



EXAMINATIONS COUNCIL OF ESWATINI  
Junior Certificate Examination

CANDIDATE  
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**Design and Technology**

**537/01**

Paper 1

**October/November 2021**

**2 hours**

Additional materials: Standard Drawing Equipment.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name in the spaces provided at the top of the page.

Write in blue or black pen in the spaces provided on the Question Paper.

You may use a pencil/pen for any sketches, drawings or rough working.

Do **not** use staples, paper clips, highlighters, glue or correction fluid.

This paper consists of **two** (2) sections, Section **A** and section **B**.

Answer all questions in both sections in the spaces provided.

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

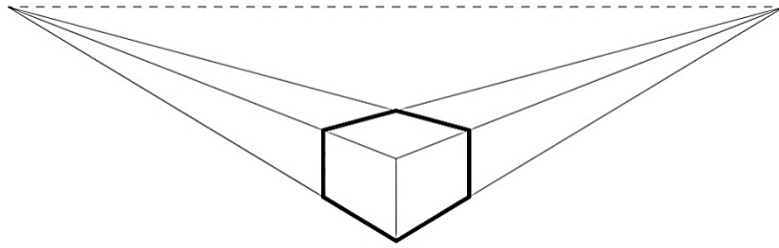
For Examiner's use	
Section A	
Section B1	
Section B2	
Section B3	
Total marks	

This document consists of **17** printed pages and **3** blank pages.

**SECTION A** [40 marks]

Answer **all** questions.

1 Figure 1 shows a cube drawn pictorially.

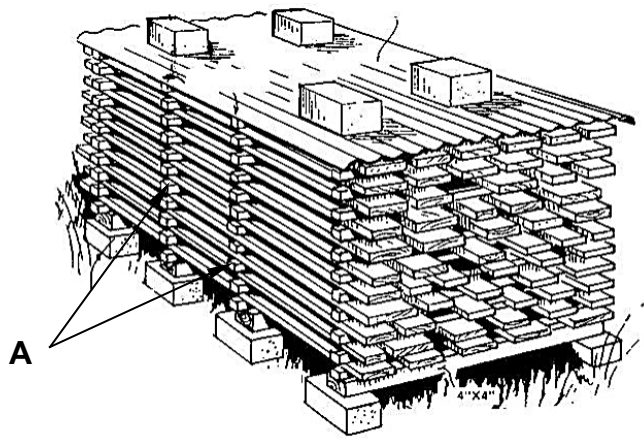


**Fig. 1**

Name the type of projection that has been used to present the cube.

..... [1]

2 Figure 2 shows a method of seasoning timber.



**Fig. 2**

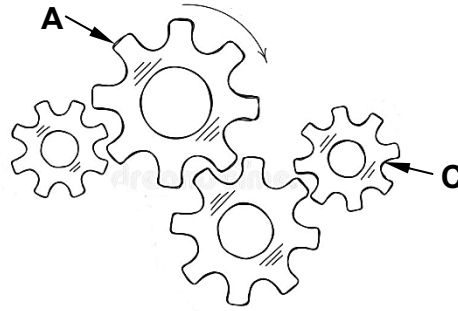
(a) Give **one** reason why timber is seasoned before use.

..... [1]

(b) What is the purpose of the wood strips labelled **A**?

..... [1]

3 Figure 3 shows a gear chain.

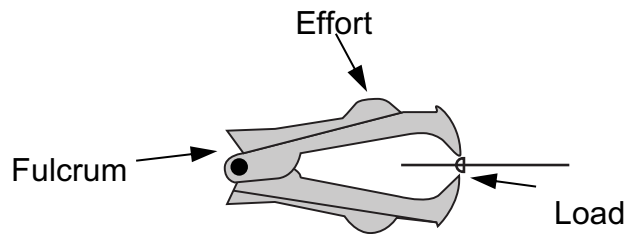


**Fig. 3**

By means of an arrow indicate the direction of rotation of gear **C** if the drive gear **A** moves in the direction indicated.

