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聖嬰中學

HOLY INNOCENTS' HIGH SCHOOL

Established in 1892

Candidate Name

Class

Index Number

PRELIMINARY EXAMINATION 2023
SECONDARY 4/5
DESIGN & TECHNOLOGY

/ 80

7059/01

Date: **25 Aug 2023**

Duration: **2 HR**

Additional Materials:

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all the work you hand in.

Write in dark blue or black pen.

You may use a soft pencil for any diagrams or graphs.

Do not use paper clips, glue or correction tape/fluid.

All dimensions are in millimetres unless otherwise stated.

Answer **all** questions on the Question Paper.

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

Set by: Mr Gary Tan
Vetted by: Ms Chen Xinyi

1 Fig. 1.1 shows a person using a lamp.

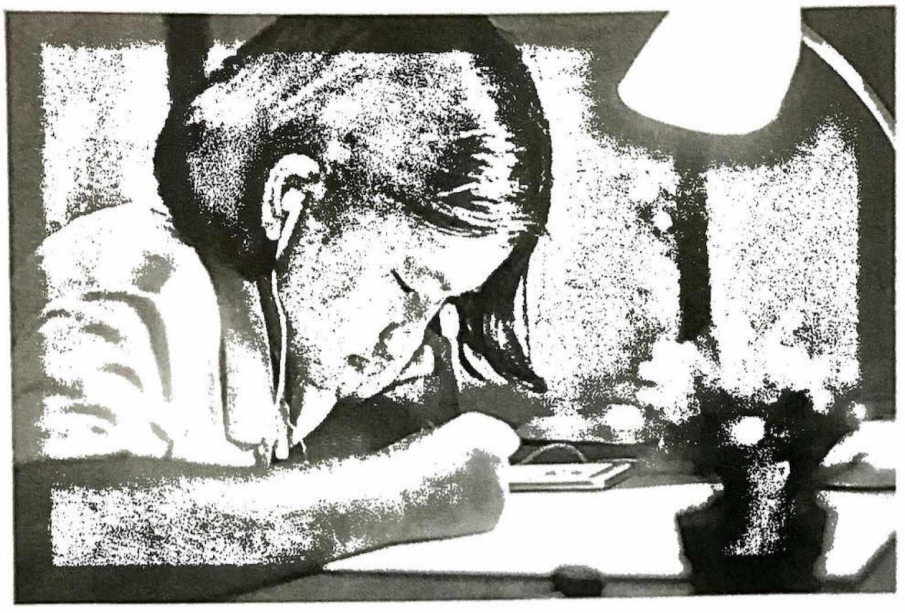


Fig. 1.1

(a) (i) Give **two** ways that a designer could collect relevant information about users' needs during the design process.

1 .....

2 ..... [2]

(ii) Describe the process of analysing the information collected by the designer.

.....

.....

.....

..... [3]

(iii) A histogram is a suitable method of presenting information collected by the designer. Name **two** other methods of presenting information.

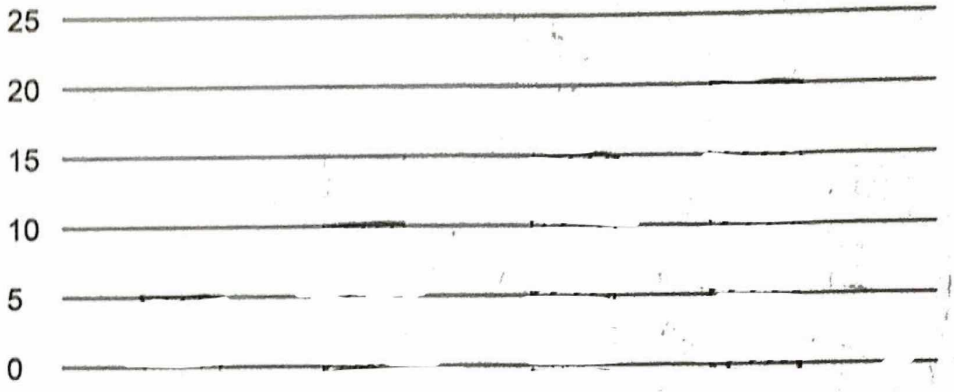
1 .....

