

6 **(a)** Define the term *ergonomics*.

.....

.....

..... [2]

(b) Use simple line sketches to distinguish between shape and form.

[2]

7 Fig. 5 shows an electric fan as well as a flow diagram of the energy conversion taking place when the fan is operated.

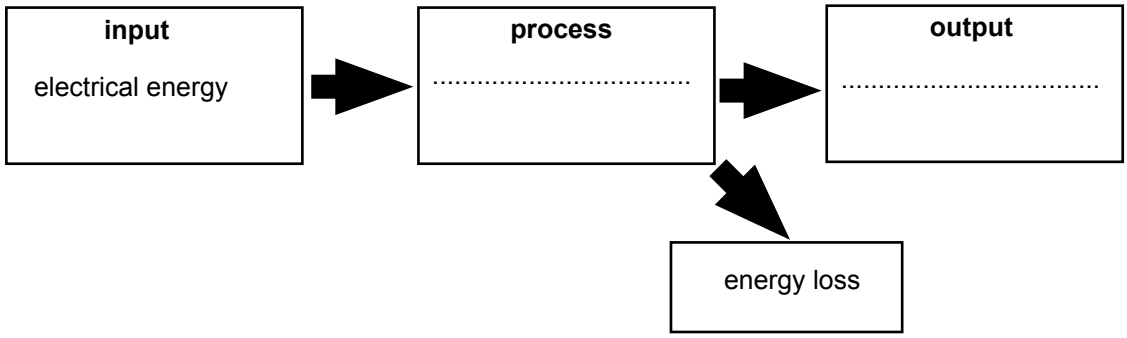


Fig. 5

(a) Complete the flow diagram by filling in the missing labels. [2]

(b) State how energy is lost during the conversion process in Fig. 5.

.....

.....

..... [2]

For Examiner's Use

8 Fig. 6 shows a picture of an automatic washing machine.

Fig. 6

The micro-computer control system in the washing machine controls certain processes.

Name any **four** processes.

1.....

2.....

3.....

4..... [4]

9 Fig. 7 shows a sketch of a steam locomotive.

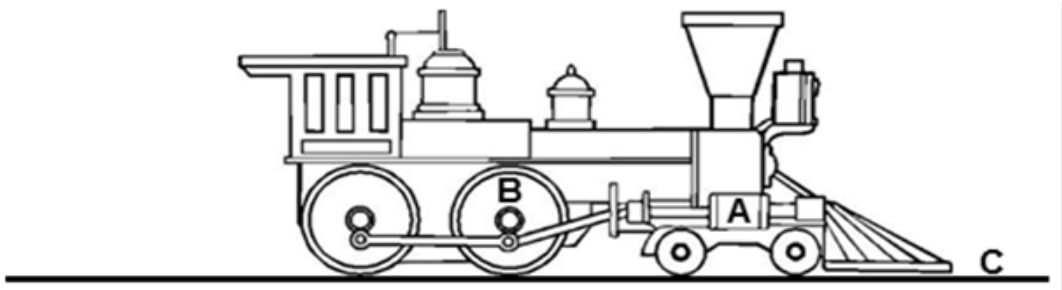


Fig. 7

Describe how:

(a) reciprocating motion is converted to rotary motion.

.....

..... [2]

(b) rotary motion is converted to linear motion.

.....

..... [2]

For Examiner's Use

10 You are required to design a barbeque for the school.
One specification for the design states that the barbeque must be easily moved around and back into the store room to prevent it being stolen.

(a) Describe a suitable test to determine if the listed specification is met.

.....

.....

.....

..... [2]

(b) State **one** result from the test in **(a)** that will show that the design is successful.

.....

..... [1]

(c) Explain what could be done if the test in **(a)** fails.

.....

..... [1]

[40]

Part B

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

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

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

(a) Fig. 8 shows a pictorial view of the monitor for a bus station.

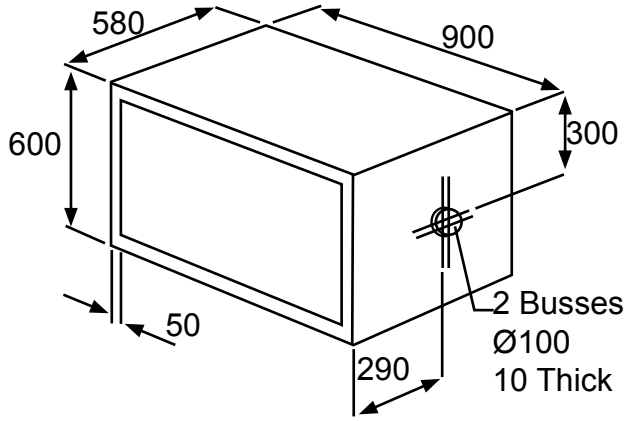


Fig. 8

Fig. 9 shows the complete end view and an incomplete front view of an information screen.