[1]

4 Figure 4 shows a staple remover.

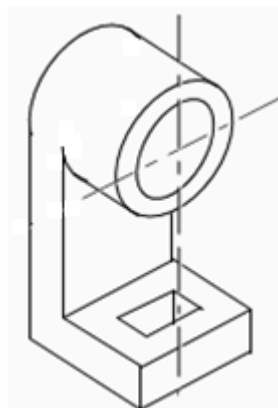


**Fig. 4**

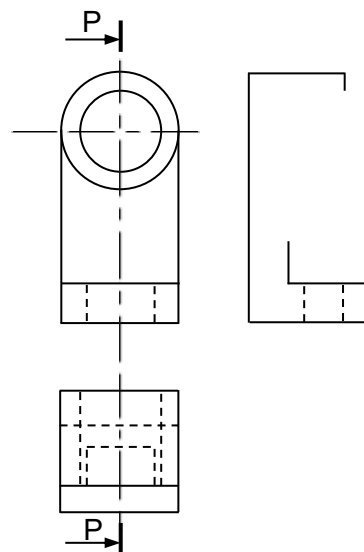
In which class of levers does a staple remover belong?

..... [1]

5 Figure 5 (a) and Figure 5 (b) show a bracket for supporting a rotating shaft in isometric and orthographic projection.



**Fig. 5 (a)**



**Fig. 5 (b)**

Complete the sectional end elevation in Figure 5 (b)

[6]

- 6 State the difference between a centre punch and a dot punch.

.....  
 ..... [1]

- 7 Figure 6 shows a mechanism.

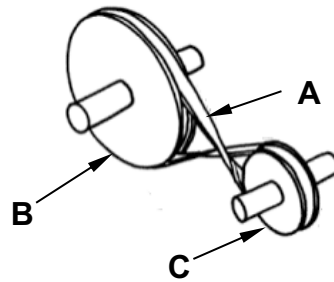
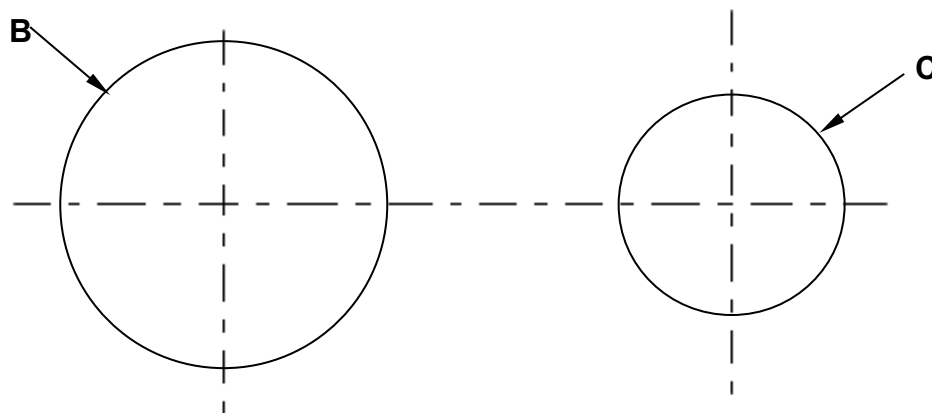


Fig. 6

- (a) Give **one** reason why part **A** of the mechanism is twisted.

.....  
 ..... [1]

- (b) The two circles below represent parts **B** and **C** of the mechanism.



Construct **one** internal tangent to the two circles to represent part **A**. [5]

8 Shown below is a saucepan.

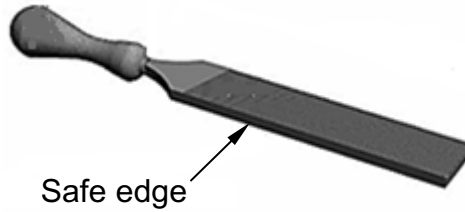


Give **two** reasons why aluminium is a suitable material for making the saucepan.

**Reason 1**..... [1]

**Reason 2**..... [1]

9 Shown below is a type of file.



(a) Give the correct name of the file.

..... [1]

(b) What is the advantage of the safe edge when using the file?

..... [1]

10 A finish is applied on wood for three main reasons.

Complete the list below.

