OCR
RECOGNISING ACHIEVEMENT

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1957/07

GENERAL CERTIFICATE OF SECONDARY EDUCATION

DESIGN AND TECHNOLOGY

SYSTEMS AND CONTROL TECHNOLOGY

Paper 7 Mechanisms (Foundation Tier)

MONDAY 2 JUNE 2008

Morning

Time: 1 hour

Candidates answer on the question paper

Additional materials: No additional materials are required

CUP/T44780

Candidate Forename		Candidate Surname	
Centre Number		Candidate Number	

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **50**.
- Dimensions are in millimetres unless stated otherwise.
- Marks will be awarded for the use of correct conventions.

FOR EXAMINER'S USE	
1	
2	
3	
4	
5	
TOTAL	

This document consists of **12** printed pages.

[Turn over

1 Fig. 1 shows an incomplete pull-along toy.

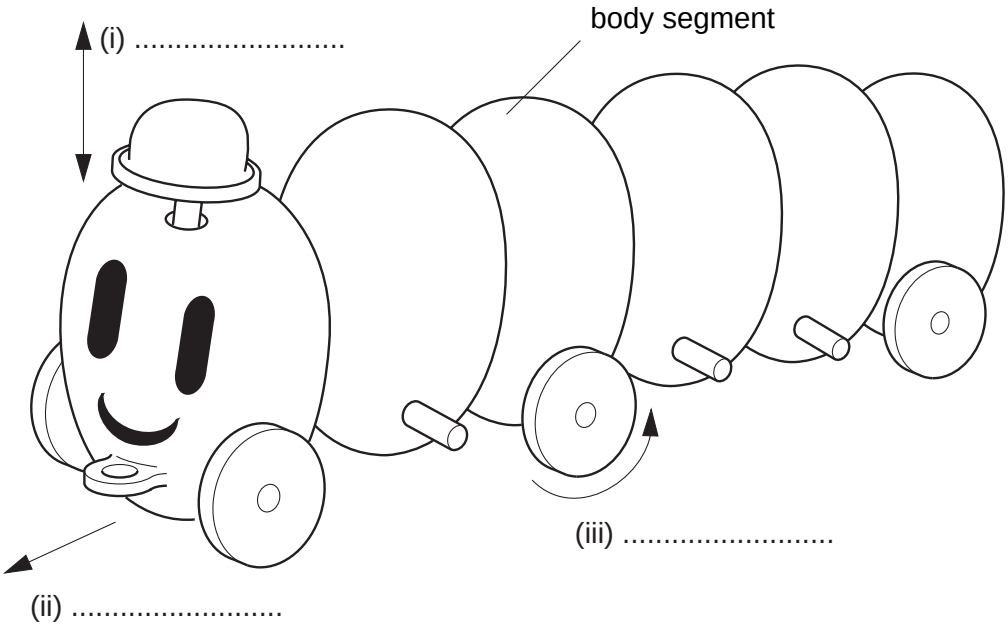


Fig. 1

(a) Complete the labels on Fig. 1 to show the types of motion.

Choose words from the list below.

Linear **Rotary** **Oscillating** **Reciprocating** [3]

(b) Fig. 2 shows one segment of the pull-along toy. Add wheels to the axle to show how the segments can be made to rock in the direction of the arrows as the toy is pulled along.