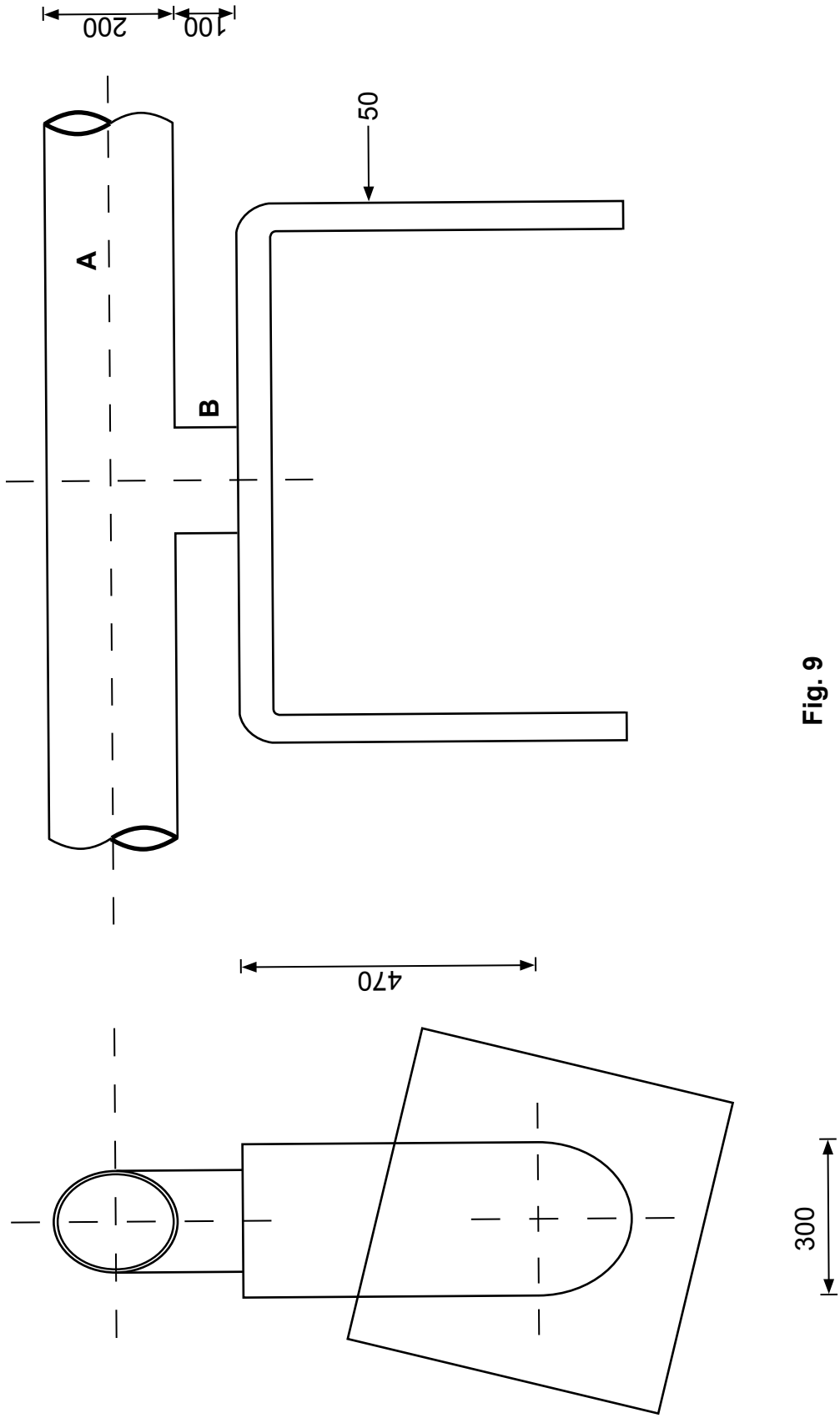


Fig. 9

(i) Draw the symbol for the angle of projection used for the orthographic views. [3]

(ii) Complete the front view in scale 1:10 by:

- constructing the line of intersection between Parts A and B; both parts are cylindrical; [7]
- drawing the monitor in position in the frame; hidden detail is not required. [9]

(iii) Project a plan view of the complete information screen including the monitor.
Hidden detail is not required. [11]

(b) Fig. 10 shows an illustration of an old car to be used in an advertisement for the Old Wheelers Club, Namibia.