**Reason 1** hygiene purposes

**Reason 2** for durability

**Reason 3** ..... [1]

11 Figure 7 (a) shows a lap joint cut out on South African Pine (SAP). Figure 7 (b) shows one member of the joint with the waste part indicated.

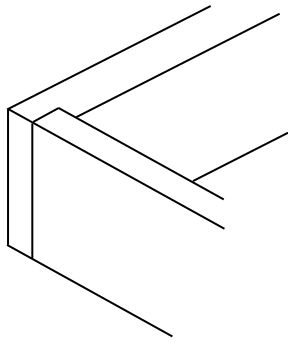


Fig. 7 (a)

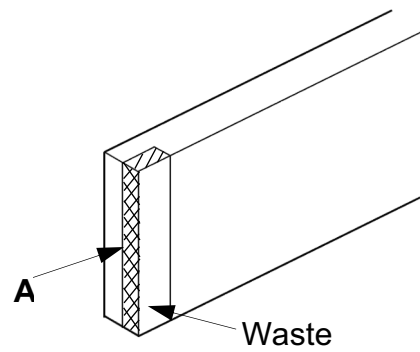
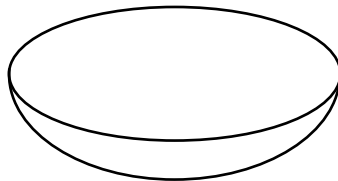


Fig. 7 (b)

(a) Name **one** tool that can be used to mark line **A**.  
..... [1]

(b) Name **one** appropriate saw that can be used to remove the waste.  
..... [1]

12 Shown below is a sketch of a bowl made of plastic.



Name **one** process of making the bowl.  
..... [1]




13 You are to design and make a soup bowl for a toddler.

Write **two** safety specifications to be considered when making the bowl.

**Specification 1**..... [1]

**Specification 2**..... [1]

14 Complete the table below by naming the fitting/fixing and stating its use.

Fitting/fixing	Name	Use
	Bolt and nut	..... .....
	.....	To hang doors of cabinets and houses
	Ball catch	..... .....

[3]

15 Figure 8 shows a mechanism that converts rotary motion to reciprocating motion.

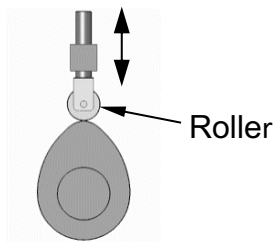


Fig. 8

(a) Name the mechanism.

..... [1]

(b) Name **one** machine where the mechanism named (a) has been applied.

..... [1]

16 Plastics are classified into two main groups; thermoplastics and thermosetting plastics.

Give **one** characteristic of thermoplastics

..... [1]

17 Give **one** reason why a hacksaw is suitable for cutting plastic.

..... [1]

18 Figure 9 shows the process of cutting a piece of wood.

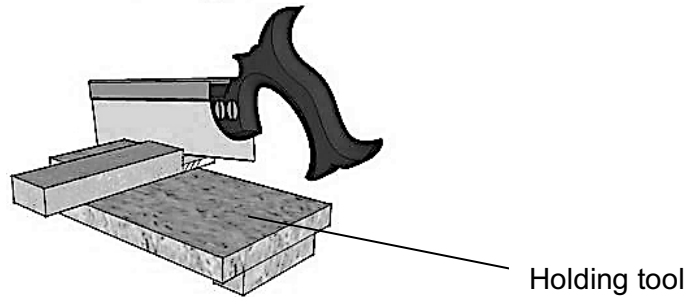


Fig. 9

Name the holding tool shown.

..... [1]

19 Shown below is a manufactured board.



(a) Name the manufactured board.

..... [1]

(b) Give **one** advantage of manufactured boards over solid wood.

