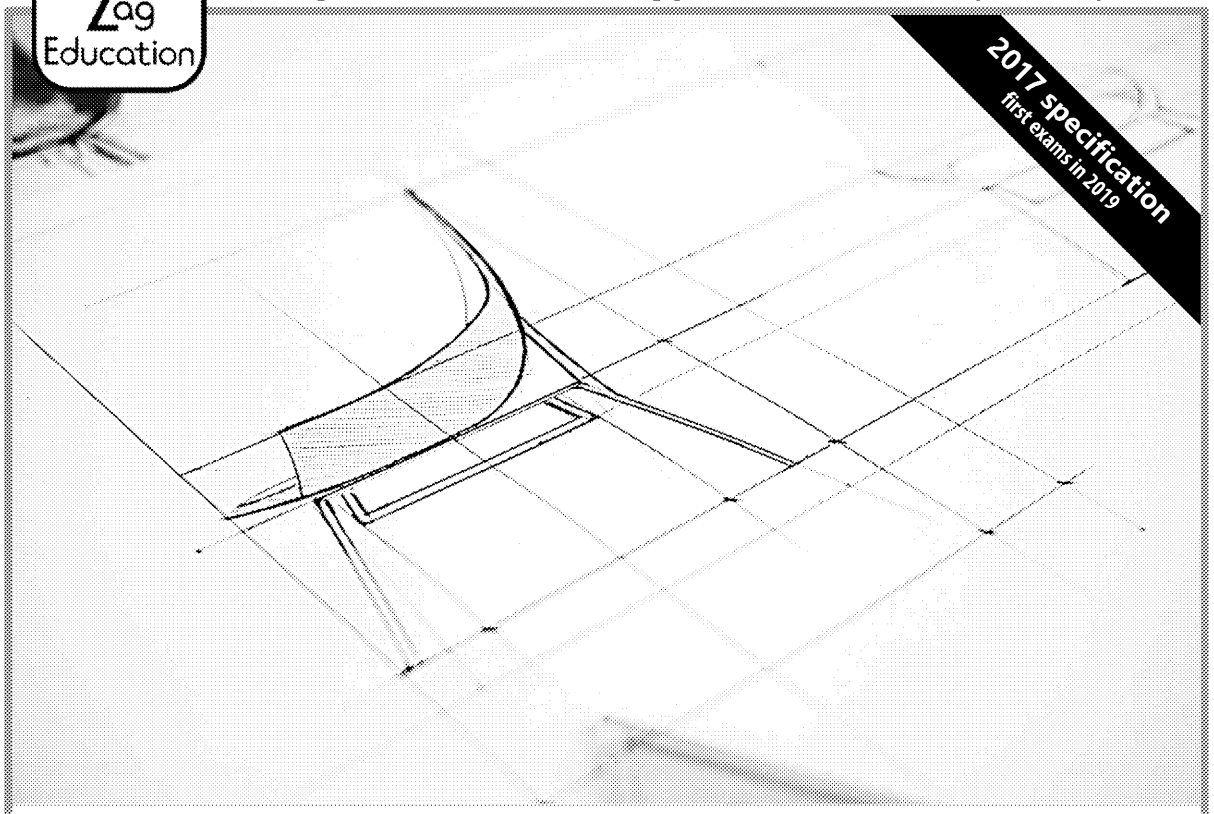
Zig Zag Education

Design and Technology GCSE (9–1) | AQA | 8552



Topic Tests for GCSE AQA Design and Technology

3.1 Core Technical Principles

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POD 7859

Contents

Teacher's Introduction

This resource consists of 12 topic tests covering Unit 3.1 – Core Technical Principles of the AQA GCSE Design and Technology specification. All aspects of the specification are covered throughout these topic tests although there is some variation from the original specification order:

- Specification point 3.1.1 is covered over the first three tests (see details overleaf).
  - Industry, enterprise, production techniques and systems, and how the critical evaluation of new and emerging technologies informs design decisions can be found in test one.
  - Test two includes people, culture and society.
  - Sustainability and environment can be found in the third topic test.
- There are five tests specific to material categories. The material categories included are: papers and boards, natural and manufactured timbers, metals and alloys, polymers and textiles. These cover only the essential material category knowledge specified in the Core Technical Principles; more detailed knowledge of specific categories will be covered in future tests for 3.2.

These topic tests are designed to test the students' knowledge and enable the teacher to diagnose the students' strengths and weaknesses in certain areas. Each test covers a range of question types and there is a wide variety of stimulus material and engaging examples.

Mark schemes for each topic test can be found at the back of this resource. For 'closed' questions, where only one answer is acceptable, a model answer has been provided. For 'open' and extended questions, level marking criteria, indicative content and example answers have been included.

When to Use This Resource

This resource can be used at the end of the unit when the students have revised or as a homework task to encourage confidence in a particular topic area. The students can also use the tests for revision later on, directly before the exam.

Each test has approximately **40–50 marks** and takes about **40–50 minutes**. The individual material categories are shorter tests with approximately **30 marks** and take about **30 minutes**.

How to Use This Resource

The tests can be completed individually in class or even as a small group. They can also be completed as 45-/30-minute homework tasks. The tests can be quickly marked by the student or the teacher, at home or in the classroom, as answers are provided.

The Benefits to the Student

The students can be confident they have been tested on every aspect of the specification. After completing a test, the student will know which areas they are strong in, and which require further work.

The students can use the tests when they have revised – this tests their initial level of knowledge. As they progress through the tests they can see how they have improved. The tests aim to include interesting and relevant examples which will help the students to engage and encourage effective revision.

October 2017

Specification Coverage

Test	Specification Points
Test 1	3.1.1 New and emerging technologies*
Test 2	3.1.1 New and emerging technologies*
Test 3	3.1.1 New and emerging technologies 3.1.2 Energy generation and storage
Test 4	3.1.3 Developments in new materials
Test 5	3.1.4 Systems approach to designing
Test 6	3.1.5 Mechanical devices
Test 7	3.1.6 Materials and their working properties
Test 8	3.1.6.1 Material Categories – Paper and boards 3.1.6.2 Material properties
Test 9	3.1.6.1 Material Categories – Natural and manufactured timbers 3.1.6.2 Material properties
Test 10	3.1.6.1 Material Categories – Metals and alloys 3.1.6.2 Material properties
Test 11	3.1.6.1 Material Categories – Polymers 3.1.6.2 Material properties
Test 12	3.1.6.1 Material Categories – Textiles 3.1.6.2 Material properties

* Test 1 covers the topics 'History', Enterprise', 'Production techniques and systems' of new and emerging technologies informs design' of 3.3.1 New emerging technologies 'People', 'Culture' and 'Society' of 3.3.1 New emerging technologies. The remaining 'Environment' are covered in Test 3.

Industry

1. Which of these are benefits of using automation in the manufacturing indus
(Tick all that apply.)

   ❒ a) Being able to meet high ... demand ❒ c) Mor

   ❒ b) Reducing h... ❒ d) Emp

2. Why is ...rtant to design the physical layout of a workplace or factory?

   .....

3. The introduction of new technology has meant that designers can work from
Give **one** positive and **one** negative of this arrangement.

   Positive: .....

   Negative: .....

4. Due to new and emerging technologies, designers do not have to be in the s
manufacturing of their products or the colleagues with whom they are colla

   Name **three** tools or technologies that make this pos...

   1. .....

   2. .....

   3. .....

Enterprise

5. What is crowd funding?

   .....

   .....

   .....

6. Give a reason why companies market their products online.

   .....

7. Name **two** platforms used f... vir... marketing.

   1. .....

   2. .....

8. What is meant by the term 'cooperative business'?

.....

.....

.....

9. This logo appears on many products and shows it is fair. Explain what the symbol means.

.....

.....

.....

Production techniques and systems

10. Write out the full name of the production techniques:

CAD .....

CAM .....

FMS .....

JIT .....

11. In 2016, the Elytra Filament Pavilion was installed in the courtyard of the V&
arm used fibre-optic sensors embedded in the canopy to track the moveme
visitors. It then used this information to build a hexagonal canopy to suit th

This canopy was 'designed' and manufactured by a robot instead of humans
example of?

.....

12. Explain the benefits of CAD over traditional drawing techniques.

.....

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.....

13. Name t ces of CAM hardware:

1. .....

2. .....

14. Name a machine that is often used in FMS and explain why it is used.

.....

.....

.....

15. Identify **one** advantage and **one** disad g JIT manufacturing.

Advantage: .....

Disadv .....

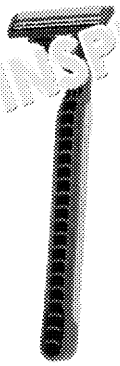
16. What does lean manufacturing aim to reduce?

.....

How the critical evaluation of new and emerging techn informs designs

17. Examine these **two** razors. **Product A** is made cheaply and quickly; the cons product away after using it for a short period of time. **Product B** is designed last for a lifetime.

Product A **Product B**



a) What is the term used to describe a product with a limited lifespan, suc

.....

b) What is the term used to describe a product tha be maintained, su

.....

c) Discuss the pos gative impacts of these methods of design. en me cerns.

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People

1. Define 'market pull'.

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2. Define 'technology push'.

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.....

3. Compare Product A and Product B. Identify **two** reasons why a consumer m
with the second product.

Product A **Prod**

1. .....

2. .....

4. Both market push and technology pull result in new products being produce
consumers.

.....

.....

.....

5. Explain why there might be fewer jobs in the automotive industry, even whe consistent or increasing.

.....

.....

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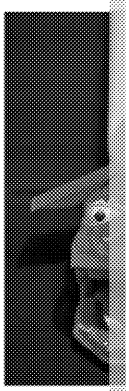
6. Self-service tills at supermark[illegible] replacing employees. Give **one** positive this change.

Positiv.....

Negative: .....

Culture

7. In China there are many designs of chopsticks and chopstick holders. Explai in the UK.



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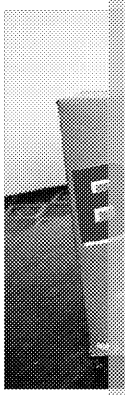
8. This is an Iranian laundry detergent, where 'Barf' means snow. Explain why t in an English-speaking market.



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9. Rosary beads are designed as a prayer aid, mainly used in Catholic Christian
offensive to produce and market a rosary for non-religious purposes, e.g. as

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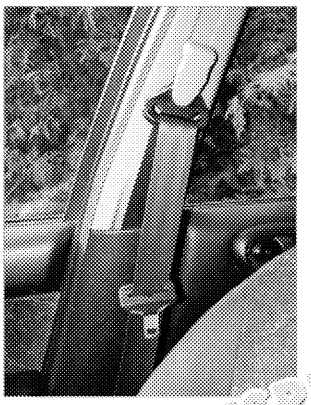
Society

10. The height of this seat belt can be adjusted. Why is this an important functi
effectiveness?



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11. These t ushes are made from bamboo as opposed to plastic. Explain w
we live in that we can make more sustainable product choices.

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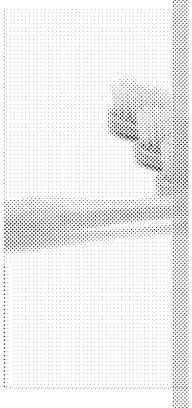


12. Evaluate the Doro phone. What makes this product better for elderly people disability to use?

13. Choose **one** of the following products and **one** of the target market demogr
meet the user's needs.

Product
Clock
Water bottle
Bike helmet

Target m
Child aged 5–11
Visually impaire
Japanese marke

Sustainability

1. The development of synthetic plastics in the nineteenth century was revolutionary. Many emerging technology is made of plastic or uses plastic components. Synthetic plastics are made from oil. Is oil a finite or non-finite resource?

   .....

2. Complete the six r's below.

   1. .....
   2. *Rethink*
   3. .....
   4. *Reuse*
   5. *Repair*
   6. .....

Environment

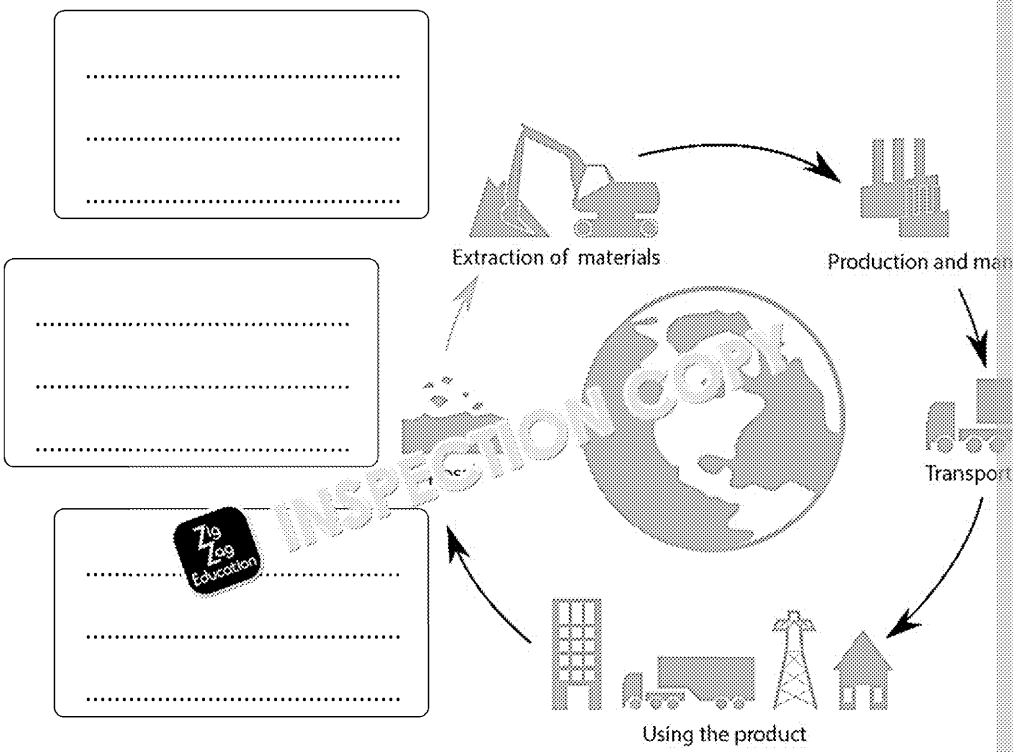
3. Define 'continuous improvement'.

   .....

   .....

   .....

4. State **one** thing that could be done at each stage of the product lifecycle to make it more environmentally friendly.



5. A carbon footprint is produced during the lifetime of a product. Why is it a g
footprint?

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6. Carbon offsetting can be used to reduce the negative impact of a product. S
manufacturer can do to offset the carbon emissions of production process

1. .....

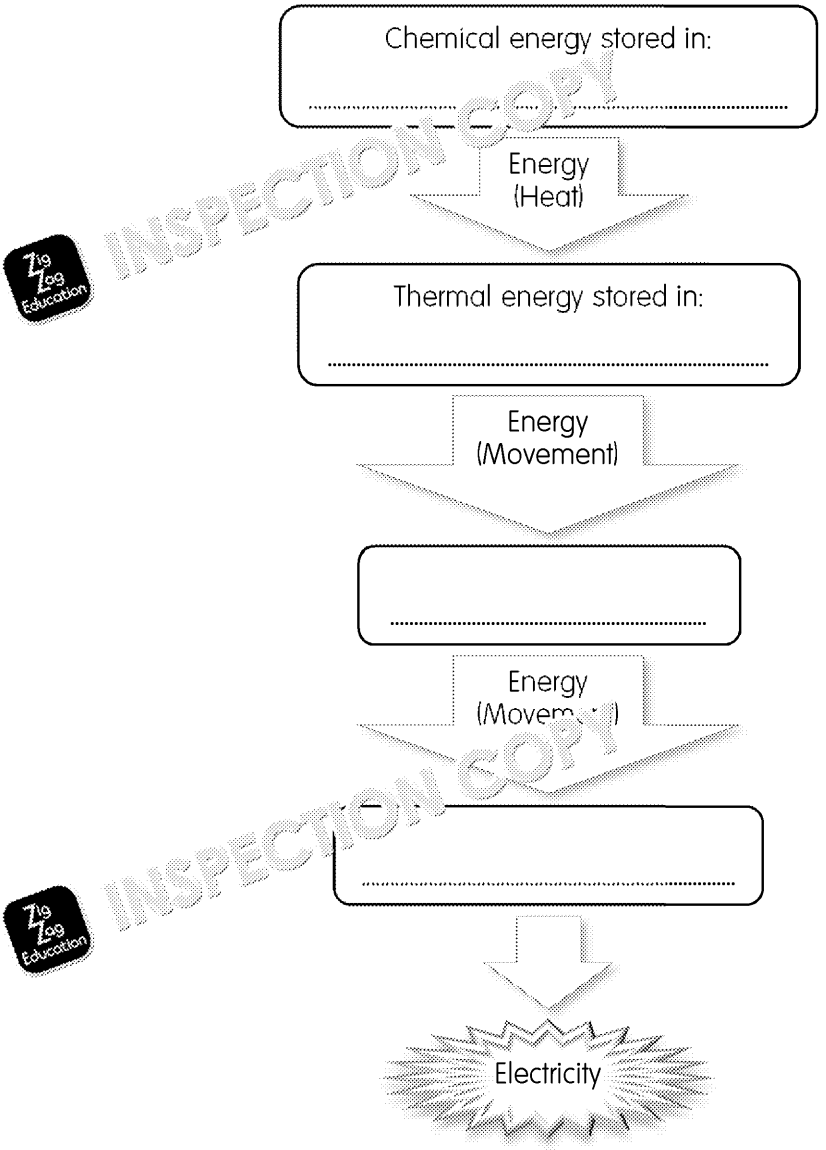
2. .....

Fossil fu

7. Which of these energy sources are fossil fuels?

- ❒ a) Oil
- ❒ b) Solar power
- ❒ c) Gas
- ❒ d) Nuclear powe
- ❒ e) Tidal power
- ❒ f) Coal

8. The flow chart should show how power is generated from fossil fuels. Fill in
of your choice.



9. Give **one** advantage of using fossil fuels.

.....

10. Give **one** disadvantage of using fossil fuels.

.....

Nuclear power

11. Generating energy [illegible] nuclear power starts with a process that involves [illegible]. What i[illegible]rc[illegible] called?

.....

12. Nuclear power plants are expensive to run and produce nuclear waste which [illegible] process involves sealing the waste in glass blocks and burying it deep under[illegible] dangerous for thousands of years. Nuclear accidents can have devastating e[illegible] the environment. Explain what makes it nuclear power a good power source.

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Renewable energy

13. This image shows a method of [illegible]ating energy from a renewable source. [illegible] is it using?

.....

14. Which [illegible] following renewable energy methods use turbines connected t[illegible] electrical energy? (Tick all that apply.)

- ❒ a) Wind
- ❒ b) Hydroelectric
- ❒ c) Solar
- ❒ d) Tidal

15. Explain why products and energy produced from biomass are considered to b
by others.

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16. Draw a labelled diagram / flow chart showing how electricity can be generate

17. Renewable energy provides potentially infinite energy sources that can be u
without damaging the environment in the way that fossil fuels do. Discuss t
renewable energy.

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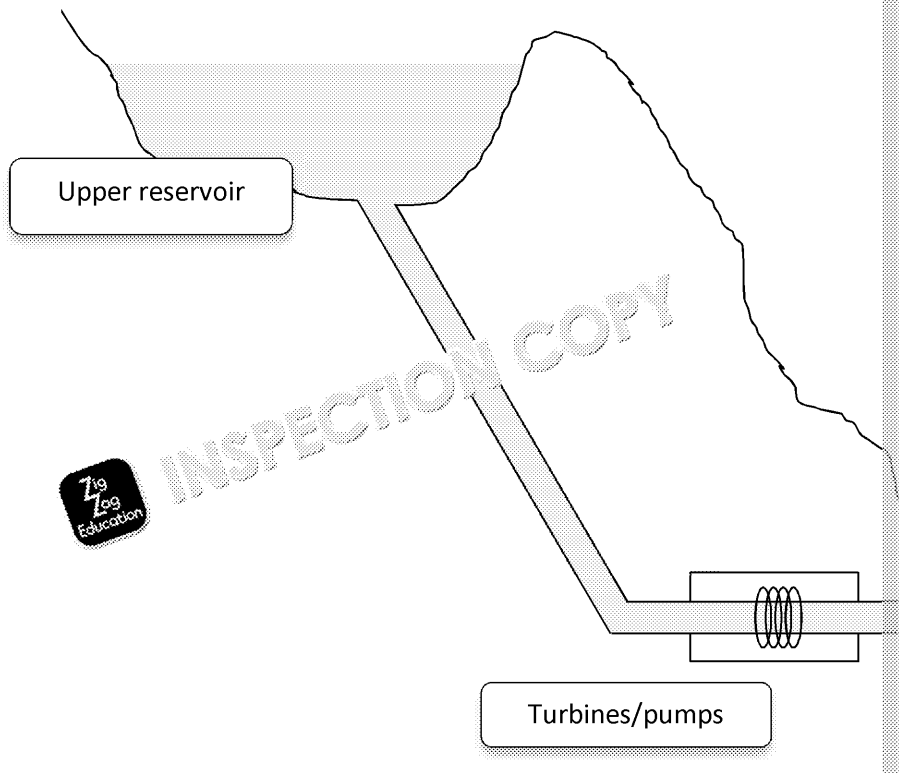
Energy ge systems including batteries

18. This diagram shows a pump storage system. Using arrows, indicate the dire
move when the stored power is released.



19. Below are two lists of statements. Decide which side of the table refers to s
which side refers to rechargeable batteries.

