

Candidate Name	Form Class	Index Number
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**ANG MO KIO SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2024
SECONDARY FOUR EXPRESS /
FIVE NORMAL (ACADEMIC)**

DESIGN & TECHNOLOGY

7059/01

Total Marks: 80

27 Aug 2024 / Tuesday

Setter: Mr Victor Tan / Mr Wilson Koh

2 Hours

Candidates answer on the Question Paper.

No Additional Materials are required.

Instructions to candidates:

Write your name, index number and class in the spaces at the top of this page.

Write in dark blue or black pen.

You may use a HB pencil for any diagrams, graphs or rough working.

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

Candidates are to answer **all** questions.

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

This document consists of **15** printed pages and **1** blank page.

Answer **all** the questions.

- 1 Fig. 1.1 shows an existing design of a snack storage.



Fig. 1.1

- (a) (i) Product analysis can be used as a research method to improve the design of the snack storage. Describe **two** ways in which product analysis can be used to improve the design of the storage shown in Fig. 1.1.

1

.....

2

..... [4]

- (ii) Describe **two** other research methods and explain how they can help to provide ideas to improve the existing design

1

.....

2

..... [4]

- (b) Fig. 1.2 shows a possible scenario of how the table top may look like after the consumption of some peanuts.



Fig. 1.2

Sketch an improved idea to the existing design of the snack storage in Fig. 1.1 to contain and dispose the shells easily after consumption. Annotate if necessary.

[4]

- (c) (i) Use sketches to show **two** anthropometric considerations that should be considered when designing the snack storage device. Annotate if necessary.

[4]

- (c) (ii) Relevant anthropometric information has to be collected for the sizing of a product. Suggest and describe how collected information can be presented for clarity and decision making.

.....

[4]

- (d) Fig. 1.3 shows some of the mock-ups of the snack storage made when the designer was generating and developing ideas.



Cardboard Mock-up



Foam Mock-up



3D Printed Mock-up

Fig. 1.3

- (i) Explain the purpose of making the mock-ups shown in Fig. 1.3.

.....

 [2]

- (ii) Give **one** possible drawback of using cardboards in the making of mock-ups.

.....
 [1]

- (e) Fig. 1.4 shows how the snack storage have developed over the years.



Fig. 1.4

- (i) Describe **one** evolution in the snack storage in Fig. 1.4. Explain the reason behind the evolution.

Evolution.....

Reason.....

..... [3]

2

Fig. 2.1 shows a classroom table.

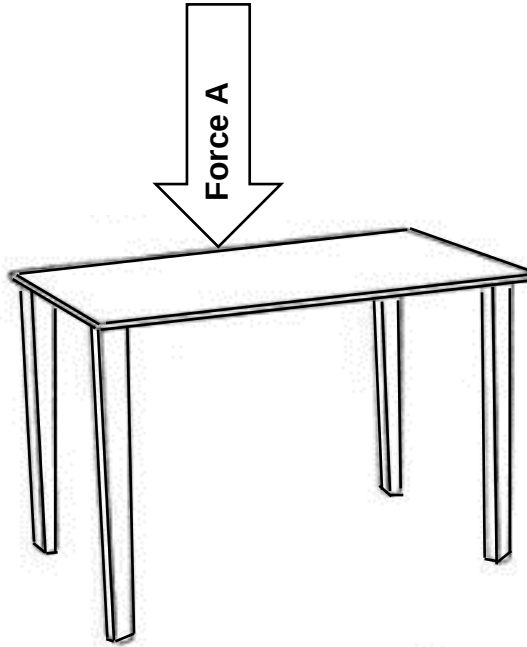


Fig. 2.1

- (a) (i) Name a method to strengthen structures to make it sturdy to resist Force A.

..... [1]

In the space below, sketch the method to resist Force A in Fig. 2.1.

[2]

- (ii) Sketch and name the type of force experienced by the tabletop when Force A is applied.

Type of Force: [1]

[2]

- (b) Fig. 2.2 shows a safety helmet worn by workers at a construction site.

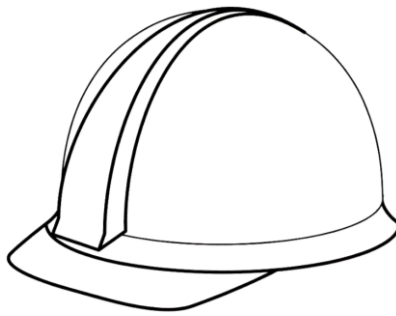


Fig 2.2

- (i) State the type of structure for the safety helmet shown in Fig. 2.2.