..... [1]

20 Figure 10 (a) shows a logo for a sports company. Figure 10 (b) shows an incomplete logo.

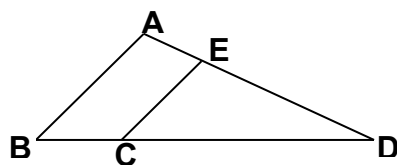


Fig. 10 (a)

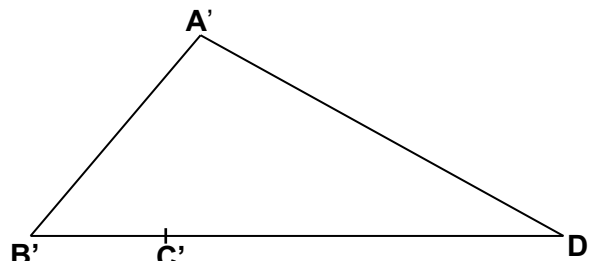


Fig. 10 (b)

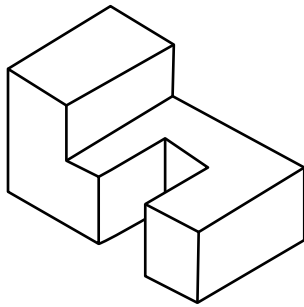
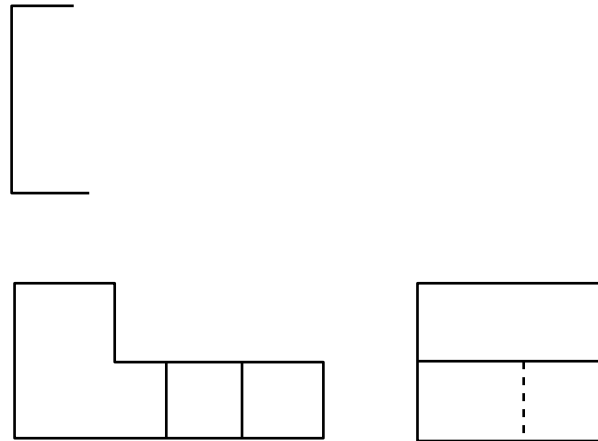
[2]

Using geometrical construction, complete the logo in Figure 10 (b).



**SECTION B** [60 marks]Answer **all** questions.**Question B1** [20 marks]

1 Figure 1 (a) shows a card model of a toy in isometric projection.

Figure 1 (b) shows an incomplete **third angle** orthographic projection of the toy.**Fig. 1 (a)****Fig. 1 (b)**

- (a) Complete the plan view in Figure 1 (b). [5]
- (b) In the space given below draw the symbol of projection to indicate the type of orthographic projection used. [4]

[4]

- 2 Figure 2 (a) shows a desk tidy made from card. Figure 2 (b) shows the orthographic views of the desk tidy.

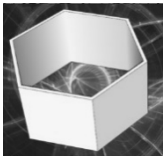


Fig. 2 (a)

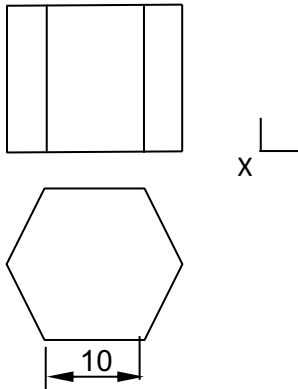
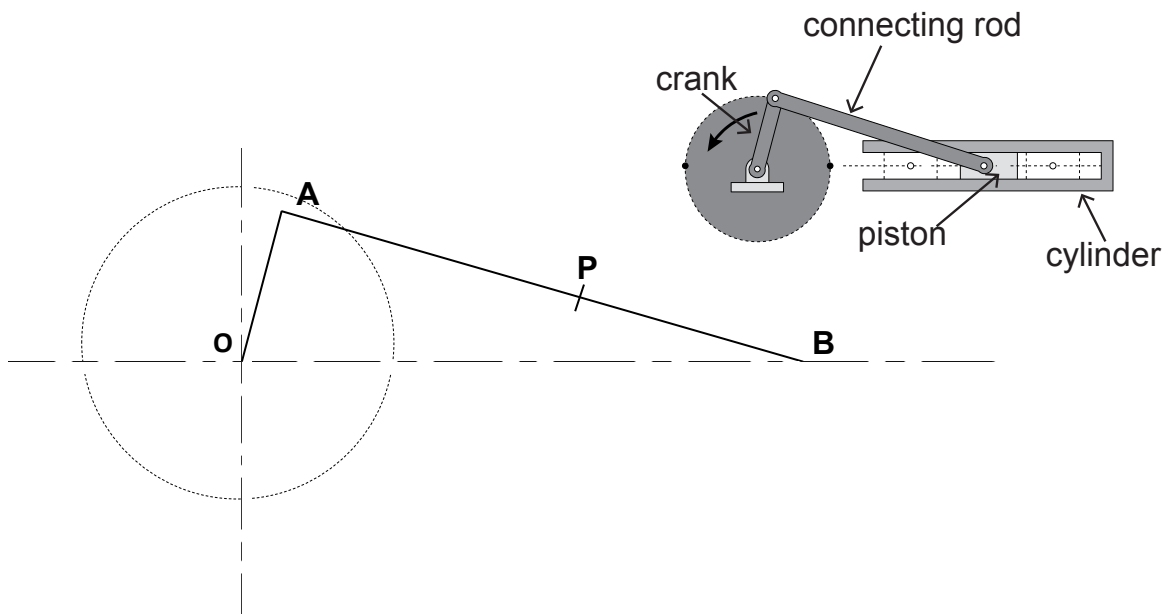


