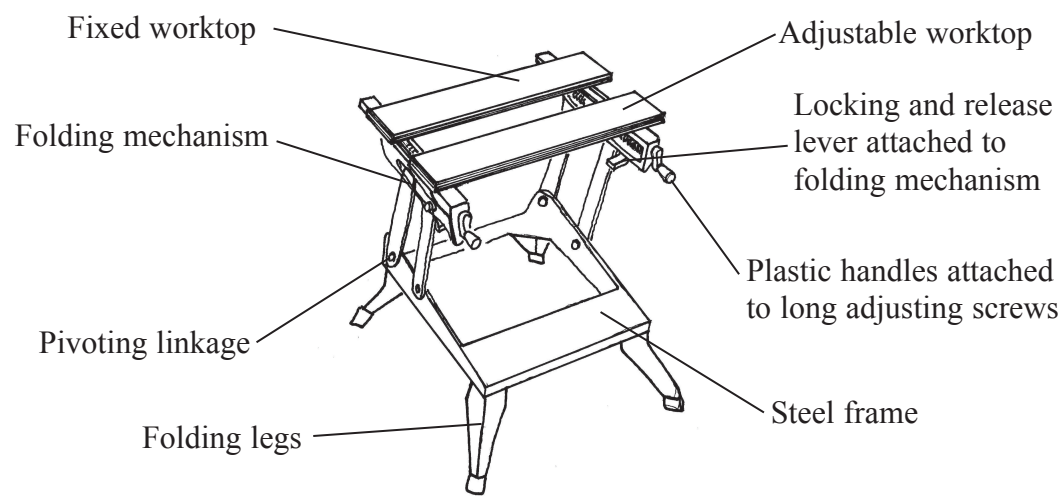


Answer ALL the questions. Write your answers in the spaces provided.

1. The drawing below shows details of a DIY workbench.



(a) Two specification points for the DIY workbench are that it must:

- fold for storage
- be able to clamp different sizes of material

Under each of the following headings, give **one** more point that should be included in the specification for the DIY workbench.

For each point, give **one** reason why it should be included.

(i) **Market**

Point

Reason

(2)

(ii) **Quality**

Point

Reason

(2)

(iii) **Environment**

Point

Reason

(2)



(b) The frame of the workbench is made from steel.
One reason for using steel is that it can be finished using a plastic coating.

(i) Give **two** other reasons why steel is a suitable material from which to make the frame.

1

2

(2)

(ii) Give **two** reasons why plastic coating is a suitable finish for the frame.

1

2

(2)

(c) The worktops are made from 20 mm thick plywood. Plywood is made from several layers of wood glued together.

Give **two** properties of plywood that make it more suitable for the worktops than a single piece of solid wood.

For each property, give **one** reason why it makes plywood suitable.

Property

Reason

Property

Reason

(4)

(d) Quality control checks are carried out at important stages during the manufacture of the DIY workbench.

Name **two** important quality control checks that should be carried out during the manufacture of the DIY workbench.

1

2

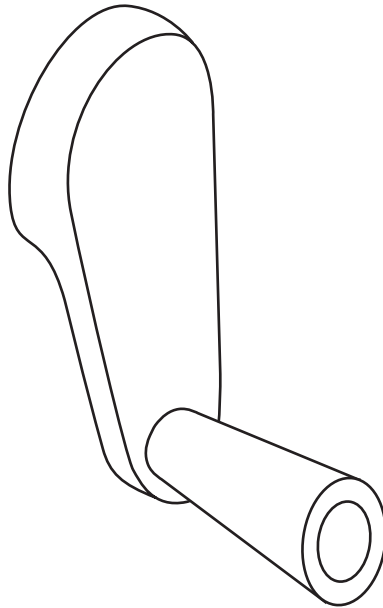
(2)



Leave
blank

- (e) The plastic handles are made in high volume from a thermoplastic using the injection moulding process.
The shape of the handles makes them suitable to be made from a thermoplastic.

The drawing below shows a thermoplastic handle.



Describe **one** way in which the shape of the handle makes it suitable to be made from a thermoplastic.

.....

.....

(2)



Leave blank

(f) Two purposes of the DIY workbench are that it must:

- fold for storage
- be able to clamp different sizes of material

Explain, under the following headings, how the DIY workbench achieves these purposes.

(i) Fold for storage.

.....
.....
.....

(2)

(ii) Be able to clamp different sizes of material.

.....
.....
.....

