DESIGN AND TECHNOLOGY
Paper 1

October/November 2017
3 hours

Additional Materials: Answer Booklet/A4 Paper
A3 Drawing Paper (2 sheets)
Extra sheets of A3 drawing paper for candidates who have used up both sides of their 2 sheets
A range of design drawing equipment

READ THESE INSTRUCTIONS FIRST

If you have been given an Answer Booklet, follow the instructions on the front cover of the Booklet.
Write your answers and working on the separate Answer Booklet/Paper provided.
Write your name, Centre number and candidate number on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil, or coloured pencils/pens as appropriate, for any diagrams, graphs or rough working.
DO NOT WRITE IN ANY BARCODES.

Section A
Answer one question on the Answer Booklet/A4 Paper provided.

Section B
Answer one question on the Answer Booklet/A4 Paper provided.

Section C
Answer one question on plain A3 paper.
Use both sides of the paper.
You may request additional sheets of A3 paper, but only if you have used up both sides of each of the 2 sheets provided.

You are advised to spend 30 minutes on each of Sections A and B and 2 hours on Section C.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
All dimensions are in millimetres.
Section A

Answer one question from this section on the Answer Booklet/A4 paper provided.

1 Fig. 1 gives details about a table lamp which is to be made in a school workshop. The base will be made from cast aluminium.

![Diagram of a lamp base with an M8 threaded hole.]

(a) Give two reasons why aluminium would be a suitable metal for casting the base. [2]

(b) Use notes and sketches to describe:

(i) how the pattern required to cast the base could be made; [6]
(ii) how the base could be cast; [6]
(iii) how the M8 threaded hole in the base could be made. [6]

You must give details about the tools, equipment and processes involved and the safety precautions that have to be undertaken at each stage.
Question 2 begins on the next page.
Fig. 2 gives details about a mechanical greeting card. A batch of twenty of these cards will be made in a school workshop. As the tab is pulled and pushed, the dog’s ears move.

(a) Use a sketch and notes, to explain how many A5 cards could be printed on an A3 sheet. [2]

(b) Use notes and sketches to describe:

(i) how the lettering and the drawing of the dog could be produced and printed onto A3 sheets of card; [6]
(ii) how the slots in the greeting card could be made; [2]
(iii) how the ears could be made and then attached to the greeting card; [4]
(iv) how the linkage mechanism could be made and then attached to both the greeting card and the ears. [6]

You must give details about the tools, equipment and processes involved and the safety precautions that have to be undertaken at each stage.

lettering and drawing of dog produced and printed on card

Have a good party !!
Have a good party!!

slots made in card

ears made and attached to card

completed greeting card

Have a good party!!

linkage mechanism fits on back of card

as the tab is pulled and pushed the dog’s ears move

Key

:: glue

● holes for pivots

Fig. 2
Fig. 3 gives details about a child’s constructional toy. The six wooden pieces fit together to make a model of a skyscraper.

(a) State suitable dimensions for X and Y on part C. [2]

(b) Use notes and sketches to describe how:

(i) part A could be made; [6]
(ii) part B could be made; [6]
(iii) part C could be made. [6]

You must give details about the tools, equipment and processes involved and the safety precautions that have to be undertaken at each stage.
Section B

Answer one question from this section on the Answer Booklet/A4 paper provided.

4. Fig. 4 shows part of a disc sander. The disc sander will be fixed to the floor in a school workshop.

(a) Explain the function of the pipe shown at X. [2]

(b) Identify and describe two problems with the design of the disc sander that make it unsafe to use. [4]

(c) Using notes and sketches, explain how the design would need to be changed to overcome the two problems you have identified in part (b). [6]

(d) Discuss the safety features on a variety of machines used by students in a school workshop and how these features help to avoid accidents.