2 ..... [2]

(iv) The following information has been collected from potential users of a lamp in response to the question: 'What would be your preferred colour for the lamp?'

Colour	No. of responses
White	5
Black	15
Blue	10
Red	20

Use this information to complete the histogram.



[3]

(ii) The red lamp would be more effective if its brightness could be adjusted. Sketch a modification to your design for part **(b)(i)**, that would enable the brightness of the lamp to be adjusted. Annotate if necessary

[6]

(c) Describe **two** ways of evaluating the design of a lamp.

[4]

(b) (i) Fig. 1.2 shows a drawing of the preferred red lamp and base.
Sketch an idea to show how the lamp's head can be attached to the base.
The idea must also allow for angle adjustments.

You may use the space below Fig. 1.2 for more sketches to communicate your design.
Annotate if necessary.

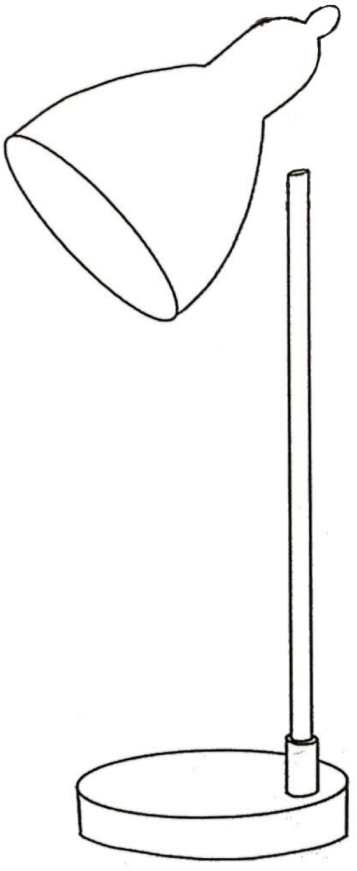


Fig. 1.2

[6]

(a) Fig. 2.1 shows a person using crutches.

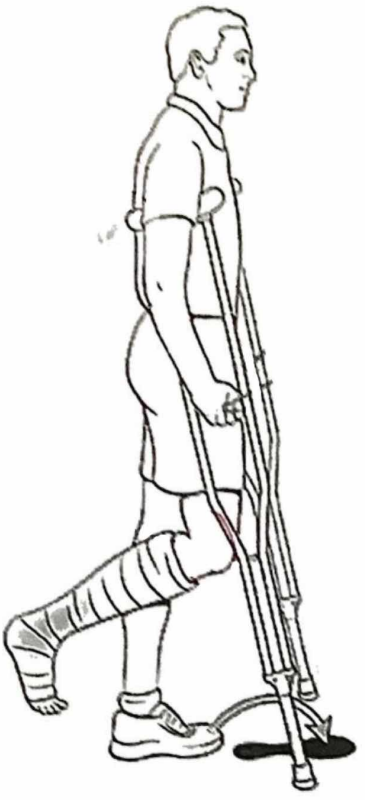


Fig. 2.1

(i) Use arrows to indicate and label on Fig. 2.1, where each of the following forces are acting.

- Compression
- Tension
- Bending

[3]

(ii) Give two reasons why aluminium would be a preferred material for the crutches.

1 .....

.....

2 .....

..... [2]

(b) Sketch a tool found in the D&T workshop that makes use of torsional force and show how it is used to twist material.

[4]

(c) Fig. 2.2 shows a beam being used to support a painter.