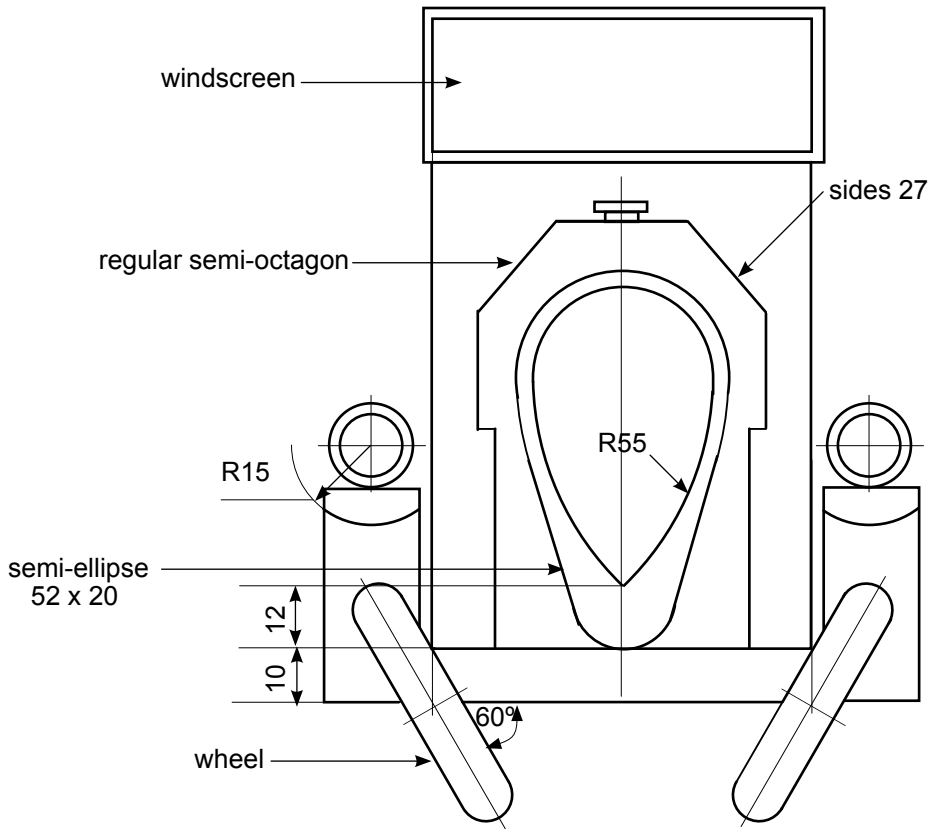


Fig. 10

Complete the full size drawing of the illustration on the A3 sheet by:

(i) drawing the other wheel; [5]

(ii) drawing the semi-octagon; [5]

(iii) constructing the semi-ellipse; [5]

(iv) constructing the two inner arcs of the radiator; [5]

(v) drawing the letters N O W C in a suitable style on the windscreen of the car; [7]

(vi) rendering the radiator. [3]

[60]

For Examiner's Use

12 Resistant Materials (page 12 to 21 of this booklet)

Answer Question 12 in the spaces provided on the question paper.

(a) Fig. 11 shows wood planks and a small table.

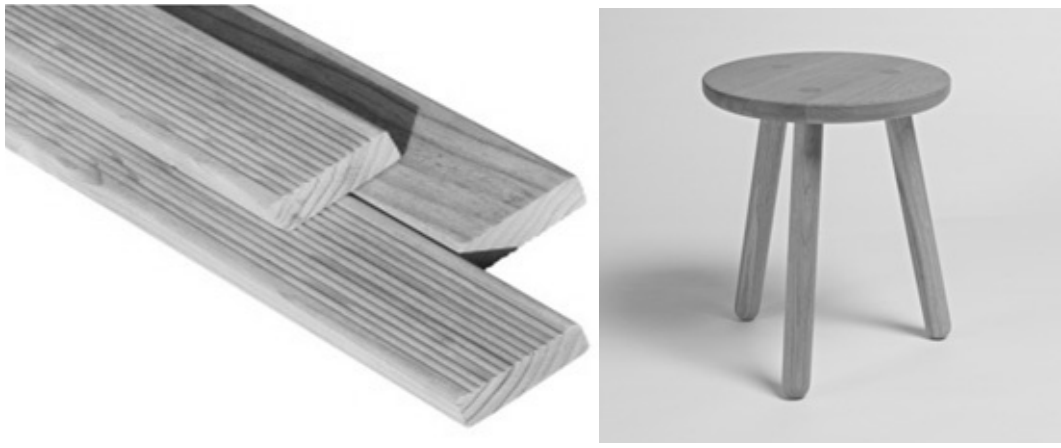


Fig. 11

The planks must be glued together to form a large enough piece to cut out the table top.
The first step before gluing the planks together is to set the datum surfaces on each plank.