.....	.....
Disposable	Expensive to buy
Have to be ace n	Reusable
ts ess over time	Better for the environ
Worse for the environment	Output remains consta
Cheap to buy	Will last longer

Modern materials

1. Explain why it is important to incorporate modern mat ials into design whe appropriate.

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2. In 2004, a new material was discovered that is only one atom thick, 200 tim lightweight and which can conduct electricity really well. What material is t

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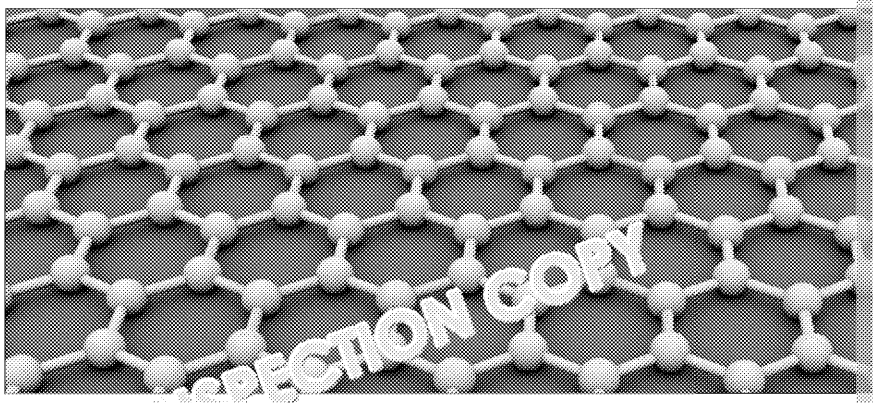

3. Name rn material and describe **two** of its properties.

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4. Silver is a material that has been used by humans for thousands of years bu a new way, as a nanomaterial.

   i) What properties of silver make it useful as a na n. terial?

   .....

   ii) Name **two** pro ct silver could be used in, as a nanomaterial.

   1. .....

   2. .....

5. What is a smart material?

.....

.....

.....

6. This is a mug that uses a smart material.

i) Which properties of the smart material demonstrating?

- ☐ a) Phosphorescent properties
- ☐ b) Photochromic properties
- ☐ c) Thermochromic properties
- ☐ d) Hydrophobic properties

ii) Explain the functional features that this smart material adds to the pro

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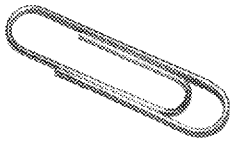
7. This paperclip is made from an SMA.



i) What does SMA stand for?

.....

ii) If [illegible] were to be bent out of shape, how would you make it g[illegible] sh[illegible]

.....

iii) What alloy is most commonly used in an SMA?

.....

Composite materials

8. Explain what a composite material is.

.....

.....

.....

9. Which of these [illegible] are composite materials? (Tick all that apply.)

- ❒ a) [illegible]d
- ❒ b) Glass-reinforced plastic (GRP)
- ❒ c) Medium-density fibreboard (MDF)
- ❒ d) Polypropylene
- ❒ e) Brit Pak (asep[illegible]

10. Carbon fibre reinforced plastic (CRP) is a composite material. Name **three** u[illegible]

1. .....
2. .....
3. .....

11. Explain the difference between flame retardants and fire-resistant fabrics.

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12. This bulletproof vest is made from Kevlar. Explain why Kevlar is used.

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13. Microencapsulation can be used in fabrics to release a desired liquid or gas o used in the medical industry to administer medications or provide antibacte other possible uses.

1. .....

2. .....

14. Conductive fabrics are made up of fibres that let electricity flow freely, and,
These fibres can connect components such as a small screen, LEDs, headpho
Design a product that uses this fabric.

Inputs

1. What is the input, process and output for this calculator?

Input .....

Process .....

Output .....

2. Name **two** types of momentary switch.

1. .....

2. .....

3. Name another type of switch.

.....

4. i) A street light comes on automatically when it gets dark. What input co this?

.....

ii) Explain why this is a good functionality to have for a street light.

.....

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.....

5. A hair straightener includes a heat sensor. Explain why this is a good functio

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6. Pressure sensors are being integrated into robotic hands and grippers. Expl
improve the function of a robotic arm/gripper.

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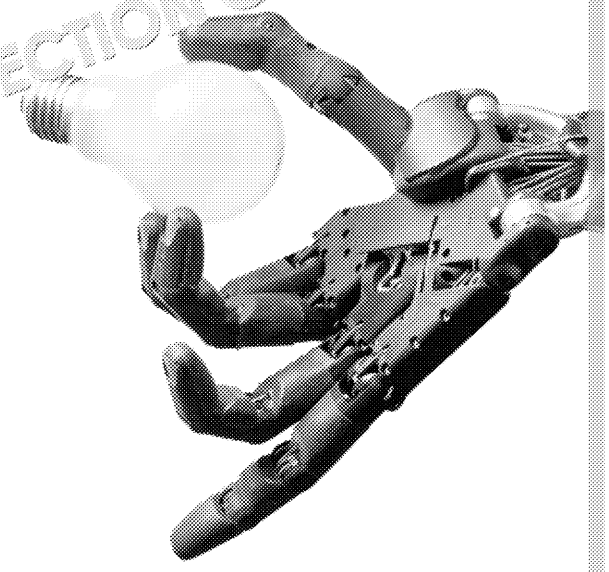

Processes

7. What does IC stand for?

.....

8. What does PIC stand for?

.....

9. A basic robot can be driven using a remote control, makes sounds when it se
makes lights flash when it drives backwards. Explain why it needs a program

.....

.....

.....

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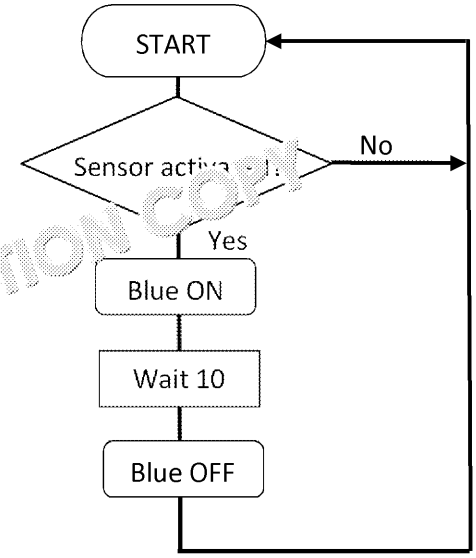
10. Identify **two** brands of pr- -mm-ble microcontroller that are commonly us

1. .....

2. .....

11. This flow chart represents a program used by a circuit containing a passive i



i) Is this circuit monostable or astable?

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ii) Describe what the circuit does.

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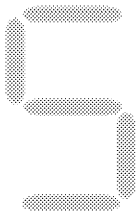
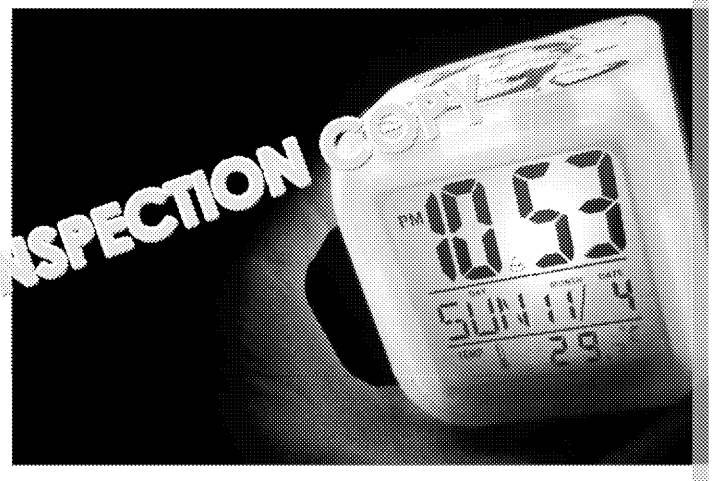
12. This is t[illegible]mber five as it would appear on a seven-segment display coun



Draw the 7 segment display counter if it received an impulse pulse and has t

Outputs

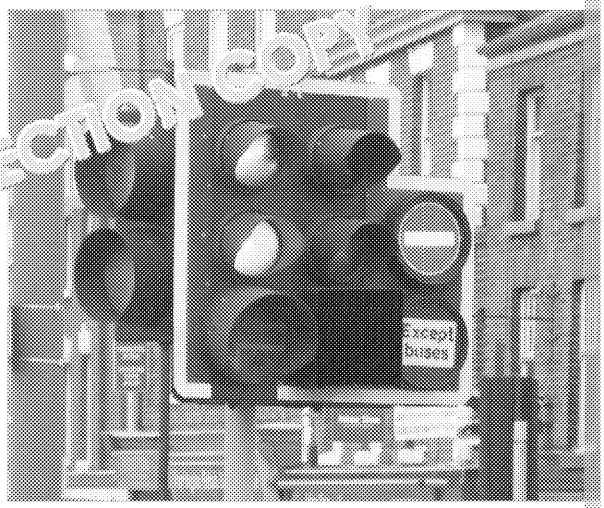
13. Name **two** outputs of this alarm clock.



1. .....

2. .....

14. Traffic lights set off a beeping sound when it is safe for pedestrians to cross. Name the output device and the function.



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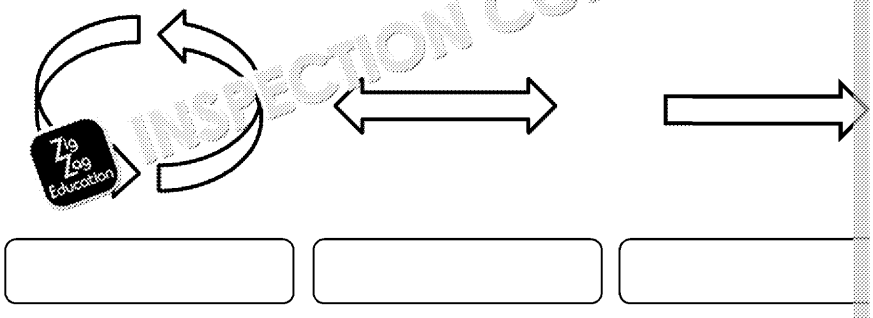
15. i) Design a product that includes a sensor as an input and provides at leas

ii) Draw a system flow ch... design.

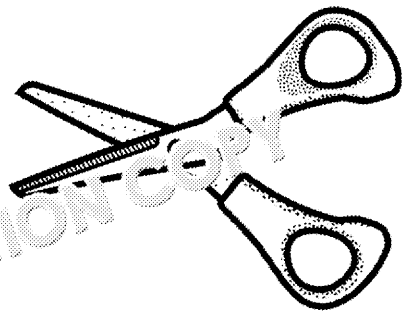
Different types of movement

1. Label the types of movement.



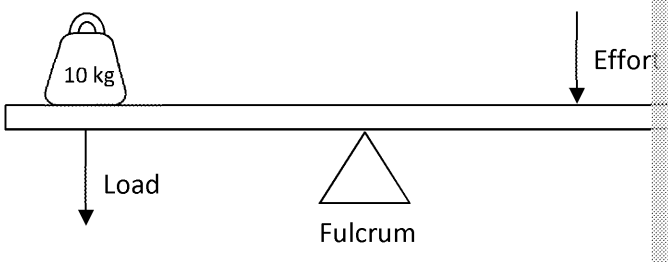
Changing magnitude and direction of force

2. Label the fulcrum on this pair of scissors.



3. Which class does each of these lever mechanisms belong to?

i)



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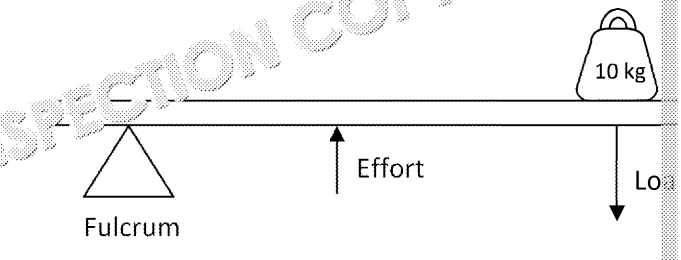
ii)



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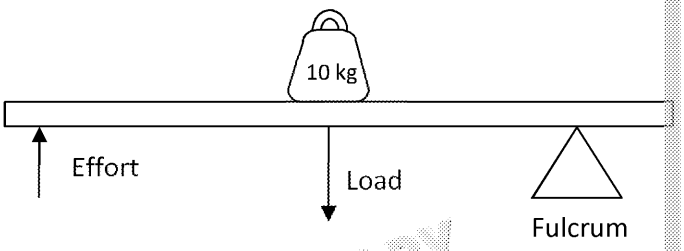
iii)



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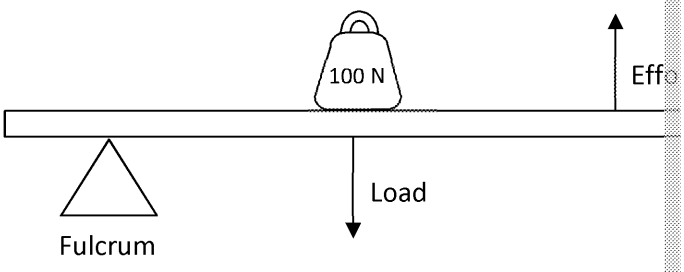
4. Using the formula provided, calculate the mechanical advantage of this example ratio.

$$MA = \frac{\text{Load}}{\text{Effort}}$$



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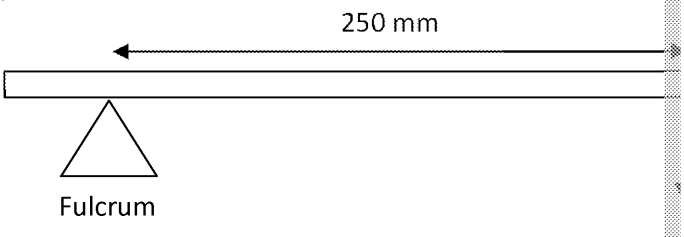
5. i) Using the formula provided, calculate the moment of this example.

Moment = Force (N) x Distance (m)



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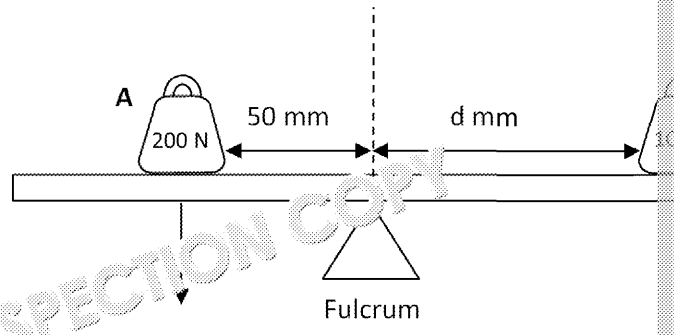
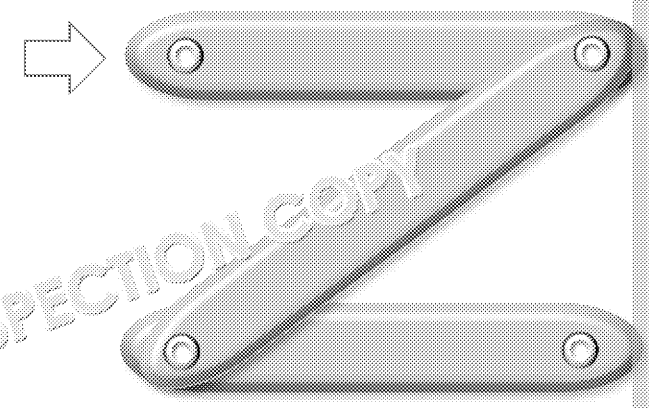
ii) Calculate the distance (d) from the fulcrum to weight B that would mak
balanced.



6. Draw a bell crank mechanism and label the movement, pivot and resulting f

7. Examine the diagram of this linkage.



i) What is this linkage called?

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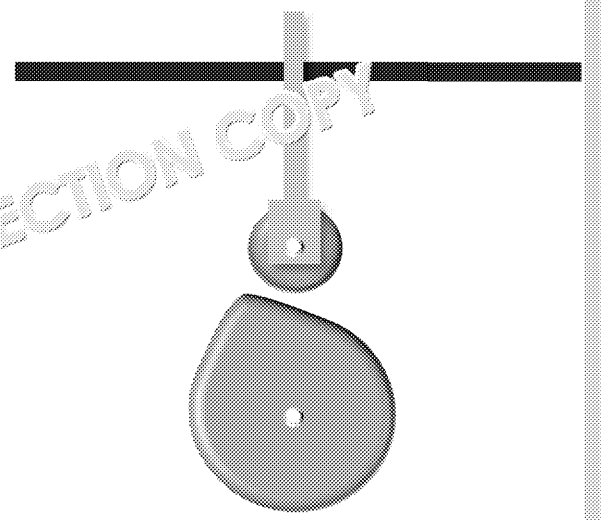
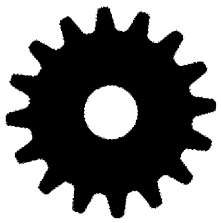
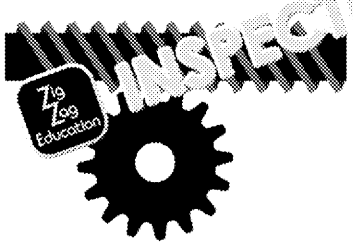
ii) The input force is indicated by an arrow. Draw an arrow showing the d
force.

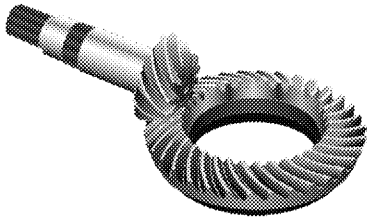
8. Draw in the directional arrows on the diagram of the cam and follower.

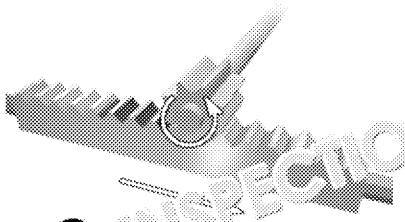


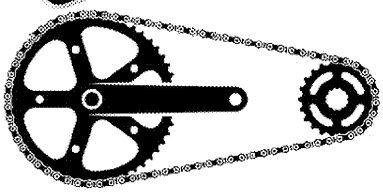
9. Label the gears.

i)  .....

ii)  .....

iii)  .....

iv)  .....

v)  .....

10. Define a simple gear train.

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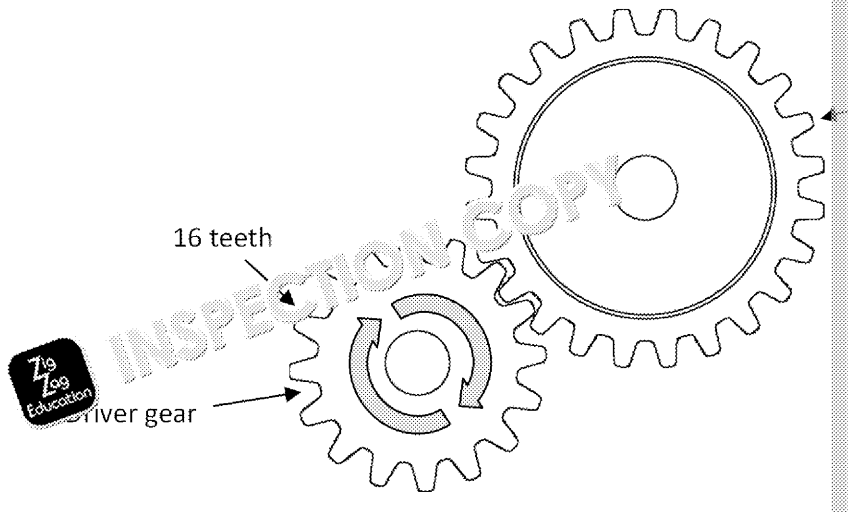
11. Below is a diagram of a simple gear train.



i) Using the formula provided, work out the gear ratio.

$$\text{Gear ratio} = \frac{\text{Number of teeth on the driven gear}}{\text{Number of teeth on the driver gear}}$$

.....

.....

.....

ii) Draw in the missing direction arrows.

12. What does the word idler mean?

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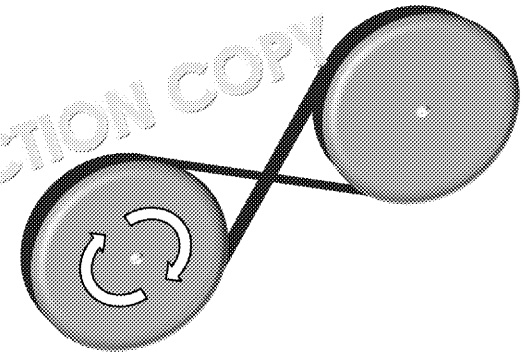
13. Examine the diagram of a pulley system.

i) Draw in the missing directional arrows.

ii) Identify the change to the input motion that this mechanism is making.