Fig. 2 (b)

Complete Figure 2 (b) by drawing the development (net) of the desk tidy using point X as a starting point. Do not include the base. [5]

- 3 Shown below is the drawing of a bell crank mechanism and a line drawing of the mechanism.

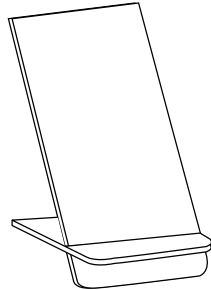


Plot the locus of point 'P' as the crank OA moves to complete one revolution.

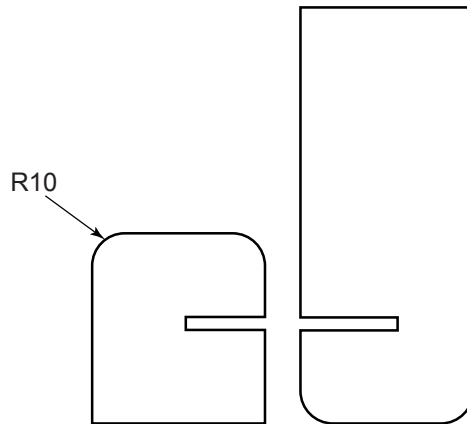
Point B slides on the horizontal centre line. [6]

**Question B2** [20 marks]

- 1 Figure 1 (a) shows a cell phone display stand made of acrylic.  
Figure 1 (b) shows the two parts of the stand.



**Fig.1 (a)**



**Fig. 1 (b)**

- (a) Give **one** reason why acrylic is a suitable material for the stand.  
 ..... [1]
- (b) Explain how the R10 corner can be produced to a smooth finish after marking  
 .....  
 .....  
 .....  
 ..... [3]
- (c) The two parts of the stand form 90° when assembled.

Using sketches show how the joint can be strengthened to always maintain the 90°.

[2]

- 2 Figure 2 shows an exploded view of a side table made of South African pine.