Explain the meaning of *face side* and *face edge*.

Face side .....

..... [1]

Face edge.....

.....

..... [2]

(b) Fig. 12 shows a table top.

Fig. 12

After the planks are glued together and sanded down, the top needs to be marked out before the circular shape is cut out.

Use sketches and notes to show how marking out is done.

[6]

(c) Fig. 13 shows a method of conversion.

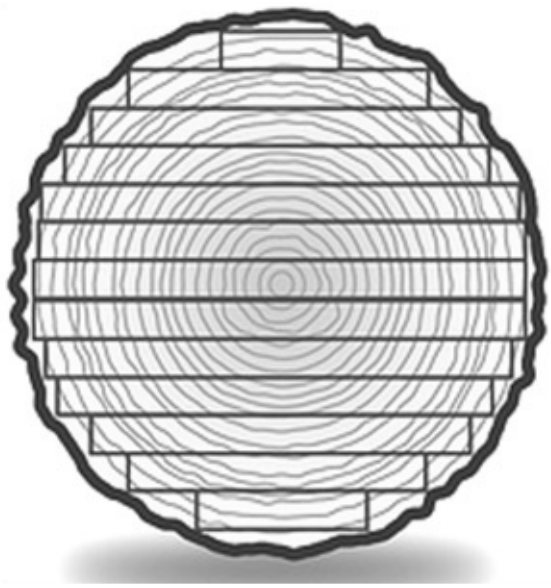


Fig. 13

(i) Name **two** methods of converting timber.

1 .....

2 ..... [2]

(ii) Use sketches and notes to describe what is meant by "kiln seasoning".

[3]

(iii) A saw kerf needs to be made before the initial saw stroke is made on a plank.

Describe the procedure to make the saw kerf. Include tools needed.

.....

.....

.....

.....

..... [4]

(d) Fig. 14 shows pictures of two woodwork tools.

A **B**

Fig. 14

(i) Identify tool **A** and **B**.

A.....

B..... [2]

(ii) State the function of each tool.

A.....

.....

B.....

..... [2]

(e) Fig. 15 shows a picture of a tool used when working sheet metal.

Fig. 15

(i) Identify the tool in Fig. 15.

..... [1]

(ii) Describe the use of the tool in Fig. 15.

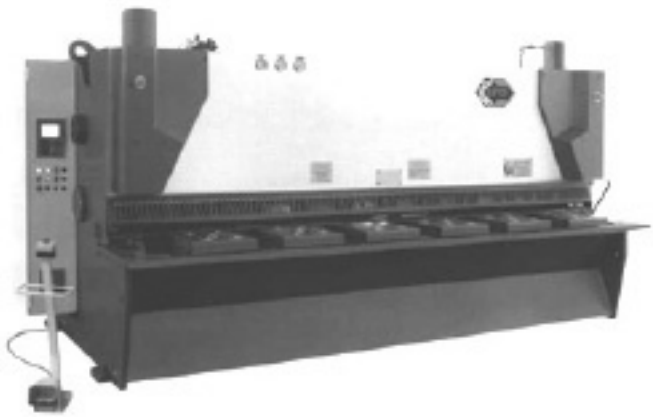
.....

.....

..... [2]

(f) Fig. 16 shows a picture of a bending machine and a bending press.

bending machine



bending press

Fig. 16

Compare the types of power used by each machine.

bending machine.....

bending press ..... [2]

For Examiner's Use

(g) Fig. 17 shows a picture of a mild steel bracket made using one of the machines in Fig. 16.

Fig. 17

(i) Name which machine in Fig.16 could be used to make the bends. Give a reason for your answer.

machine.....

reason .....

..... [2]

(ii) The bracket in Fig.17 must be fabricated. Use sketches and notes to show an appropriate development of the bracket in Fig. 17.

[4]

(h) Fig. 18 shows a box made out of mild steel plate. The edges were joined by soft soldering.

