SAMPLE DESIGN AND TECHNOLOGY GCSE EXAMINATION PAPER (SAMPLE 4)

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

SURNAME _____

FORENAME(S) _____

CANDIDATE SIGNITURE _____

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 131.
- There are 22 marks for Section A, 37 marks for Section B and 72 marks for Section C.

CORE TECHNICAL PRINCIPLES - SECTION A

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

1. Which one of the following energy production systems is an alternative energy ?

A. Wind Power ☑

B. Hydraulic Fracturing ☐

C. Crude Oil ☐

D. Coal ☐

This link will help you answer this question

http://www.technologystudent.com/energy1/engex.htm

2. Which type of motion does the diagram below represent?

A. Rotary ☐

B. Reciprocating ☐

C. Linear ☐

D. Oscillating ☑

This link will help you answer this question

http://www.technologystudent.com/forcmom/motion2.html

3. A Foam Metal is:

Link to potential answer

http://www.technologystudent.com/joints_flsh/metalfoam1.html

A. A dense metal, starting at the core and out to the exterior layer . ☐

B. A metal that cannot be heated, as it will melt. ☐

C. A solid structures, usually composed of a dense outer layer, with the inner portion in the form of a matrix of pores. ☑

D. A composite metal, made up of several layers. ☐

4. From the list of woods, identify the natural wood.

A. Plywood ☐

B. MDF ☐

C. Mahogany ☑

D. Flexiply ☐

Link to potential answer

http://www.technologystudent.com/designpro/natwd1.htm

5. Which of the following designers, designed the 'Juicy Salif' - Citrus Squeezer?

A. Charles Eames. ☐

B. Marcel Breuer ☐

C. Philippe Starck ☑

D. Robin Day ☐

Link to potential answer

http://www.technologystudent.com/despro_flsh/phillipe1.html

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

Link to potential answer
http://www.technologystudent.com/joints/plywood1.html

A. Plywood is a composite material. ☐

B. Plywood is composed of several layers of thin plies / veneers. ☐

C. Plywood is relatively weak, compared to other manufactured boards. ☑

D. Plywood is supplied in a variety of thicknesses. ☐

7. Which of the statements below is the definition of the physical property 'fusability'?

Link to potential answer
http://www.technologystudent.com/joints_flsh/property3.html

A. The ability of a material to be twisted into a variety of shapes, without the need for heat. ☐

B. The ability of a material to resist a stretching force, without cracking. ☐

C. The ability of a material to return to its original shape, repeatedly. ☐

D. The ability of a material to be transformed from a solid state to a liquid state, due to the application of heat. ☑

8. Which of the following statements is representative of Iterative Design?

Link to potential answer
http://www.technologystudent.com/despro_flsh/iterative1.html

A. A linear design process, whereby one stage follows another. ☐

B. A process of continual improvement, of a concept, prototype, design or product, with model making, sketching, client feedback applied when required. ☑

C. Designing as a team, following a strict design process. ☐

D. A systems approach - PROCESS - SYSTEM - OUTCOME. ☐

9. Which of the following is the process called 'INJECTION MOULDING'?

Link to potential answer
http://www.technologystudent.com/equip1/inject1.htm

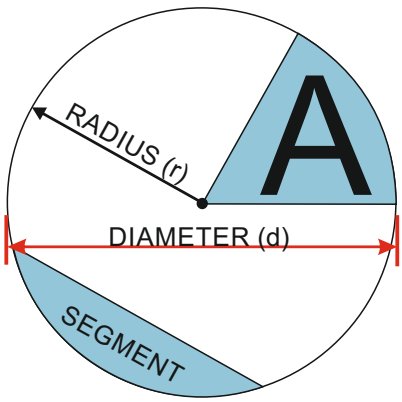
A. An automated painting process. ☐

B. Plastic coating of a metal surface, to increase its resistance to temperature. ☐

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

D. A process involving heating 'plastic' granules to liquid form and forcing the solution into a mould . ☑

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



Follow the link to a potential answer.
http://www.technologystudent.com/pdf14/maths4.pdf

A. Sector ☑

B. Radian ☐

C. Triangulated Part ☐

D. Aspect ☐

TO HELP YOU ANSWER THIS QUESTION http://www.technologystudent.com/joints/titanium1.html

11. Give two reasons why Titanium is suitable for making turbine blades in jet engines. *2 marks*

Reason 1:

One mark per correct reason.

