



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

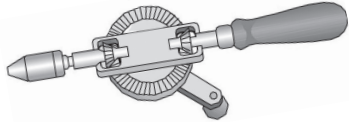
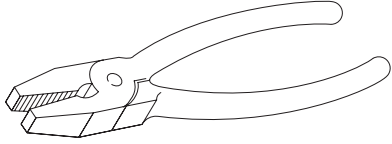
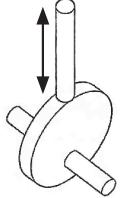
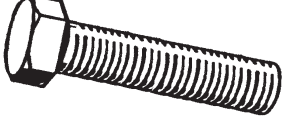
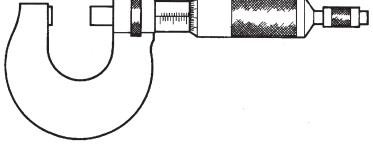
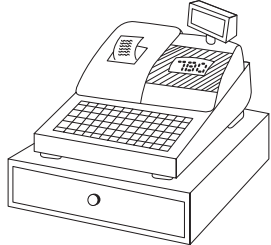
1. The table below shows some tools, components and equipment.

(a) Complete the table by:

(i) naming each tool, component or piece of equipment

(ii) describing its use

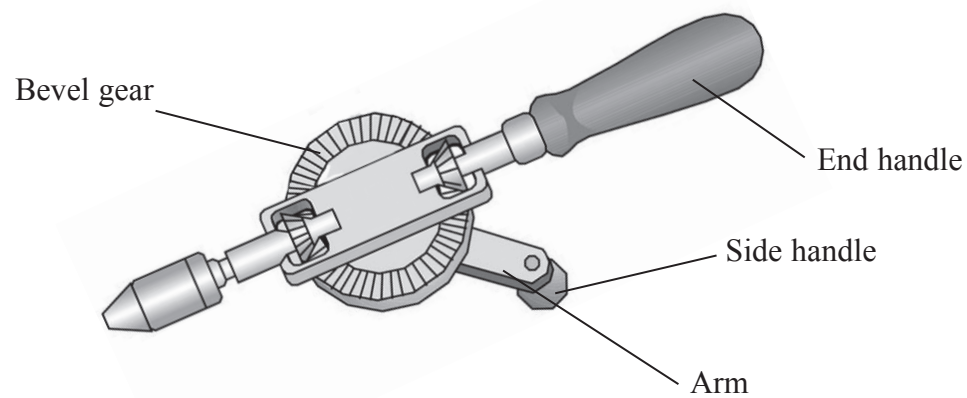
The first one has been done for you.

Tool/Component/Equipment	Name	Use
	Hand drill	To hold a drill bit and to drill holes in metals, woods and plastics
		
		
		
		
		

(10)



(b) The drawing below shows a hand drill.



(i) The handles are made from wood.

Choose **one** surface finish from the list below which is suitable for the handles of the drill.

- Teflon      varnish      electro-plating      plastic coating**

..... (1)

(ii) The hand drill has a small side handle.

Give **one** reason why the drill needs the side handle.

..... (1)

(iii) The side handle is fixed to the arm with a rivet.

Give **one** reason why a rivet is a suitable method of fixing the side handle to the arm.

..... (1)

(c) The drill is used when drilling a hole.

Give **two** safety precautions that should be taken when using the drill.

1 .....

2 .....

(2)



Leave blank

(d) A manufacturer produces 5000 hand drills at a time.

Choose terms from the list below to complete the statements about manufacturing the hand drills. Each term may be used once or not at all.

- production line**      **batch production**
- one-off production**      **injection moulding**

Statements about manufacturing the hand drills.

1. To manufacture 5000 hand drills ..... will be used.
2. Because 5000 hand drills are produced at a time, they are assembled on a .....  
(2)

(e) (i) The wooden handles of the hand drill were designed using CAD.

Explain **one** advantage to the manufacturer of using CAD to design the wooden handles.

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

(ii) The wooden handles of the hand drill are manufactured using CNC machinery.

