

SAMPLE DESIGN AND TECHNOLOGY GCSE EXAMINATION PAPER AND MARKSCHEME

CENTRE NUMBER

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CANDIDATE NUMBER

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(SAMPLE 5)

SURNAME

FORENAME(S)

CANDIDATE SIGNATURE

2 HOURS ALLOWED

Materials required for this examination:

- normal writing and drawing instruments
- a calculator
- a protractor.

Instructions to candidates:

- Use black ink or black ball-point pen. Use pencil only for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write on blank pages.
- Do all rough work in this book. Cross through any work that you do not want to be marked.

Information

- The marks for questions are displayed.
- The maximum mark for this paper is 130.
- There are 22 marks for Section A, 37 marks for Section B and 71 marks for Section C.

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CORE TECHNICAL PRINCIPLES - SECTION A

The questions to follow are multiple choice. Tick one answer for each question.

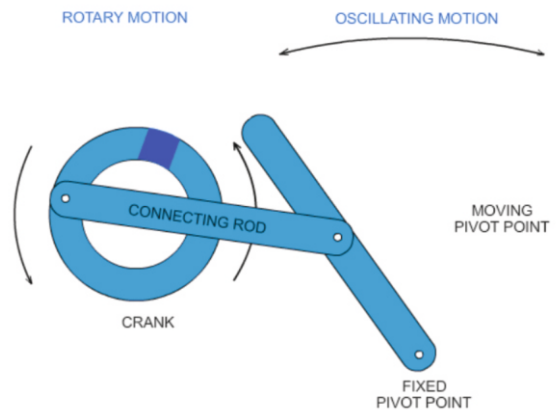
1. Which one of the following manufacturers, initially concentrated on designing and manufacturing 'metal' kitchenware ?

- A. Apple
- B. Alessi
- C. Raleigh
- D. Tesla

This link will help you answer this question

http://www.technologystudent.com/prddes_2/alessi1.html

2. Which type of mechanism does the diagram opposite represent?



- A. Cam
- B. Spring
- C. Treadle
- D. Worm Gear

This link will help you answer this question

http://www.technologystudent.com/despro_fish/treadle1.html

3. Linear Motion is:

[Link to potential answer](#)

<http://www.technologystudent.com/forcmom/motion1.html>

- A. Movement in a straight line and in one direction.
- B. Movement following a circular path, around a fixed point
- C. When an object swings left and then right (or vise-versa), from a fixed point.
- D. A repetitive movement left to right OR up and down.

4. Identify the material that is a thin sheet/layer of natural wood

- A. Flexiply
- B. MDF
- C. Veneer
- D. Plywood

Link to potential answer

<http://www.technologystudent.com/joints/timber4.html>

5. Which of the following designers, designed the London Underground Map?

- A. Philippe Starck
- B. Marcel Breuer
- C. Jorn Utzon
- D. Harry Beck



Link to potential answer

http://www.technologystudent.com/prddes_2/beck1.html

6. Which of the following statements describing 'POLYESTER' is FALSE?

Link to potential answer

<http://www.technologystudent.com/joints/pet1.html>

- A. It is also called 'polyethylene terephthalate'.
- B. It is a thermoplastic polymer.
- C. It cannot be manufactured as a fibre / textile material.
- D. It is 100% recyclable.

7. Which of the statements about Graphene is FALSE?

Link to potential answer

http://www.technologystudent.com/despro_fish/graphene1.html

- A. Graphene is a nonmetal.
- B. Graphene has high resistance to the flow of electricity.
- C. Graphene has the potential to radically change our consumer world.
- D. Graphene exhibits amazing potential, especially in the electrical and electronics industries.

8. Which of the following statements about nano materials is TRUE?

[Link to potential answer](#)

http://www.technologystudent.com/joints_flash/revcard_nano1.html

A. Nanos are used by the Food Processing industry, to add flavour and taste.

B. Nano materials are widely used in the construction industry, because of their resistance to corrosion.

C. A single particle of a nanomaterial, has an average size between 1 to 100 nanometres (nm), which is extremely small.

D. Nano materials are derived from natural wood.

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9. Which of the statements below is accurate regarding 'wood turning'?