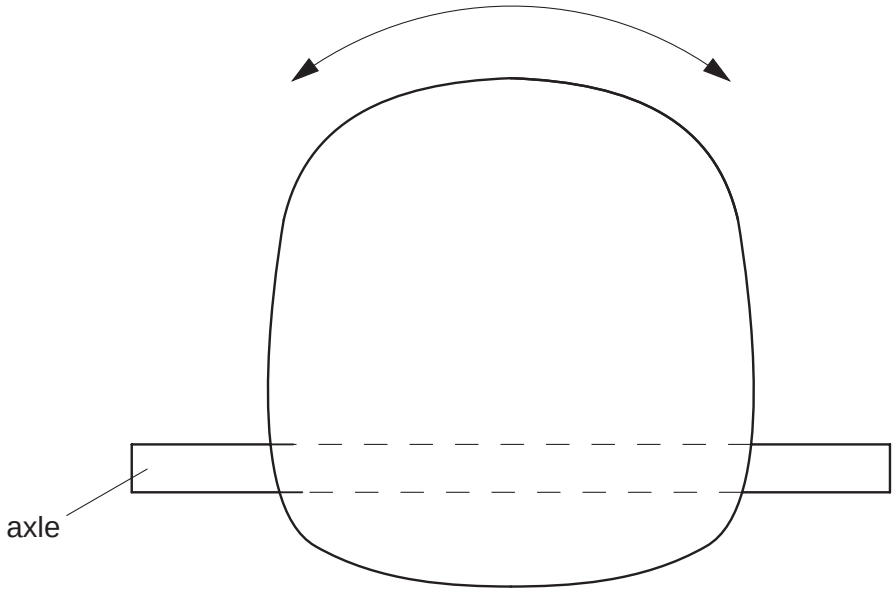


Fig. 2

[2]

(c) Fig. 3 shows part of the mechanism that will move the hat in the direction of the arrows as the toy is pulled along.

(i) Label component **A**. [1]

(ii) Add and name a component to the axle to lift the hat. [2]

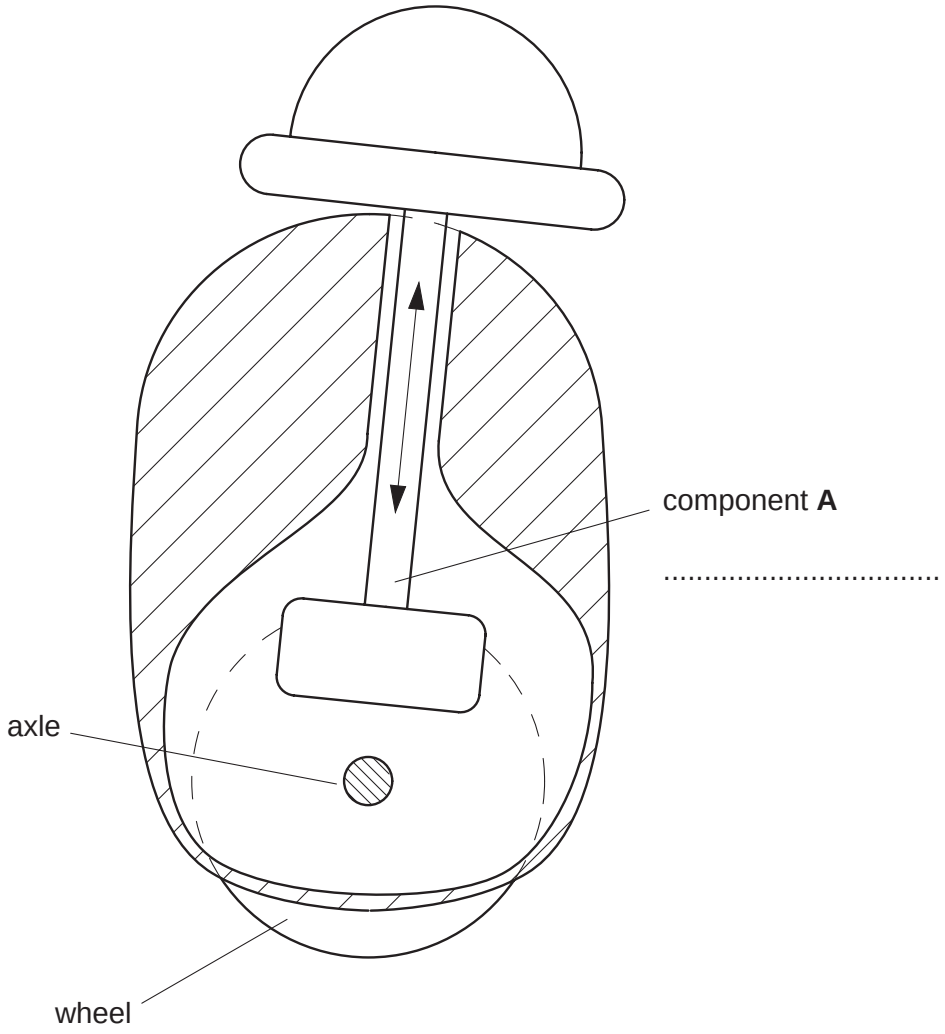


Fig. 3

(d) The parts of the pull-along toy are manufactured from a rigid plastic material.