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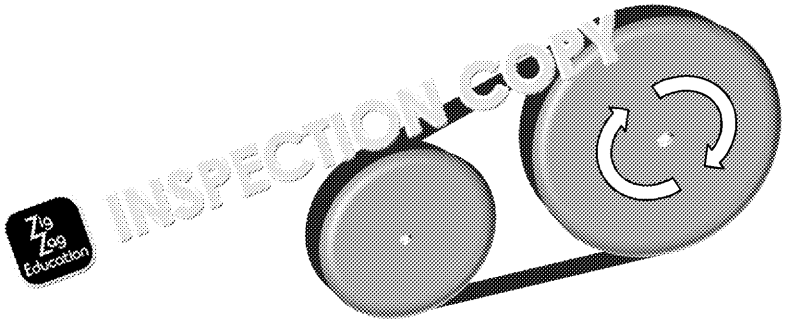
14. Examine the diagram of a pulley system.

    i) Draw in the missing directional arrows.

    ii) Identify the change to the input motion that this mechanism is making.



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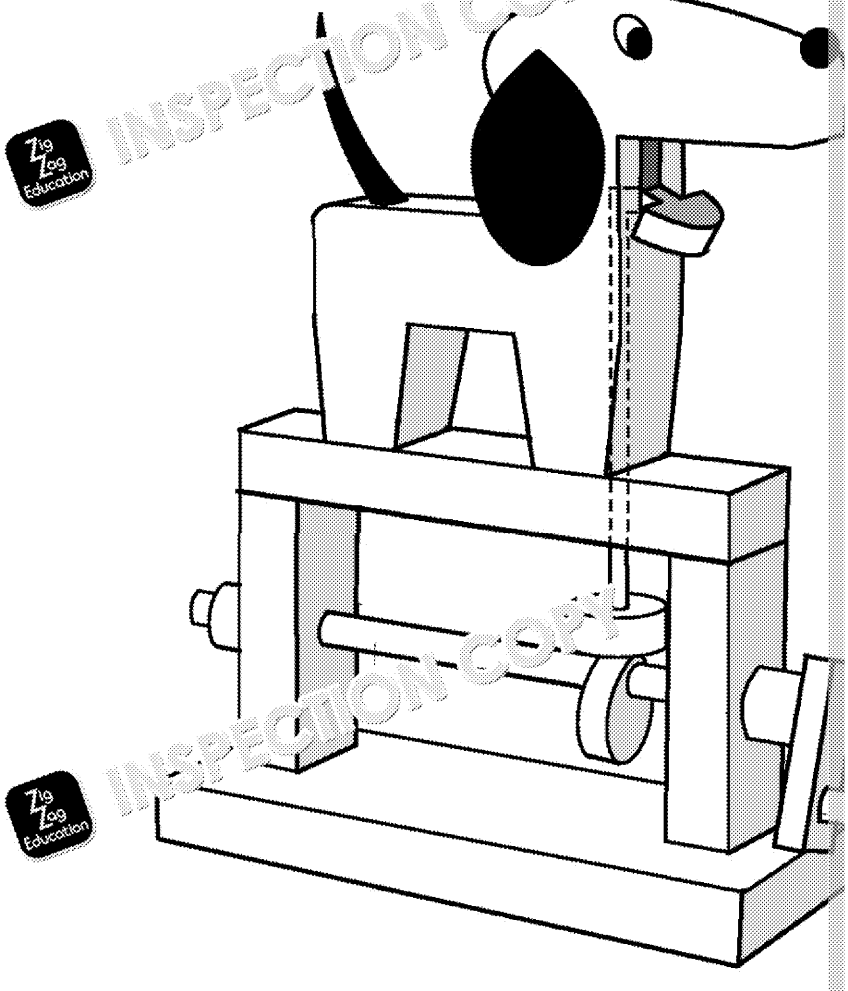
15. Look at the diagram of an automaton.

    i) Label the mechanism used in it.

    ii) Label the changes in motion.

    iii) Label the types of movement.



Material properties

1. Which of the material categories is most likely to have absorbent physical properties?

   - ❒ a) Polymers
   - ❒ b) Metal and alloys
   - ❒ c) Textile
   - ❒ d) Wood
   - ❒ e) Paper and boards

2. Define 'fusibility'. Include an example in your answer.

   .....

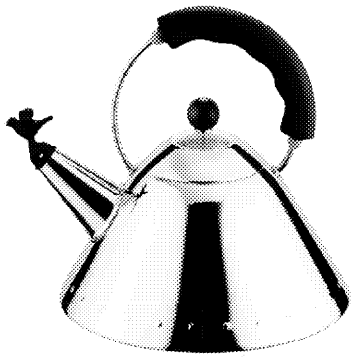
   .....

   .....

3. Which of these materials conducts electricity?

   - ❒ a) Leather
   - ❒ b) Polypropylene
   - ❒ c) Copper
   - ❒ d) Cork
   - ❒ e) Rubber

4. Consider this stovetop kettle.



   i) Label the **two** main types of material from which the kettle is made.

   ii) Explain why each of these materials is used.

   .....

   .....

   .....

   .....

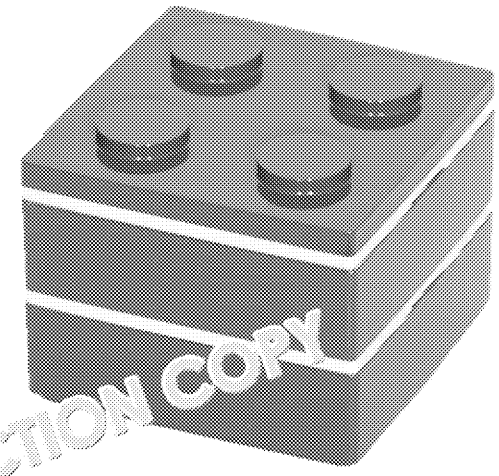
5. The Transrapid 09 travels at 311 mph. Transrapid is a monorail train that do
over the tracks. What physical properties is this system using for movemen

.....

6. Name six common working properties.

1. .....
2. .....
3. .....
4. .....
5. .....
6. .....

7. Consider this lunch box.



i) Id[illegible]nd explain a mechanical property of the plastic from which th

.....

.....

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ii) Explain why this material property is appropriate for the product's func

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8. Define 'malleability'. Include an exam[illegible] answer.

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9. Fill in the gaps.

i) A material that has the ability to resist being crushed has high _____

ii) A material that can be easily stretched has a low _____ st

10. Explain how the properties of a material can be improved. Include an exam

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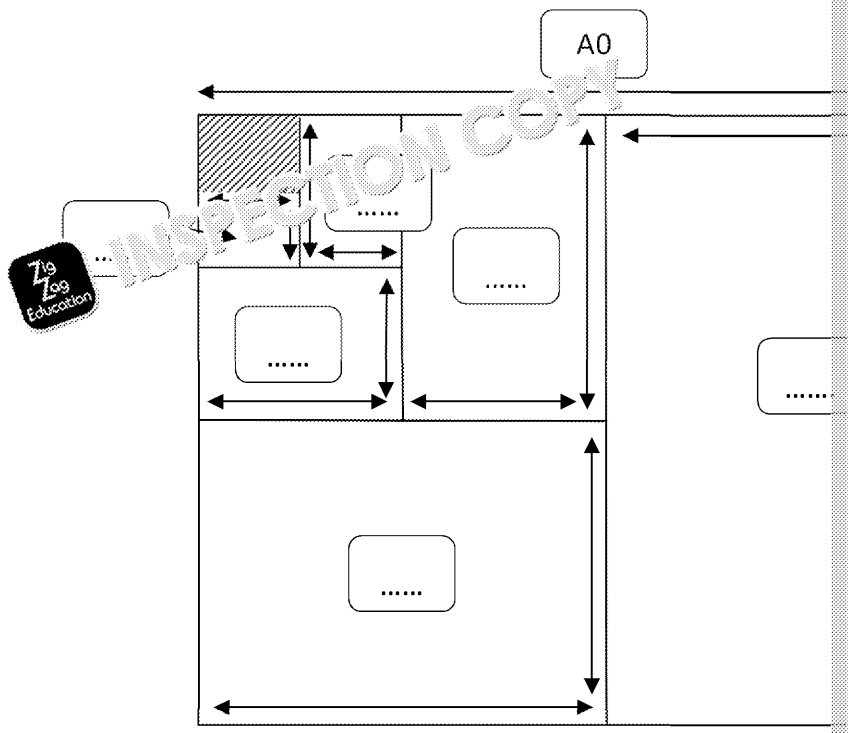
.....

11. Design a travel coffee mug. Use at least two different materials. Annotate y
material properties make them an appropriate choice for your design.

Test 8: Material categories – Paper

1. Label the standard sizes of paper. A0 has already been labelled for you.



2. Name **three** types of paper.

   1. .....
   2. .....
   3. .....

3. The thickness of paper and boards is measured using the unit gsm. What do

   .....

4. What is the minimum thickness for board?

   .....

5. Explain how paper can be strengthened.

   .....

   .....

   .....

6. i) Explain what foam core is used for, and why.

.....

.....

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ii) Draw and annotate a cross section of a piece of foam board.

7. i) Explain what corrugated cardboard is used for, and why.

.....

.....

.....

ii) Draw and annotate a cross section of a piece of corrugated cardboard.

8. What type of board is being described?

Strong board made from high-quality bleached pulp. Mainly used for primary packaging due to it being excellent to print onto.

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9. Explain the difference between duplex board and foil lined board.

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Test 9: Material categories – Natural and m

1. Explain the difference between a hardwood and a softwood.

.....

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.....

.....

2. Name **three** hardwoods.

1. .....

2. .....

3. .....

3. Name **three** softwoods.

1. .....

2. .....

3. .....

4. What type of hardwood would you use for tool handles?

.....

5. Name a suitable hardwood that this children's toy could be made of.

.....

6. Why is balsa wood often chosen for modelling?

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7. Describe oak. Identify whether it is a hardwood or a softwood and what it is

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8. Name the type of finish for wood.

1. .....

2. .....

3. .....

9. The FSC symbol is found on wood from sustainable sources. What does FSC stand for?

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10. Explain what manufactured board is.

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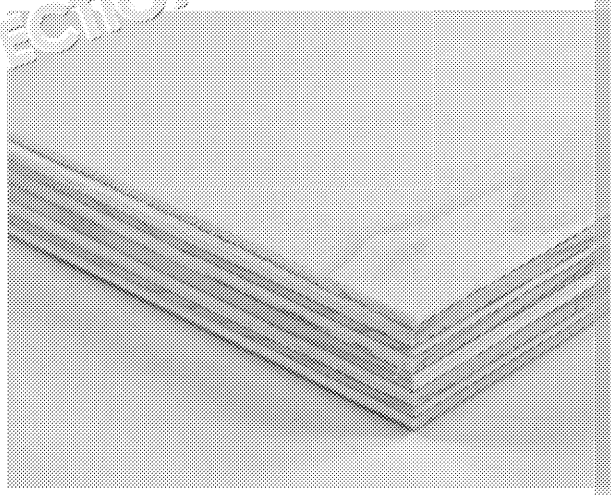
11. Which type of manufactured board is this?



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12. Name **three** other types of manufactured board.

1. .....

2. .....

3. .....

Test 10: Material categories – Metal

1. Explain the difference between ferrous metals and non-ferrous metals.

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2. Name **three** ferrous metals.

1. .....

2. .....

3. .....

3. Name **three** non-ferrous metals.

1. .....

2. .....

3. .....

4. Explain what an alloy is.

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5. What kind of metal is commonly used for drinks cans?

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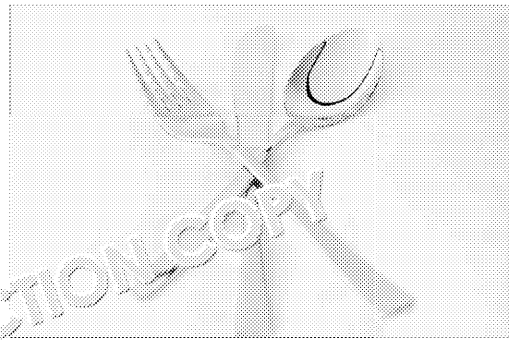
6. Why is stainless steel often chosen for cutlery?



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7. Name **two** properties of tool steel.

1. .....

2. .....

8. Name **two** properties of low-carbon steel (mild steel).

1. .....

2. .....

9. Describe, and identify whether it is ferrous or non-ferrous and what it is

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10. Name **three** types of ferrous metal.

1. .....

2. .....

3. .....

Test 11: Material categories – Po

1. Explain the difference between thermoplastics and thermosetting plastics.

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.....

.....

2. Name **three** thermoplastics.

1. .....

2. .....

3. .....

3. Name **three** thermosetting plastics.

1. .....

2. .....

3. .....

4. Explain what a natural plastic is. Give an example in your answer.

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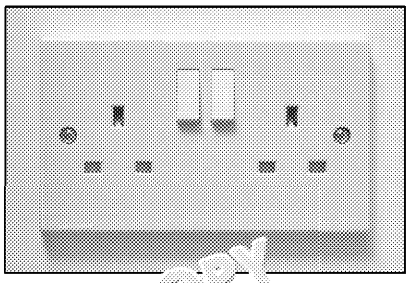
5. Why is urea formaldehyde often used to make plug sockets?



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6. Why is expanded polystyrene (PS) often chosen for packaging?

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7. Name **two** properties of high density polyethylene (HDPE).

1. .....

2. .....

8. Name **two** properties of acrylic (PMMA).

1. .....

2. .....

9. Which plastics are these products most likely to be made of?

i)

.....

ii)

.....

10. Describe polypropylene (PP). Identify whether it is a thermoplastic or a ther
commonly used for.

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11. Name **three** common forms that thermoplastics are produced in.

1. .....

2. .....

3. .....

12. Name **two** common forms that thermosetting plastics are produced in.

1. .....

2. .....

Textiles

1. Explain the difference between natural fibres and synthetic fibres.

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2. Name **three** natural fibres.

1. .....

2. .....

3. .....

3. Name **three** synthetic fibres.

1. .....

2. .....

3. .....

4. Explain the difference between blending fibres and mixing fibres.

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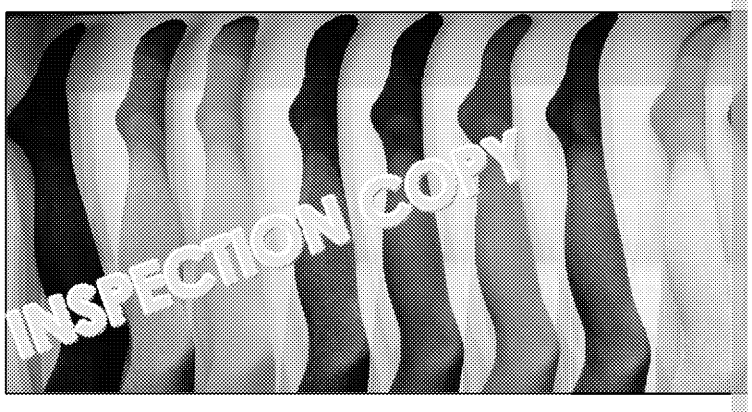
5. What kind of fabric is commonly used for tights?



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6. Why is cotton often chosen for bed sheets?

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7. Name **two** properties of cotton.

1. .....

2. .....

8. Name **two** properties of elastane.

1. .....

2. .....

9. Describe silk. Identify whether it is a natural fibre or a synthetic fibre and wh
used for.

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10. Give an example of a use for knitted fabrics.

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11. Give an example of a use for woven fabrics.

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12. Give an example of a use for non-woven fabrics.

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13. Draw and annotate a diagram of knitted fabric, as a fabric construction meth

14. Draw and annotate a diagram of woven fabric, as a fabric construction meth

15. Draw and annotate a diagram of non-woven fabric, as a fabric construction

Test 1: New and emerging techn

Industry

1. Which of these are benefits of using automation in the manufacturing indus
   a) Being able to meet high customer dema
   b) Reducing human error
   c) More effi
   d) Employee

2. Why is it impor to design the physical layout of a workplace or factory?

3. The intr ion of new technology has meant that designers can work from
   Give **one** positive and **one** negative of this arrangement.

4. Due to new and emerging technologies, designers do not have to be in the s
   manufacturing of their products or the colleagues with whom they are colla
   Name **three** tools or technologies that make this possible.

Enterprise

5. What is crowd funding?

6. Give a reason why companies market their products online.

7. Name **two** platforms used for virtual marketi

8. What is meant by the term 'co e usiness'?

9. This logo ne any products and food items. Explain what the symb

Production techniques and systems

10. Write out the full name of the production te ue

    CAD

    CAM

    FMS

    JIT

11. In 2016, the Elytra Filament Pavilion was installed in the courtyard of the V&
arm used fibre-optic sensors embedded in the canopy to track the moveme
visitors. It then used this information to build a hexagonal canopy to suit th

This canopy was 'designed' and manufactured by a robot instead of humans
example of?

12. Explain the benefits of CAD over traditional drawing techniques.

13. Name **two** pieces of CAM hardware:

14. Name a machine that is often used in FMS and explain why it is used.

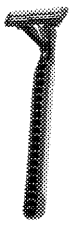
15. Identify **one** advantage and **one** disadvantage of [illegible] anufacturing.

16. What does lean manufacturi[illegible]educe?

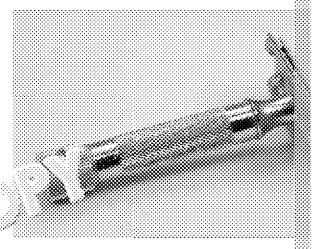
How the [illegible]cal evaluation of new and emerging techn informs designs

17. Examine these **two** razors. **Product A** is made cheaply and quickly; the cons
product away after using it for a short period of time. **Product B** is designed
last for a lifetime.

Product A



Product B



a) What is the term [illegible]escribe a product with a limited lifespan, suc

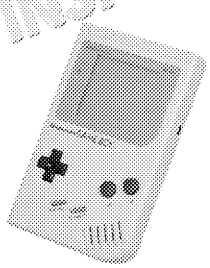
b) W[illegible]he term used to describe a product that can be maintained, su

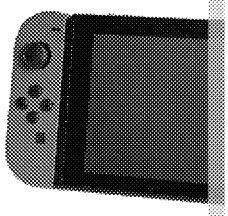
c) Discuss the positive and negative impacts of these methods of design. I
concerns.

People

1. Define 'market pull'.
2. Define 'technology push'.
3. Compare Product A and Product B [illegible] reasons why a consumer m[illegible] with the second product.

Prod





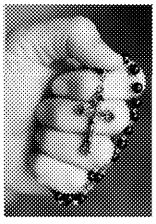
4. Both market push and technology pull result in new products being produce[illegible] consumers.
5. Explain why there might be fewer jobs in the automotive industry, even whe[illegible] consistent or increasing.
6. Self-service tills at supermarkets are replacing employees. Give **one** positive[illegible] this change.

Culture

7. In China there are [illegible] designs of chopsticks and chopstick holders. Explai[illegible] in the [illegible]

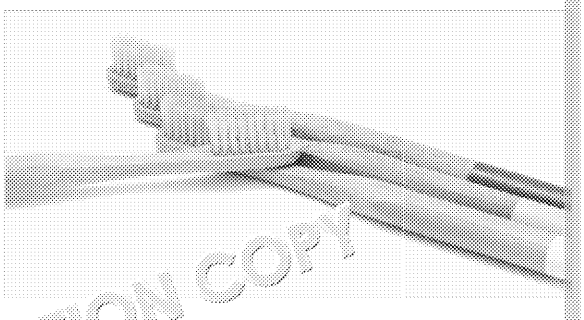
8. This is an Iranian laundry detergent, where 'Barf' means snow. Explain why [illegible] in an English-speaking market.

9. Rosary beads are des[illegible] prayer aid, mainly used in Catholic Christian[illegible] offensive [illegible] market a rosary for non-religious purposes, e.g. as [illegible]



10. The height of this seat belt can be adjusted. Why is this an important functi effectiveness?

11. These toothbrushes are made from bamboo as opposed to plastic. Explain w we live in that we can make more sustainable product choices.



12. Evaluate th D e. What makes this product better for elderly people disabil se

13. Choose **one** of the following products and **or** th arget market demogr meet the user's needs.

Water bottle
Bike helmet

Target m
Child aged 5–11
Visually impaire
Japanese marke

Sustainability

1. The development of synthetic plastics in the nineteenth century was revolutionary. Many emerging technology is made of plastic or uses plastic components. Synthetic plastics are made from oil. Is oil a finite or non-finite resource?