[Link to potential answer](#)

<http://www.technologystudent.com/equip1/woodturn1.html>

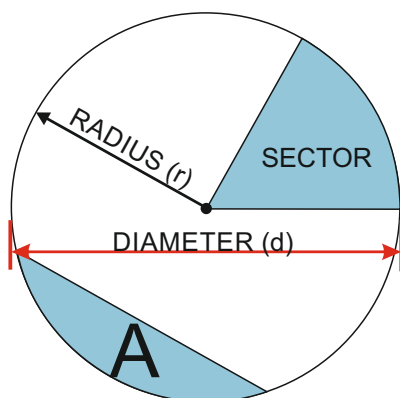
A. Is a method of bending thin layers of wood, forming complicated shapes.

B. Is a technique whereby wood is turned around, during the seasoning process.

C. A process that creates a 'reflective' coating on a range of woods.

D. Wood is 'turned' on a woodworking lathe, producing items such as lamps, table legs and bowls.

10. What is the name of the area of the circle labelled 'A', seen below?



[Follow the link to a potential answer.](#)

<http://www.technologystudent.com/pdf14/math4.pdf>

A. Segment

B. Chord

C. Tangent

D. Aspect

TO HELP YOU ANSWER
THIS QUESTION

<http://www.technologystudent.com/prddes1/susenv1.html>

11. Describe two ways, in which sustainable forests can contribute to the local economy. 2 marks

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1:

*Follow the link for possible answers.
1 mark per correct answer.*

2:

Employment, careers, leisure industry etc.....

TO HELP YOU ANSWER
THIS QUESTION

<http://www.technologystudent.com/joints/sustain1.html>

12. The logo shown opposite, is sometimes printed on timber and packaging. Explain the meaning of this logo. 2 marks

Follow the link for the answer.

*1 mark for basic answer.
2 marks for more detail.
Use teacher discretion.*



TO HELP YOU ANSWER
THIS QUESTION

<http://www.technologystudent.com/enerflsh/coal3.html>

13. A number of Power Stations, produce electricity from coal. Give two reasons why some people are against this method of energy production. 2 marks

Reason 1:

*Follow the link for possible answers.
1 mark per correct answer.*

Reason 2:

TO HELP YOU ANSWER
THIS QUESTION

<http://www.technologystudent.com/enerflash/coal3.html>

14. Give two reasons why some people are in favour of electricity produce by coal fuelled power stations . 2 marks

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Reason 1:

*Follow the link for possible answers.
1 mark per correct answer.*

Reason 2:

TO HELP YOU ANSWER
THIS QUESTION

<http://www.technologystudent.com/pdf14/maths5.pdf>
PAGE 2

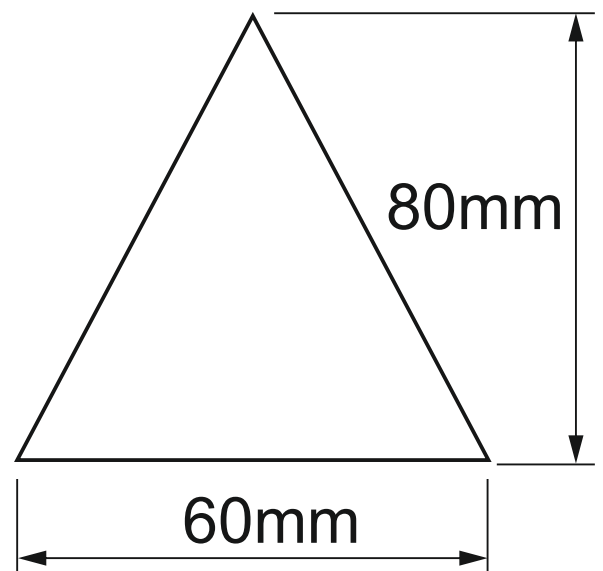
15. What is the area of the triangle seen in the diagram.

You will gain marks for each stage of the calculation, written in the space below.

4 marks

CALCULATION:

A triangle has a base of 60mm and a height of 80mm



AREA = 1/2 X BASE X HEIGHT

$$\text{AREA} = \frac{60 \times 80}{2}$$

$$\text{AREA} = \frac{4800}{2}$$

$$\text{AREA} = 2400\text{mm}^2$$

FORMULA

AREA = 1/2 X BASE X HEIGHT

AREA = 1/2 b x h

$$\text{AREA} = \frac{b \times h}{2}$$

SECTION B - Specialist Technical Principles

16. Nylon is one of the most useful of all plastics

Describe the manufacture of nylon. Include notes and a labelled sketch(s)

8 marks

TO HELP YOU ANSWER
THIS QUESTION

http://www.technologystudent.com/joints_fish/nylon2.html

Up to 4 marks for the quality and clarity of the diagram / diagrams.