..... [1]

- (ii) The safety helmet is made from a plastic material.

Suggest an appropriate plastic for the safety helmet and give a reason for your choice.

Plastic [1]

Reason [1]

- (iii) Explain why the safety helmet does not have an applied finished.

.....

 [2]

- (iv) Safety helmets come in different colours for a construction site, like grey, orange, white, blue, and yellow. Explain why the safety helmet has different colour coding.

.....

 [2]

- (c) Fig. 2.3 shows a roof structure in equilibrium.

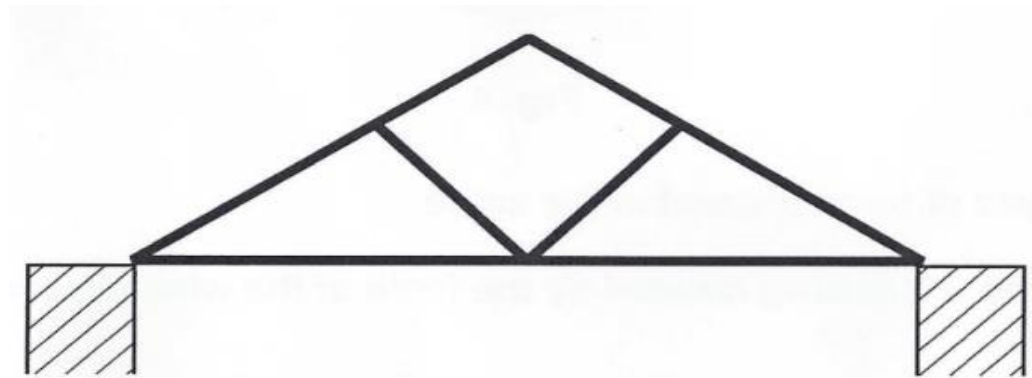


Fig. 2.3

- (i) In Fig. 2.3, indicate and label one member in compression and one in tension. [2]

- (ii) State the type of the structure.

..... [1]

- (iii) Define the term “equilibrium”.

.....

 [2]

3

Fig. 3.1 shows a close-up view of the mechanism used to move the worktable of a drilling machine.

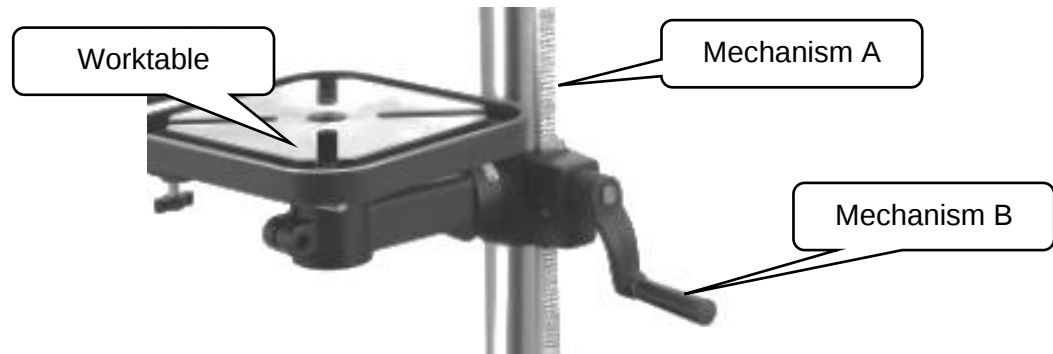


Fig. 3.1

- (a) (i) Mechanism A is used to raise worktable up or down. Name Mechanism A.
 [1]
- (ii) Name Mechanism B.
 [1]
- (iii) The control system used in Fig 3.1 is an open loop system.
 State the reason why it is an open loop system.

 [1]
- (iv) Describe how the mechanical system works using a block diagram.

[4]

- (v) Fig. 3.2 shows parts of the drill-press column of a drilling machine. The chuck key is often misplaced after use.

Design a holder that could be securely attached to the drilling machine drill-press column to hold the chuck key.

Sketch your idea for a holder on Fig. 3.2. You may add more sketches to communicate your design. Annotate if necessary.