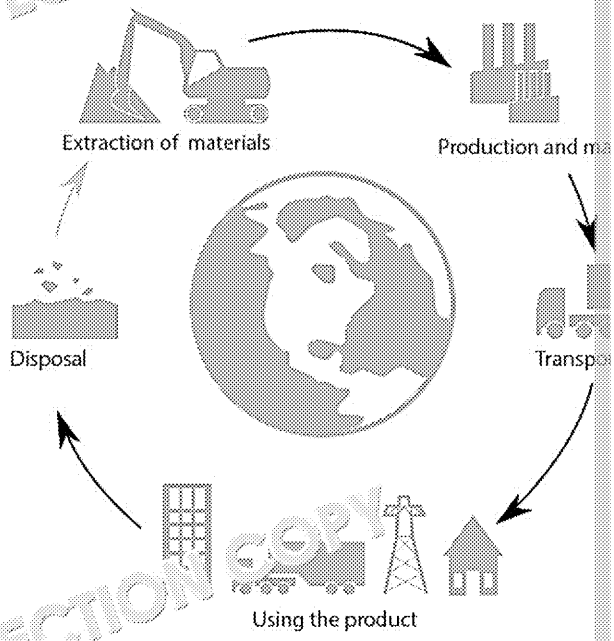
2. Copy and complete the six r's.

   1.
   2. *Re*
   3.
   4. *Reuse*
   5. *Repair*
   6.

Environment

3. Define 'continuous improvement'.

4. State **one** thing that could be done at each stage of the product lifecycle (shown in the diagram) to make it more environmentally friendly.



5. A carbon footprint is produced during the lifetime of a product. Why is it a good idea to reduce the carbon footprint of a product?

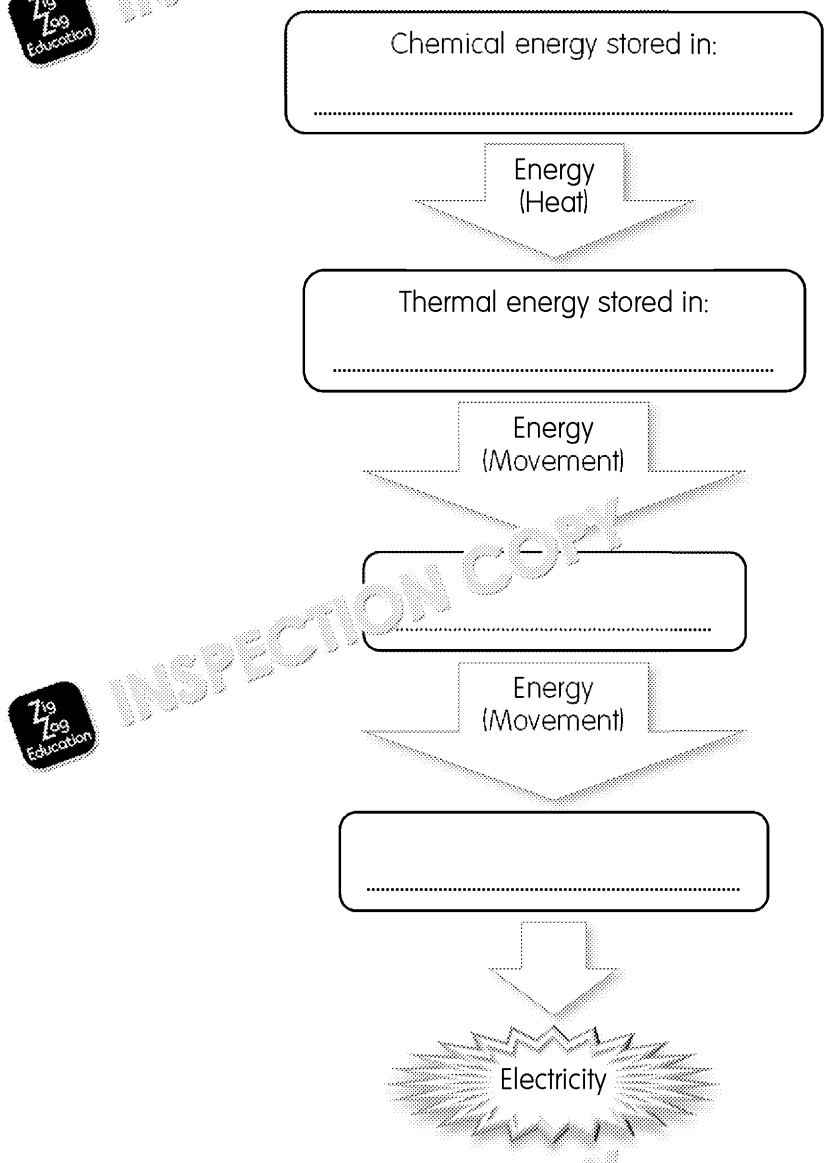
6. Carbon offsetting can be used to reduce the negative impact of a product. State one thing a manufacturer can do to offset the carbon emissions of a production process.

Fossil fuels

7. Which of these energy sources are fossil fuels?

   a) Oil
   b) Solar power
   c) Gas
   d) Nuclear power
   e) Tidal power
   f) Coal

8. The flow chart should show how power is generated from fossil fuels. Copy and complete it with a fossil fuel of your choice.



9. Give **one** advantage of using fossil fuels.

10. Give **one** disadvantage of using fossil fuels.

Nuclear power

11. Generating energy through nuclear power starts with a process that involves ... What is this process called?

12. Nuclear power plants are expensive to run and produce nuclear waste which ... process involves sealing the waste in glass blocks and burying it deep underg... dangerous for thousands of years. Nuclear accidents can have devastating e... the environment. Explain what makes nuclear power a good power source...

Renewable energy

13. This image shows a method of generating energy from a renewable source. ... is it using?

14. Which of the following renewable energy methods use turbines connected t... electrical energy? (Write all that apply.)

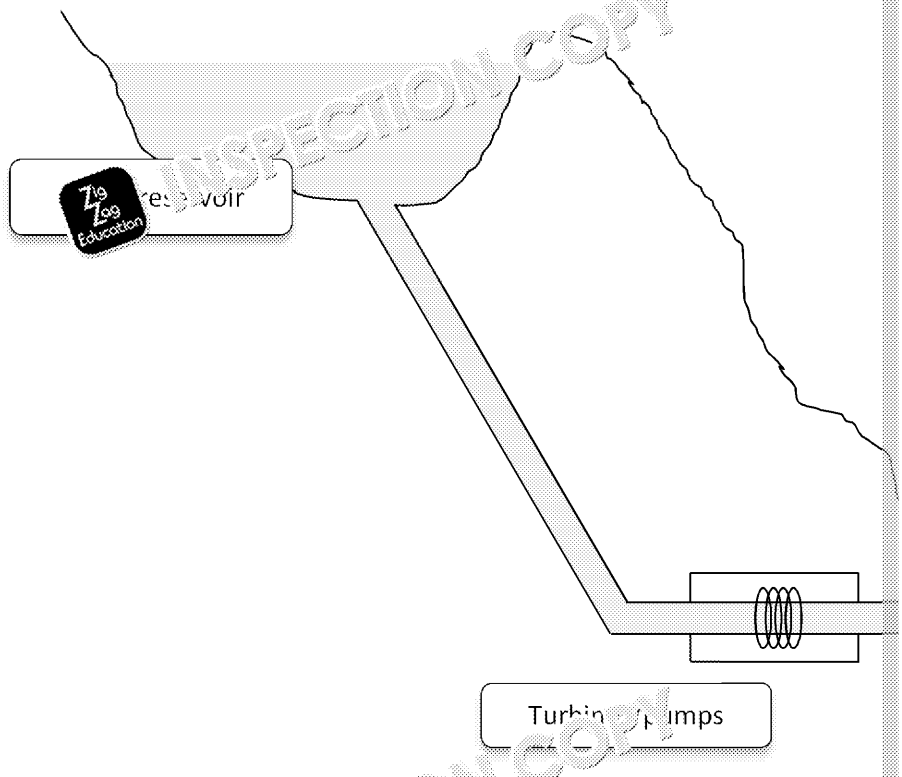
a) Wind
b) Hydroelectric
c) Solar
d) Tidal

15. Explain why products and energy produced from biomass are considered to b... by others.

16. Draw a labelled diagram / flow chart showing how electricity can be generat...

17. Renewable energy provides potentially infinite energy sources that can be us... without damaging the environment in the way that fossil fuels do. Discuss t... renewable energy.

18. This diagram shows a pump storage system. Copy the diagram. Then, using a
which the water would move when the stored power is released.



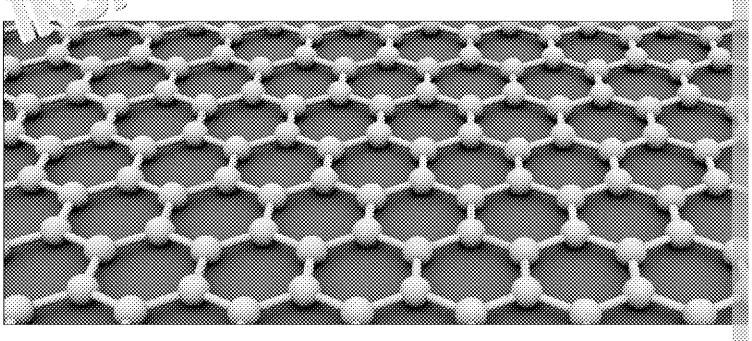
19. Below are two lists of statements. Decide which side of the table refers to s
which side refers to rechargeable batteries.

Disposable	Expensive to buy
Have to be replaced often	Reusable
Output gets less over time	Better for the environ
Worse for the environment	Output remains consta
Cheap to buy	Will last longer

Modern materials

1. Explain why it is important to incorporate modern mat ials into design whe appropriate.

2. In 2004, a new material was di e hat is only one atom thick, 200 tim lightweight and which ct electricity really well. What material is t



3. Name a modern material and describe **two** of its properties.

4. Silver is a material that has been used by humans for thousands of years bu a new way, as a nanomaterial.

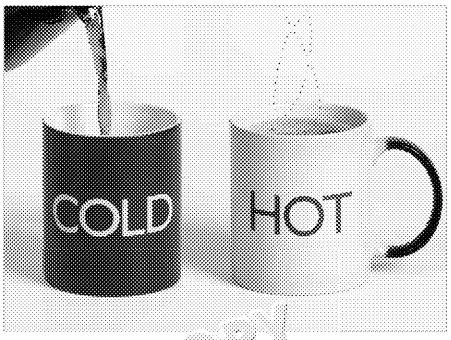
   i) What properties of silver make it useful as a na terial?

   ii) Name **two** products that silver c e d in, as a nanomaterial.

Smart materials

5. What is rt material?

6. This is a mug that uses a smart material.



   i) Which properties is the smart m t l d onstrating?

   a) Phosphorescent p pe i s

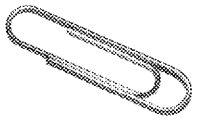
   b) P oto m properties

   c) mochromic properties

   d) Hydrophobic properties

   ii) Explain the functional features that this smart material adds to the pro

7. This paperclip is made from an SMA.



i) What does SMA stand for?

ii) If this paperclip were to be ber[illegible] shape, how would you make it g[illegible] shape?

iii) What [illegible] commonly used in an SMA?

Composite materials

8. Explain what a composite material is.

9. Which of these materials are composite materials? (Tick all that apply.)

a) Wood
b) Glass-reinforced plastic (GRP)
c) Medium-density fibreboard (MDF)
d) Polypropylene (PP)
e) Brit Pak (aseptic pa[illegible]

10. Carbon fibre reinforced plastic (CRP) is a composite material. Name **three** u[illegible]

Technical textiles

11. Explain th[illegible] diff[illegible] between flame retardants and fire-resistant fabrics.

12. This bu[illegible] proof vest is made from Kevlar. Explain why Kevlar is used.

13. Microencapsulation can be used in fab[illegible] release a desired liquid or gas o[illegible] used in the medical industry t[illegible] ni[illegible]ter medications or provide antibacte[illegible] other possible uses.

14. Condu[illegible] fabrics are made up of fibres that let electricity flow freely, and, [illegible] These fi[illegible] can connect components such as a small screen, LEDs, headpho[illegible] Design a product that uses this fabric.

Inputs

1. What is the input, process and output for this calculator?

2. Name **two** types of momentary switch.

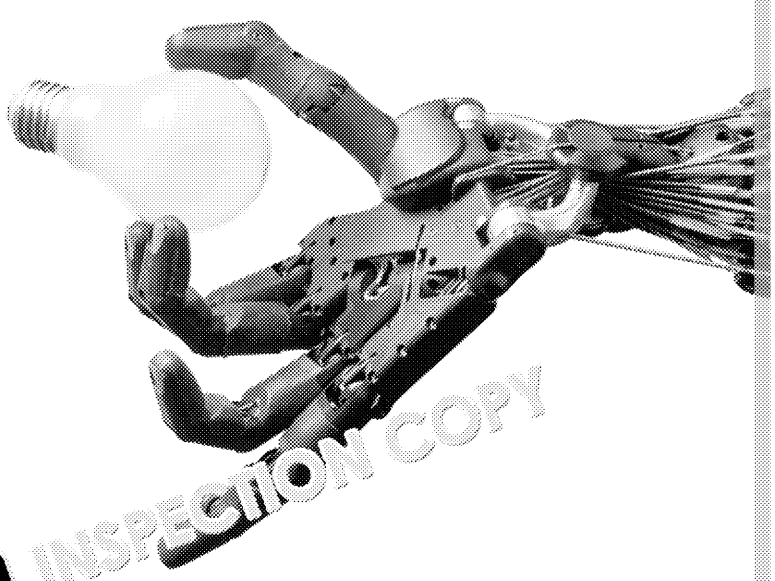
3. Name another type of switch.

4. i) A street light comes on automatically when it gets dark. What input co this?

   ii) Explain why this is a good functionality to have f street light.

5. A hair straightener includes a heat s Explain why this is a good functio

6. Pressure sensors ar grated into robotic hands and grippers. Expl improv fu a robotic arm/gripper.



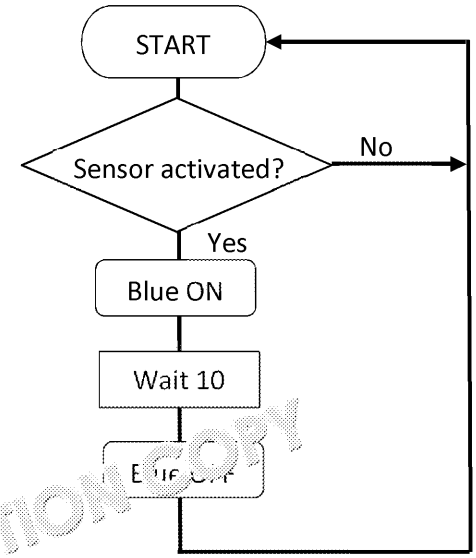
7. What does IC stand for?

8. What does PIC stand for?

9. A basic robot can be driven using a remote contr[illegible] sounds when it s[illegible] makes lights flash when it drives backwar[illegible]s. Exp[illegible] why it needs a program[illegible] microcontroller.

10. Identify **two** bra[illegible] programmable microcontroller that are commonly us[illegible]

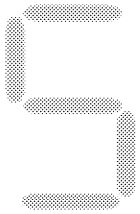
11. This flo[illegible]t represents a program used by a circuit containing a passive i[illegible]



i) Is [illegible] cu[illegible] monostable or astable?

ii) Describe what the circuit does.

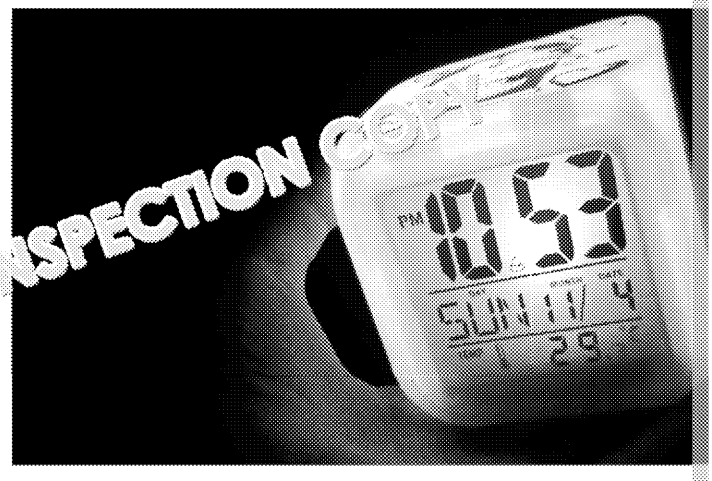
12. This is the number five as it would appear on a seven-segment display coun[illegible]



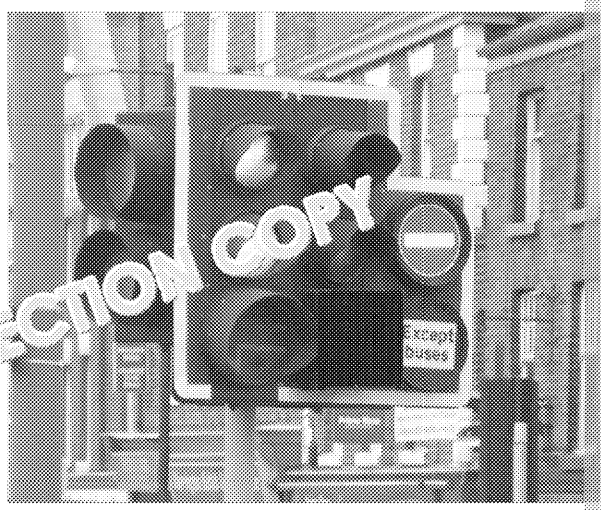
Draw the 7 segment display counter if it received an i[illegible]lse pulse and has t[illegible]

Outputs

13. Name **two** outputs of this alarm clock.



14. Traffic lights set off a beeping sound when it is safe for pedestrians to cross. Name the input and process for this function.

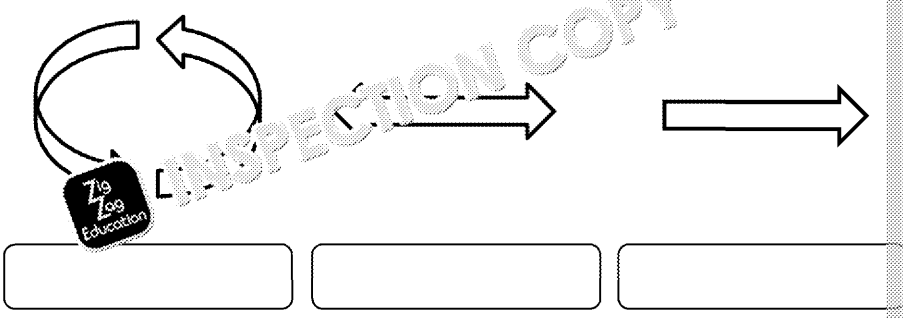


15. i) Design a product that includes a sensor as an input and provides at least

    ii) Draw a system flow chart for this design.

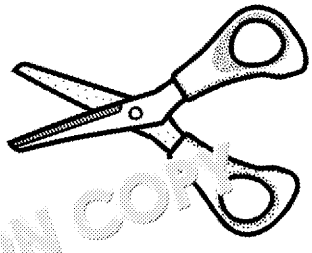
Different types of movement

1. Copy the diagrams below and label the types of movement.



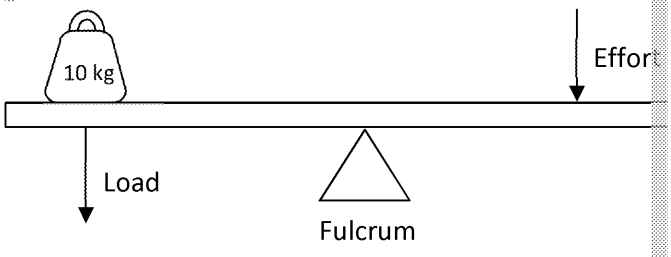
Changing magnitude and direction of force

2. Copy the diagram and label the fulcrum on this pair of scissors.

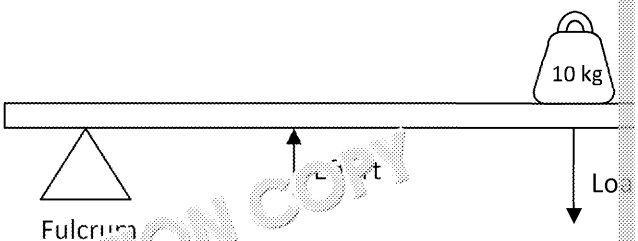


3. Which order does each lever mechanisms belong to?

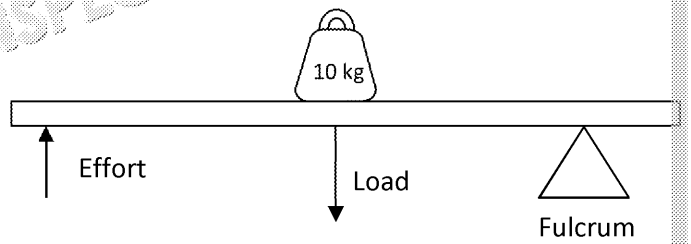
i)



ii)

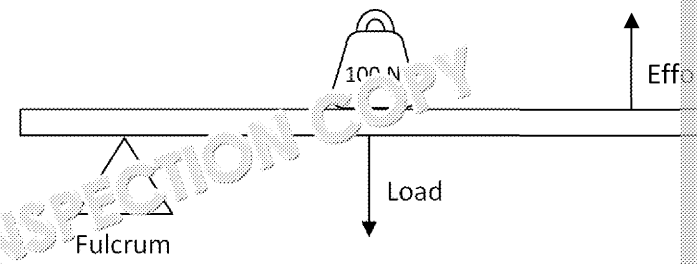


iii)



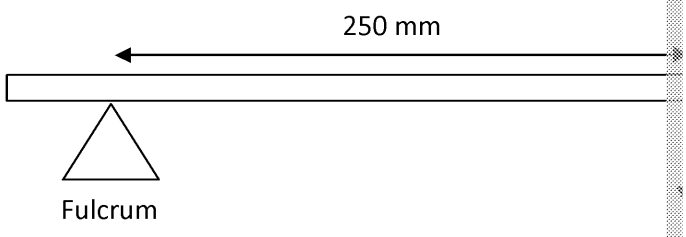
4. Using the formula provided, calculate the mechanical advantage of this exam
ratio.

$$MA = \frac{\text{Load}}{\text{Effort}}$$

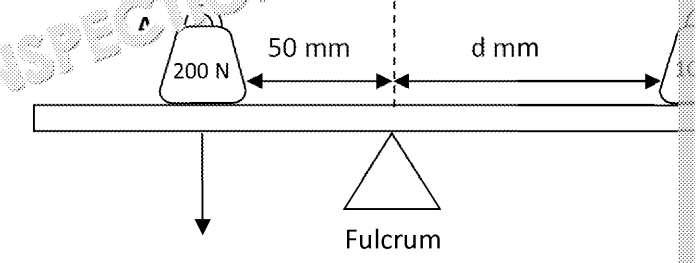


5. i) Using the formula provided, calculate the moment of this example.