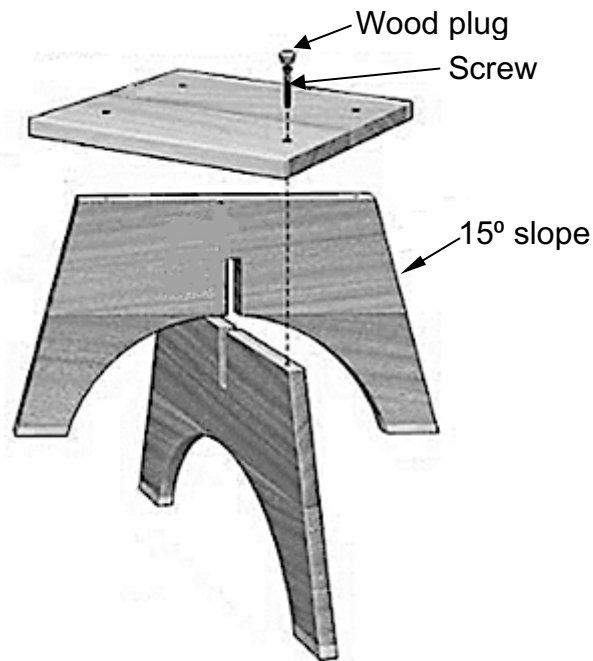


Fig. 2

- (a) Name the joint used to join the legs of the table.  
 ..... [1]
- (b) Name **three** tools that can be used to mark the 15° slope.  
 Tool 1..... [1]  
 Tool 2..... [1]  
 Tool 3..... [1]
- (c) State **two** reasons why the curves have been cut on the legs.  
**Reason 1**..... [1]  
**Reason 2**..... [1]
- (d) Draw and label the three holes that are drilled before fitting a countersunk head screw to join wood together. [3]

3 Figure 3 shows an incomplete design for a holder to support a roll of wire.

The stand and arm are made of mild steel.

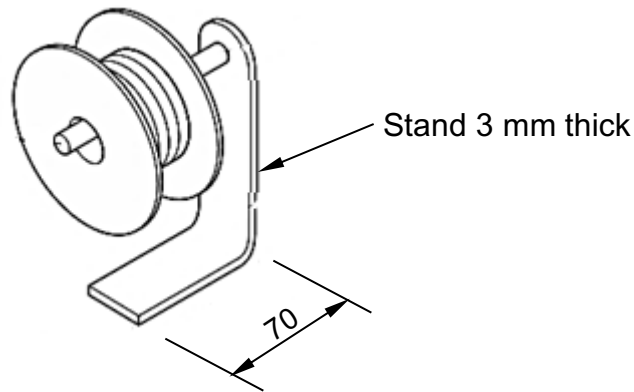


Fig. 3

(a) Give **two** reasons why mild steel is a suitable material for the holder.

1 ..... [1]

2 ..... [1]

(b) Figure 4 shows the stand of the holder marked out before it is bent to shape.

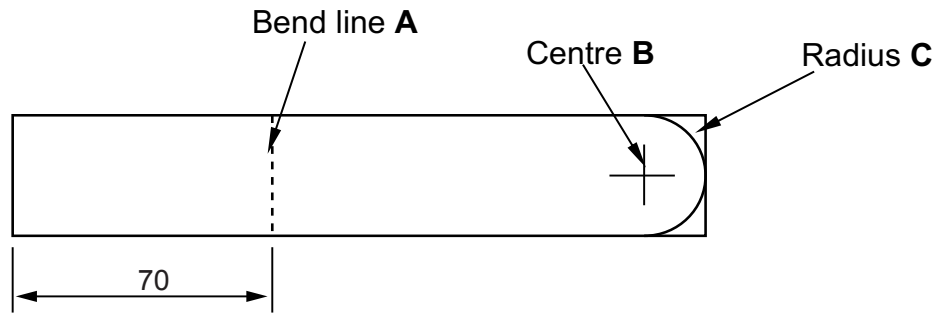


Fig. 4

Name the tools used to mark out:

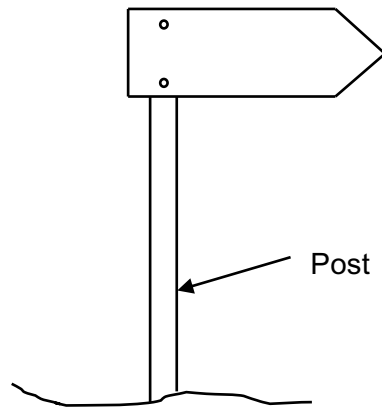
Bend line **A**..... [1]

Centre **B** ..... [1]

Radius **C** ..... [1]

**Question B3** [20 marks]

1 Figure 1 shows a sign board.



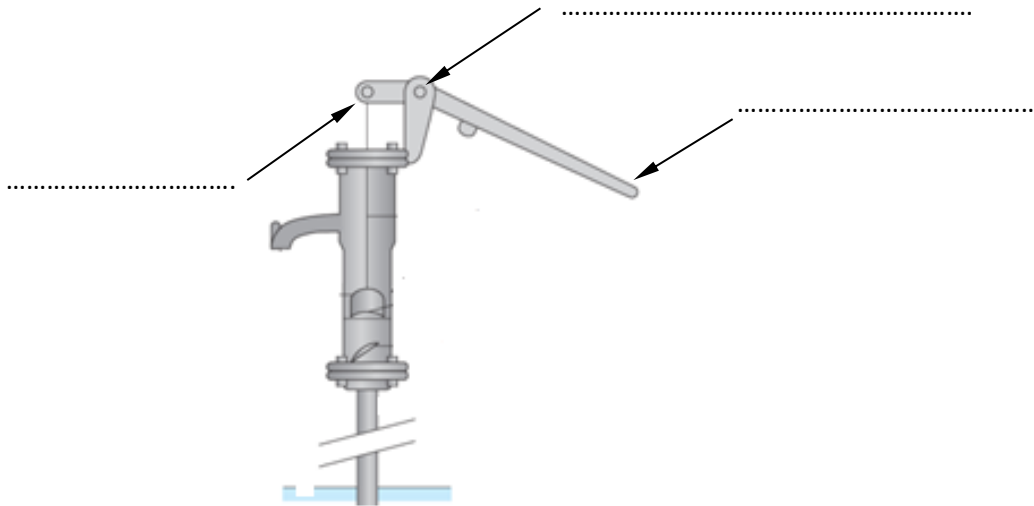
**Fig. 1**

(a) State a type of force that acts on the post on a windy day.

..... [1]

(b) Show on Figure 1, show the sign board can be made more rigid. [1]

2 Figure 2 shows a hand pump.

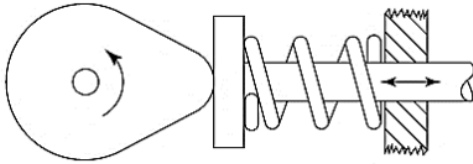


**Fig. 2**

On **Figure 2** label the fulcrum, load and effort.

[3]

3 Name the type of cam shown below.

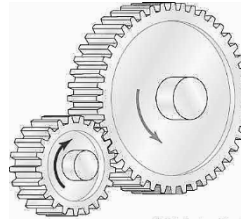


..... [1]

4 Shown below are sketches of two mechanisms **A** and **B**.



**A**



**B**

(a) Name mechanism **A**.

..... [1]




(b) State the type of gears shown in **B**.

..... [1]

(c) State the advantage of mechanism **B** compared to **A**.

..... [1]

5 Classify the structures shown in the table below.

Structure			
Class	.....	.....	.....

[3]

- 6 Figure 3 shows a type of gears.



**Fig. 3**

State the correct name of the gears.

..... [1]

- 7 Figure 4 shows a pair of scissors in use.

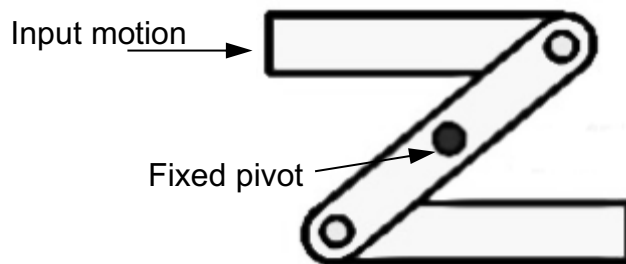


**Fig. 4**

Name the type of force applied by the blades of the scissor on the cut material.

..... [1]

- 8 Figure 5 shows a linkage mechanism



**Fig. 5**

Indicate the direction of the output motion of the mechanism.

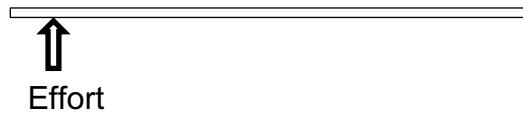
[1]



- 9 Make a neat two dimensional (2D) labelled sketch of a rack and pinion.

[3]

- 10 Complete the diagram below to show a second class lever.



[2]



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