(i) Name a suitable plastic for the pull-along toy.

.....[1]

(ii) Name a manufacturing process used to produce plastic parts.

.....[1]

[Total: 10]

2 Fig. 4 shows a design for a mechanical display to promote interest in an olympic event.

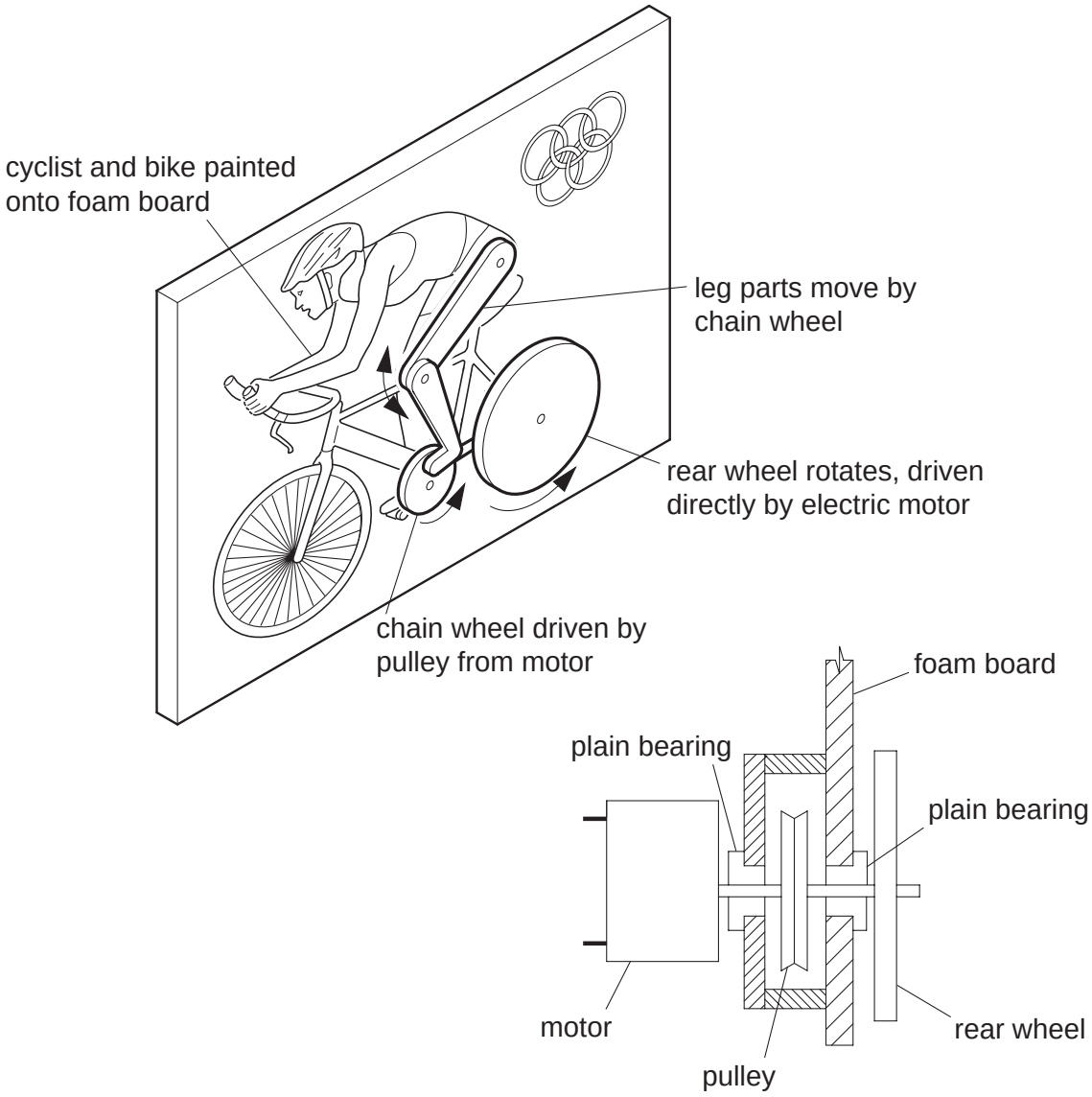


Fig. 4

(a) Give **two** reasons why bearings are needed in this product.