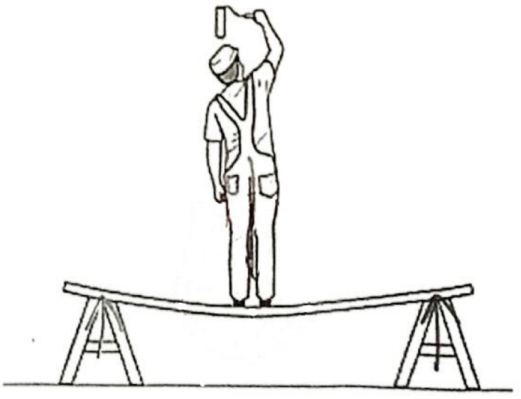


Fig. 2.2

(i) Use arrows to indicate bending force acting on the beam shown in Fig. 2.2.

[3]

(ii) Sketch a beam with a different cross-section that would be more suitable to resist bending forces.

[2]

(d) Figs. 2.3 shows a handrail which is 5m long.

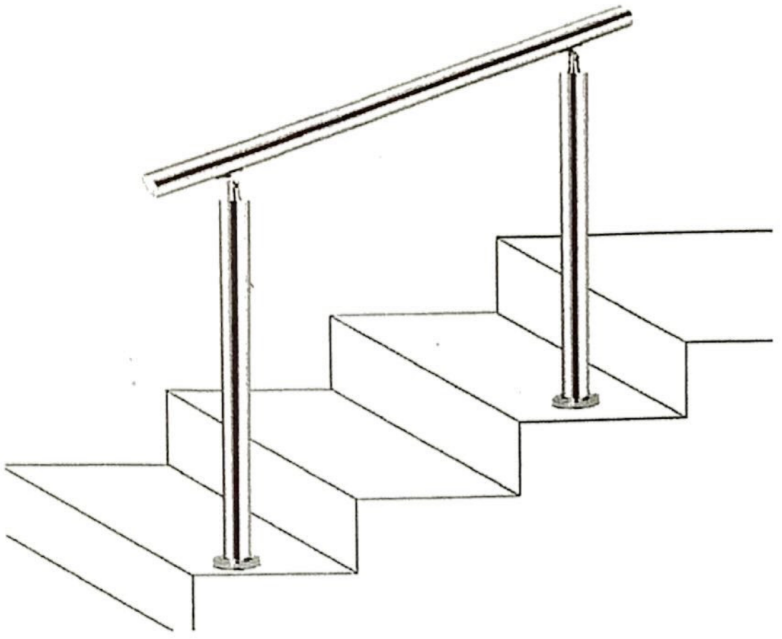


Fig. 2.3

Use sketches and notes to show how the stability of the handrail can be increased. [4]

(a) Fig. 3.1 shows a bottle opener.

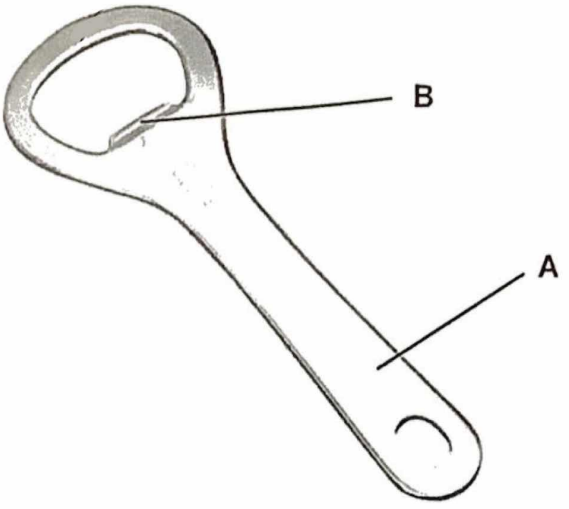


Fig. 3.1

(i) State which order of lever is used in the bottle opener.

..... [1]

(ii) Name the parts of the lever shown at:

A .....

B ..... [2]

(iii) State a suitable metal for the opener and give a reason for your choice.

Suitable metal .....

Reason .....

..... [3]

(v) The bottle opener shown in Fig. 3.1 has to be made accurately from metal. Use sketches to design a jig for drilling the hole for attaching a key ring to the bottle opener.

[5]

(b) Fig. 3.2 shows a belt ...