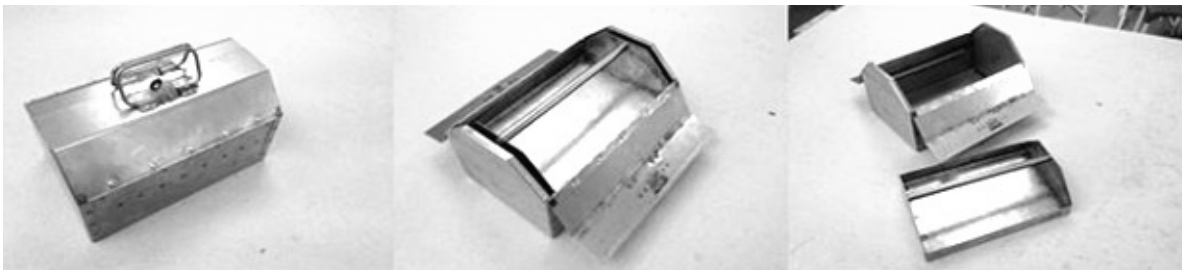


Fig. 18

(i) Describe how to join the edges by means of soft soldering.

.....

.....

.....

.....

.....

..... [4]

(ii) Soldering flux is applied on the joints to be soldered. Give **two** reasons for using flux when soldering.

1 .....

2 ..... [2]

(i) Fig. 19 shows oxy-acetylene gas welding equipment.

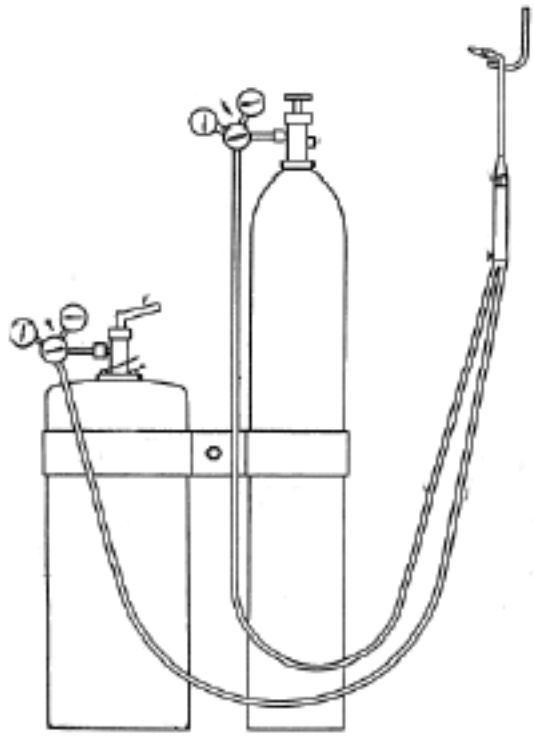


Fig. 19

(i) Name the colour of hoses fitted to the oxygen and acetylene cylinders.

oxygen cylinder .....

acetylene cylinder ..... [2]

(ii) State the colour of each gas cylinder.

oxygen cylinder .....

acetylene cylinder ..... [2]

(iii) Describe how to test the equipment in Fig. 19 for leaks.

.....

.....

.....

..... [2]

(j) Fig. 20 shows a plastic garden bench.

Fig. 20

(i) Give **two** reasons why plastic is a suitable material for the garden bench.

1 .....

.....

2 .....

..... [2]

(ii) Stabilizers are added to plastic to prolong the life span of the bench. Describe the effects stabilizers have on plastics.

.....

.....

..... [2]

(iii) Explain how the bench is coloured.

.....

.....

..... [2]

(iv) Explain the reasons for adding plasticizers to plastic.

.....

.....

.....

..... [2]

(k) Fig. 21 shows a glass reinforced plastic garden lounge.

Fig. 21

(i) State what type of plastic GRP is.
Give a reason for your answer.

type of plastic .....

reason ..... [2]

(ii) Describe the effects of using glass fibres as reinforcement.

.....

..... [2]

(iii) Name **three** selection criteria to select a plastic for an article.

1 .....

2 .....

3 ..... [3]

[60]

For Examiner's Use

13 Technology (page 22 to 31 of this booklet)

Answer Question 13 in the spaces provided on the question paper.

(a) Fig. 22 shows a gardener pushing a wheelbarrow.