1 .....[1]

2 .....[1]

(b) Name a suitable material for these bearings.

.....[1]

(c) Suggest **one** reason why a pulley and belt system is used instead of a chain and sprocket system in this product.

.....[1]

On the original design the rear wheel rotated at the same speed as the motor.
The designer has decided to move the motor and add another pulley.
Fig. 5 shows the modification.

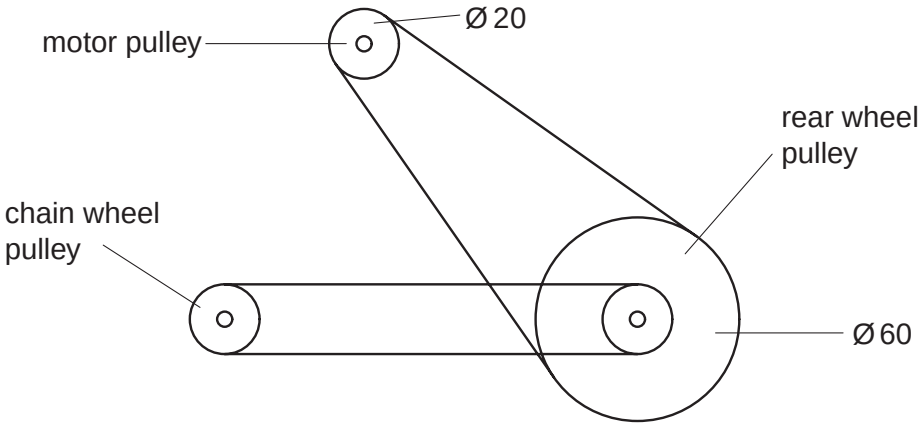


Fig. 5

(d) Explain in detail what effect this change will have on the **rear wheel**.

.....

.....[2]

Fig. 6 shows a pulley positioned on an axle.

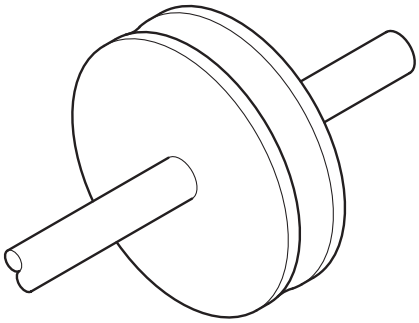


Fig. 6

(e) Use sketches to show how the pulley can be fixed to the axle but still remain removable.
Label any additional components used.

[4]

[Total: 10]

3 Fig. 7 shows parts of a machine that produces tickets from a paper roll.

The pinch roller moves the paper through the machine.