Give **three** benefits to the manufacturer of using CNC machinery.

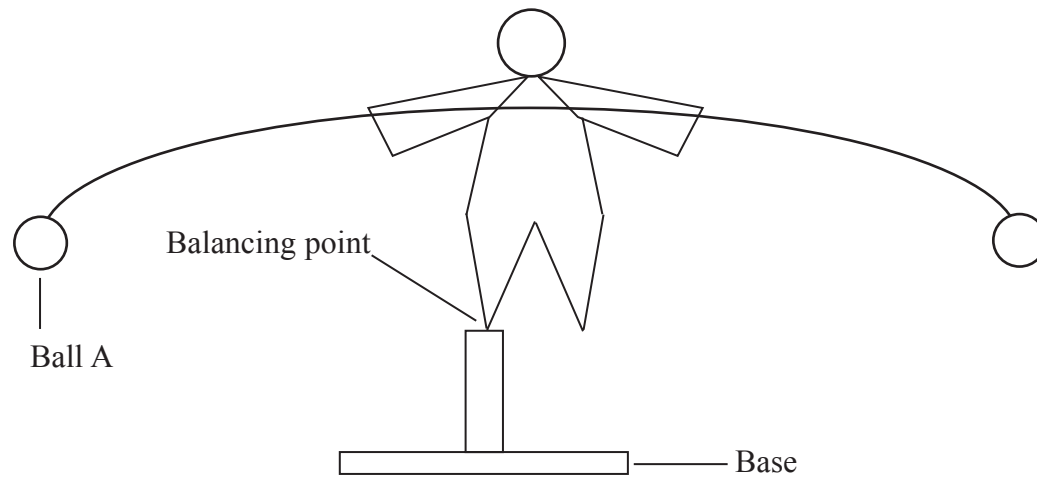
- 1 .....
- 2 .....
- 3 .....  
(3)

**(Total 22 marks)**

Q1



2. The diagram below shows a balancing toy.



The balancing toy is made from a ferrous metal.

(a) (i) Choose **one** metal from the list below which is a ferrous metal.

- aluminium      brass      steel      lead**

..... (1)

(ii) Give **three** properties of ferrous metals that make them suitable for making the balancing toy.

1 .....

2 .....

3 ..... (3)

(b) The balancing point on the toy is like a bearing.

(i) Give the specific name of the balancing point.

..... (1)

(ii) Name **two** other types of bearing.

1 .....

2 ..... (2)



(c) (i) The balancing toy is shown in a state of equilibrium.

Explain what is meant by the term **equilibrium**.

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

(ii) Describe the effect on the balancing toy if the weight of ball A is increased.

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

(d) The metal parts of the balancing toy can be reclaimed when the toy is thrown away.

Explain what is meant by the term **reclaimed**.

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

(e) The manufacturer introduces CAM to reduce the cost of making each balancing toy.

Give **two** ways in which CAM will reduce the cost of making each balancing toy.

1 .....  
2 .....  
(2)

(f) The designer of the balancing toy must be aware of environmental issues when selecting the materials.

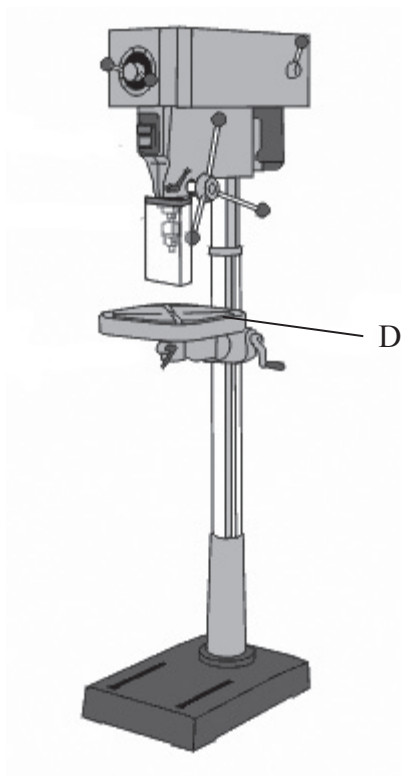
Give **three** different environmental issues that the designers must consider when selecting materials.