Follow the link for possible answers

Reason 2:

TO HELP YOU ANSWER THIS QUESTION http://www.technologystudent.com/despro_flsh/graphene1.html http://www.technologystudent.com/despro_flsh/graphene2.html

12. Describe one potential practical application of Graphene. Include in your answer, why graphene is suitable for the practical application. *2 marks*

Practical Application:

One mark for each aspect of the question i.e. names practical application and suitability.

Why suitable?:

TO HELP YOU ANSWER THIS QUESTION http://www.technologystudent.com/energy1/nuclear1.htm http://www.technologystudent.com/energy1/rwaste1.htm

13. Nuclear Power Stations, produce electricity from radioactive fuel sources such as uranium. Give two reasons why some people are against this method of energy production. *2 marks*

Reason 1:

One mark per correct reason.

Follow the link for possible answers

Reason 2:

TO HELP YOU ANSWER THIS QUESTION	http://www.technologystudent.com/energy1/nuclear1.htm http://www.technologystudent.com/energy1/rwaste1.htm

14. Give two reasons why some people are in favour of Nuclear Power. ***2 marks***

Reason 1:

One mark per correct reason.

Follow the link for possible answers

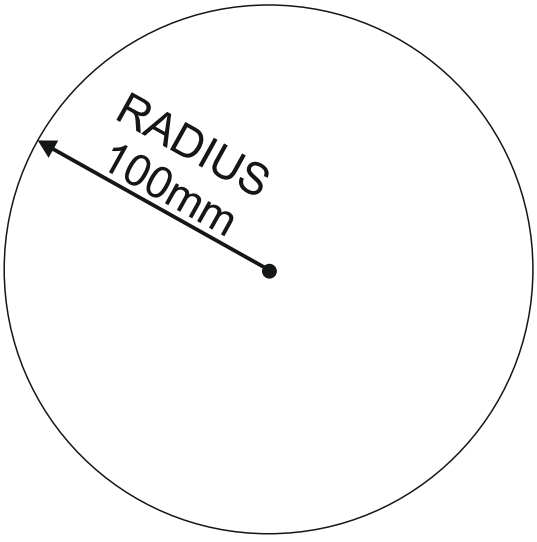
Reason 2:

TO HELP YOU ANSWER THIS QUESTION	http://www.technologystudent.com/pdf14/maths4.pdf PAGE 2

15. What is the circumference of the circle seen in the diagram.

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

4 marks



CALCULATION:

Two marks for each stage as outlined below

CIRCUMFERENCE = 2 x π x r

C = 2 x π x r

C = 2 x 3.14 x 100 ***2 marks***

C = 628mm ***2 marks***

FORMULA

CIRCUMFERENCE = 2 x π x r

π (pi) = 3.14

SECTION B - Specialist Technical Principles

METAL FOAM **PLYWOOD**

16. Select one of the materials listed above.

Name of Material _____

Describe your chosen material's manufacture. Include notes and a labelled sketch(s)
8 marks

TO HELP YOU ANSWER THIS QUESTION

http://www.technologystudent.com/joints_flsh/metalfoam1.html
http://www.technologystudent.com/joints/plywood1.html

1 to 2 marks for a simplistic answer.

3 - 4 marks for reasonable detail

5 to 8 marks for detailed / very detailed notes and sketch(s), fully explaining the process

TO HELP YOU ANSWER THIS QUESTION

http://www.technologystudent.com/joints_flsh/metal7.html
http://www.technologystudent.com/joints_flsh/revcard_metal6.html

17a. Why is lacquer sometimes applied to a metal surface? *2 marks*

1 mark for basic answer

2 marks for increased detail

See links for detailed answer / relevant information

17b. Describe the process of applying lacqurer to a metal surface? *2 marks*

1 mark for basic answer

2 marks for increased detail

See links for detailed answer / relevant information

18. Select one of the products shown below. Then, give two reasons, why the product is a good example of one off / single item production. *2 x 2 marks*