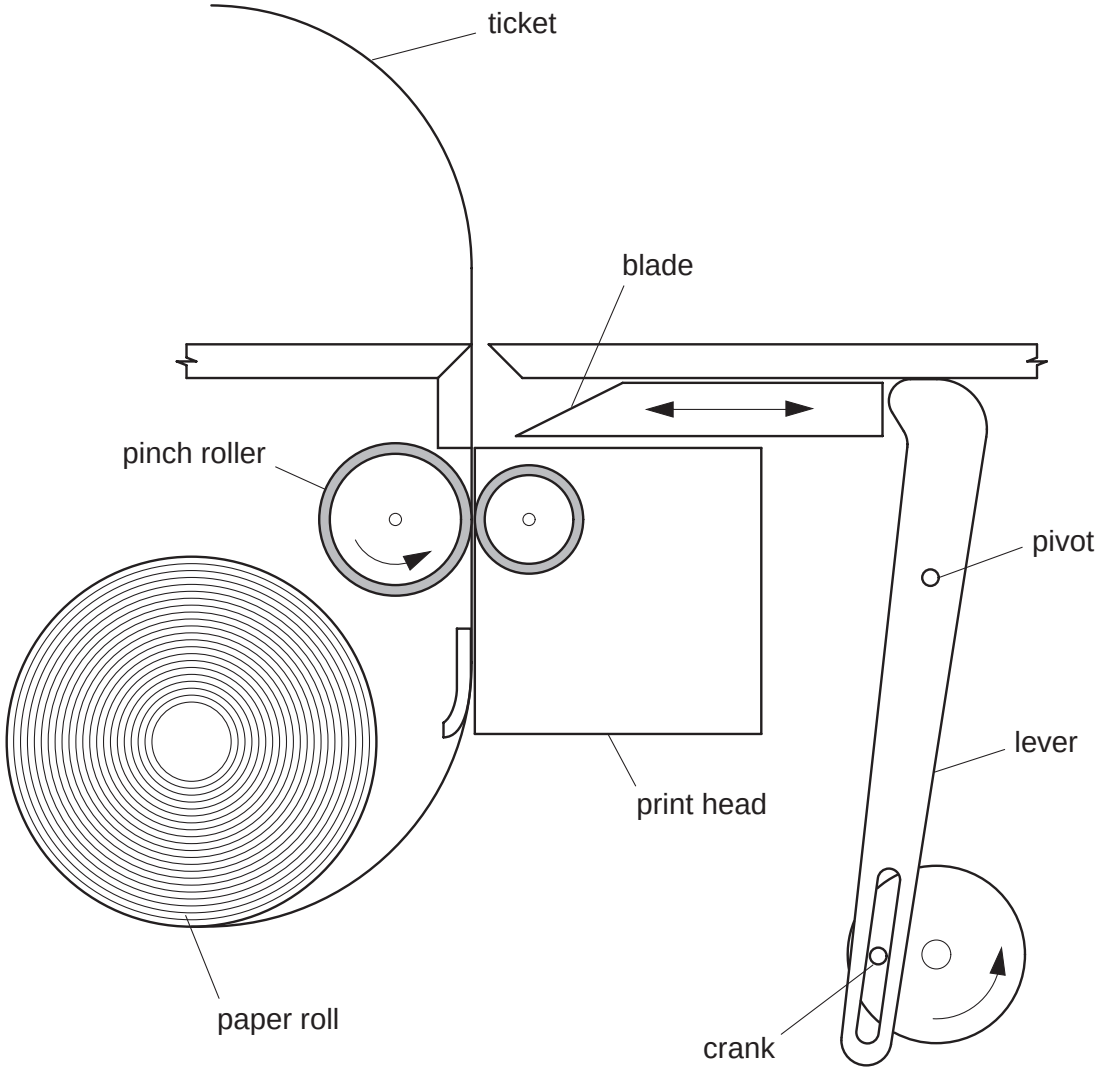


Fig. 7

(a) State where friction is used to an advantage in the ticket machine

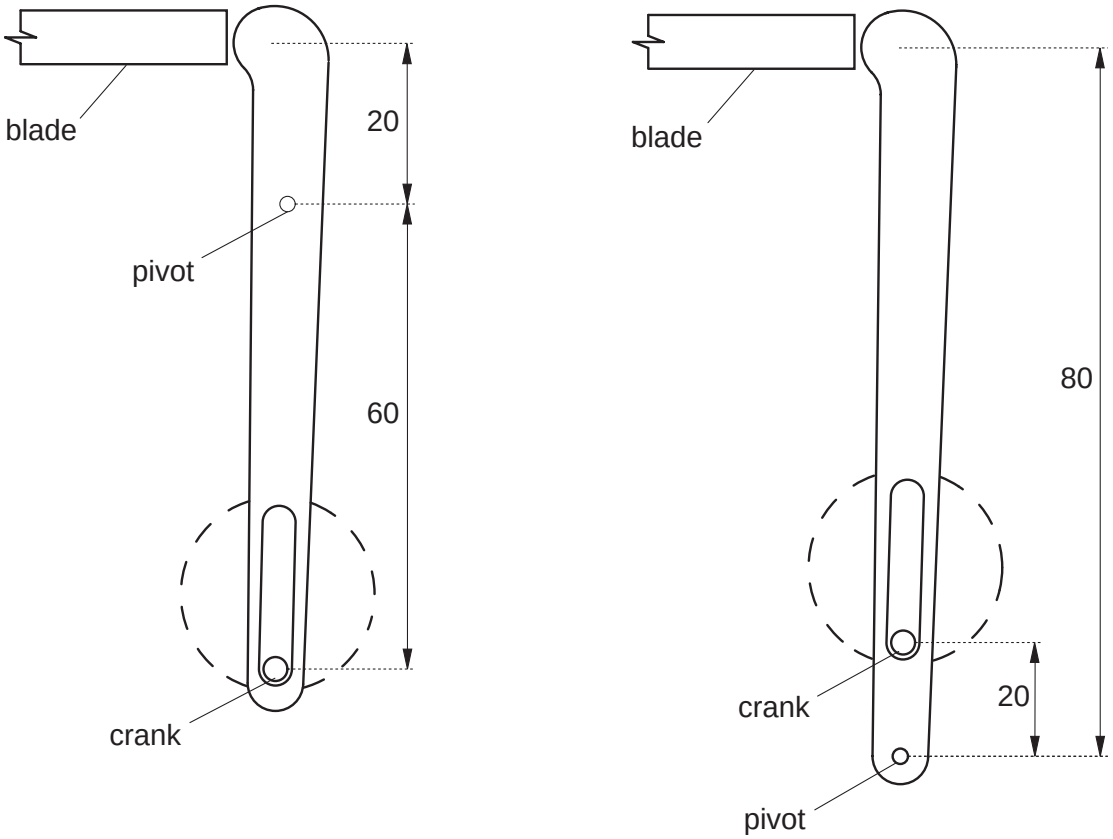
.....[1]

(b) The ticket is cut from the paper roll by the blade.

Add to Fig. 7 details of a method that could be used to make the blade return to the open position after the ticket has been cut.

Label any additional parts. [3]

Fig. 8 shows two alternative lever systems for operating the blade.



system **A** system **B**

Fig. 8

(c) State the class of lever used in each system.

System **A** .....[1]

System **B** .....[1]

(d) Explain why the designer has chosen system **A** rather than system **B**.