1 mark simple / basic diagram(s)

2-3 marks for increased detail.

4 marks for good quality diagram(s)

Up to 4 marks for the written detail.

1 mark simple / basic explanation.

2-3 marks for increased detail.

4 marks for excellent detail and clarity.

TO HELP YOU ANSWER
THIS QUESTION

http://www.technologystudent.com/joints_flesh/nylon1.html

17a. List two properties of nylon? 2 marks

*Follow the link for potential answers.
1 mark awarded per correct answer*

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17b. Name two products manufactured from nylon? 2 marks

1 mark for each correctly identified product.

18. Name a product manufactured from kevlar® and explain why this is a suitable material for its production. 4 marks

TO HELP YOU ANSWER
THIS QUESTION

<http://www.technologystudent.com/joints/kevlar1.html>
<http://www.technologystudent.com/joints/kevlar2.html>
<http://www.technologystudent.com/joints/kevlar3.html>
<http://www.technologystudent.com/joints/kevlar4.html>

PRODUCT: _____

REASONS 1:

1 mark for correctly identified kevlar product.

1 mark awarded for each correct reason (up to 3 marks)

19. Steel is a very important material, found all around us in buildings, bridges, cars and many other products. Iron is 'converted' into steel. In the space below, name and describe the process of conversion, using notes and diagrams.

5 marks

TO HELP YOU ANSWER
THIS QUESTION

<http://www.technologystudent.com/joints/iron5.html>

PROCESS NAME: _____

1 mark for the correct process name (follow link for answer)

1 further mark for a basic diagram.

2 marks for additional detail.

3-4 marks for a detailed answer.

Use teacher discretion.

20a. Some products are manufactured through a process called ‘compression moulding’. Using notes and a diagram(s), explain this process. 4 marks

TO HELP YOU ANSWER
THIS QUESTION

Follow the links below.

<http://www.technologystudent.com/equip1/hypress1.htm.htm>

Follow the link for the answer.

Up to 2 marks for detailed notes.

Up to 2 further marks for a diagram(s)

20b. List four products manufactured through compression moulding. 4 marks

TO HELP YOU ANSWER
THIS QUESTION

Follow the links below.

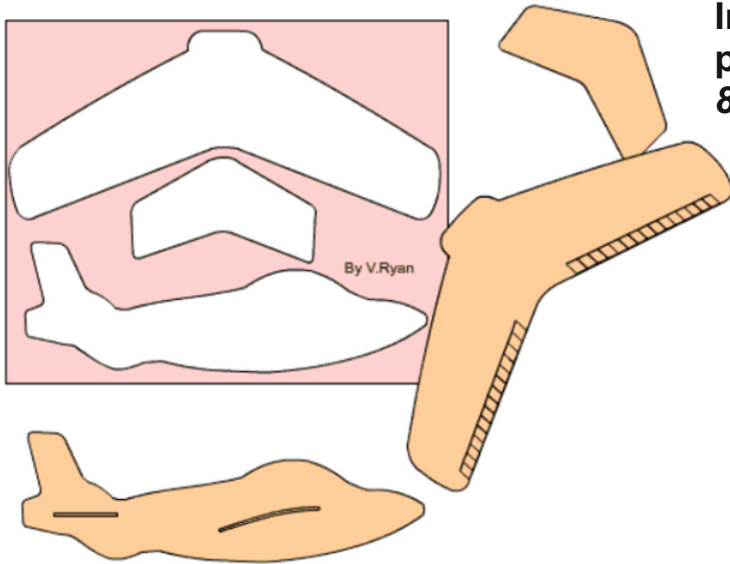
<https://www.youtube.com/watch?v=-FxiWMnY4aQ&t=7s>

1 mark for each correctly identified product. Total of 4 marks.

TO HELP YOU ANSWER
THIS QUESTION

Follow the links below.
<http://www.technologystudent.com/rmprp07/glider2.html>

21a. The toy glider shown below, is 'batch' manufactured, through a process called die cutting. It arrives to the customer on a flat sheet of polystyrene and the three parts are pressed out of the sheet, to form the lightweight glider.



In the space below, explain the process, using notes and a diagram(s).
8 marks

Follow the link for potential answers.

Up to 4 marks for detailed notes / explanation.

1 mark for basic notes.

2-3 marks for increased detail.