(2)

Q1

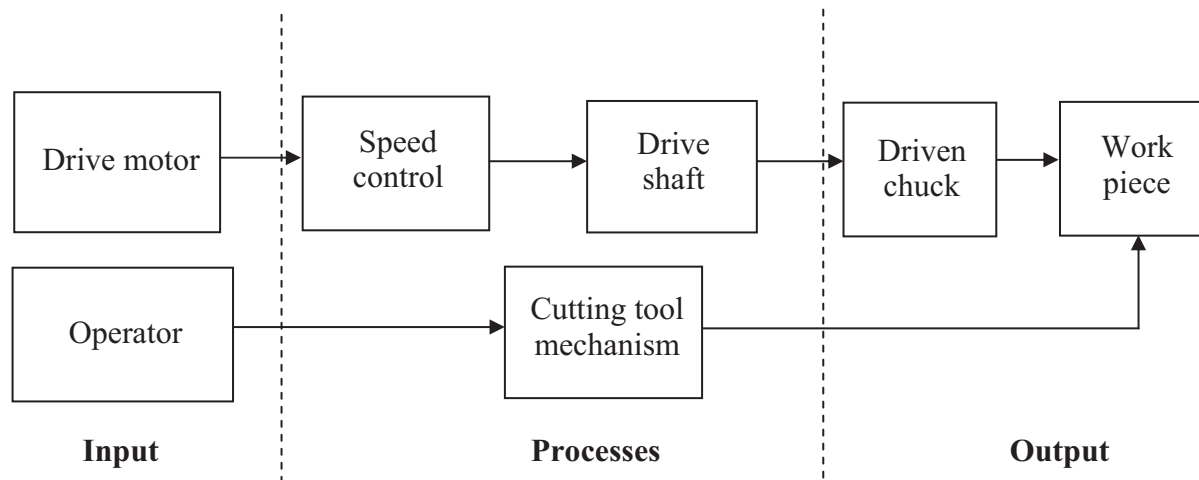
(Total 22 marks)

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2. (a) A centre lathe contains a combination of electrical and mechanical systems to make it work.

A simplified block diagram of the mechanical system is shown below.



(i) Name **one** appropriate mechanical system for providing the speed control in the block diagram.

..... (1)

(ii) Name the appropriate mechanical system that will disengage and engage the drive shaft to allow the speed to be changed.

..... (1)

(iii) Give the technical term for the output motion of the chuck.

..... (1)

(b) A computer can be used to control a lathe for single item production.

Give **one** reason for using a computer to control a lathe for single item production.

..... (1)

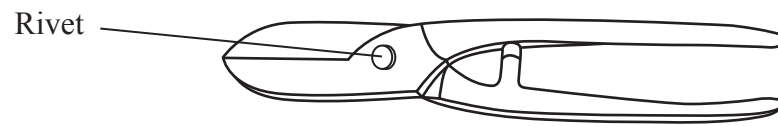
(c) Mechanical systems may be modelled using resistant materials. Describe **one** other way of modelling mechanical systems.

.....
..... (2)



Leave blank

(d) The drawing below shows a pair of tin snips. The tin snips are joined by a rivet.



Describe how a riveted joint is made.

.....
..... (2)

(e) Many metal parts are finished with a coating of Teflon.

Give **three** functional reasons why many metal parts are finished with a coating of Teflon.

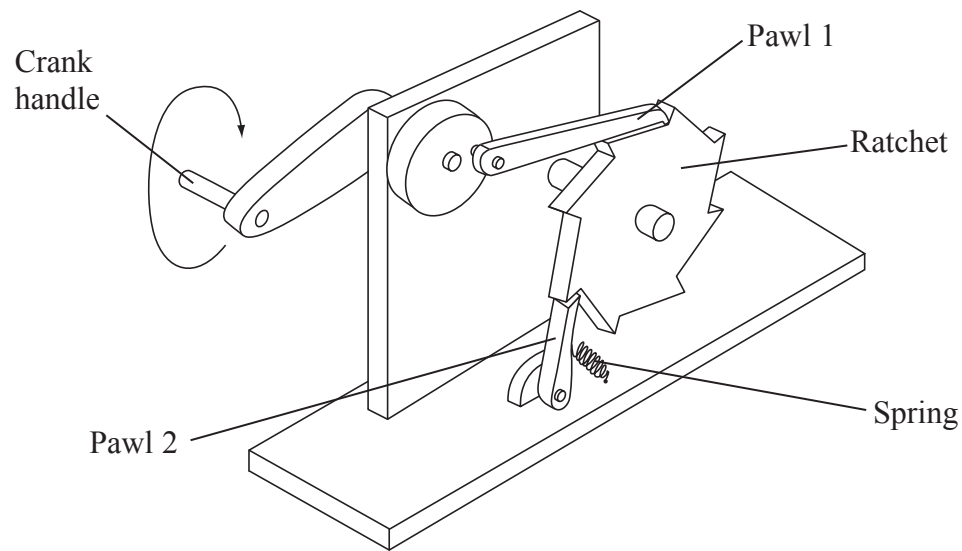
1
2
3 (3)