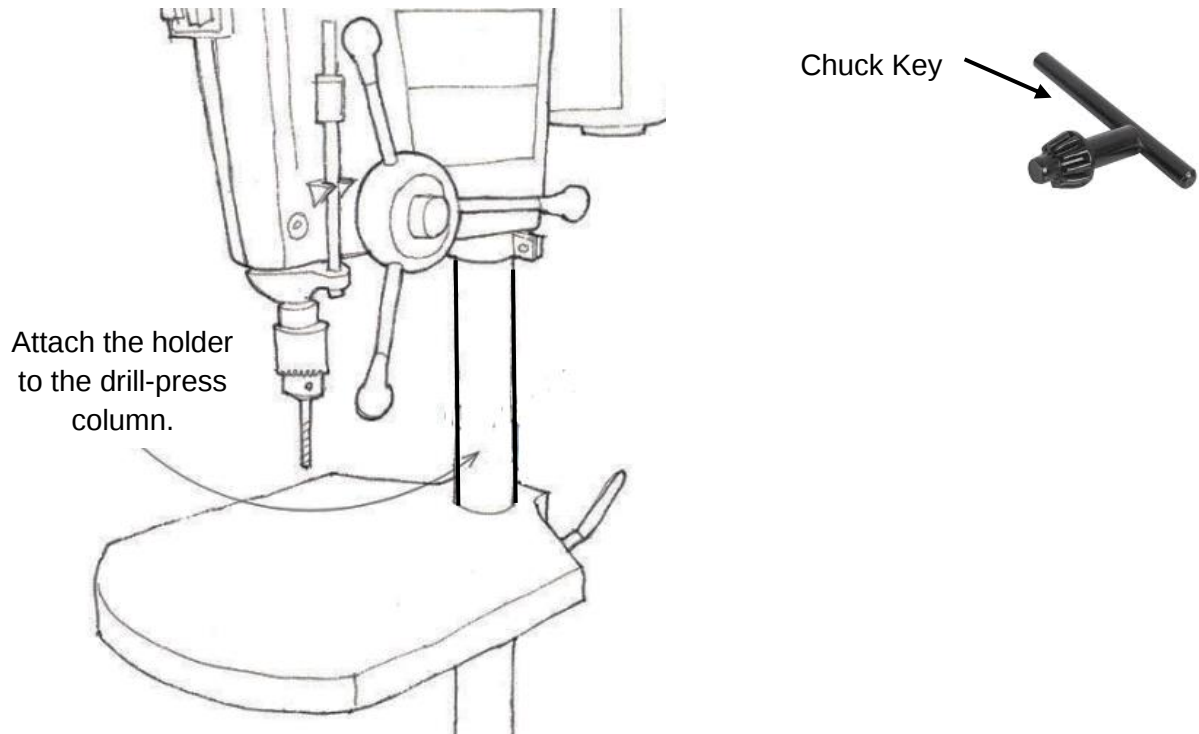


Fig. 3.2

[4]

- (b) Fig. 3.3 shows a hole puncher and the side view of the mechanism.

