

Wednesday 12 June 2024 – Morning

A Level in Design and Technology: Product Design

H406/02 Problem Solving in Product Design

Time allowed: 1 hour 45 minutes



You must have:

- the Resource Booklet

You can use:

- a ruler (cm/mm)
- a scientific calculator
- geometrical instruments



Please write clearly in black ink. **Do not write in the barcodes.**

Centre number

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Candidate number

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First name(s)

Last name

INSTRUCTIONS

- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. You can use extra paper if you need to, but you must clearly show your candidate number, the centre number and the question numbers.
- Answer **all** the questions.
- Use the Resource Booklet to answer all the questions.
- Where appropriate, your answer should be supported with working. Marks might be given for using a correct method, even if your answer is wrong.
- Each question tells you which part of the Resource Booklet to use.

INFORMATION

- The total mark for this paper is **70**.
- The marks for each question are shown in brackets [].
- Quality of extended response will be assessed in questions marked with an asterisk (*).
- This document has **16** pages.

ADVICE

- Read each question carefully before you start your answer.

Read the **Resource Booklet** before you answer the questions.

- 1*** Videotech product designers have developed a concept design for an entry level product called iStand. This is shown in **Fig. 2** of the Resource Booklet.

The designers need to consider the viability of the iStand concept design for a range of stakeholders to make home videos.

Critically evaluate the suitability of the iStand for a range of stakeholders to use a mobile phone to make home videos.

In your answer you **must** consider the following:

- stakeholder needs
- function
- health and safety.

Refer to information on **pages 2 and 3** of the Resource Booklet.

[12]

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2 Videotech is keen to bring the iStand to market.

As part of the development process, the designers need to carry out quality assurance on the prototype stand.

Products such as the stand in **Fig. 2** of the Resource Booklet undergo testing in order to check that they meet the technical specification and British Standards.

Discuss suitable methods of testing the stand.

In your answer you **must** include:

- testing for accuracy
- testing of materials.

Refer to information on **page 3** of the Resource Booklet.

[8]

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- 3 Designers at Videotech have undertaken a feasibility study of the iStand concept design in **Fig. 2** of the Resource Booklet.

The results indicate that a reduction in cost is required and modifications should be made to the design to minimise materials and components.