4 marks for full/complete explanation.

Up to 4 further marks, depending on the quality of the diagram(s).

1 marks for simple/basic diagram

2-3 marks for increased detail.

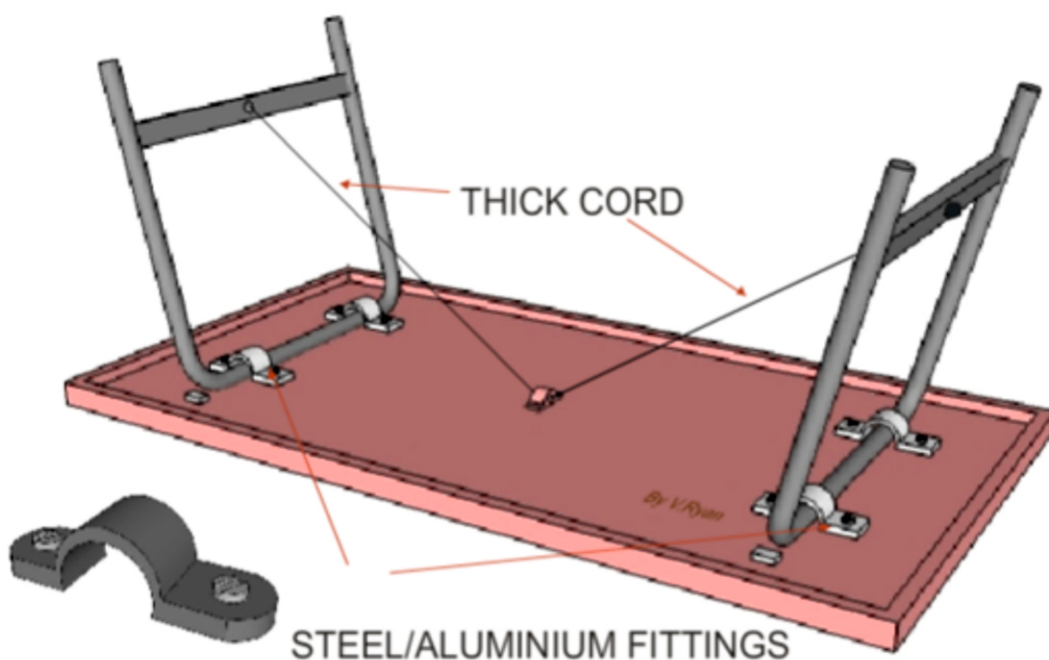
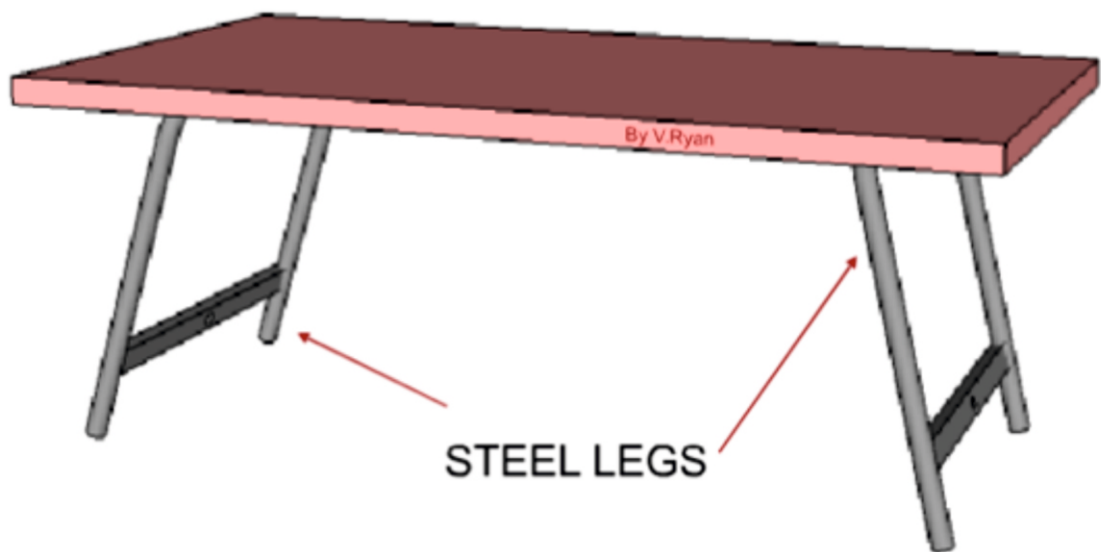
4 marks for a detailed diagram(s)

SECTION C - DESIGNING AND MAKING PRINCIPLES

FOLDING PICNIC TABLE

This picnic table, has been designed to fold away to a compact form and to be transported with ease.