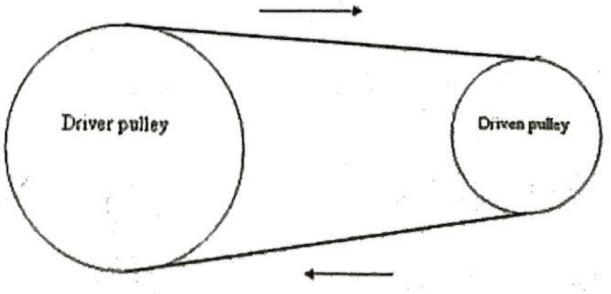


Fig. 3.2

State the effect on the output speed of the belt drive in the arrangement shown in Fig. 3.2.

.... [2]

(c) Fig. 3.3 shows a mechanical music box.

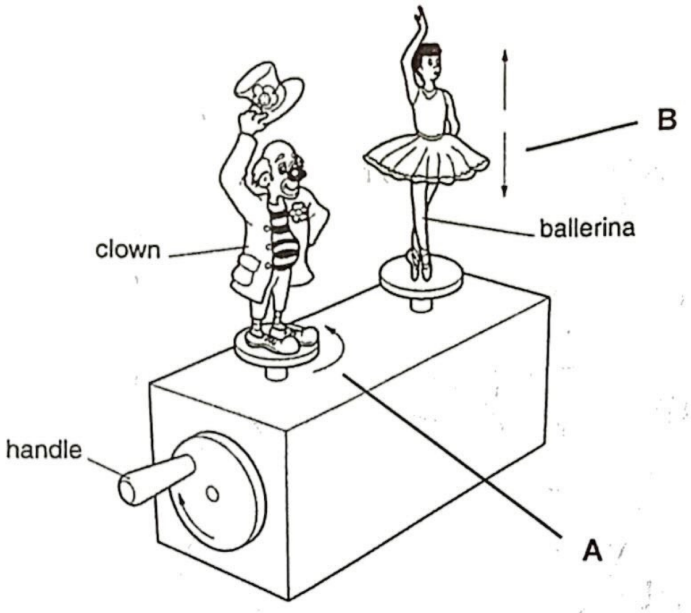


Fig. 3.3

(i) State the types of motion at A and B.

A .....

B ..... [2]

(ii) Sketch and label a mechanism that would make the ballerina rise and fall twice for one revolution of the handle.

[3]

(a) Complete the table to show a suitable material and electrical property for each electrical use.

material	electrical property	electrical use
		wires
		cable covering

[4]

(b) **(i)** A power supply of 1.5 volts is needed for a torch.

Different batteries are available. Explain the differences in environmental impact between the use of a dry cell battery and a rechargeable battery.

.....

.....

.....

.....

.....

..... [4]

(ii) Use a sketch to show how two batteries are connected in parallel. Annotate if necessary.

[2]

(c) Give **two** reasons why using a temperature control circuit in an electrical thermal flask is advantageous.

1 .....

2 ..... [2]

(c) A person wants to monitor the temperature in a fish tank to ensure the well-being of the fish. Sketch a design for a simple electronic device that will alert the owner if the temperature in the fish tank becomes too high or too low.
Your sketch should show the position of essential components such as a battery, a switch, and an alarm.

Use the space below Fig. 4.1 to communicate your design.
Annotate if necessary.

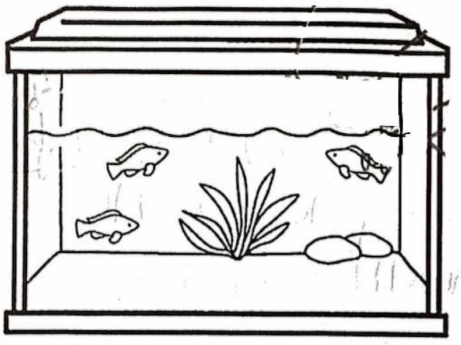


Fig. 4.1

[6]

End of Paper