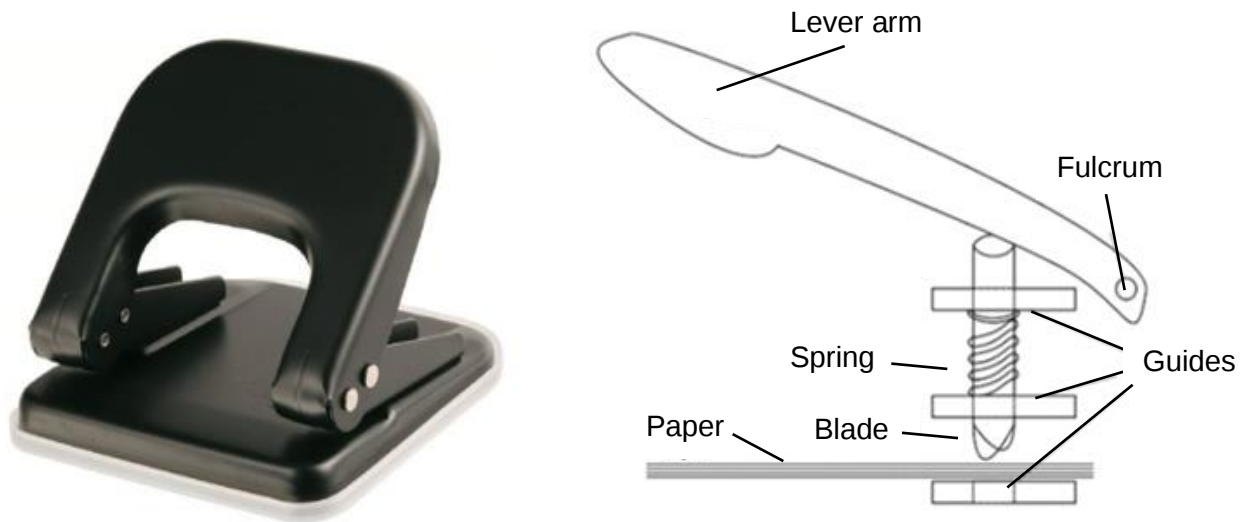


Fig. 3.3

- (i) Name the type of spring mechanism used in the hole puncher.

..... [1]

- (ii) Explain the function of the spring in the hole puncher.

.....

.....

.....[2]

- (iii) State the class of lever and sketch the lever schematic diagram for the hole puncher.

Label "Load", "Effort" and "Fulcrum" in your sketch.

..... [1]

[3]

- 4 (a) (i) Complete the circuit shown in Fig. 4.1 by adding **two** single pole single throw (SPST) switches in **series** so that the lamp will be lit only if **both** switches are closed.

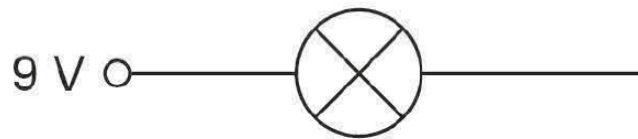


Fig. 4.1

[2]

- (ii) Complete the circuit shown in Fig. 4.2 by adding **two** SPST switches in **parallel** so that the lamp will be lit if **either** switch is closed.

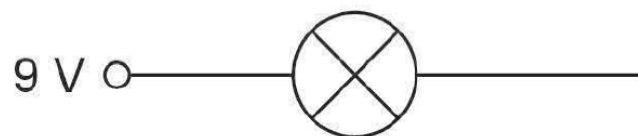


Fig. 4.2

[2]

- (iii) Describe the difference between a single pole single throw switch and a membrane switch.

.....

.....

.....

..... [4]

- (b) Fig. 4.3 shows a diagram of the diode.

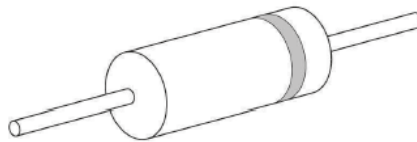


Fig. 4.3

- (i) On Fig. 4.3, draw
- an arrow which clearly shows the direction that current would flow through the diode.
 - label the anode and cathode leads.

[2]

- (ii) Draw the circuit symbol for a diode in the space below.

[1]

3

Fig. 4.4 shows a light that is used in a bedroom. The light will turn on automatically when the area is dark.



Fig. 4.4

- (c) (i) Name the sensing component used in Fig. 4.4.

..... [1]

- (ii) Complete the circuit in Fig 4.5, so that the light automatically will turn on when the area turns dark.

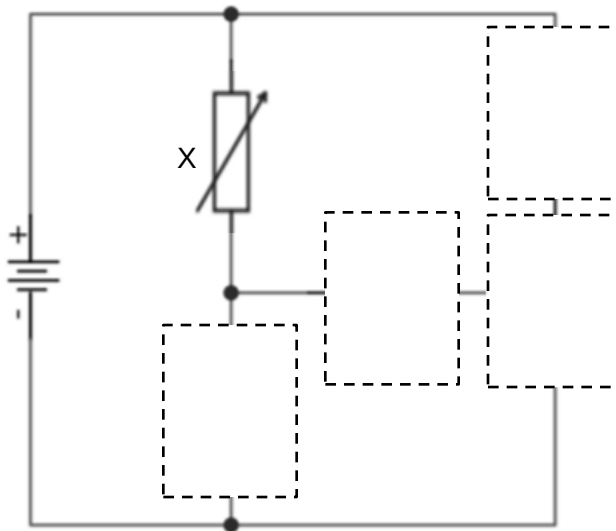


Fig. 4.5

[4]

State the name and the function of component X in Fig 4.5.

.....

.....

..... [2]

End of Paper

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