HIGH DENSITY POLYETHYLENE TABLE TOP



PICNIC TABLE QUESTIONS

TO HELP YOU ANSWER
THIS QUESTION

Follow the links below.
<http://www.technologystudent.com/rmprep08/plastab3.html>

22a. Why is High Density Polyethylene (HDPE), a suitable material for the table top? 4 marks

Follow the link for potential answer.

1 mark awarded per suitable reason.

22c. Describe the stages of manufacturing the table top? Use notes and diagrams 6 marks (Link for help - <http://www.technologystudent.com/rmprep08/plastab6.html>)

*Up to 3 marks for the diagram(s)
1 mark for a basic / simple diagram
2-3 marks for increased detail*

*Up to 3 marks awarded for notes/explanation
1 mark for a basic explanation
2-3 marks for more detail.*

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

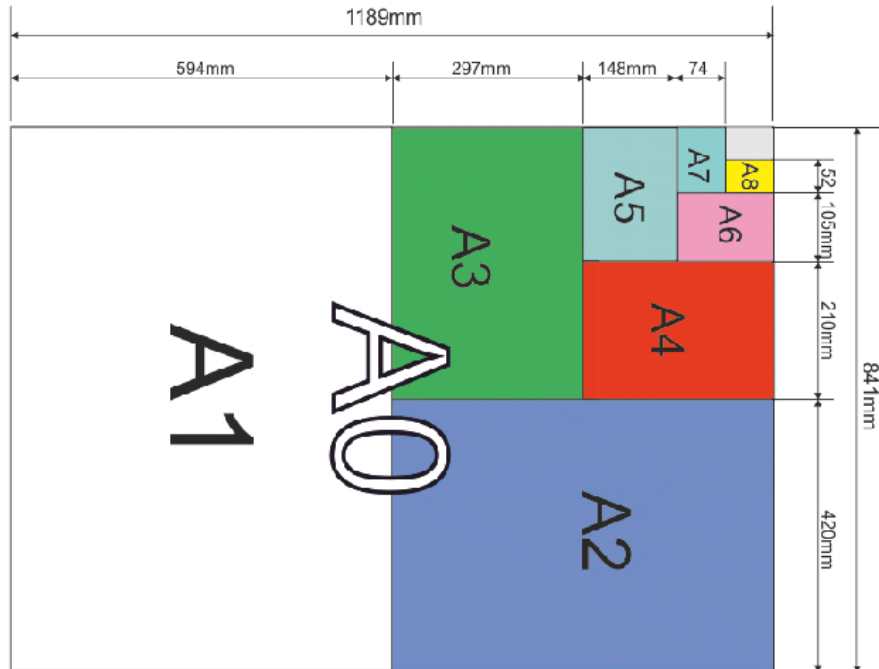
http://www.technologystudent.com/despro_flsh/cardpap1.html

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23a. The International Standard ISO 216 (International Organization for Standardization), sets out the common paper sizes used around the world? Mark the following paper sizes on the diagram below, in the correct positions . A2, A3, A4, A5
4 marks



1 mark per correct answer.

23b. What is the meaning of the symbol shown below? 4 marks

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

http://www.technologystudent.com/despro_flsh/eurosym1.html

Follow the link for potential answer.

1 mark per fact - up to 4 marks.



TO HELP YOU ANSWER THIS QUESTION Follow the link below.

http://www.technologystudent.com/despro_flash/laminate1.html

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24a. Laminated card packs such as Tetra Paks , are often used to store liquids. Briefly, describe the process of manufacture, of this type of pack. 5 marks.

Follow the link to a detailed explanation

1 mark awarded per correctly identified fact / statement/ stage.

24b. There are different forms of corrugated card. These include: Single Face, Single Wall and Double Wall . Draw a simple diagram representing each the the forms listed. 3 marks

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

http://www.technologystudent.com/despro_flash/charity9.html

Single Face

Single Wall

Double Wall

Follow the link for all three diagrams.

1 mark per correct diagram.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.
http://www.technologystudent.com/prddes_2/crowd1.html

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25a. These questions are related to key business terms / phrases (6 marks in total)

What is crowd funding? 2 marks

Follow the link at the top of the page for the answers.