Q2

(Total 11 marks)



3. (a) The drawing below shows a model ratchet and pawl mechanism.



(i) Calculate the number of turns of the crank handle to make the ratchet turn once.

.....
(1)

(ii) Describe **one** action of pawl 1 and the ratchet when the crank handle is turned in the direction shown.

.....
.....
.....
(2)

(iii) Describe **one** action of pawl 2 and the ratchet when the crank handle is turned in the direction shown.

.....
.....
.....
(2)

(iv) Name **two** types of motion made by pawl 1.

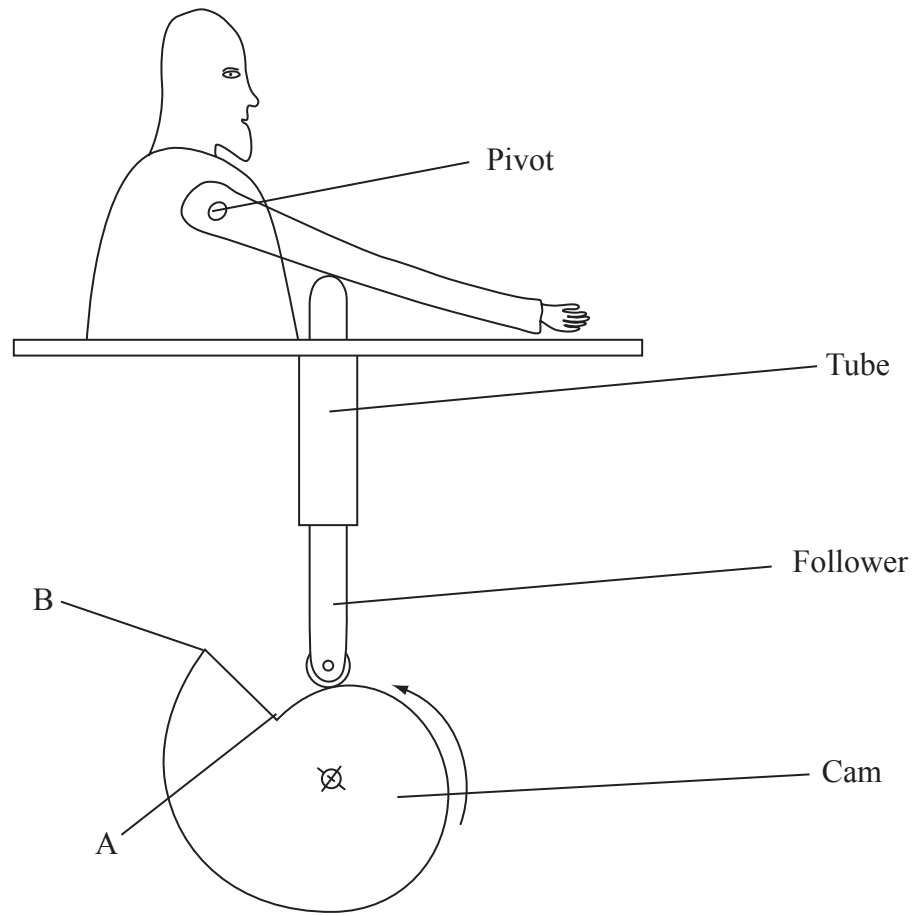
1

2

(2)



(b) The drawing below shows part of a model of a mechanical man.



The cam has a follower that passes through a tube. The follower is used to move the man's arm as the cam rotates.

(i) Describe the action of the man's arm as the follower travels from point A to point B on the cam.

.....
.....

(2)

(ii) Describe the action of the man's arm as the follower travels from point B to point A on the cam.

.....
.....

(2)

(Total 11 marks)

Q3

TOTAL FOR PAPER: 44 MARKS

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