Moment = Force (N) × Distance (m)

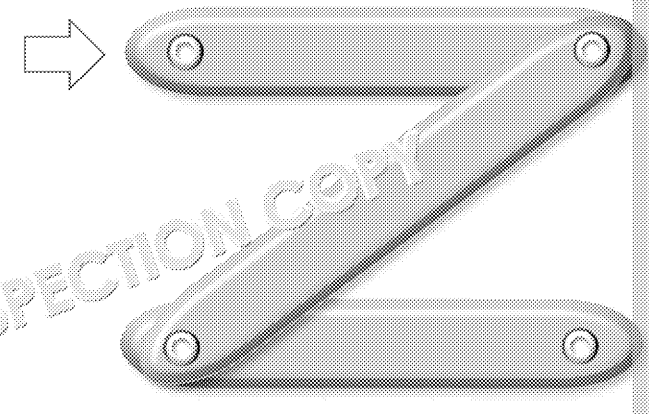


ii) Calculate the distance (d) from the fulcrum to weight B that would make
balanced.



6. Draw a bell crank mechanism and label the movement, pivot and resulting fo

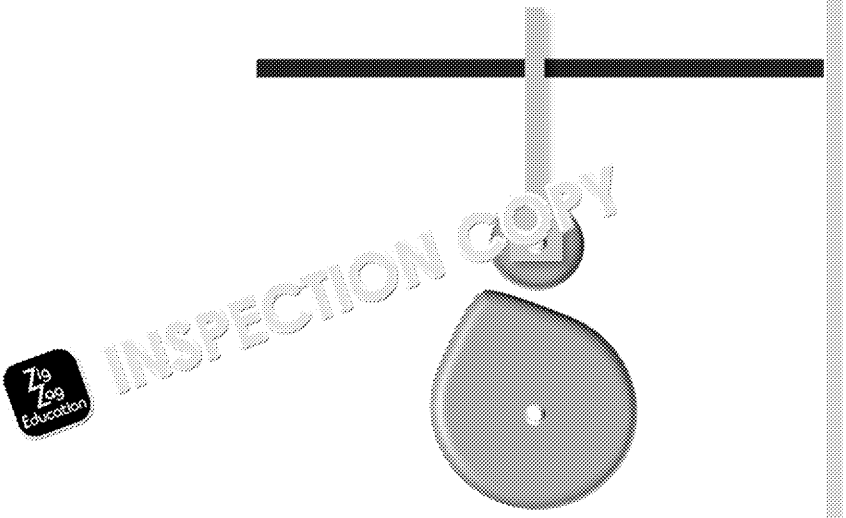
7. Examine the diagram of this linkage.



i) What is this linkage called?

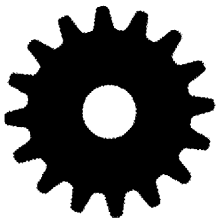
ii) The input force is indicated by an arrow. Draw an arrow showing the di
force.

8. Copy the diagram and draw in the directional arrows on the diagram of the

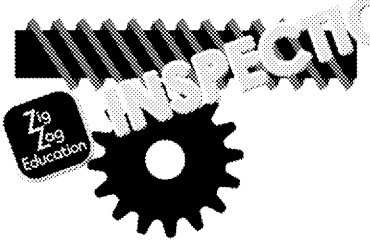


9. Label the gears.

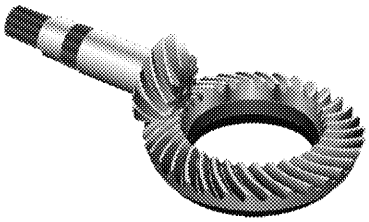
i)



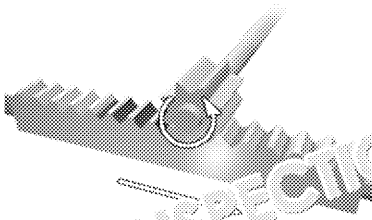
ii)



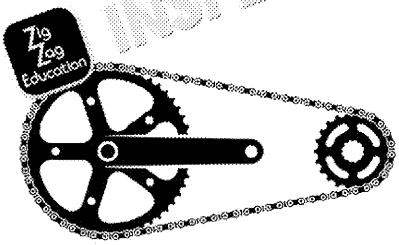
iii)



iv)

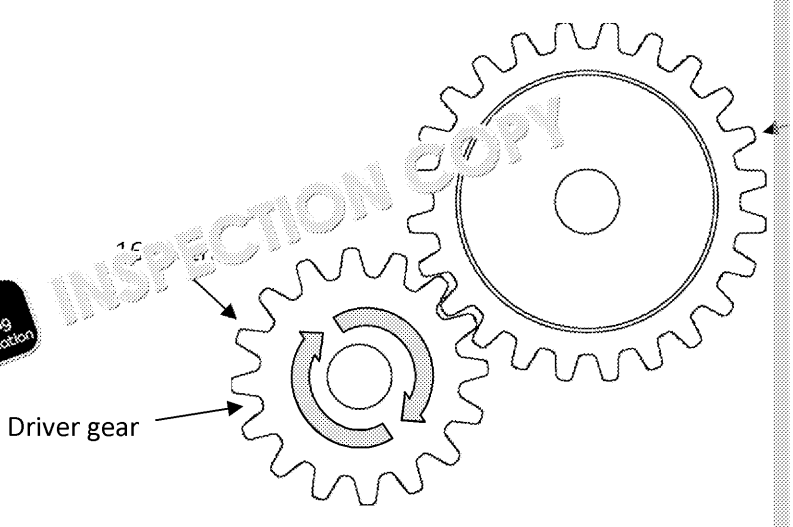


v)



10. Define a simple gear train.

11. Below is a diagram of a simple gear train.



i) Using the formula provided, work out the gear ratio.

$$\text{Gear ratio} = \frac{\text{Number of teeth on the driven gear}}{\text{Number of teeth on the driver gear}}$$

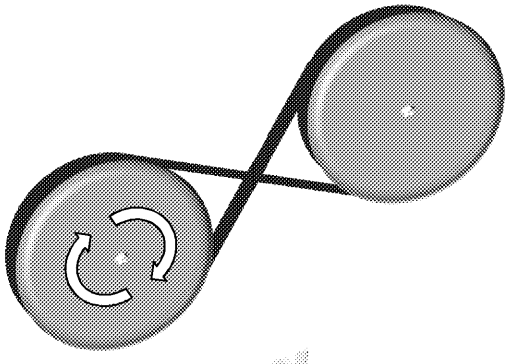
ii) Copy the above diagram and draw in the missing directional arrows.

12. What does the gear ratio mean?

13. Examine the diagram of a pulley system shown below.

i) Copy the diagram and draw in the missing directional arrows.

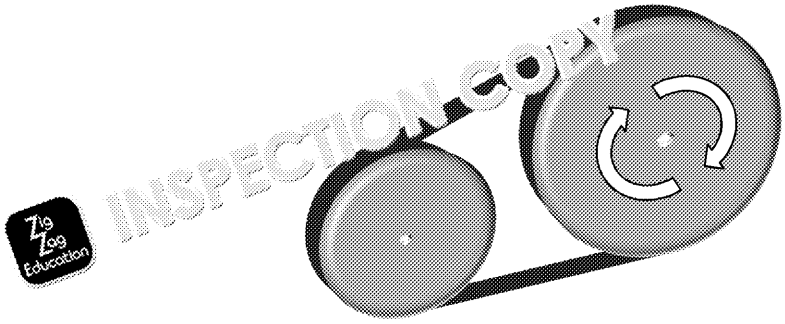
ii) Identify the change to the input motion that this mechanism is making.



14. Examine the diagram of a pulley system.

    i) Copy the diagram and draw in the missing directional arrows.

    ii) Identify the change to the input motion that this mechanism is making.

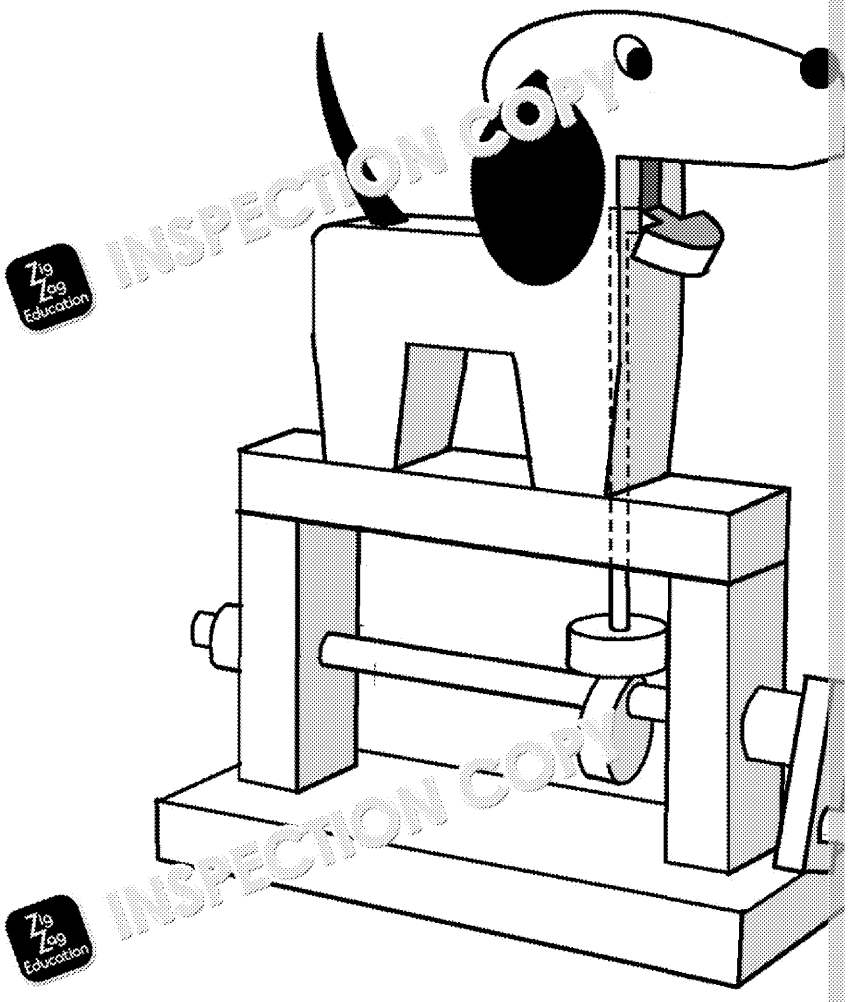


15. Look at the diagram of an automaton. Copy the diagram and label the follow

    i) The mechanism used in it.

    ii) The changes in motion.

    iii) The types of movement.



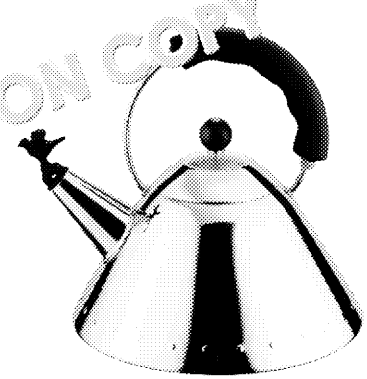
Material properties

1. Which of the material categories is most likely to have absorbent physical properties?
   a) Polymers
   b) Metal and alloys
   c) Textiles
   d) Wood
   e) Paper and boards

2. Define 'fusibility'. Include an example in your answer.

3. Which of these materials conducts electricity?
   a) Leather
   b) Polypropylene
   c) Copper
   d) Cork
   e) MDF

4. Consider this stovetop kettle.



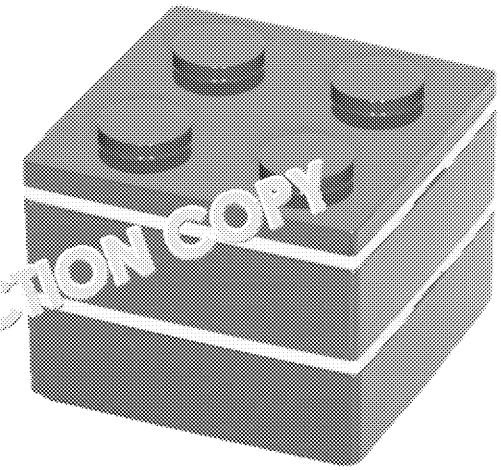
   i) State the **two** main types of material from which the kettle is made.

   ii) Explain why each of these materials is used.

5. The Transrapid 09 travels at 311 mph. Transrapid is a monorail train that does not run over the tracks. What physical properties is this system using for movement?

6. Name six common working properties.

7. Consider this lunch box.



i) Identify and explain a mechanical property of the plastic from which th

ii) Explain why this material property is appropriate for the product's funct

8. Define 'malleability'. Include an example in your answer.

9. Copy the sentences below and fill in the gaps.

i) A material that has the ability to resist being crushed has high _____

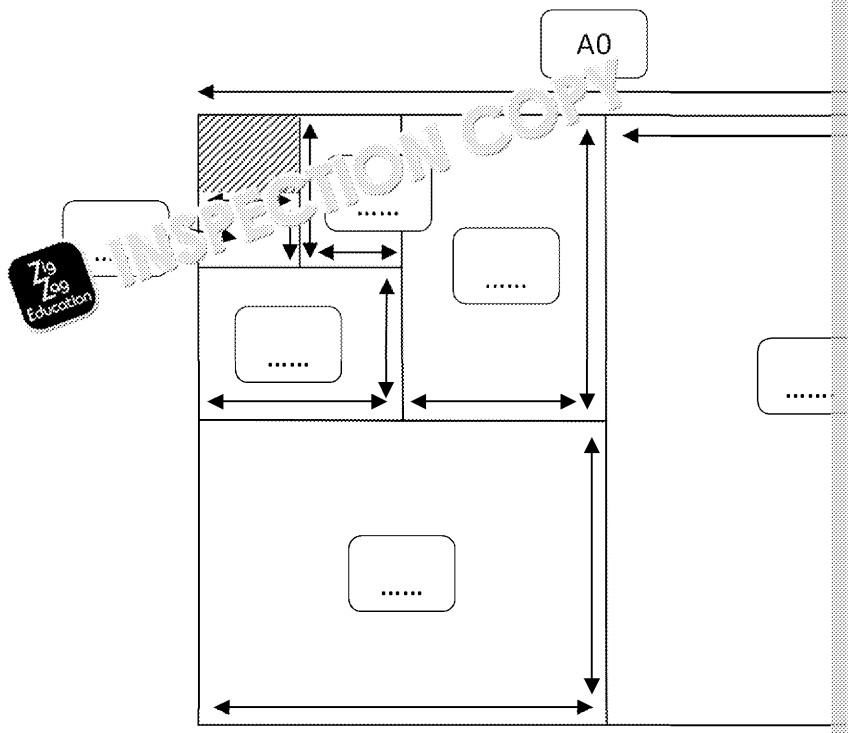
ii) A material that can be easily stretched has a lo_____ st

10. Explain how the properties of a mat_____ be improved. Include an exam

11. Design_____ mug. Use at least two different materials. Annotate y
materi_____erties make them an appropriate choice for your design.

Test 8: Material categories – Paper

1. Copy the diagram below and label the standard sizes of paper. A0 has alread



2. Name **three** types of paper.

3. The thickness of paper and b... s... easured using the unit gsm. What do

4. What is ... thickness for board?

5. Explain how paper can be strengthened.

6. i) Explain what foam core is used for, and why.

   ii) Draw and annotate a cross section of a piece of foam board.

7. i) Explain what corrugated cardboard is used for, and why.

   ii) Draw and annotate a cross section of a piece of corrugated cardboard.

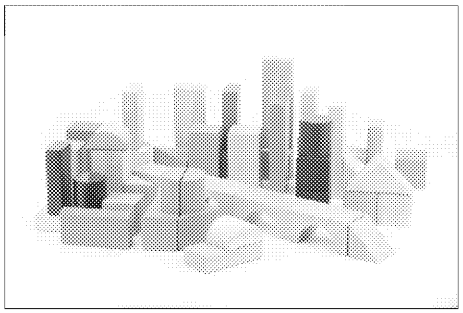
8. What type of board is being described?

   Strong board made from high-quality bleache... ulp. Mainly used for primary ... to it being excellent to print onto.

9. Explain the differen... ... duplex board and foil-lined board.

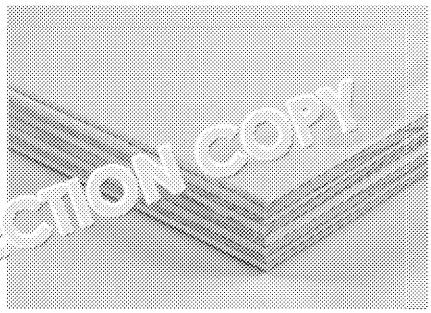
Test 9: Material categories – Natural and m

1. Explain the difference between a hardwood and a softwood.
2. Name **three** hardwoods.
3. Name **three** softwoods.
4. What type of hard[illegible] you use for tool handles?
5. Name a [illegible]le hardwood that this children's toy could be made of.



6. Why is balsa wood often chosen for modelling?
7. Describe oak. Identify whether it is a hardwood or a soft wood and what it i
8. Name **three** types of finish for wood.
9. The FSC symbol is found [illegible]wood from sustainable sources. What does FSC

10. Explain what manufactured board is.
11. Which type of manufactured board is this?

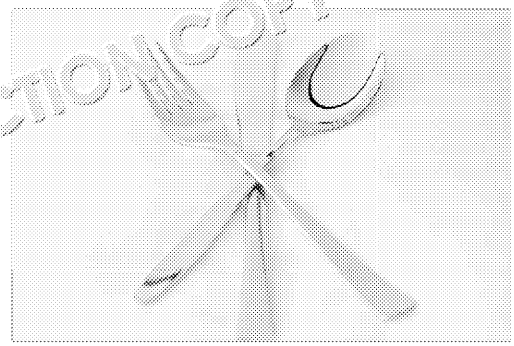


12. Name **three** other types of manufactured board.

Test 10: Material categories – Metal

1. Explain the difference between ferrous metals and non-ferrous metals.
2. Name **three** ferrous metals.
3. Name **three** non-ferrous metals.
4. Explain what an alloy is.
5. What l[illegible]m[illegible] commonly used for drinks cans?

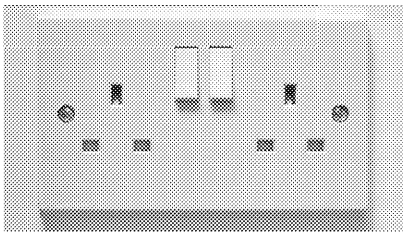
6. Why is stainless steel often chosen for cutlery?



7. Name **two** properties of tool steel.
8. Name **two** properties of low-carbon steel (mild steel).
9. Describe copper. Identify whether it is ferrous or non-ferrous and what it is c
10. Name **three** types of precious metal.

Test 11: Material categories – Po

1. Explain the difference between thermoplastics and thermosetting plastics.
2. Name **three** thermoplastics.
3. Name **three** thermosetting plastics.
4. Explain what a natural plastic is. Give an example in your answer.
5. Why is formaldehyde often used to make plug sockets?



6. Why is expanded polystyrene (PS) often chosen for packaging?
7. Name **two** properties of high-density polyethylene (HDPE).
8. Name **two** properties of acrylic (PMMA).
9. Which plastics are these products most likely to be made of?

i)

ii)

10. Describe polypropylene (PP). Identify whether it is a thermoplastic or a thermosetting plastic and comment on the properties it has.
11. Name **three** common forms that thermoplastics are produced in.
12. Name **two** common forms that thermosetting plastics are produced in.