1 mark awarded for a basic answer.

2 marks for additional detail.

25b. What is the Fair Trade system? 2 marks

Follow the link at the top of the page for the answers.

1 mark awarded for a basic answer.

2 marks for additional detail.

25c. What are cooperatives? 2 marks

Follow the link at the top of the page for the answers.

1 mark awarded for a basic answer.

2 marks for additional detail.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

<http://www.technologystudent.com/prddes1/ictmod1.html>

Designers need an understanding of the role ICT, in designing and developing ideas.

26a. What role does ICT play in modelling and developing ideas? 4 marks

Follow the link for potential answer.

1 mark per correct statement.

Use teacher discretion.

26b. What is the meaning of CNC? Include an explanation of the role of coordinates in your answer. 4 marks

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

<http://www.technologystudent.com/cam/cnccut1.html>

Follow the link for potential answer.

1 mark per reasoned statement

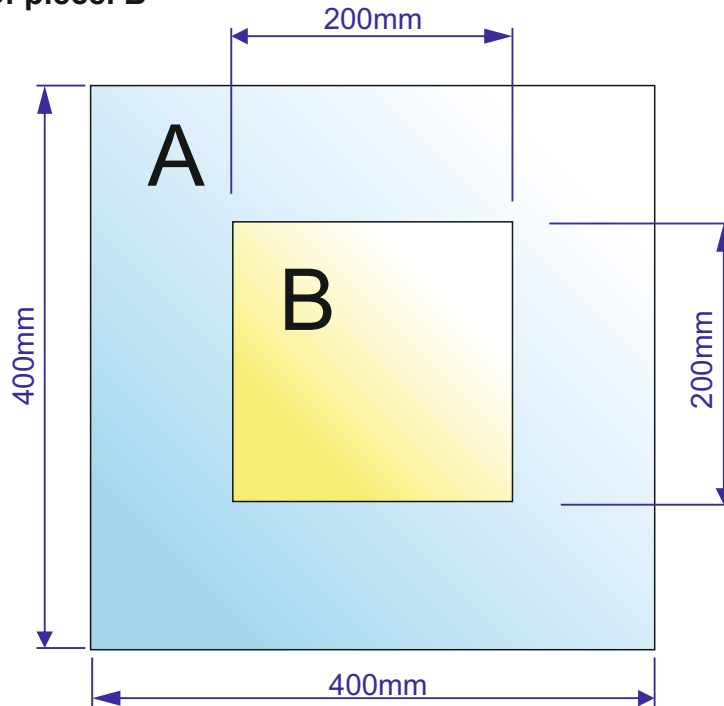
Please note reference to the use of 'coordinates' must be made in order to gain 3 or more marks.

AREA OF A SQUARE - EXAMINATION QUESTION

27. An acrylic window for a school project seen below, is composed of two pieces, accurately cut to size on a laser cutter. They fit perfectly together. 2 x 3 marks (6 marks in total)

a. Calculate the area of piece A

b. Calculate the area of piece. B



Award a total of 3 marks per area calculated.

Teacher discretion required.

First, calculate the entire area of 'A', without the centre piece being removed, by treating it as a square 400mm x 400mm.

AREA = LENGTH OF SIDE X LENGTH OF SIDE

AREA = 400 X 400

AREA = 160000mm²

Now, calculate the area of the smaller piece 'B', which is also the size of the piece to be removed from 'A'.

AREA = LENGTH OF SIDE X LENGTH OF SIDE

AREA = 200 X 200

AREA = 40000mm²

Now subtract the smaller area 'B' from the area of 'A'. The answer will be the area of 'A' with it's central window of material removed.

160000 - 40000 = 120000mm²

AREA OF FINAL SHAPED PIECE 'A' WITHOUT CENTRAL PIECE IS 120000mm²

AREA OF PIECE 'B' IS 40000mm²

TO HELP YOU ANSWER THESE QUESTION Follow the link below.

<http://www.technologystudent.com/pics/picgen1.html>

28a. In general terms, what is a PIC microcontroller? What does it do? 2 marks

Follow the link for potential answer.

