GCE A LEVEL

A602U10-1

O20-A602U10-1

MONDAY, 12 OCTOBER – MORNING

DESIGN AND TECHNOLOGY – A level component 1
Product Design

3 hours

A602U101
01

ADDITIONAL MATERIALS

In addition to this paper you will need:
a WJEC pink 16-page answer booklet, a calculator, ruler, pencil and coloured pencils.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.
Answer **all** questions.
Write your answers in the separate answer booklet provided.

INFORMATION FOR CANDIDATES

When and where appropriate, answers should be amplified and illustrated with sketches and/or diagrams.
The number of marks is given in brackets at the end of each question or part-question. You are advised to divide your time accordingly.
The number of marks available is 100.
You are reminded of the need for good English and orderly, clear presentation in your answers.
You may use a calculator in this examination.

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Answer **all** *questions.*

1. Materials can broadly be classified into groups.

(a) Provide a definition of **each** of the three material classification groups given below: [3]

(i) Synthetic
(ii) Natural
(iii) Regenerated

(b) The image shown below is of a car body made from GRP (Glass Reinforced Plastic). Describe the stages of laminating a GRP product by hand. [6]



(c) The bicycle wheel and water bottle shown below are made from anodised aluminium. Explain what is meant by the term 'anodising'. [2]

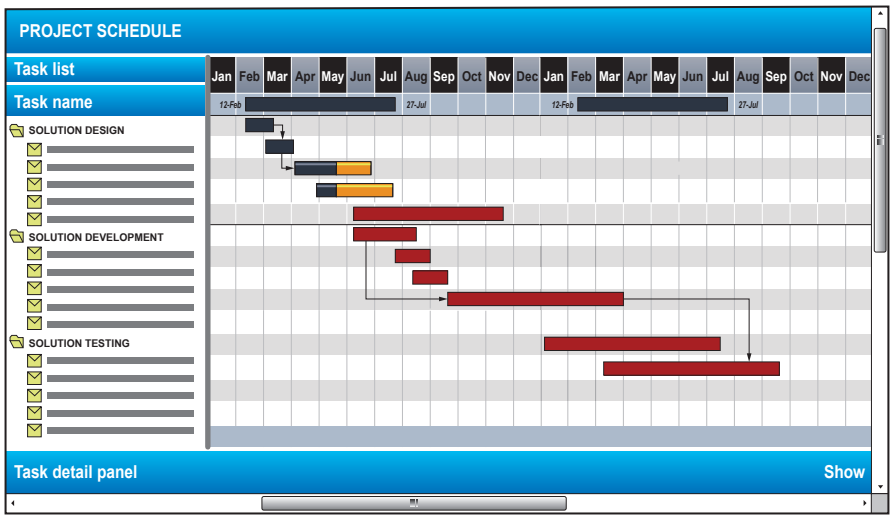




(d) Describe in detail **four** benefits of anodising as a finish for aluminium. [4]

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2. Charts like the one shown below are often used to help manage complex projects.



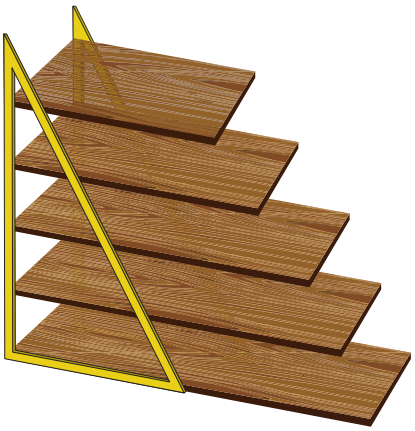
(a) Name the type of chart shown above, then compare and contrast the features of this project management system with a flowchart. [5]

(b) The chart above includes a critical path. Explain the purpose of a critical path. [2]

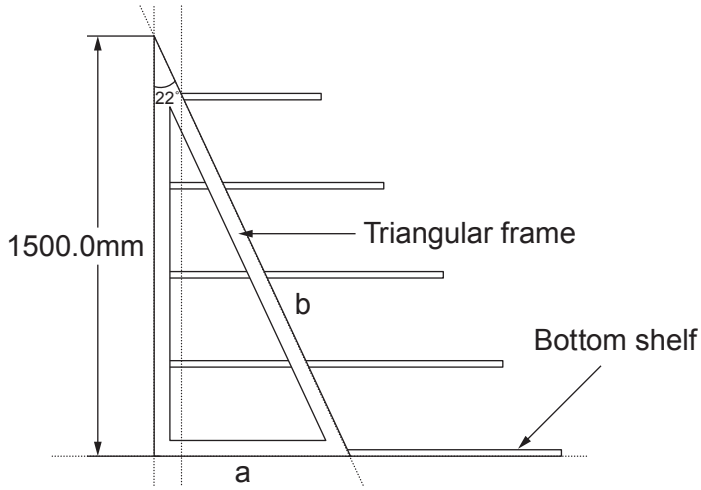
3. A patent is an example of intellectual property protection. Analyse and describe, using examples, the conditions that must be met if a creation is to be patented. [6]

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4. Shown below is a student's design for a modern shelving unit. The shelves will be made from a natural timber and the triangular frame from a composite board.



Isometric view



Front elevation

(a) The bottom shelf is 1200 mm long. The shelves above decrease in length by 10% at **each** height. Calculate the length of **each** shelf to the nearest mm. [4]
(Show all calculations.)

(b) The shelves are 365 mm wide. The natural wood planks used to make them are supplied in planks measuring 144 mm wide which require edge gluing to make up to 365 mm. Calculate how many linear metres of wood planks would be needed to make all of the shelves. [3]
(Show all calculations.)

(c) The top shelf is 200 mm from the top of the triangular frame. Each shelf is 18 mm thick and evenly spaced. Calculate the space between **each** shelf to the nearest mm. [2]
(Show all calculations.)

(d) Calculate the missing dimensions of the triangular frame identified as 'a' and 'b'. [4]
(Show all calculations.)

(e) The student has decided to increase the overall size of the product. The new bottom shelf will measure 1500 mm. If the size ratio remains the same, calculate the new height of the shelving unit to the nearest mm. [2]
(Show all calculations.)

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5. Promotion is one of the 4 Ps of the marketing mix.



(a) Identify the other three Ps. [3]

(b) Discuss the various methods that can be used to promote products. [6]

6. Health and safety is a key element in any workshop environment.

(a) Identify and describe **each** of the steps in a five-stage risk assessment. [5]

(b) Describe and justify **four** ways in which risks can be reduced when using a pillar drill. [4]

7. Fad products, such as the products shown below have a short Product Life Cycle.





(a) Draw and label a typical life cycle graph for a fad product. [4]

(b) Evaluate the ways in which designers can increase the time at which a product is at peak sales. [5]

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8. Some manufacturers are using wind power as the main energy source to power their factories. Analyse the benefits and limitations of wind power for manufacturing. [9]

9. Designers use a range of strategies to encourage creative outcomes. Two of these are morphological analysis and brainstorming. Explain how these strategies promote creativity in the design process. [9]

10. Evaluate the impact that Product Champions and Entrepreneurs play in the development and delivery of innovative products. [12]

END OF PAPER

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