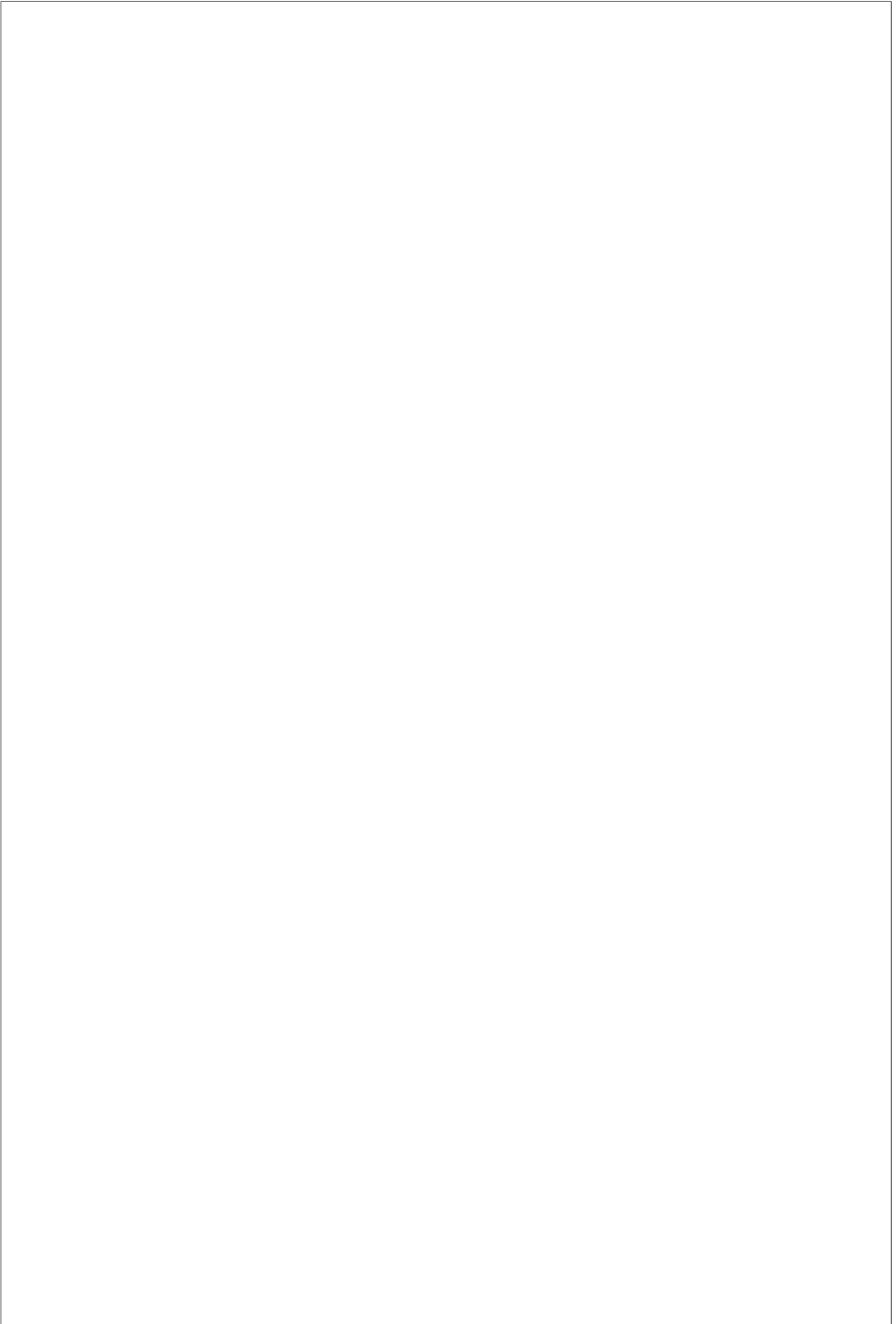
Use sketches and/or notes to show how the iStand concept design in **Fig. 2** of the Resource Booklet could be manufactured.

In your answer you **must** include details of:

- modifications to minimise materials and components
- methods of manufacture
- surface finishes.

Refer to information on **page 3** of the Resource Booklet.

[12]





- 4* Videotech designers want to move away from users needing a number of products such as the examples shown in **Fig. 3** of the Resource Booklet towards a more compact integrated solution.

Compare and contrast the suitability of the existing Vizion products shown in **Fig. 4** and **Fig. 5** of the Resource Booklet for the use of vlogging.

In your answer you **must** consider the following:

- ergonomics
- functions
- required maintenance
- planned obsolescence.

You will need to use information on **pages 4–6** of the Resource Booklet.

[16]

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- 5** In response to user feedback Vizion is considering increasing the weight of the cast iron base of the Live Stand to improve stability for use with some heavy phones.

In order to assess the feasibility of this change, designers need to know the new volume of cast iron.

- (a)** For the cast iron base shown in **Fig. 6** of the Resource Booklet:

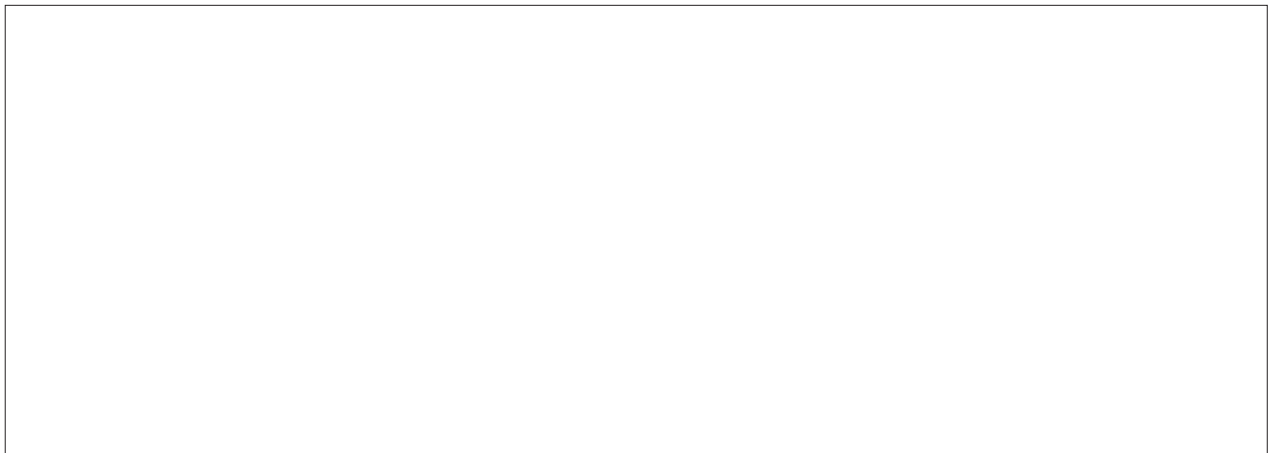
Determine by calculation that the volume of the hole is 5498 mm^3 . Show your working.

The formula for the volume of a cylinder is $\pi r^2 h$

Assume the volume of the small cylinder is 785.39816 mm^3 .

Refer to information on **page 7** of the Resource Booklet.

[3]

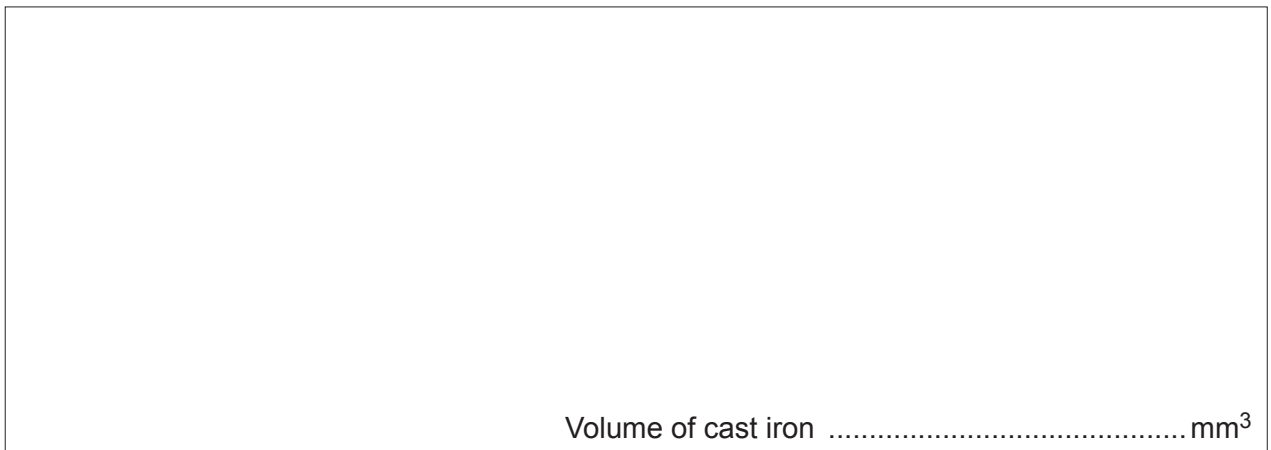


- (b)** The cast iron base in **Fig. 6** of the Resource Booklet is a truncated cone.

Calculate the volume of cast iron in mm^3 . Show your working.

Refer to information on **page 7** of the Resource Booklet.

[3]



Volume of cast iron mm^3

- 6 Artificial intelligence (AI) has created a concept model of a vlogging stand, suitable for use by dancers for social media videos.

In order to lower transportation and storage costs the manufacturer needs the final product to be flat-packed and weigh as little as possible.