Textiles

1. Explain the difference between natural fibres and synthetic fibres.
2. Name **three** natural fibres.
3. Name **three** synthetic fibres.
4. Explain the difference between blending fibres and mixing fibres.
5. What kind of fabric is commonly used for tights?

6. Why is cotton often chosen for bed sheets?
7. Name **two** properties of cotton.
8. Name two properties of elastane.
9. Describe silk. Identify whether it is a natural fibre or a synthetic fibre and what it is used for.
10. Give an example of a use for knitted fabrics.
11. Give an example of a use for woven fabrics.
12. Give an example of a use for non-woven fabrics.
13. Draw and annotate a diagram of knitted fabric, as a fabric construction method.
14. Draw and annotate a diagram of woven fabric, as a fabric construction method.
15. Draw and annotate a diagram of non-woven fabric, as a fabric construction method.

Test 1

Industry

1. **1 mark** for correctly identifying all three statements below
   a) Being able to meet high customer demand
   b) Reducing human error
   c) More efficient manufacturing

2. **1 mark** for valid point.
   Answer could include:
   - To increase its efficiency.
   - To decrease
   - To reduce accidents / health and safety risks.
   - To be more e
   - To increase work productivity.

   Allow any other valid point(s).

3. **1 mark** for valid point.
   Answer could include:
   Positive:
   - Projects can be completed faster; more reactive to market trends.
   - Manufacturers in different countries can be used to keep cost down.
   - Designers can work outside of business hours which can be beneficial when
     other time zones.
   - Designers can market their products and services internationally.

   Negative:
   - Employees may not be as efficient.
   - Employees may use company time or resources
   - Meeting may not be as effective if not face t
   - Data security may be an issue
   - Collaboration or teamw
   Allow any other valid point(s).

4. **1 mark** for valid point.
   Answer could include:
   - Computer-aided design (CAD)
   - CNC
   - Computer-aided manufacturing (CAM)
   - 3D printer
   - Internet
   - Remote man
   - Video conferencing / Skype
   - Rapid proto
   - Emails

   Allow any other valid point(s).

Enterprise

5. **1 mark** for valid definition and **1 mark** for valid explanation / example / demo
   Answer could include:
   Crowd funding is an alternative way for a start-up business or entrepreneur to
   service is advertised to the public who can choose to invest in products in return
   early access to the new product/servi
   Allow any other valid point(s).

6. **1 mark**
   Answer include:
   - Ta market, such as young professionals, expect to be able to buy produ
   - Reduce cost and improve profit by not having a physical shop to run.
   - Ability to reach a wider market.

   Allow any other valid point(s).

7. **1 mark** per valid answer.

Answers could include:

- Google / Search engine
- Facebook
- Instagram
- Twitter
- YouTube
- Emails
- Social media

Allow any other valid point(s).

8. **1 mark** for valid point/definition and **1 mark** for valid explanation/example.

Answer could include:
Cooperative means that the business is owned and actively run by a group of people. John Lewis is an example of a cooperative business.

Allow any other valid point(s).

9. **1 mark** for valid point/definition and **1 mark** for valid explanation/example.

Answer could include:
The symbol means that the product is Fairtrade. It indicates that the workers involved in the product are paid fairly and have acceptable working conditions.

Allow any other valid point(s).

Production techniques and systems

10. **1 mark** per correctly identifies term:

CAD – Computer-aided design
CAM – Computer-aided manufacture
FMS – Flexible manufacturing systems
JIT – Just in time

11. **1 mark** per valid answer.

- Automation

12. **1 mark** for valid point and **1 mark** for valid explanation/example.

Answer could include:
The benefits of CAD modelling over traditional drawing techniques include improved efficiency, the ability to test designs with software (CAT) or print using a 3D printer.

Allow any other valid point(s).

13. **1 mark** per valid answer.

Answers could include:

- 3D printer
- Laser cutter/ cutter
- Router
- Miller/mills
- Lathes

Allow any other valid point(s).

14. **1 mark** for valid point/definition and **1 mark** for valid explanation / example / c

Answer could include:
CNC machines are often used in flexible manufacturing systems because they are quick at manufacturing tasks relatively quickly and cheaply. This is perfect for flexible manufacturing as the method aims to respond to a constantly changing market and level of demand. CNC machines allow this to happen in an efficient way.

Allow any other valid point(s).

15. **1 mark** for valid point.

Answer could include:

Advantages:

- No need to store products, saving storage costs.
- More environmentally friendly because limited or no waste goes to landfill
- Stock stays current / in fashion / in date.
- Minimal waste of resources and time.
- Income is collected before costs are paid – less financial risk.
- Stock does not go unsold / doesn't waste money

Disadvantages:

- Vulnerable supply chain, need everything to go smoothly.
- Sales might be lost if customers don't want to wait.
- Bulk-buying discounts may not apply.
- Having to pay for product before receiving it / it being made may put some

Allow any other valid point(s).

16. **1 mark** per valid answer.

- Waste

Allow any other valid point(s).

How the critical evaluation of new and emerging technologies informs

17. a) **1 mark** for valid point.
Planned obsolescence / Built-in obsolescence

b) **1 mark** for valid point.
Design for maintenance

c) ***0 marks***
Nothing worthy of credit.

1–2 marks
Some understanding of positive and negative impacts of planned obsolesce
Limited analysis of positive and/or negative points.
Limited analysis of ethical or environmental concerns.

3–4 marks
Good understanding of positive and negative impacts of planned obsolesce
Analysis of positive and negative points.
Analysis of ethical and environmental concerns.

5–6 marks
Excellent understanding of positive and negative impacts of planned obsol
Thorough analysis of both positive and negative points of each design meth
Thorough analysis of ethical and environmental concerns.

Positive features of planned obsolescence to identify:

- Material can be saved if product only has a short lifespan.
- Consumer gets to upgrade product more frequently.
- Companies sell more products and make more money from lesser qua
- Products can keep up with fashions if they can be made quickly, cheap

Negative features of planned obsolescence to identify:

- Products are of poorer quality.
- Consumers have no choice but to replace products – they are often di
- Products are often harder to successfully recycle as different material
- More waste is produced.
- Customers perceive brand or product as cheap and disposable, with le

Positive features of design for maintenance to identify:

- Products are of higher quali
- Products can be fixed when broken.
- Consumers spend less money on products over time.
- Consumers have less frustration over broken products.
- Consumers buy into quality, often luxury product.
- Less wastage as fewer products end up in landfill.

Negative features of design for maintenance to identify:

- Production is expensive.
- Initial cost to customers is high.
- Companies make less sales.

Allow any other valid point(s).

People

1. **1 mark** for valid definition and **1 mark** for valid explanation / example / demo

   Answer could include:
   Market pull is when consumer tastes and behaviours make a product viable. M this, they developed from people demonstrating the nee ant to listen to mus boom boxes to portable cassette and CD players to m layers and iPods and n

   Allow any other valid point(s).

2. **1 mark** for valid de n and **1 mark** for valid explanation / example / demo

   Answe in
   Techno sh is when developments in technology and innovation lead to ne market. Companies want to produce products that are innovative and exciting h product and encourages customers to choose their product instead of a compet invest lots of time and money in their research and development departments.

   Allow any other valid point(s).

3. **1 mark** per valid answer.

   Answers could include:
   - New technology/features
   - Games only made for the new console (planned obsolescence)
   - Changing fashion
   - Improved product experience
   - Larger screen
   - Better design for use with two hands

   Allow any other valid point(s).

4. **1 mark** for valid point/definition and **1 mark** for valid explanation / example /

   Answer could include:
   New products and technol s cr e choice and solve user problems. More co competition betwe n es which could reduce cost.

   Allow a er point(s).

5. **1 mark** for valid point/definition and **1 mark** for valid explanation / example /

   Answer could include:
   Because the manufacturing process is being automated. This means that fewer p cars because the machinery and robots are performing the same jobs but more e

   Allow any other valid point(s).

6. **1 mark** per valid answer.

   Positive answers could include:
   - More efficient service for customers.
   - Less human error involved.

   Negative answers could include:
   - Less personal service for customer.
   - More chance for customers to be dishonest.
   - Employees lose jobs.

   Allow any other valid point(s).

Culture

7. **1 mark** for valid point/definition and **1 mark** for valid explanation/example.

   Answer could include:
   Chopsticks would not sell as well in the UK because of the cultural differences b
   chopsticks are the traditional eating utensils and are used for every meal so the
   chopsticks compared to the UK where cutlery is traditionally used for eating a m

   Allow any other valid point(s).

8. **1 mark** for valid point/definition and **1 mark** for valid explanation/example.

   Answer could include:
   Barf, the laundry det[illegible] wouldn't sell very well in an English speaking mark
   English. The de[illegible]ave the same visual imagery as the intended meaning o
   impres[illegible] the consumer; this name in an English-speaking market would n
   white la[illegible]y and, therefore, may not sell well.

   Allow any other valid point(s).

9. **1 mark** for valid point/definition and **1 mark** for valid explanation/example.

   Answer could include:
   Marketing rosary beads for fashion purposes would be to encourage the use of t
   Wearing a rosary for non-religious and fashion reasons could be seen as devalu
   could also lead to the wearer being associated with the religion while acting out
   appropriate behaviour which reflects badly on the religion.

   Allow any other valid point(s).

Society

10. **1 mark** for valid point/definition and **1 mark** for valid exp[illegible]nation / example /

    Answer could include:
    It is an important function because it mea[illegible] th[illegible] t[illegible]position of the seat belt can
    a range of heights. Having this adj[illegible]b[illegible]eans that the seatbelt can be at op
    the average of the popula[illegible]n[illegible]uf[illegible]s for the fifth and ninety-fifth percentile ra
    the seat belt safer f[illegible]s.

    Allow a[illegible]er [illegible]point(s).

11. **1 mark** for valid point/definition and **1 mark** for valid explanation / example /

    Answer could include:
    Providing sustainable alternatives to products is important to society because i
    to make a more environmentally friendly choice. This affects society in a positiv
    will have access to resources for longer and will have a cleaner, healthier enviro

    Allow any other valid point(s).

12. **0 marks**
    Nothing worthy of credit.

    1–2 marks
    Limited understanding of how features or functionality can be used as part of in
    Brief point/s describing the Doro phone features or functionality.
    No conclusions drawn as to why the Doro phone is bet[illegible] elderly people or p

    3–4 marks
    Some understanding of how features [illegible]ionality can be used as part of incl
    Limited analysis of Doro phon[illegible]r functionality.
    Minimal conclusions [illegible]as to why the Doro phone is better for elderly peop

    5–6 m[illegible]
    Good u[illegible]nding of how features and functionality can be used as part of inc
    Some an[illegible]sis of Doro phone features or functionality.
    Comparison of features or functionality of phones aimed at the wider market.
    Minimal conclusions drawn as to why the Doro phone is better for elderly peop

7–8 marks
Good understanding of how features and functionality can be used as part of inc
Analysis of Doro phone features and functionality.
Comparison of features and functionality of phones aimed at the wider market.
Some conclusions drawn as to why the Doro phone is better for elderly people o

9–10 marks
Excellent understanding of how features and functiona[illegible]n be used as part o
Thorough analysis of Doro phone features and f[illegible]io[illegible]lity.
Comparison and analysis of features a[illegible]ity of phones aimed at the w
Reasoned conclusions drawn a[illegible] Doro phone is better for elderly peo
to use.

Possib[illegible]re[illegible] Doro phone to identify:
- It [illegible] buttons which makes them easier to press.
- Simple features which makes using the phone less confusing.
- Buttons lets the user have the feeling of pressing something.
- Big numbers are easier to see.
- Not touchscreen – this makes it less likely to be pressed accidentally.

Allow any other valid point(s).

13. Give the full **8 marks** for an appropriate design that is clearly presented and an
1–2 marks awarded if the design is based on one of the given products and/or
2–4 marks awarded if the design is based on one of the given products and/or
clearly.
4–6 marks awarded if the design is based on one of the given products and/or
annotated.
6–8 marks awarded if the design is based on one of the given products and/or
annotated and the functionality and/or aesthetics have been considered and are

Test 3

Sustainability

1. **1 mark** [illegible]
   - Fi[illegible]

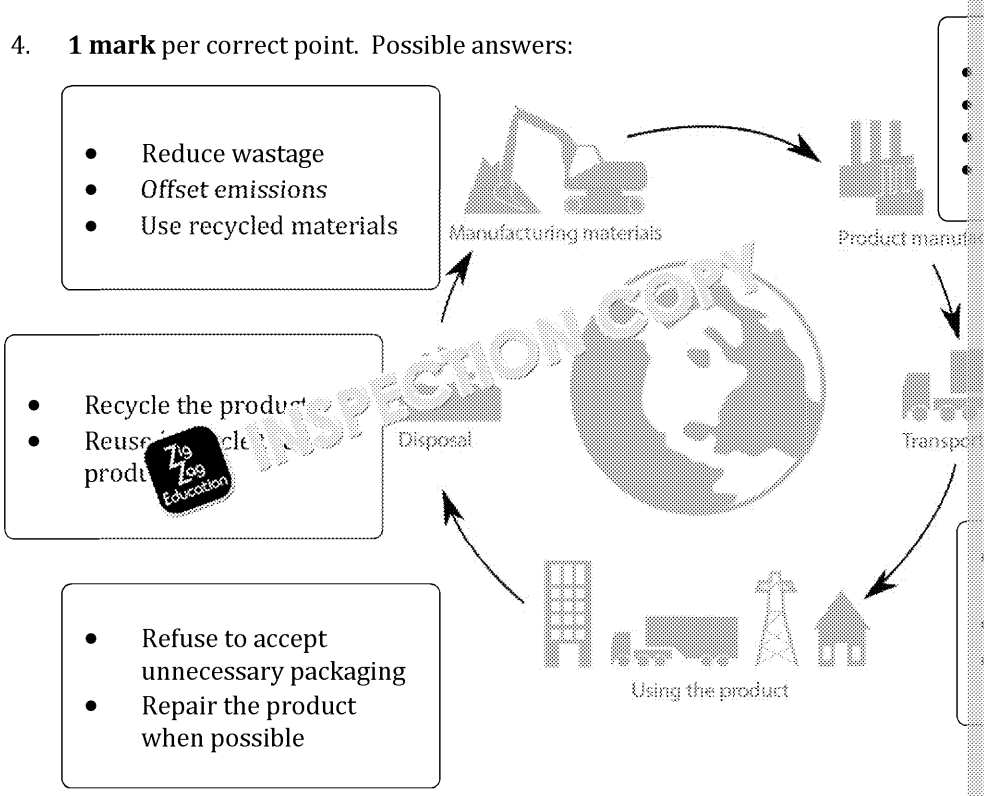
2. **1 mark** per valid answer.
   Answers could include:
   - Refuse
   - Reduce
   - Recycle

   Allow any other valid point(s).

Environment

3. **1 mark** for valid definition and **1 mark** for valid explanation / example / demo
   Answer could include:
   The continuous improvement method involves cons[illegible]odating production
   resources, time and money. All employees are [illegible]ed to find ways of impl
   Allow any other valid point(s).

4. **1 mark** per correct point. Possible answers:



Allow any other valid point(s)

5. **1 mark** per valid answer.

Answers could include:

- To contribute less to global warming.
- To meet government regulations.
- To reduce negative impact on the er ion

Allow any other valid point(s)

6. **1 mar** lid nswer.

Answer include:

- Improve energy efficiency for buildings and equipment.
- Use renewable energy sources.
- Recycle / reuse / reduce wastage.
- Purchase
- Use recyc

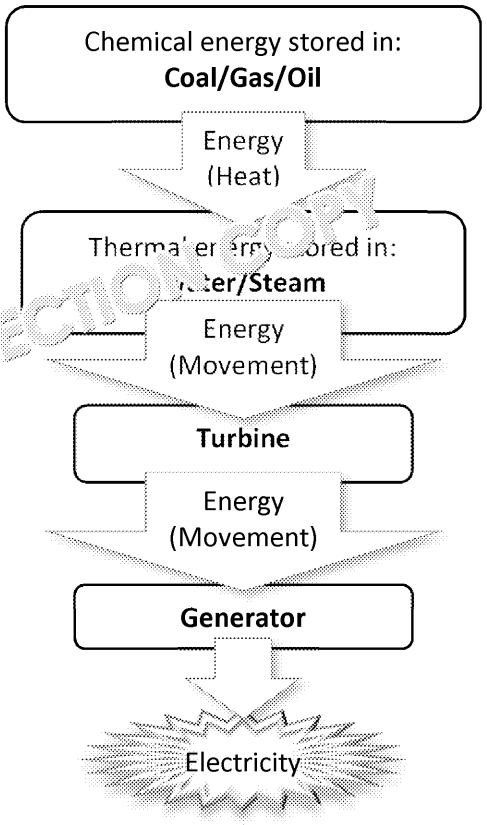
Allow any other valid point(s).

Fossil fuels

7. **1 mark** per valid answer.

a) Oil
c) Gas
f) Coal

8.



9. **1 mark** per valid answer.

Answers could include:

- Relatively easily available.
- Relatively cheap to convert into energy.

Allow any other valid point(s).

10. **1 mark** per valid answer.

Answers could include:

- Fossil fuels release carbon dioxide when burnt.
- Mining destroys habitats and ecosystems as topsoil is removed.
- Mining produces waste rock.
- Oil spills in the ocean and on land affect environment and wildlife.
- Disposal of fracking solution has a negative effect on the environment.

Allow any other valid point(s).

Nuclear power

11. **1 mark** per valid answer.

Answers could include:

- Nuclear fission / fission

Allow any other valid point(s).

12. **1 mark** for valid point/description and **1 mark** for valid explanation/example.

Answer could include:

It makes a good power source because it does not produce greenhouse gases. This means carbon footprint is less and is less likely to contribute to global warming.

Allow any other valid point(s).

Renewable energy

13. **1 mark** per valid answer.
    - Wind energy

14. **1 mark** per valid answer.
    a) Wind
    b) Hydroelectric
    d) Tidal

15. **1 mark** for valid reason that some people consider biomass **to be** sustainable a
    example / evidence of knowledge.

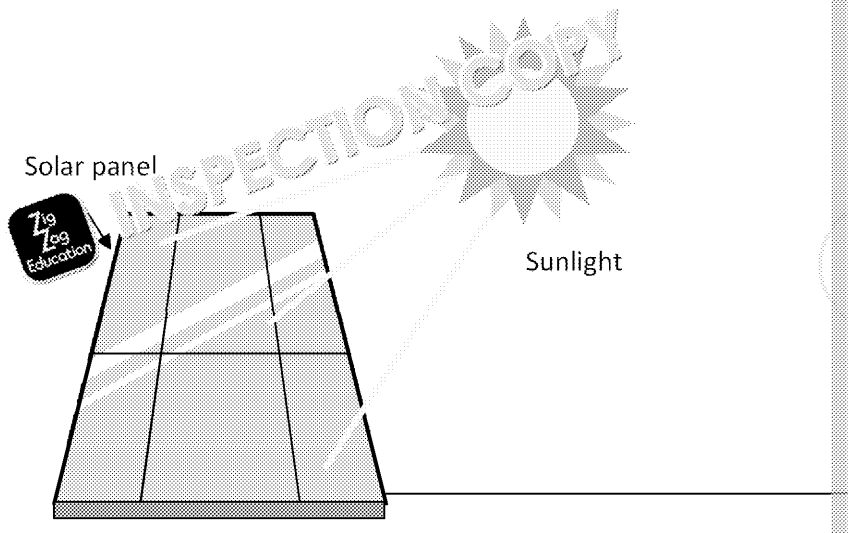
    1 mark for valid reason that some people consider biomass **not to be** sustainabl
    explan ex ple / evidence of knowledge.

    Answer include:
    The products produced from biomass are considered sustainable by some beca
    being produced. Therefore, the CO_2 that is produced when they are burnt for e
    is considered carbon neutral.
    However, some people argue that using a large amount of land to produce biom
    food shortages. This makes it unsustainable as an energy source. It is also muc
    fuel needs to be produced to meet energy consumption, making it even less sust

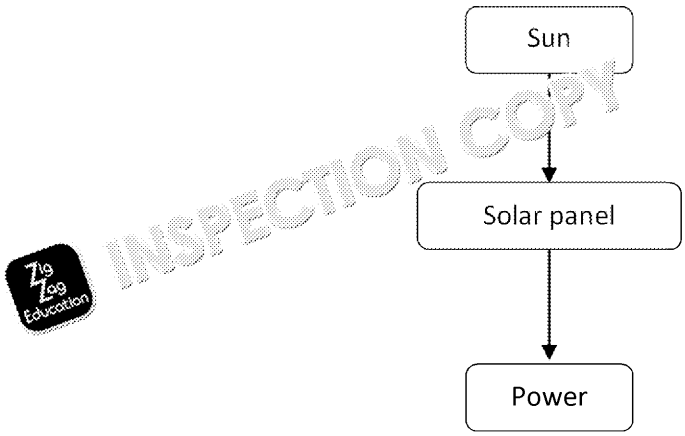
    Allow any other valid point(s).