Your answer should:

(i) analyse the given situation and identify three relevant issues raised by the question; [3]

(ii) explain why you consider these issues to be relevant; [3]

(iii) contain specific examples/evidence to support your conclusions. [2]
Fig. 5 gives details about a perfume bottle and its packaging. The packaging consists of two parts, an insert and a sleeve into which the insert slides.
(a) Explain the function of the design feature shown at X. [2]

(b) Identify and describe two problems with the development (net) required to make the insert. [4]

(c) Using notes and sketches, explain how the development (net) would need to be changed to overcome the two problems you have identified in part (b). [6]

(d) Discuss how the colours and surface finishes used on packaging can influence the sales of a product.

Your answer should:

(i) analyse the given situation and identify three relevant issues raised by the question; [3]
(ii) explain why you consider these issues to be relevant; [3]
(iii) contain specific examples/evidence to support your conclusions. [2]
Fig. 6 shows a design for a table and seats which will be located in a park or other public space. Details are also given about wheelchair sizes.

![Diagram of table and seats with dimensions](image)

tops of table and seats made from perforated metal

table 1150 × 1150 × 750H
seat 1150 × 300 × 450H

wheelchair sizes

**Fig. 6**

(a) Explain why perforated metal is a material that is often used in the manufacture of outdoor furniture. [2]

(b) Identify and describe two problems with the design that would make it difficult for a person in a wheelchair to use the table. [4]

(c) Using notes and sketches, explain how the design would need to be changed to overcome the two problems you have identified in part (b). [6]

(d) Discuss how and why designers need to gather information about the needs of different user groups before they start to design a product.

Your answer should:

(i) analyse the given situation and identify three relevant issues raised by the question; [3]

(ii) explain why you consider these issues to be relevant; [3]

(iii) contain specific examples/evidence to support your conclusions. [2]
Section C

Answer one question from this section on the plain A3 paper provided.

You are provided with two sheets of plain A3 paper. You should use both sides of the paper. Each of the four parts (a)–(d) of the question you choose to answer should take up one side of paper.

When you are asked to develop a design you must show, using notes and sketches, the development and evaluation of a range of ideas into a single design proposal. The design proposal should be annotated to give details about materials, joining methods and important sizes.

7  Fig. 7 shows an incomplete design for a student’s desk.

![Diagram of a student's desk with notes: part of the top can be adjusted and fixed at different angles. Top of desk size 900 × 500.]

(a) Using notes and sketches, develop a design which supports the top of the desk at a height of 750 mm.  

(b) Using notes and sketches, develop a design which allows part of the top of the desk to be adjusted and fixed at different angles.

(c) Using notes and sketches, develop a design for three drawers that will fit under the desk. Your design must include details about how the drawers will be attached to the main structure of the desk.

(d) Produce a pictorial rendered drawing of the complete desk which shows all of the features that you have designed in parts (a)–(c).
Fig. 8 shows an incomplete idea for a folder to hold A2 sheets of paper. The folder will be made from thin corrugated plastic sheet.

(a) Using notes and sketches, develop a design for the folder. The folder must be made from a one piece development (net) which is held together without the use of glue. Your design must include details of the one piece development (net) required to make the folder. [20]

(b) Using notes and sketches, develop designs that:

(i) allow the folder to be carried;
(ii) keep the folder securely closed. [20]

(c) Using notes and sketches, develop a design for the lettering to go on the folder. This will be the words ‘Graphic Design’ and the lettering should be in a style that reflects this name. [20]

(d) Produce a pictorial rendered drawing of the complete folder which shows all of the features that you have designed in parts (a)–(c). [20]
Fig. 9 shows an incomplete idea for a wind powered mechanical toy dog.

(a) Using notes and sketches, **develop** a design that will make the shaft rotate when the wind blows. [20]

(b) Using notes and sketches, **develop** designs for the open sided box, the dog and the mechanism that will be attached to the shaft to make the parts of the dog move as shown in Fig. 9. [20]

(c) Using notes and sketches, **develop** a design for a free standing base that will support the mechanical toy at a height of 1750 mm. [20]

(d) Produce a pictorial rendered drawing of the complete wind powered mechanical toy that shows all of the features you have designed in **parts (a)–(c)**. [20]