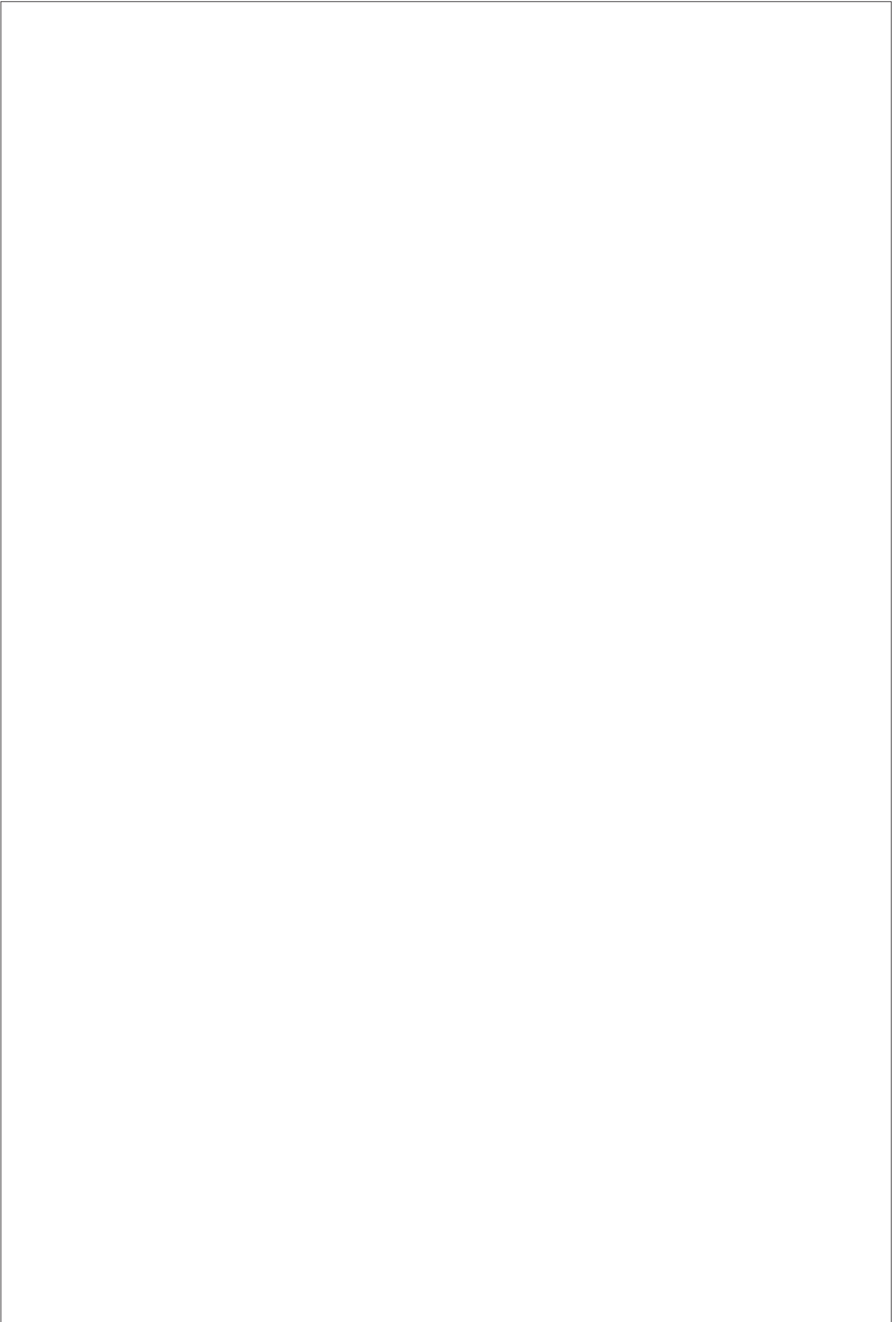
Use sketches and/or notes to outline suitable methods of assembly for the vlogging stand in **Fig. 7** of the Resource Booklet to be suitable for flat-pack distribution to retailers and customers.