16. Up to **5 marks** for a clearly indicated, correct process.
    1 mark per stage (up to **3 marks**) in the process identified (sun, solar panel, po
    1 mark for a correctly annotated diagram / flow chart
    1 mark for a clearly presented drawing / flow chart.

    Example of a diagram:



Example of a flow chart:



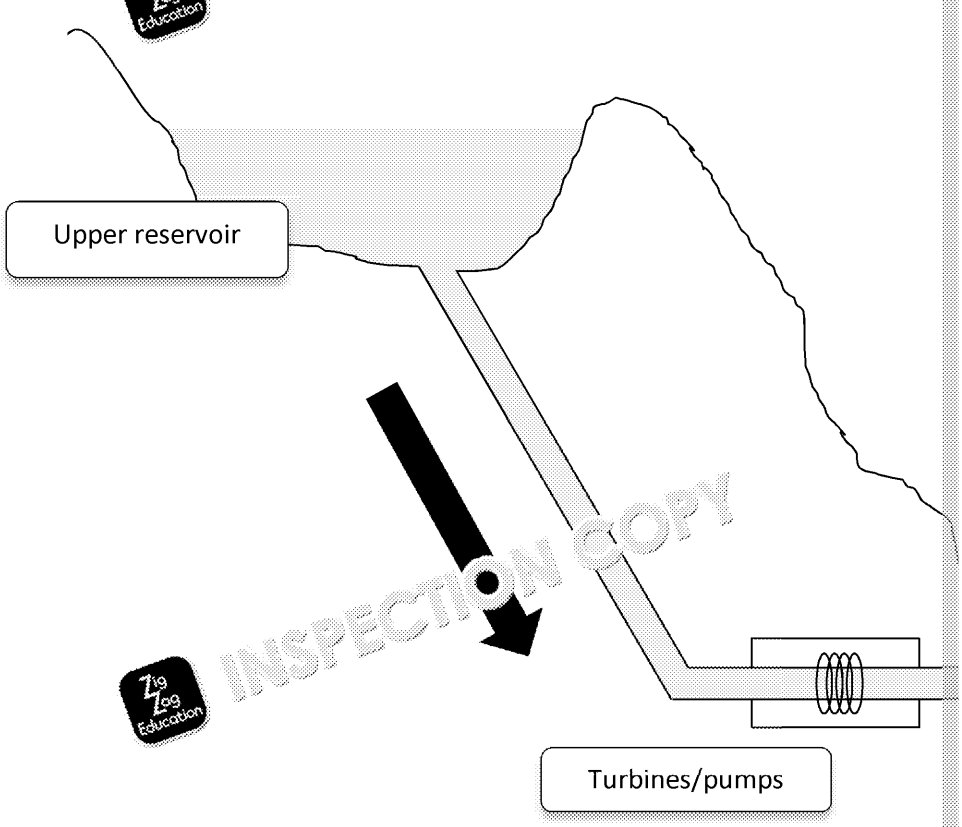
17. **1 mark** for identifying a disadvantage and **1 mark** for demonstrating understa of the disadvantage. **Two** disadvantages must be identified.

Answer could include:
One disadvantage of the use of renewable energy is that it can be costly. This is manufacturing can cost a lot.
Another disadvantage could be that some methods can have negative effects on can lead to habitats being destroyed, ruin countryside views or, in the case of tid of sewage into the sea.

Allow any other valid point(s)

Energy storage syste[illegible]ding batteries

18.



19.

Alkaline batteries	Rechargeable batteries
Disposable	Expensive to buy
Have to be replaced often	Reusable
Output gets less over time	Better for the environment
Worse for the environment	Output remains constant
Cheap to buy	Will last longer

Te[illegible] 4

Modern materials

1. **1 mark** for valid poi[illegible] **1 mark** for valid explanation / example / demonstra

Answe[illegible] in[illegible]
It is im[illegible] to incorporate modern materials into design to be innovative an propert[illegible] functions provided by the new materials. This helps to different market.

Allow any other valid point(s).

2. **1 mark** per valid answer.
Graphene

3. **1 mark** for naming a modern material.
1 mark per property described.

Answer could include:
Metal foams are a modern material. The properties of metal foam include, but a
weight ratio and good ability to absorb sound.

Allow any other valid point(s).

4. **1 mark** per valid answer.
i) Its antibacterial properties.

1 mark per valid answer.
ii) 1) Medical suppli
2) Socks

Smart ma

5. **1 mark** for valid definition and **1 mark** for valid explanation / example / demo

Answer could include:
A smart material is a material that reacts to changes in its environment.

Allow any other valid point(s).

6. i) **1 mark** per valid answer.
c) Thermochromic properties

ii) **1 mark** per function stated. **1 mark** for an explanation of the function stat
Two functions should be stated.

Answer could include:
The first function that the thermochromic properties perform is that they l
the mug are hot and, therefore, to be careful not to scold themselves; this c
The second function is an aesthetic one. The aesth appeal of the mug w
purchase the mug and then use it on a regu da

Allow any other valid point(s).

7. **1 mark** per valid answ
i) Shape mem
ii) A t / Apply an electric current
iii) Nitinol

Composite materials

8. **1 mark** for valid point/definition and **1 mark** for valid explanation/example.

Answer could include:
A composite material is formed when two materials are combined to create a si
properties. An example of a composite material would be glass reinforced plast
strength-to-weight ratio and is highly heat, chemical and corrosion resistant.

Allow any other valid point(s).

9. **1 mark** per valid answer.
b) Glass-reinforced plastic (GRP)
c) Medium-density fibreboard (MDF)
e) Brit Pak (aseptic packaging)

10. **1 mark** per valid answer.

Answers could incl
- Ca
- B
- M kes
- Planes
- Bike frames
- Prosthetics

Allow any other valid point(s).

11. **1 mark** for valid definition of flame retardants and **1 mark** for valid explanation knowledge of flame retardants.

    1 mark for valid definition of fire resistance and **1 mark** for valid explanation / of fire resistance.

    Answer could include:
    Flame retardants are a finish that can be applied to ... fabrics. These are of furniture and curtains and are designed to extinguish flames with a chemical re... Fire-resistant fabrics, made from ... fibres, resist heat and are very hard to ... make protective clothing and fire ... curtains.

    Allow any other valid point(s).

12. **1 mark** ... valid point and **1 mark** for valid explanation. **Two** valid points shou...

    Answer could include:
    Kevlar is used because it is extremely tough and can help deflect bullets and pro...
    It is also used because it can be woven, making it breathable and flexible. This m...

    Allow any other valid point(s).

13. **1 mark** per valid answer.

    Answers could include:
    - Adding aromas to fabric for clothing or furnishings.
    - Antibacterial functions for sportswear.
    - Moisturising or nourishing vitamins added to skin through clothing.
    - Antibacterial and fungal resistance to shower curtains.
    - Bug repellent to mosquito nets or outdoor clothing.

    Allow any other valid point(s).

14. Give the full **8 marks** for an appropriate design that is ... presented and an...
    1–2 marks awarded if the design uses conductive fabric.
    2–4 marks awarded if the design uses ... fabric and is also presented c...
    4–6 marks awarded if the design ... conductive fabric, is presented clearly an...
    6–8 marks awarded if ... uses conductive fabric, is presented clearly an... has been considered ... is appropriate.

Test 5

1. **1 mark** per valid answer.
   Input = keyboard
   Process = microcontroller
   Output = LCD display/screen

2. 1. Push to make. This switch is normally open (NO).
   2. Push to break. This switch is normally closed (NC).

3. Answers could include:
   - Slide
   - Rocker
   - Key
   - Reed
   - Rotary
   - Toggle
   - Membrane
   - Tilt
   - Micro
   - Latching

4. i) **1 mark** for a valid ...
   Light ... resistor (LDR)

   ii) **1 ...** for a valid point and **1 mark** for supporting evidence / example.
   Answers could include:
   A light-dependent resistor can turn on the street light as soon as it's dark. ... be an acceptable level of visibility; for example, if bad weather makes the ... time of day the light will come on and improve the visibility.
   Allow other valid answer(s).

5. **1 mark** for a valid point and **1 mark** for supporting evidence / example.

Answers could include:
A heat sensor could turn off the hair straightener if it gets too hot which would st
and help make the straightener safer.
A heat sensor could set off a beep or turn a light on or off to let the user know th
temperature / is too hot.

Allow other valid answer(s).

6. **1 mark** for a valid point and **1 mark** for supporting evidence / example.

Answers could include:
Pressure sensors will allow the robotic hand to sense what it is trying to grip. Th
accurate and less likely to crush/drop the objects. This will allow for
important role in providing functionality for prosthetics, etc.

Allow other valid answer(s).

7. **1 mark** for a valid answer.
Integrated circuit

8. **1 mark** for a valid answer.
Peripheral interface controllers

9. **1 mark** for a valid point and **1 mark** for supporting evidence / example / show
microcontroller.

Answers could include:
The robot needs a microcontroller because it is responsible for the communicat
decision-making; therefore, it acts like the 'brain' of the robot. The microcontrol
and executed. In this robot, which is capable of being remotely controlled, uses
outputs triggered by other outputs, a microcontroller is essential. All these inpu
would be interpreted through the microcontroller which would contain the inst
can be programmed through coding or a flow chart.

Allow other valid answer(s).

10. **1 mark** for a valid answer (up to **2 marks**).

Answers could include:
- Picaxe
- Genie
- Arduino

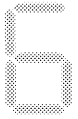
Allow other valid answer(s).

11. i) **1 mark** for a valid answer.
Monostable

ii) **1 mark** for identifying that the sensor needs to be activated.
1 mark per correctly identified process or output (up to **3 marks**).
1 mark for identifying that nothing happens if the sensor is not activated.

Answers could include:
If the sensor is activated:
The blue LED turnings on (output), waits 10 seconds (process) then turns o
If the sensor isn't activated:
Nothing happens.

12. **1 mark** for drawing the correct number: 6
1 mark correctly and clearly drawing the number 6 as it would appear on a
Example correctly drawn 6:



13. **1 mark** for a valid answer.

Answers could include:

- LCD display
- LED/lamp
- Buzzer/speaker

14. **1 mark** for a valid point and **1 mark** for supporting evidence / example.

Answers could include:

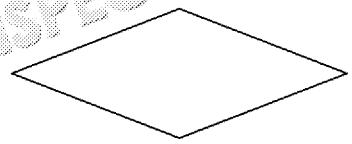
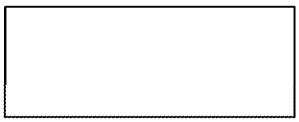
The beeping sound that traffic lights make i di ate hen it is safe to cross for v
function makes the traffic lights an in u e design and makes the road safer fo

Allow other valid answer(

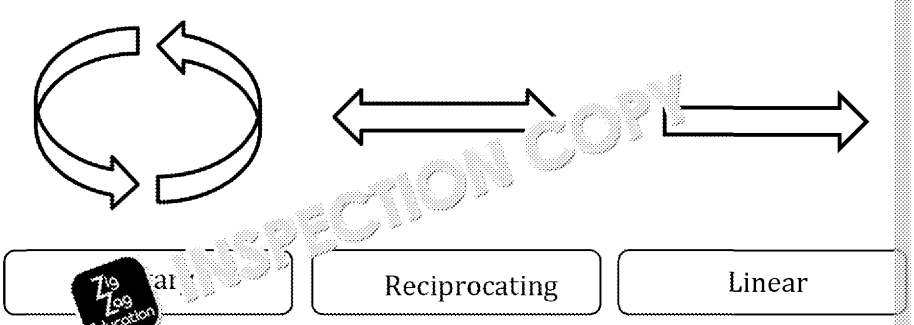
15. i) Gi fu **ks** for an appropriate design that is clearly presented an
1 warded for including a sensor as an input (e.g. heat sensor, light s
1 n awarded **per output** included (up to **2 marks**) (e.g. buzzer, speake
Up to 2 marks awarded if the design is presented clearly.
Up to 2 marks awarded if the design is annotated.

ii) Give the full **6 marks** for an appropriate system flowchart that is clearly pr
1 mark awarded for showing the input.
1 mark awarded per output shown (up to 2 marks).
Up to 2 marks awarded if the flow chart clearly shows the function of the d
Up to 2 marks awarded if the flow chart uses the correct shapes.

Key for reference:

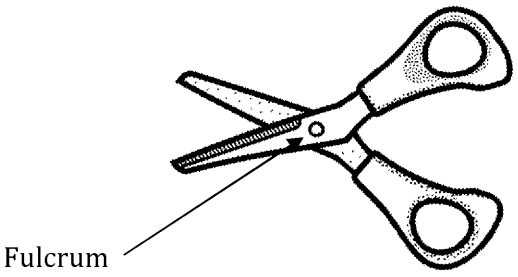
Shape	Meaning
	e minator. The start and end of a f
	Decision-making
	Inputs/outputs
	Process/instruction

1. **1 mark** per valid answer.



[illegible]	Reciprocating	Linear

2. **1 mark** per valid answer.



3. **1 mark** per valid answer.
   i) First order

   ii) Third order

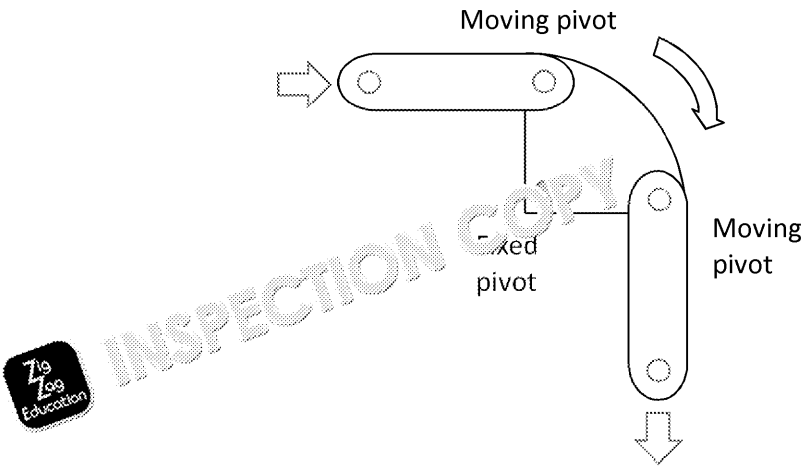
   iii) Second order

4. **1 mark** for correct answer. **1 mark** for showing working out.
   MA = Load = 100 N = 10 = 10:1
   Effort 10 N 1

5. i) **1 mark** for correct answer. **1 mark** for showing working out.
   Moment = Force (N) × Distance (m) = 50 × 0.25 = 12.5

   ii) **1 mark** for correct answer. **1 mark** for showing working out.
   200 N × 50 mm = 100 N × d mm
   2 × 50 mm = d mm
   d = 100 mm

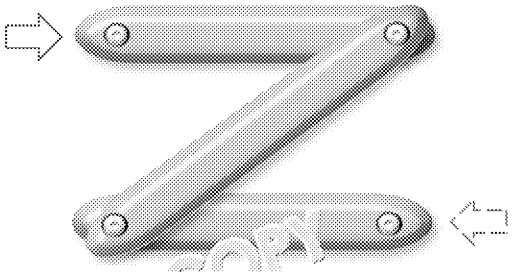
6. Up to **6 marks** for a clearly drawn, annotated, correct mechanism.



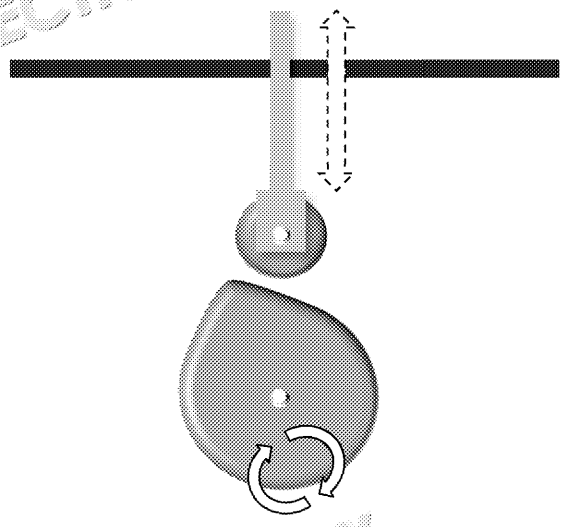
Lose **1 mark** per mistake in the mechanism, annotations or if the drawing is un

7. i) Push/pull reverse linkage

   ii) **1 mark** for a correctly drawn arrow.



8. **1 mark** for a correctly drawn a… **mark** for indication reciprocating move…



9. **1 mark** per valid answer.
   i) Spur gear

   ii) Worm wheel and worm gear

   iii) Bevel gear

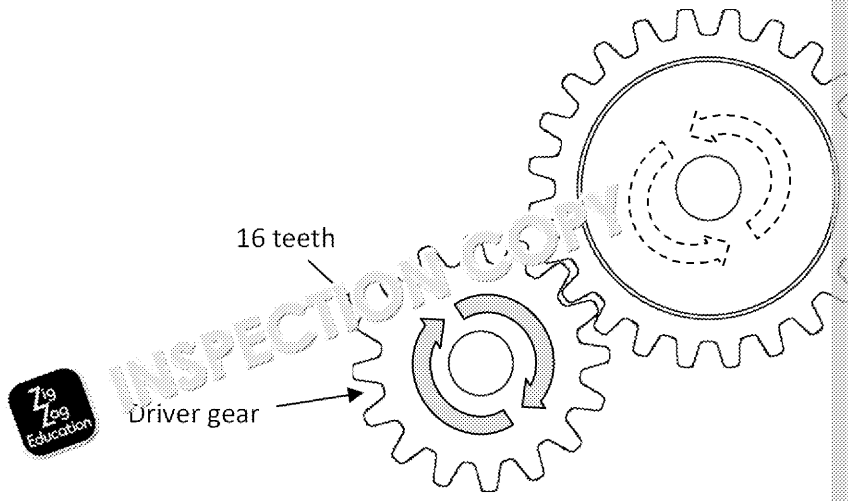
   iv) Rack-and-pinion

   v) Sprocket and chain

10. Award **1 mark** for simple definition.
    Award up to **2 marks** for appropriate definition that shows understanding.
    Example mark answer:
    A gear train is when one gear is locked into another, a simple gear train indicates each gear shaft.
    Accept other valid answer(s).

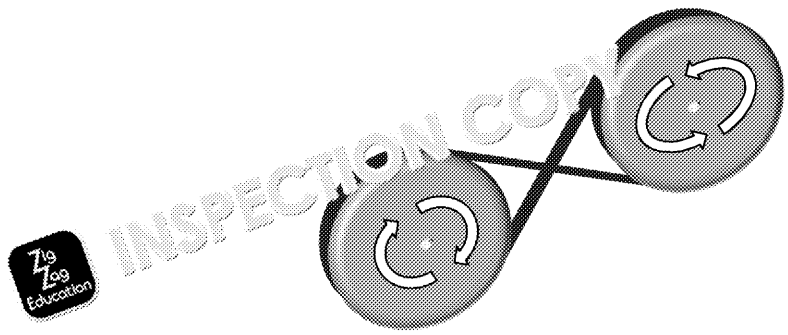
11. i) **1 mark** for correct answer. **1 mark** for showing working out.
    Gear ratio = Number of teeth on the driven gear = 24 = 3:2
    Number of teeth on the driver gear 16

    ii) **1 mark** for a correctly drawn arrow/s.



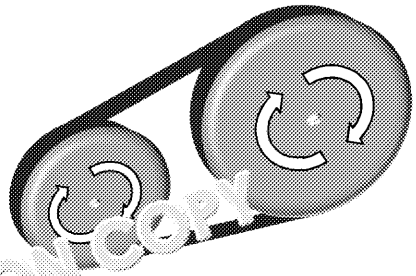
12. **1 mark** for valid point/definition and **1 mark** for valid explanation/example.
    Answer could include:
    Gear ratio means the amount one gear spins in relation to its connected gear. For turn once, but the driven gear will turn twice, making the gear ratio 1:2.
    Allow any other valid point(s).

13. i) **1 mark** for a correctly drawn arrow.



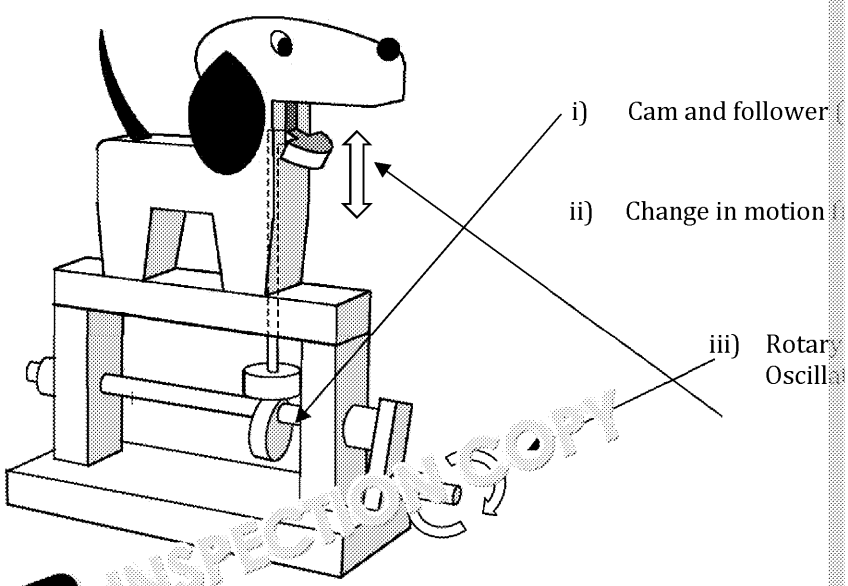
    ii) **1 mark** per valid answer.
    Changing the direction of the motion.