Award 1 mark per correct statement - maximum of 2 marks

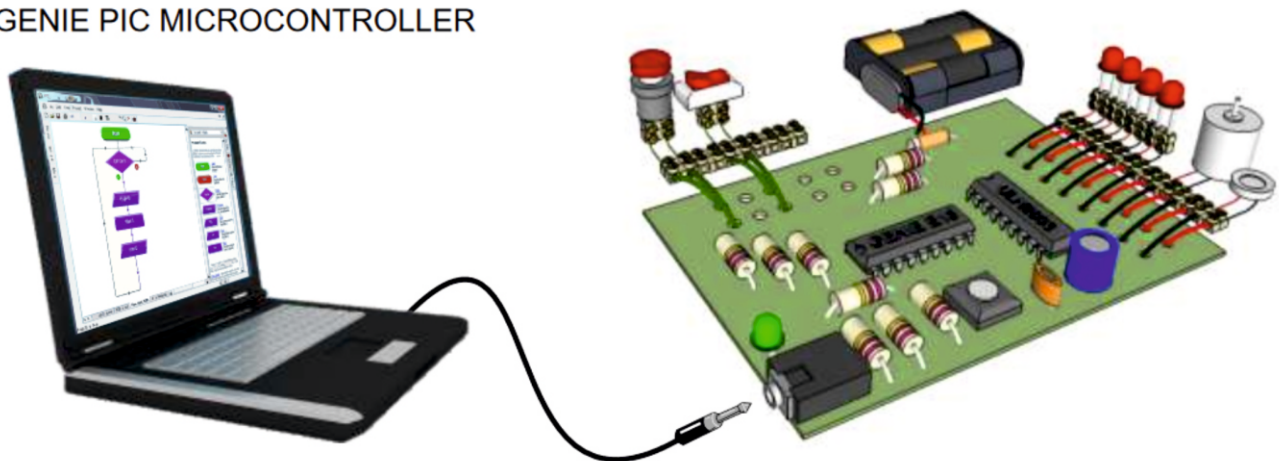
28b. Name a piece of programming software, used to program PIC Microcontrollers and to design circuits. 1 mark

1 mark for a correctly identified software name.

28c. The diagram below shows all the necessary equipment for operating a PIC microcontroller. Label the equipment and explain how at works together, to enable the programming of the microcontroller. 5 marks

CIRCUIT WIZARD SOFTWARE BEING USED TO PROGRAMME THE GENIE PIC MICROCONTROLLER

A GENIE PIC MICROCONTROLLER PROGRAMMABLE CIRCUIT



Follow the link at the top of the page for a detailed explanation.

1 mark for a correct statement only.

2-3 marks for a basic answer

4-5 marks for a detailed answer.

Teacher discretion required.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

<http://www.technologystudent.com/gears1/gears1.htm>

29a. When gears mesh together, what are they called? 1 mark

1 mark for Spur Gear.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

<http://www.technologystudent.com/gears1/gears2.htm>

29b. What is a gear train? 1 mark

1 mark for a description of the animations seen when following the link.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

<http://www.technologystudent.com/gears1/gears4.htm>

29c. Write a simple description of a rack and pinion gear system. Include a diagram. 4 marks

Up to 2 marks for the diagram. 1 mark for a basic diagram.

Up to 2 marks for a detailed answer. 1 mark for a basic description.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

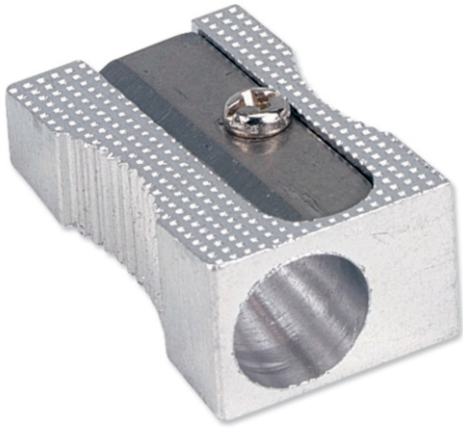
<http://www.technologystudent.com/gears1/bevel1.htm>

29d. What is the main purpose of a bevel gear? Include an example of a practical application. 2 marks

1 mark for a correct description and 1 further mark for a practical application.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

<http://www.technologystudent.com/despro2/estper1.htm>



30. This is a simple pencil sharpener.

A two point perspective drawing of the sharpener has been started below.

Complete the outline of the sharpener.
3 marks

Add appropriate pencil shading, to enhance the final finish. **3 marks**

*1 mark for a basic drawing.
2 - 3 depending on accuracy and detail.*

*1 mark for basic shade.
2 - 3 marks for greater realism of shade.*