Include any relevant calculations. Use the formula VR = $\frac{\text{distance moved by effort}}{\text{distance moved by load}}$

.....

.....

.....

.....[4]

[Total: 10]

4 Fig. 9 shows a litter picker. The litter picker is assembled from pre-manufactured components using the 'just in time' system.

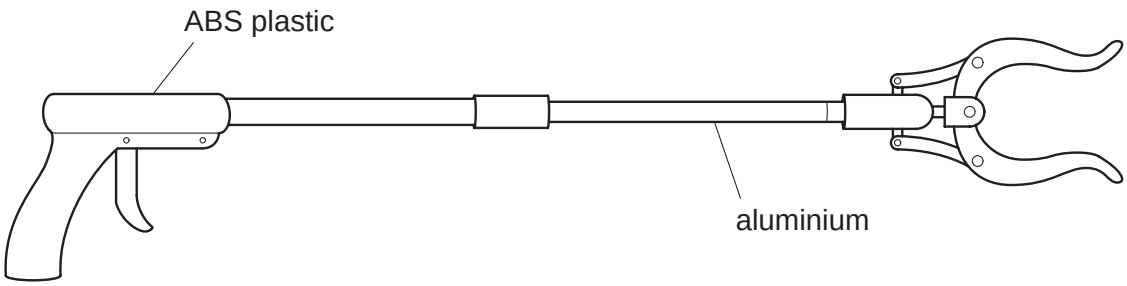


Fig. 9

(a) Give **two** advantages of using the 'just in time' system.

Advantage 1 .....

.....[1]

Advantage 2 .....

.....[1]

(b) Give **one environmental** disadvantage of the 'just in time' system.

.....

.....[1]

(c) Give **one** example of how quality control could be used during the **assembly** of the litter picker.