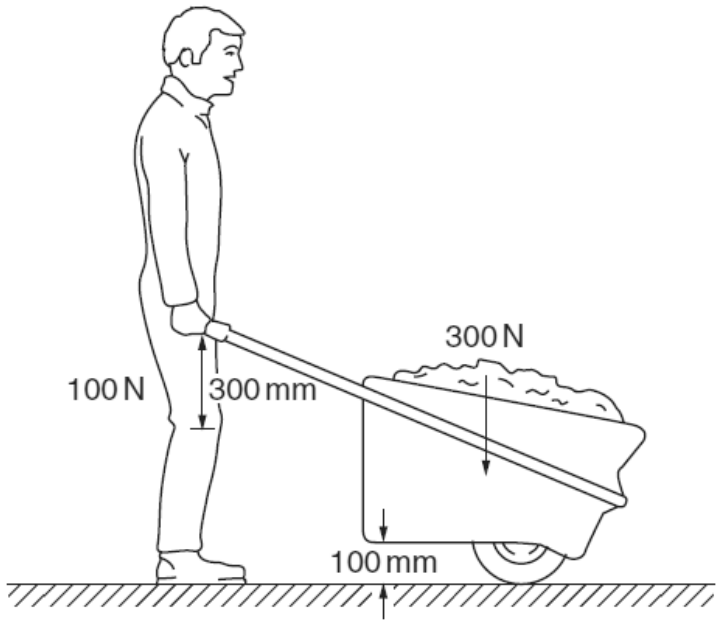


Fig. 22

(i) Label with arrows on Fig. 22:

- load,
- effort,
- fulcrum. [3]

(ii) From the list below, circle the type of lever that a wheelbarrow represents.

first order, second order, third order [1]

(iii) For the wheelbarrow shown, calculate the velocity ratio (VR).

.....

.....

.....

.....

..... [4]

(iv) State **one** way that lifting the load could be made easier for the gardener.

.....

..... [1]

(v) Give **two** other examples of gardening tools that use leverage.

1 .....

2 ..... [2]

(b) The garden has a small greenhouse where seedlings are produced.

The watering system for the greenhouse has a safety cut-off device to prevent watering the seedlings too much.

Using the components in the table below, complete the circuit diagram in Fig.23.

component name	component system
resistor	
variable resistor	
diode	
relay	

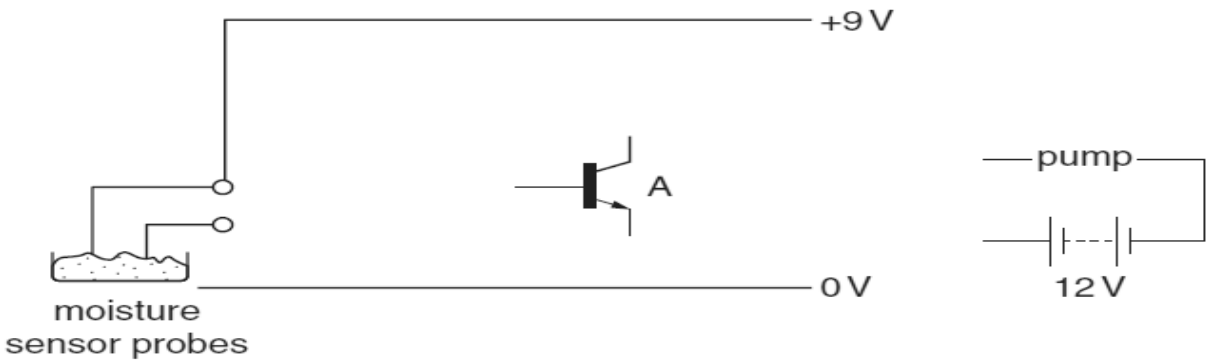


Fig. 23

[5]

(c) Fig. 24 show part of the roof section of a greenhouse.

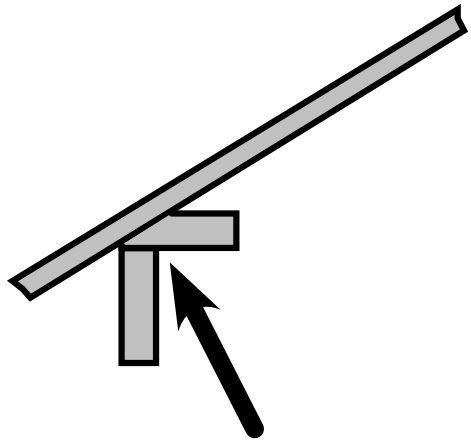


Fig. 24

A gusset plate could strengthen the joint at the arrow.

Show, using labelled sketches, what is meant by a 'gusset plate'.

[4]

(d) As part of the cultural activities, a school started a band.

Fig. 25 shows part of a tuning system on one of the guitars.

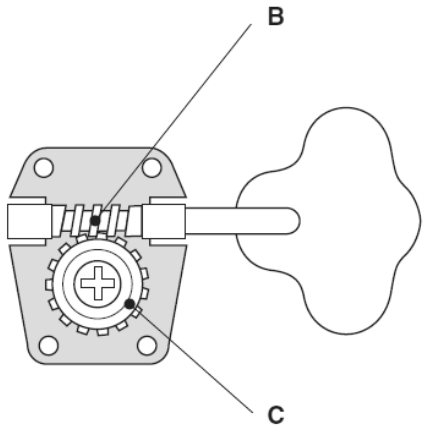


Fig. 25

(i) Name the parts of the mechanism labelled **B** and **C**.