1 .....  
2 .....  
3 .....  
(3)

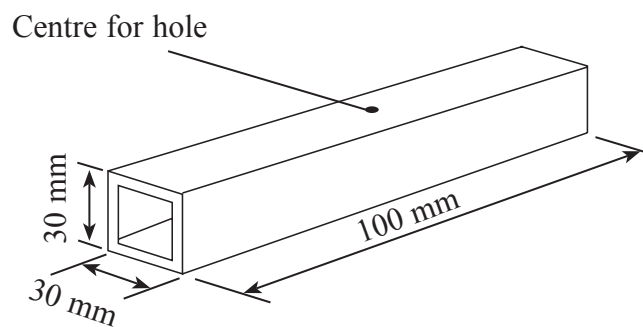




3. A clamping device is required to hold the steel tube shown below whilst drilling a hole using a pillar drill.



Pillar drill



Steel tube

The specification for the clamping device is that it must:

- clamp and release the tube
- allow the centre for the hole to be seen and the hole drilled
- be held on the drill table securely
- be made from materials and processes used in a school workshop

(a) In the spaces opposite, use sketches and, where necessary, brief notes to show **two different** design ideas for the clamping device that meet this specification.

**Do not** evaluate your designs in part (a).

Candidates are reminded that if pencil is used for diagrams/sketches that it must be dark (HB or B). Coloured pens, pencils and highlighter pens must **not** be used.

Please do not write in the space below. Please write your answers in the spaces provided opposite.







Leave blank

(b) Three of the original specification points are repeated below.

Evaluate how **one** of your design ideas succeeds or fails to meet each of the specification points.

Write the number of your chosen design idea (1 or 2) here .....

(i) The clamping device must clamp and release the tube.

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

(2)

(ii) The clamping device must allow the centre for the hole to be seen and the hole drilled.

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

(2)

(iii) The clamping device must be made from materials and processes used in a school workshop.

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

(2)

(Total 22 marks)

Q3

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4. The drawing below shows a folding bicycle and its carrying bag. It is used by people who need to take a bicycle on trains and buses.



(a) Two specification points for the folding bicycle are that it must

- stop efficiently
- reduce in size to fit in a carrying bag

Under each of the following headings, give **one** more point which should be included in the specification for the folding bicycle.

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

**Market**

Point .....

Reason .....

.....  
.....

**Environment**

Point .....

Reason .....

.....  
.....



**Quality**

Point .....

Reason .....

.....

.....

**(6)**

- (b) The folding bicycle frame is made from an aluminium alloy.  
One reason for the use of aluminium alloy is its good strength to weight ratio.

Give **two** other reasons why aluminium alloy is a suitable material for the frame.

1 .....

2 .....

**(2)**

- (c) A bearing is used on the wheel axle.

Give **two** reasons for using a bearing on the wheel axle.

1 .....

2 .....

**(2)**

- (d) The mudguards of the folding bicycle are made of a thermoplastic.

Give **two** properties of a thermoplastic that make it a suitable material for the mudguards.

For each property give **one** reason why it makes a thermoplastic suitable.

Property 1 .....

Reason .....

.....

Property 2 .....

Reason .....

.....

**(4)**



(e) The reflector on the rear mudguard is made from red coloured plastic.

Explain **one** reason why the reflector is coloured red.

.....

.....

(2)

(f) A chain and sprocket system is used to transfer motion from the pedals to the rear wheel. The chain must be kept lubricated.

Explain **one** reason why the chain must be kept lubricated.

.....

.....

(2)

(g) Two purposes of the folding bike are that it must:

- stop efficiently
- reduce in size to fit in a carrying bag

Explain, under the following headings, how the folding bike achieves these purposes.

(i) Stop efficiently

.....

.....

.....

.....

(2)



(ii) Reduce in size to fit in a carrying bag.

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

(2)

(Total 22 marks)

Leave  
blank

Q4

**TOTAL FOR PAPER: 88 MARKS**

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