..... [1]

(d) Give **two** different ways that ICT systems could be used in the ordering and delivery of the litter picker.

1 .....

.....[1]

2 .....

.....[1]

(e) Describe **one** method that the manufacturer of the litter picker could use to encourage responsible disposal of the product at the end of its useful life.

.....

.....

.....[2]

(f) Consider the mechanical system in the litter picker.

Explain how ergonomics has played a part in the design of the litter picker.

.....

.....

.....[2]

[Total: 10]

5 Fig. 10 shows two different systems used to tension tennis nets.

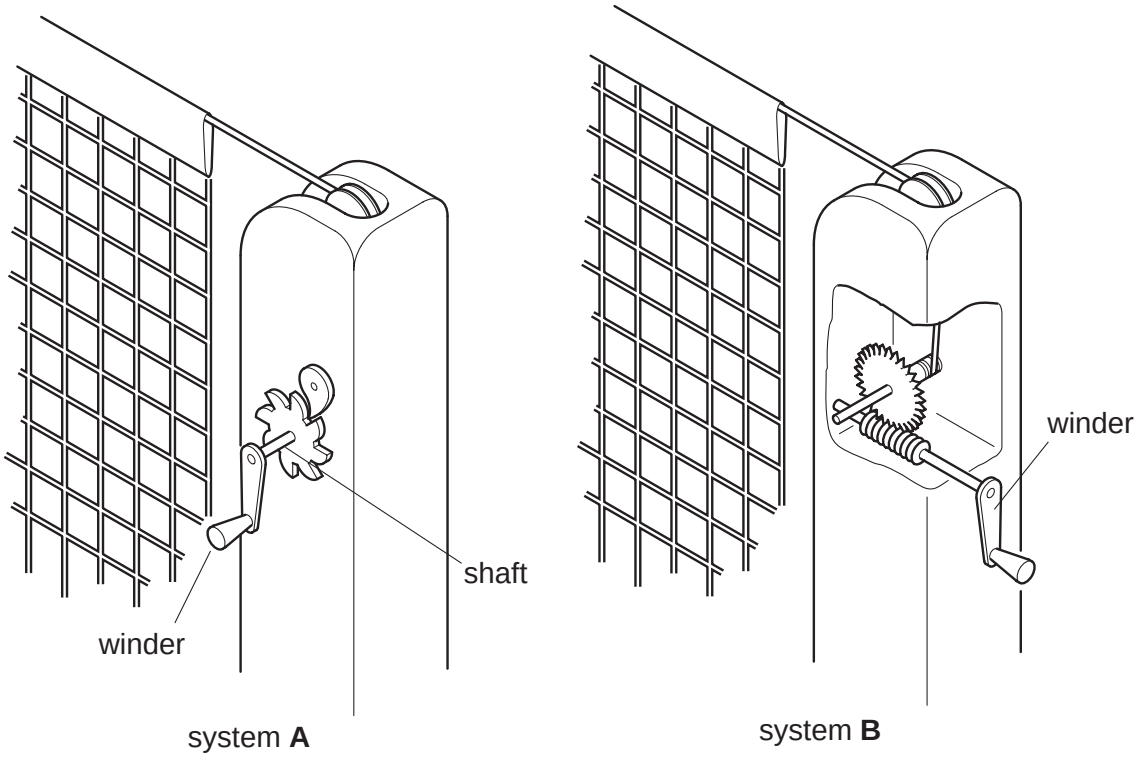


Fig. 10

(a) Name the **two** mechanical systems shown.

System **A** .....[1]

System **B** .....[1]

(b) Complete the table below to describe how system **A** works.

Input	Process	Output
		Net remains tensioned

[2]

(c) Explain **one** advantage that system **B** has over system **A**.

.....

.....

.....[2]

(d) For the safety of the tennis players, the tensioning winder needs to be removable.

Use sketches and notes to re-design the winder to meet the following specification points.

The winder must:

- turn the shaft; [1]
- be easily removable; [1]
- leave no external protrusion of the shaft. [1]

Label any important features. [1]

[Total: 10]

PLEASE DO NOT WRITE ON THIS PAGE