B..... [1]

C..... [1]

(ii) Explain why this mechanism is suitable for this application.

.....

.....

.....

..... [3]

(iii) Describe the motion conversion that takes place when the mechanism is operated.

.....

.....

.....

..... [2]

(e) Fig. 26 shows a folding stand for the electronic keyboard of the band.

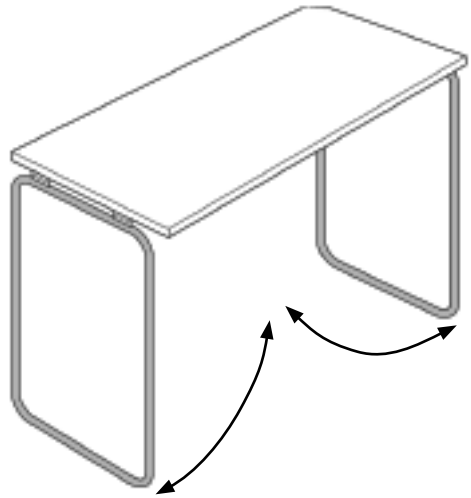


Fig. 26

Use sketches and notes to show how levers and linkages can be used to lock the frame into the open position.

[4]

(f) Fig. 27 shows a circuit diagram where the transistor is used as a switch.

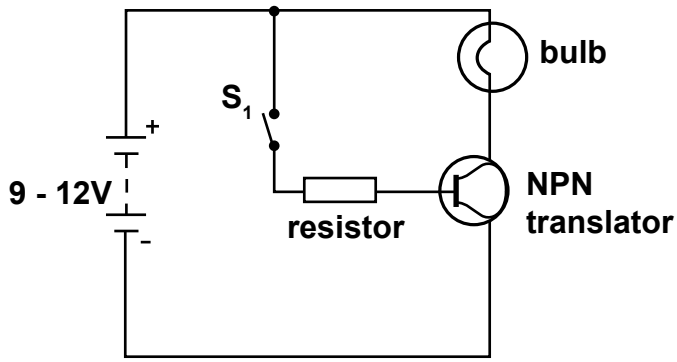


Fig. 27

Describe how the circuit in Fig. 27 operates so that the bulb is switched on.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(g) Fig. 28 shows an incomplete circuit for an alarm for the band room.

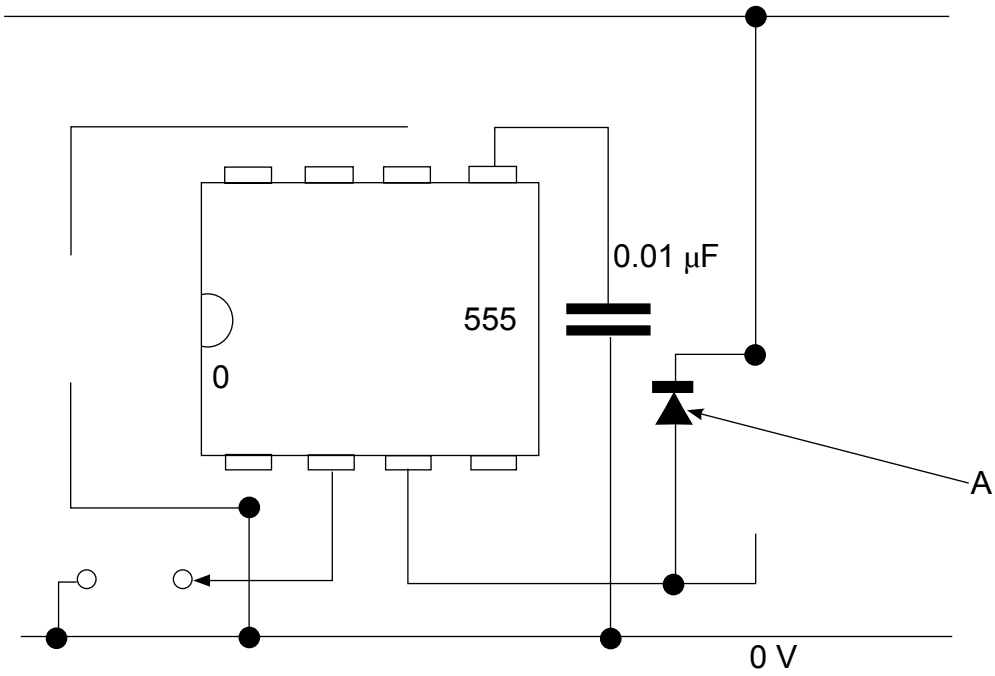


Fig. 28

(i) Complete Fig. 28 to show a suitable audio signal alarm. [4]

(ii) Identify the component labelled **A** in the circuit shown.