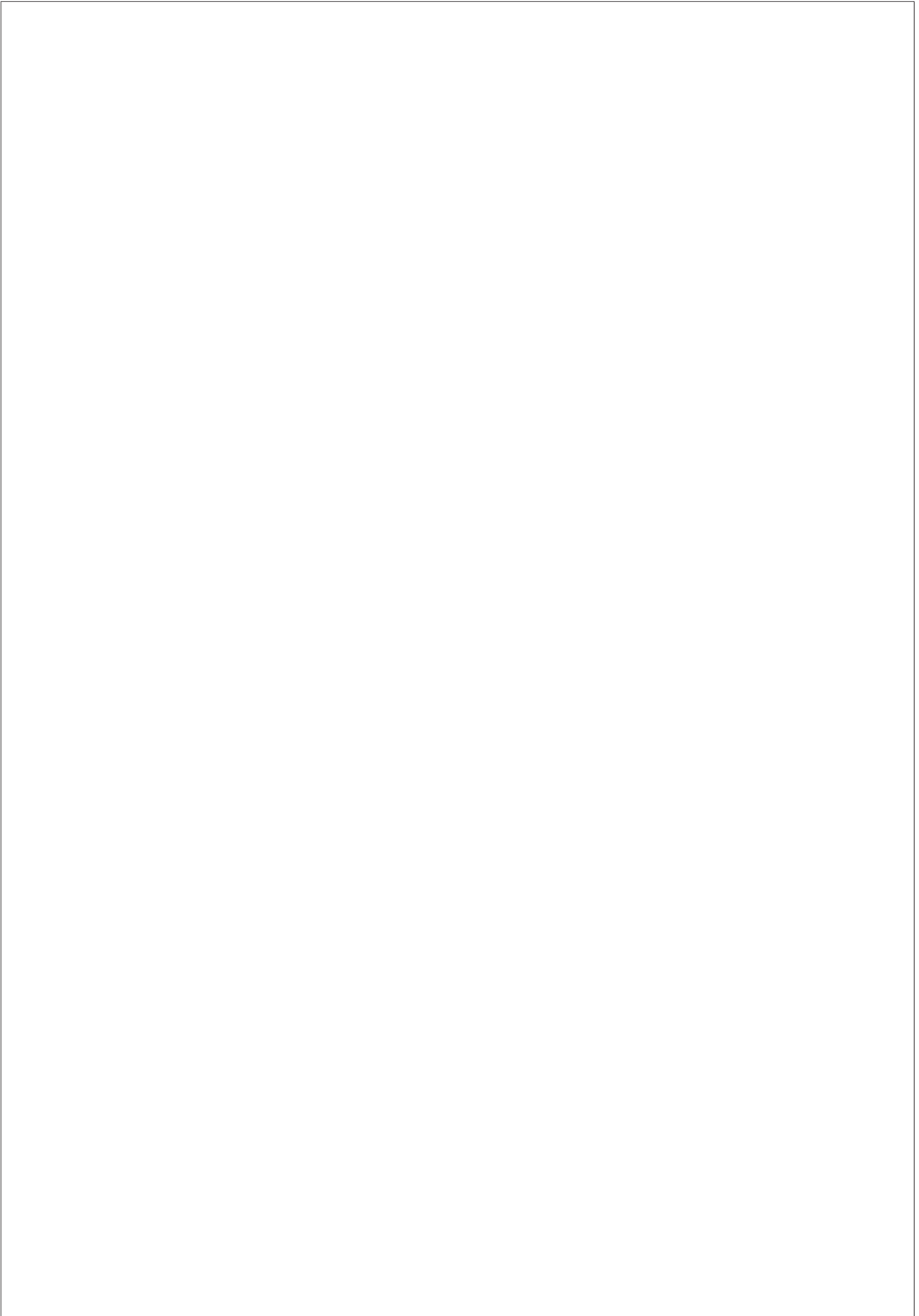
In your answer you **must** address the following problems:

- The phone holder requires a method of attachment to the top of the pole.
- The legs will scratch hard floors and may damage carpets.
- The legs need a method to stop them opening too far.
- The post requires a method of locking and unlocking it while allowing for adjustment of height.

Refer to information on **page 8** of the Resource Booklet.

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END OF QUESTION PAPER

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