BESPOKE CHAIR

HANDMADE JEWELLERY

THE EIFFEL TOWER

TO HELP YOU ANSWER THIS QUESTION

http://www.technologystudent.com/joints/sing1a.htm
http://www.technologystudent.com/joints/revcard_oneoff1.html

PRODUCT: *Product must be identified for any marks from this question*

REASON 1:

1 mark for basic answer

2 marks for increased detail

See links for detailed answer / relevant information

REASON 2: *1 mark for basic answer*

2 marks for increased detail

See links for detailed answer / relevant information

19. Metals can be permanently joined in a number of ways. Using notes and sketches, describe / explain the industrial process called BRAZING. ***5 marks***

TO HELP YOU ANSWER THIS QUESTION

http://www.technologystudent.com/equip1/braz1.htm
http://www.technologystudent.com/joints/braz2.htm

THE INDUSTRIAL PROCESS CALLED BRAZING
INCLUDE NOTES AND A SKETCH(S)

1 - 2 marks for an answer that displays a basic understanding of the process.

3 to 5 marks for increased detail. 5 marks awarded only for detailed sketch(s) and detailed notes. Teacher discretion required.

20a. What is the Lean Manufacturing system? *4 marks*

TO HELP YOU ANSWER THIS QUESTION	Follow the links below. http://www.technologystudent.com/despro_3/lean1.html http://www.technologystudent.com/despro_3/lean2.html http://www.technologystudent.com/despro_3/revcard_lean1.

1 mark for a single accurate statement

2 - 3 marks for increased detail which includes 2 / 3 accurate statements

4 marks for a detailed full answer.

Follow the links for guidance on the statements that can be regarded as correct.

20b. Name four international companies that utilise the Lean Manufacturing philosophy *4 marks*

TO HELP YOU ANSWER THIS QUESTION	Follow the links below. http://www.technologystudent.com/despro_3/lean1.html http://www.technologystudent.com/despro_3/lean2.html http://www.technologystudent.com/despro_3/revcard_lean1.

1 mark per compnay correctly identified.

Follow the links for a list of some of the international companies applying Lean Manufacture.

TO HELP YOU ANSWER THIS QUESTION	Follow the links below. http://www.technologystudent.com/prddes_2/global1.html

21a. *What is Globalisation?* *4 marks*

1 mark for a single accurate statement

2 - 3 marks for increased detail which includes 2 / 3 accurate statements

4 marks for a detailed full answer.

Follow the links for guidance on the statements that can be regarded as correct.

TO HELP YOU ANSWER THIS QUESTION	Follow the links below. http://www.technologystudent.com/prddes_2/global1.html http://www.technologystudent.com/prddes_2/global2.html

21b. Select a manufactured product that is the result of globalisation, Describe the stages involved in it's manufacture. *4 marks*

PRODUCT: *For any marks a product must be identified first.*

DESCRIPTION:

1 mark for a single accurate statement

2 - 3 marks for increased detail which includes 2 / 3 accurate statements

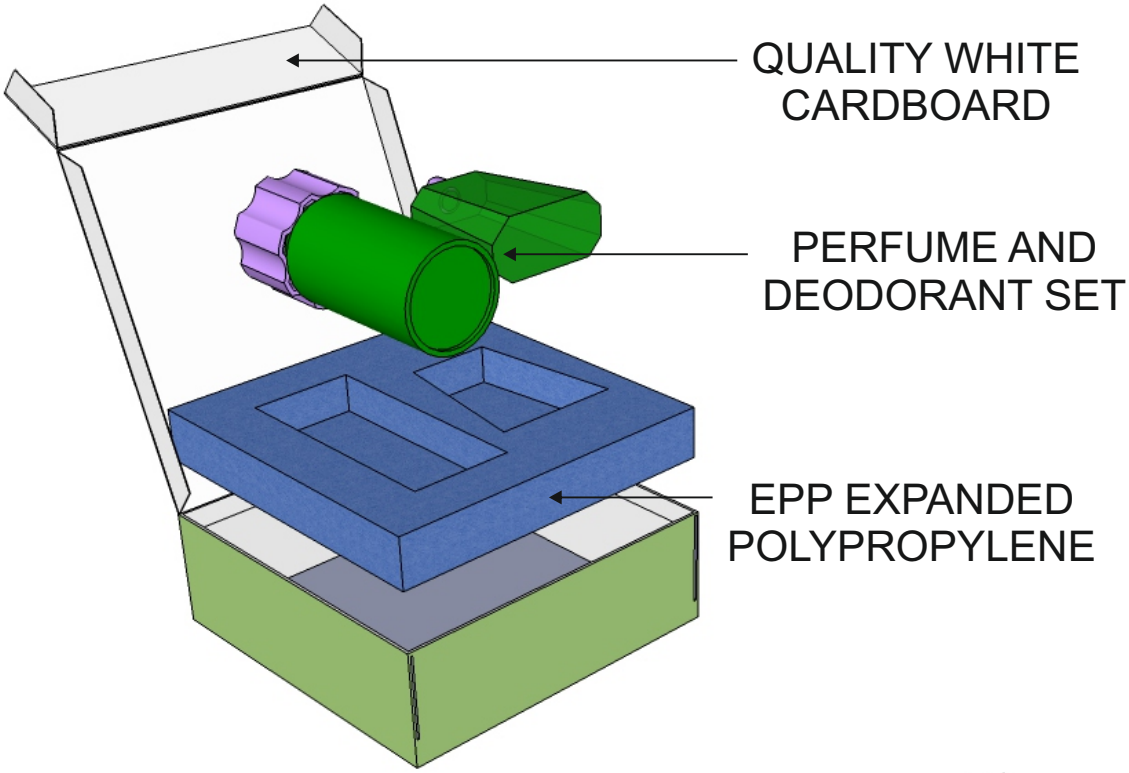
4 marks for a detailed full answer.

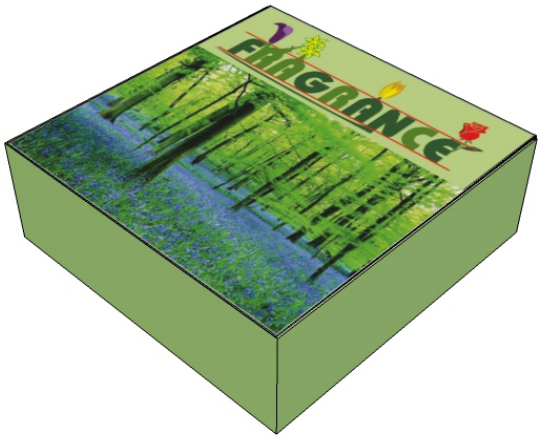
Follow the links for guidance on the statements that can be regarded as correct.

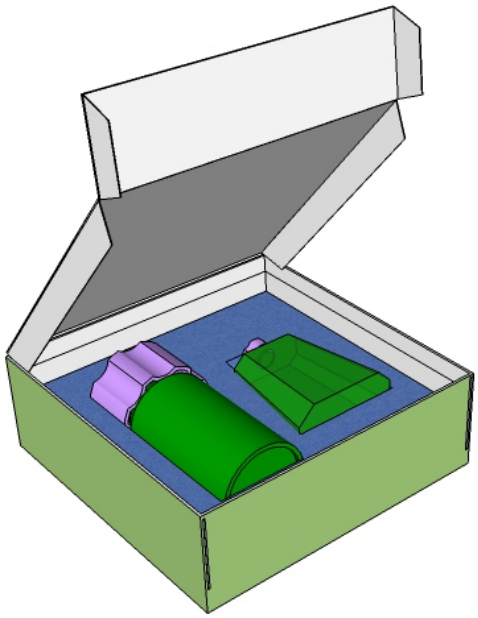
SECTION C - DESIGNING AND MAKING PRINCIPLES

PACKAGING OF PERFUMED PRODUCTS

The packaging seen below, has been designed to hold / store deodorant and perfume containers.







22. The packaging should have the following design features:

TO HELP YOU ANSWER THIS QUESTION	Follow the links below. http://www.technologystudent.com/despro2/drink7.htm http://www.technologystudent.com/despro2/drink14.htm

22a. Draw a typical symbol that should be found on the packaging and add a description / explanation of the symbol. *2 marks*

_____

1 mark for a correct symbol

_____

1 mark for the description

_____

22b.What is the advantage of using Expanded Polypropylene (EPP)?
2 marks (Link for help http://www.technologystudent.com/prddes1/perfpk3.html**)**

1 to 2 marks depending on the level of detail.
Follow the link for potential answers

22c. Why is quality card also used in the manufacture of the packaging? *2 marks*
(Link for help - *http://www.technologystudent.com/prddes1/perfpk4.html* ***)***

1 to 2 marks depending on the level of detail.
Follow the link for potential answers

22d. The printing process called lithography is used to print the detail, images and colour on to the surfaces of the packaging. Draw a labelled diagram of lithography and included a written explanation. *4 marks (Link for help*
http://www.technologystudent.com/designpro/prtpro5.htm ***)***

_____

_____

Up to 2 marks awarded for the notes.

_____

Up to 2 marks awarded for the diagram (1 mark for sketch and 1 mark for labels)

_____

_____

_____

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

http://www.technologystudent.com/despro_3/promopk2.html

23a. List <u>FOUR</u> ways, in which the printed surfaces of packaging, helps in the promotion of a product? *4 marks*

1 mark awarded per correctly identified point regarding product promotion.

Follow the link for further guidance.

23b. How could the packaging be improved, if the target market was specifically aimed at teenagers? *4 marks*

1 mark awarded per point

e.g. Adding a sporting logo / symbol / theme. Use of celebrity endorsement. Change of shape. Increased environmental awareness etc.....

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

http://www.technologystudent.com/despro2/prneff2.htm

24a. The surface of the packaging is to finished through the process of UV varnishing? Explain this process with a diagram and notes *5 marks*

Up to 2 marks awarded for the notes.

Up to 3 marks awarded for the diagram - dependent in detail.

Follow the link for guidance.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

http://www.technologystudent.com/prddes1/perfpk12.

24b. The packaging is in the form of a cuboid. Give three advantages of using this common shape *3 marks*

REASON 1:

REASON 2:

1 mark awarded per correct reason.

Follow link for guidance and potential answers.

REASON 3:

TO HELP YOU ANSWER THIS QUESTION Follow the link below.
http://www.technologystudent.com/prddes1/brand1.html
http://www.technologystudent.com/prddes1/brand2.html

25a. *These questions are related to Brand Identity (8 marks in total)*

What is a brand? *2 marks*

1 mark for a basic answer

2 marks for increased knowledge.

25b. Name a company that you think has reached brand status. Explain why you consider it has reached this status. *2 marks*

1 mark for a company name (teacher discretion required)

1 further mark for explanation.

25c. Describe / explain four characteristics of Brand Identity. *4 marks*

1 mark per characteristic.

Follow the link for potential answers.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

http://www.technologystudent.com/prddes1/markrs1.html
http://www.technologystudent.com/prddes1/marks2.html
http://www.technologystudent.com/prddes1/markrs2.html
http://www.technologystudent.com/prddes1/ict1.html

Designers need an understanding of Market Research

26a. What is meant by the term Market Research? ***4 marks***

1 mark per relevant statement.

Follow the link for potential answers / statements

26b. How can ICT specifically contribute to market research? ***4 marks***

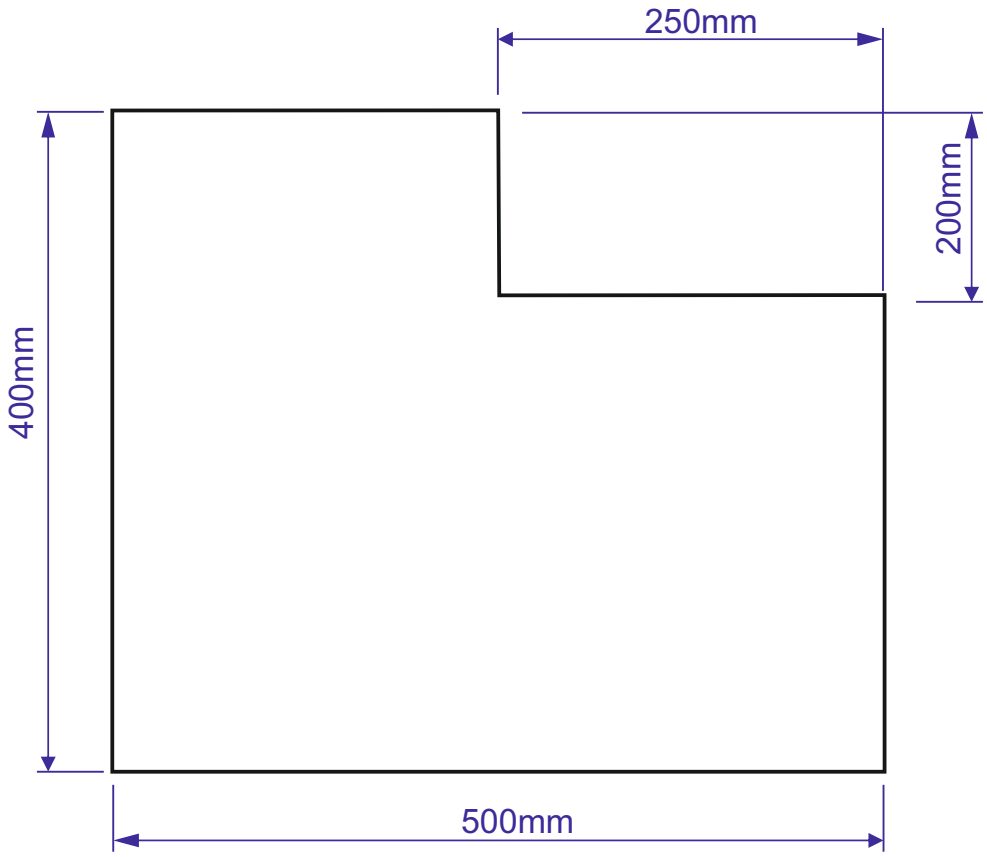
1 mark per relevant statement.

Follow the link for potential answers / statements

An acrylic panel for a storage unit is seen below.

27a. Calculate the area of the acrylic required, before it is cut to shape (the overall rectangle of acrylic required before it is cut into an L shape). *3 marks*

27b. Calculate the area of the final L shape 5 marks



First, calculate the area of the uncut acrylic, by treating it as a rectangle 500mm x 400mm.

AREA = LENGTH X HEIGHT
AREA = 500 X 400 *1 mark*
AREA = 200000mm²

Now, calculate the area of the smaller rectangular piece to be cut away, during the shaping of the panel

AREA = LENGTH X HEIGHT
AREA = 250 X 200 *2 marks*
AREA = 50000mm²

Now subtract the smaller area from the area of the uncut plywood.

200000 - 50000 = 150000 *2 marks*

AREA OF FINAL SHAPED PIECE IS 150000mm²

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

http://www.technologystudent.com/joints_flsh/phosphor1.html
http://www.technologystudent.com/joints_flsh/recard_phos1.html

28a. Designers need an understanding of smart materials. Phosphorescent Pigments have many practical applications. What are Phosphorescent Pigments? *2 marks*

1 mark awarded for a basic answer / one statement of fact.

2 marks for increased relevant detail.

28b. Describe two practical applications of Phosphorescent Pigments. 2 x 3 marks

PRACTICAL APPLICATION 1:

1 mark awarded for a basic answer / one statement of fact.

2 marks for increased relevant detail.

3 marks for full, detailed answer.

PRACTICAL APPLICATION 1:

1 mark awarded for a basic answer / one statement of fact.

2 marks for increased relevant detail.

3 marks for full, detailed answer.

TO HELP YOU ANSWER THIS QUESTION Follow the link below.

http://www.technologystudent.com/designpro/model1.htm

29a. Designers make models throughout the design and development of a product? Why is model making important? *2 marks*

1 mark awarded for a basic answer / one statement of fact.

2 marks for increased relevant detail.

Follow the link for relevant information / potential answers.

TO HELP YOU ANSWER THIS QUESTION Follow the links below.

http://www.technologystudent.com/prddes1/modmat1.html
http://www.technologystudent.com/prddes1/modemat2.html

29b. Name two model making materials used by designers and describe the characteristics that make them suitable for model making. *2 x 3 marks*

Modelling Materials 1:

1 mark for a named modelling material and a basic description.

2 marks for increased detailed to the description.

3 marks for detailed and full answer.

Modelling Material 2:

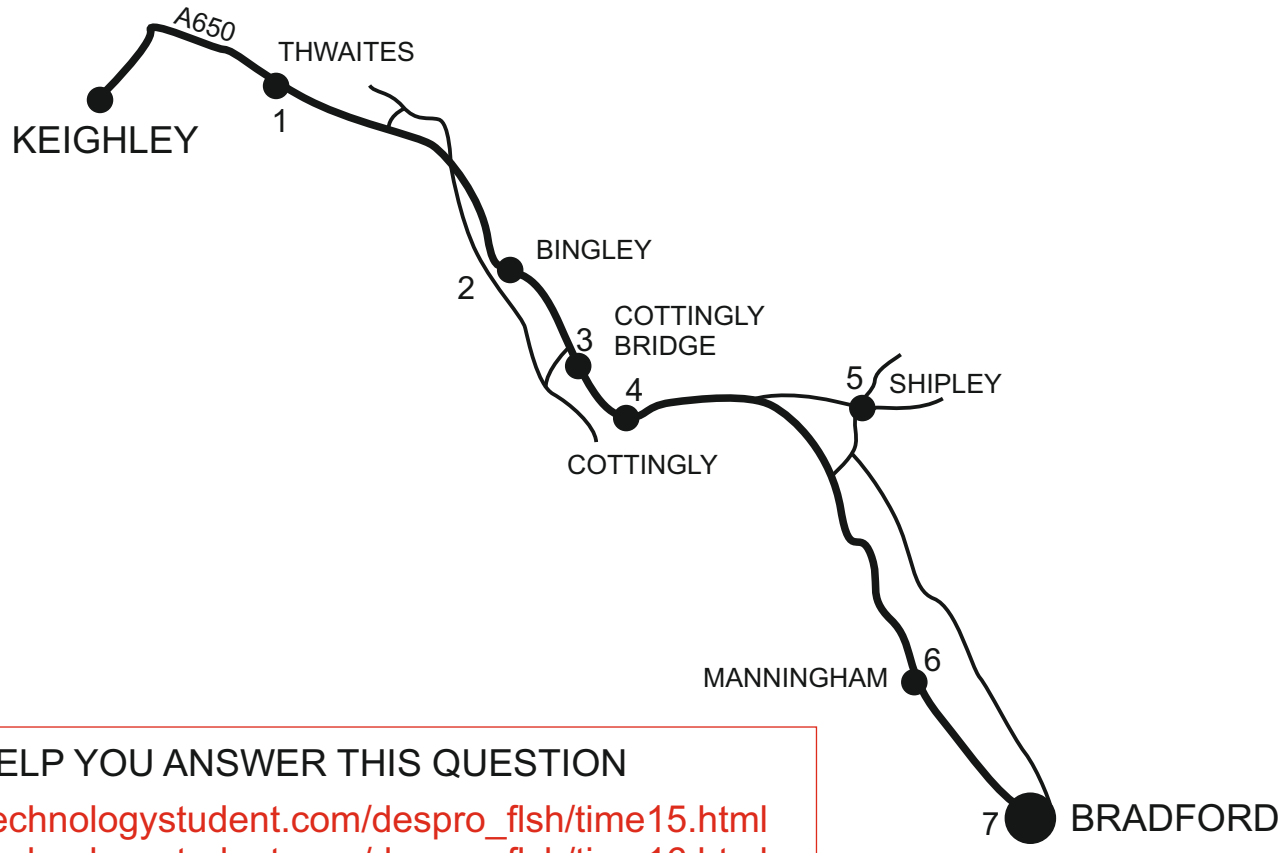
1 mark for a named modelling material and a basic description.

2 marks for increased detailed to the description.

3 marks for detailed and full answer.

30. A local public bus, takes a route from Keighley to Bradford, as shown on the map below. The bus stops are indicated on the map

Draw a topological map, in the style of London Underground, in the available space.
6 marks



TO HELP YOU ANSWER THIS QUESTION

http://www.technologystudent.com/despro_flsh/time15.html
http://www.technologystudent.com/despro_flsh/time16.html

1 - 2 marks for a basic outline / answer with <u>most</u> places labelled.

3 - 5 marks for increased detail and accuracy of the labelled map and some colour.

6 marks for an accurate representation with London Underground map style.