..... [1]

(iii) Explain the purpose of component **A** in the circuit shown.

.....

.....

.....

.....

.....

..... [3]

(iv) Describe how the student can avoid damaging the 555 timer IC when soldering it onto a printed circuit board.

.....

.....

.....

..... [2]

(h) Fig. 29 shows a model of a simple framework of a stool for the band.

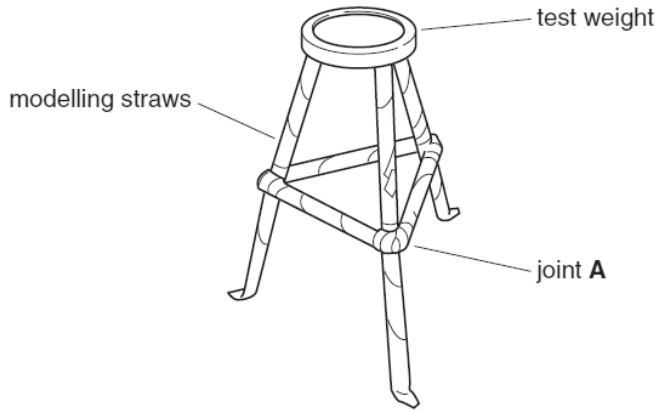


Fig. 29

(i) The test weight applies a static load to the model in Fig.29.
Explain, briefly, the effect of applying dynamic loading to a structure.

.....

.....

..... [2]

(ii) Modelling straws are used to model the stool.
Give **one** benefit and **one** drawback of using modelling straws.

Benefit

.....

..... [1]

Drawback

.....

..... [1]

(i) Fig. 30 shows a ceiling mounted bracket for a speaker.

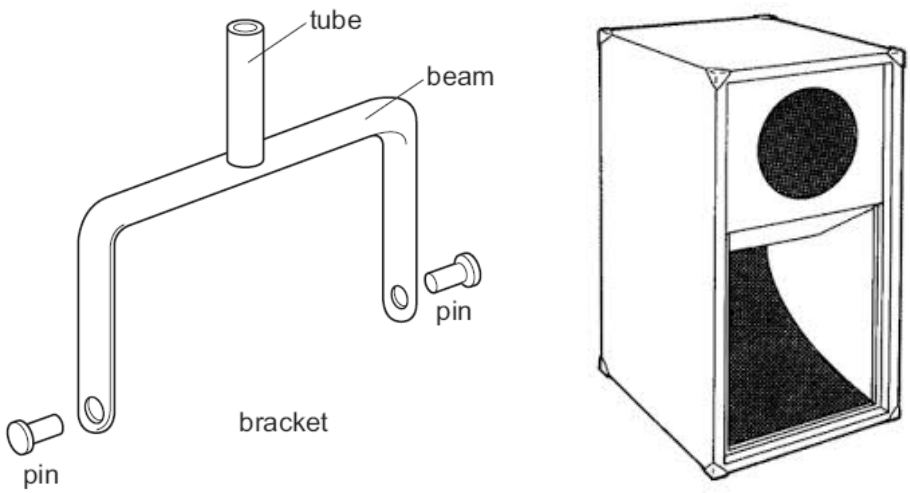


Fig. 30

(i) Name the type of force acting on the pins when the speaker is in place.

..... [1]

(ii) Describe **one** way of reducing this force in the pins.

.....

.....

.....

..... [2]

(iii) When the speaker is adjusted the pins also experience torsion.
Explain, using sketches and notes, what is meant by 'torsion'.

[3]

(j) Fig. 31 shows a linkage for the pedal of the drummer.

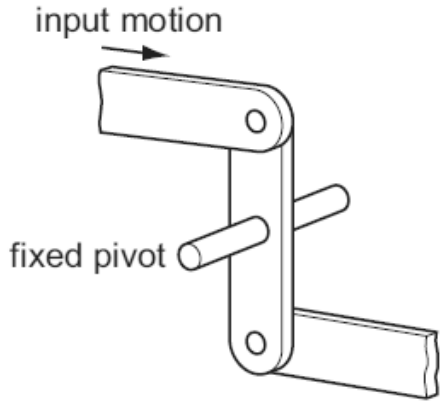


Fig. 31

(i) Add a label and arrow to Fig. 31 to show the direction of the output motion. [2]

(ii) Name the type of input motion on the linkage.

..... [1]

(iii) Explain the function of this linkage.

.....

..... [2]

[60]

BLANK PAGE