14. i) **1 mark** for a correctly drawn arrow.



ii) **1 mark** per valid answer.
Changing the speed of the motion.

15. **1 mark** per correctly labelled feature (up to **4 marks**).



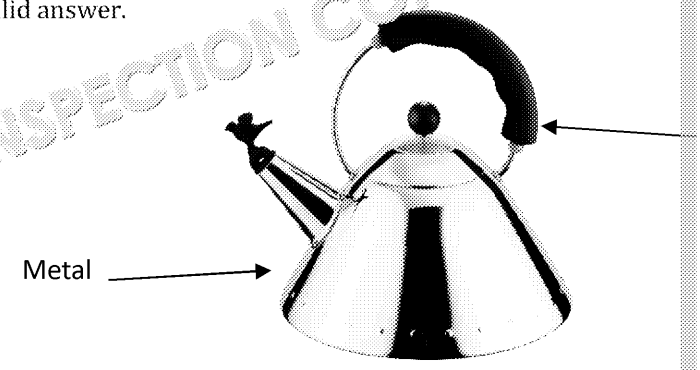
Test 7

1. **1 mark** per valid answer.
   c) Textiles

2. **1 mark** for a valid definition and **1 mark** for supporting example.
   Answers could include:
   Fusibility is a material's ability to melt easily. A material with a low melting poi
   fusibility.
   Allow other valid answer(s).

3. **1 mark** per valid answer.
   c) Copper

4. i) **1 mark** per valid answer.



ii) **1 mark** for a valid point per material identified (up to **2 marks**).
1 mark for supporting evidence / example per material identified (up to **2**

Answers could include:
Metal is used because it is a good thermal conductor which means that the
conducted easily and heat the water efficiently. The plastic is used on the
heat well and, therefore, means the user can use the handle to lift the kettle

Allow other valid answer(s).

5. **1 mark** per valid answer.
Magnetic properties

6. **1 mark** per valid answer.

Answers could include:

- Elasticity
- Strength
- Hardness
- Toughness
- Plasticity
- Durability
- Malleability
- Brittleness

Allow other valid answer(s).

7. i) **1 mark** for identifying a valid mechanical property of plastic.

Answers could include:

- Strength
- Hardness
- Toughness
- Durability
- Plasticity

1 mark for supporting evidence / example.

Answers could include:
The plastic which the lunch box is made from has high plasticity. This mea
during manufacture.

Allow other valid answer(s).

ii) **1 mark** for mentioning the
1 mark for identifyin
Answers co
H
va
Allow other valid answer(s).

8. **1 mark** for a valid definition and **1 mark** for supporting example.

Answers could include:
Malleability is the ability to bend without breaking. Metals are considered malle
and manipulated without cracking or breaking. Gold, copper and tin are examp

Allow other valid answer(s).

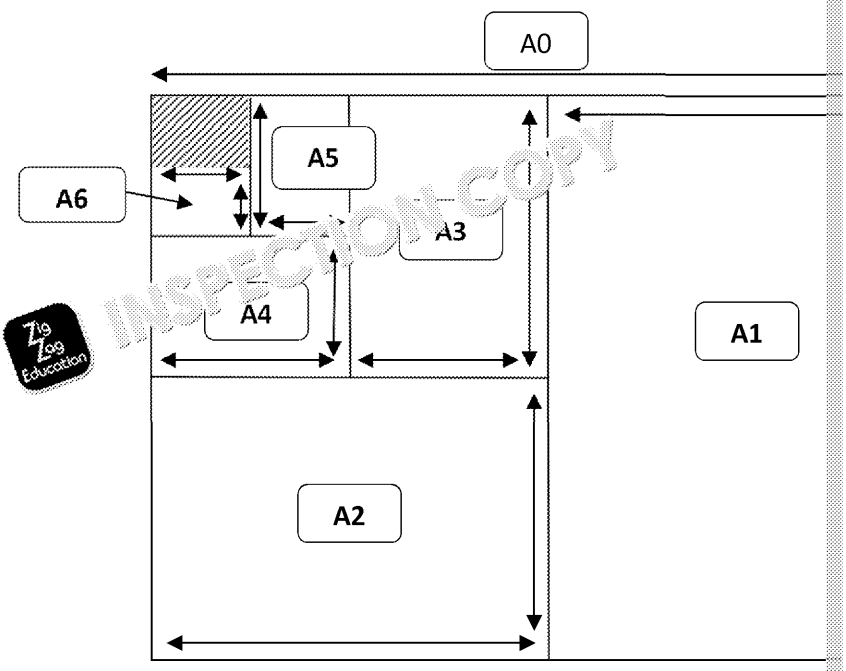
9. i) **1 mark** per valid answer.
A material that has the ability to resist being crushed has high **compressiv**

ii) **1 mark** per valid answer.
A material that can be easily stretched has a low **t** strength.

10. **1 mark** for a valid point and **1 mark** for
Answers could include:
The properties of a m
than one
Allow

11. **1 mark** per material used (up to **2 marks**).
1 mark per correct annotation (up to **2 marks**).
1 mark per explanation of material property.
Up to **2 marks** awarded for clarity of drawing.

1. **1 mark** per valid answer.



2. **1 mark** per valid answer.

Answers could include:

- Bleedproof
- Grid
- Layout
- Tracing
- Cartridge

Allow any other valid point(s).

3. **1 mark** per valid answer.
Grams per metre squared.

4. **1 mark** per valid answer.
200 gsm

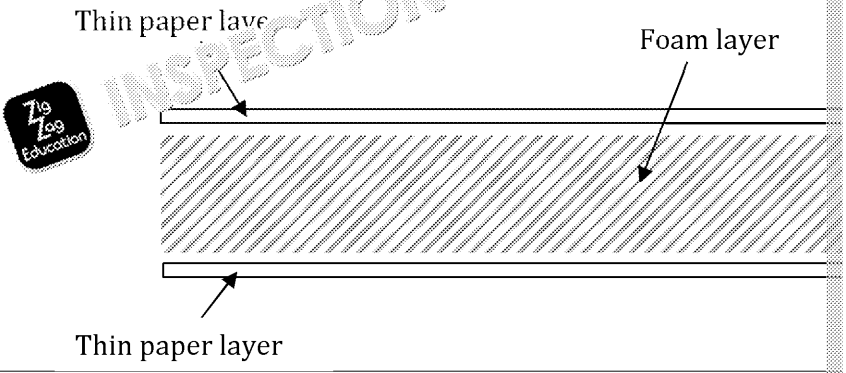
5. **1 mark** for valid point/definition and **1 mark** for valid explanation/example.

Answer could include:
Paper can be laminated to make it stronger. Lamination is the process of layering materials to make it stronger or give it other properties.

Allow any other valid point(s).

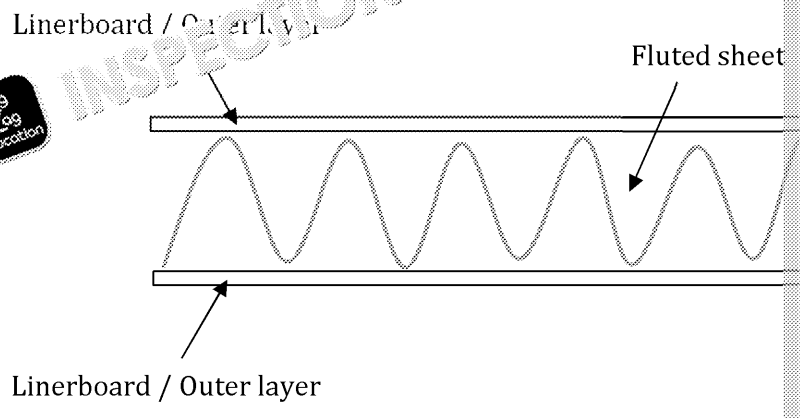
6. i) **1 mark** per valid answer.
Foam core is often used for models and mounting posters because it is stiff.

ii) **1 mark** awarded if drawing is a cross section.
1 mark if drawing is of foam board.
Up to **2 marks** awarded for correct annotations.
Up to **2 marks** awarded for clarity of drawing.



7. i) **1 mark** for valid point/definition and **1 mark** for valid explanation/exampl
Answer could include:
Corrugated cardboard is often used for secondary packaging because it's li
Allow any other valid point(s).

ii) **1 mark** awarded if drawing is a cross section.
1 mark if drawing is of corrugated cardboard.
Up to **2 marks** awarded for correct annotatio
Up to **2 marks** awarded for clarity of d



8. **1 mark** per valid answer.
Solid white board

9. **1 mark** for valid point/definition and **1 mark** for valid exp nation/example.
Answer could include:
Duplex board is a thick card (normally 250-50 gs.) which is unbleached on o
the other. It is mainly used for fo d packaging and is printed on the bleached si
saves money in the produc pro ss.
Allow any other v t(s).

Test 9

1. **1 mark** for identifying that a hardwood is wood from slow-growing trees.
1 mark for supporting evidence / example of hardwoods.
1 mark for identifying that softwood is wood from fast-growing trees.
1 mark for supporting evidence / example of softwoods.
Allow other valid answer(s).

2. **1 mark** per valid answer.
Answers could include:
- Ash
- Beech
- Oak
- Balsa
- Teak
- Mahogany

Allow any other valid answer(s).

3. **1 mark** per valid answer.
Answers could include:
- Larch
- Pine
- S e
- Pa ne
- Fir
- Douglas fir
- Hemlock
- Corsican pin
- Monterey pi
- Spruce

Allow any other valid answer(s).

4. **1 mark** per valid answer.
Ash

> **For Your Information:**
>
> **Ash** is often used for tool handles because it is tough and is the most elastic European wood. These properties help the wood to absorb shock which prevents the shock from travelling into the user's arm and makes it a more durable tool handle.

5. **1 mark** per valid answer.
Beech

> For Your Information:
>
> **Beech** is often used for outdoor children's toys because it is non-toxic and resistant to splintering due to its dense grain. Beech also finishes well and can be painted.

6. **1 mark** for a valid point and **1 mark** for supporting evidence / example.
Answers could include:
Balsa wood is often used for modelling because it is incredibly light and soft. This and makes the overall weight of the model light with less need for support.
Allow other valid answer(s).

7. **2 marks** for a valid description, **1 mark** for identifying that it is a hardwood, **2** for the uses of oak.
Answers could include:
Oak is a hardwood. It is strong, durable and has a light brown colour. It can and is often used for making decorative furniture pieces, boat building and building
Allow other valid answer(s).

8. **1 mark** per valid answer.
Answers could include:
- Oil
- Paint
- Wood stain
- Polyurethane

Allow any other valid answers(s).

9. Forest Stewardship Council

10. **1 mark** for a valid point and **1 mark** for supporting evidence / example / explan
Answers could include:
Manufactured board is sheets of wood composite which is man-made. These sheets sizes which makes them particularly useful for construction and cheap furniture
Allow other valid answer(s).

11. **1 mark** per valid answer.
Plywood

12. **1 mark** per valid answer.
Answers could include:
- MDF
- Chipboard
- Blockboard
- Hardboard
- Laminboard

Allow any other valid answers(s).

1. **1 mark** for identifying that a ferrous metal is a metal that contains iron.
1 mark for supporting evidence / example of ferrous metals.
1 mark for identifying that non-ferrous metal is metal that doesn't contain iron.
1 mark for supporting evidence / example of non-ferrous metals.
Allow other valid answer(s).

2. **1 mark** per valid answer.
Answers could include:
- Cast iron
- Stainless steel
- Low-carbon st
- High-carbon

Allow any other valid point(s).

3. **1 mark** per valid answer.
Answers could include:
- Aluminium
- Copper
- Zinc
- Tin
- Brass
- Silver
- Pewter
- Gold
- Platinum

Allow any other valid point(s).

4. **1 mark** for a valid point and **1 mark** for supporting evidence / example.
Answers could include:
An alloy is a metal that is made by combining two or more metals. Combining tw with improved, or required, properties or characteristics. Pewter is a non-ferrou like silver but is cheaper to produce.
Allow other valid answer(s).

5. **1 mark** per valid answer.
Aluminium

6. **1 mark** for a valid point and **1 mark** for supporting evidence / example.
Answers could include:
Stainless steel is hard and does not rust. This makes it a good material to use for hygenic. It also has a shiny silvery finish which makes it aesthetically pleasing.
Allow other valid answer(s).

7. **1 mark** per valid answer.
Answers could include:
- Very hard
- Strong
- Less ductile than mild steel
- Harder than
- Durable

Allow any other valid point(s).

8. **1 mark** per valid answer.
Answers could include:
- Ductile
- Malleable
- Poor resistance to corrosion
- Tough
- Easily machi

Allow any other valid point(s).

9. **2 marks** for a valid description, **1 mark** for identifying that it is non-ferrous.
2 marks for providing examples of the uses of copper.
Answers could include:
Copper is a non-ferrous metal. It is a very good electrical conductor, it is reddish and malleable. It also conducts heat well. It is most commonly found in electrica also be used for roofing and jewellery.
Allow other valid answer(s).

10. **1 mark** per valid answer.

Answers could include:

- Silver
- Gold
- Platinum

Allow any other valid point(s).

Test 11

1. **1 mark** for identifying that th[illegible]cs can be remoulded using heat.
1 mark for supporti[illegible] example of thermoplastics.
1 mark f[illegible]at thermosetting plastics cannot be remoulded using he
1 mar[illegible]pp[illegible]ding evidence / example of thermosetting plastics.

Allow o[illegible]valid answer(s).

2. **1 mark** per valid answer.

Answers could include:

- Polypropylene (PP)
- Acrylic (PMMA)
- Polyethylene terephthalate (PET)
- High-density polyethylene (HDPE)
- High-impact polystyrene (HIPS)
- Acetate
- Low-density p
- Expanded po
- Polyvinyl chl
- Nylon

Allow other valid answer(s).

3. **1 mark** per valid answer.

Answers could include:

- Polyester resin (PR)
- Phenol formaldehyde (PF)
- Epoxy resin (ER)
- Urea formald
- Melamine fo

Allow other valid answer(s).

4. **1 mark** for a valid poi[illegible] **mark** for supporting example.

Answers[illegible]d [illegible]
A natu[illegible]ic is a plastic that occurs naturally and is not produced through p
include [illegible]and amber.

Allow other valid answer(s).

5. **1 mark** for valid point and **1 mark** for valid explanation.

Answer could include:
Urea formaldehyde (UF) is a very good electrical insulator. This means that it d
makes it safe to use for plug sockets as it allows people to touch the socket with

Allow any other valid point(s).

6. **1 mark** for a valid point and **1 mark** for supporting evidence / example.

Answers could include:
Polystyrene is lightweight and a good insulator. It is often chosen for packaging
unnecessary weight while keeping the product intact and protected.

Allow other valid answer(s).

7. **1 mark** per valid answer.

Answers could include:

- Strong
- Li[illegible]gh
- St[illegible]

Allow other valid answer(s).

8. **1 mark** per valid answer.

Answers could include:

- Tough
- Brittle when thin
- Easily formed
- Easily scratch
- Available in a
- Can be trans

Allow other valid answer(s).

9. **1 mark** per valid answer.

i) Polyethylene terephthalate (PET)

ii) Polyvinyl chloride / PVC

10. **2 marks** for a valid d... **1 mark** for identifying that it is a thermoplastic. **2 marks** for ... examples of the uses of polypropylene.

Answe... include:

Polypro...ene is a thermoplastic. It is a very flexible plastic with a high-impact ... found plastic, it is easily recyclable. It is used for products with live hinges due ... used for food containers.

Allow other valid answer(s).

11. **1 mark** per valid answer.

Answers could include:

- Films and rolls
- Foam
- Granules
- Sheets
- Tubes
- Powders
- Blocks

Allow other valid answer(s).

12. **1 mark** per valid answer.

Answers could include:

- Resin
- Powder

Allow other valid answer(s).

Test 12

1. **1 mark** for identifying that a natural fibre is an animal- or plant-based fibre.
1 mark for supporting evidence / example of natural fibres.
1 mark for identifying that synthetic fibres are man-made and made from crud...
1 mark for supporting evidence / example of synthetic fibres.

Allow other valid answer(s).

2. **1 mark** per valid answer.

Answers could include:

- Wool
- Cotton
- Linen
- Silk

Allow any other valid point(s).

3. **1 mark** per valid answer.

Answers could include:

- Nylon/polyamide
- Polyester
- Acrylic
- Elastane (Ly...

Allow any other valid ...

4. **1 mar...** fi... blending fibres. **1 mark** for defining mixing fibres.

Answer... include:

The difference between blending and mixing fibres is whether the fibres are pu... made into yarn. Blending fibres is when two or more types of fibre are mixed to... when two or more yarns made of one fibre are knitted/woven together to make ...

Allow other valid answer(s).

5. **1 mark** per valid answer.
Nylon/polyamide

6. **1 mark** for a valid point and **1 mark** for supporting evidence / example.
Answers could include:
Cotton is often used for bedsheets because it is comfortable, hardwearing, abso
hot weather. These properties make cotton desirable for bed sheets because th
comfortable during the night and can be washed oft ut deteriorating.
Allow other valid answer(s).

7. **1 mark** per valid answer.
Answers could incl
- E e
- C han pure cotton
- More durabl
- Easily dyed /

Allow any other valid point(s).

8. **1 mark** per valid answer.
Answers could include:
- Hard-wearing
- Great stretch
- Resists creasing
- Easily takes colour
- Quick-drying
- Good handle
- Good drape

Allow any other valid point(s).

9. **2 marks** for a valid description, **1 mark** for identifying that it is a natural fibre
2 marks for providing examples of the uses of silk.
Answers could include:
Silk is a natural fibre. It is made from the cocoon of a Chine e silkworm. It is a s
good drape. It is most commonly used to produce hi h lothing and beddin
Allow other valid answer(s).

10. **1 mark** per valid answer.
Answers could incl
- J
- Cl lankets
- Sca s
- Sportswear
- Cardigans
- Tights and le
- Socks
- Baby shoes

Allow other valid answer(s).

11. **1 mark** per valid answer.
Answers could include:
- Upholstery
- Tablecloths
- Clothing
- Bed sheets

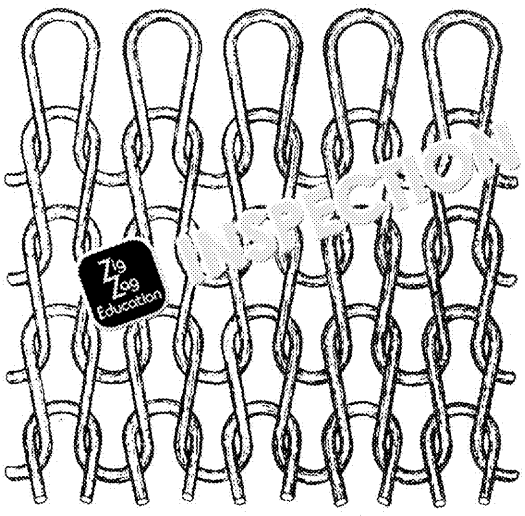
Allow other valid answer(s).

12. **1 mark** per valid answer.
Answers could include:
- Disposable products
- Cloths
- Protective clothing
- Teabags
- Anti-scratch
- Insulation
- Crafts

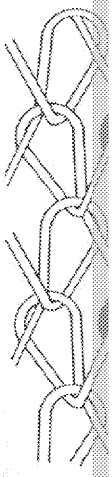
Allow other valid ans

13. **1 mark** for an appropriate diagram showing a knitted fabric construction meth
Up to **2 marks** awarded for a correctly annotated and clearly presented diagra
Example of diagrams:

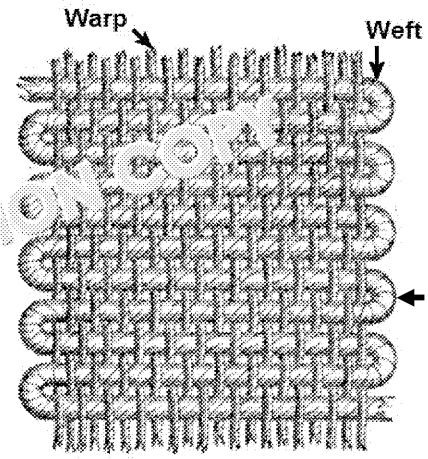
Weft knitting **Warp**



or



14. **1 mark** for an appropriate diagram showing a woven fabric construction metho
Up to **2 marks** awarded for a correctly annotated and clearly presented diagra
Example of diagram:



15. **1 mark** for an appropriate diagram showing a non-woven fabric construction m
Up to **2 marks** awarded for a correctly annotated and clearly presented diagra
Example of diagram: