

FOR OFFICIAL USE



National
Qualifications
2021 ASSESSMENT RESOURCE

Mark

X819/75/01

Design and Manufacture

Duration — 1 hour 45 minutes



Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Number of seat

Date of birth

Day

Month

Year

Scottish candidate number

Total marks — 80

SECTION 1 — 60 marks

Attempt ALL questions.

SECTION 2 — 20 marks

Attempt ALL questions.

Write your answers clearly in the spaces provided in this booklet. Additional space for answers is provided at the end of this booklet. If you use this space you must clearly identify the question number you are attempting.

Show all working and units where appropriate.

Use **blue** or **black** ink.

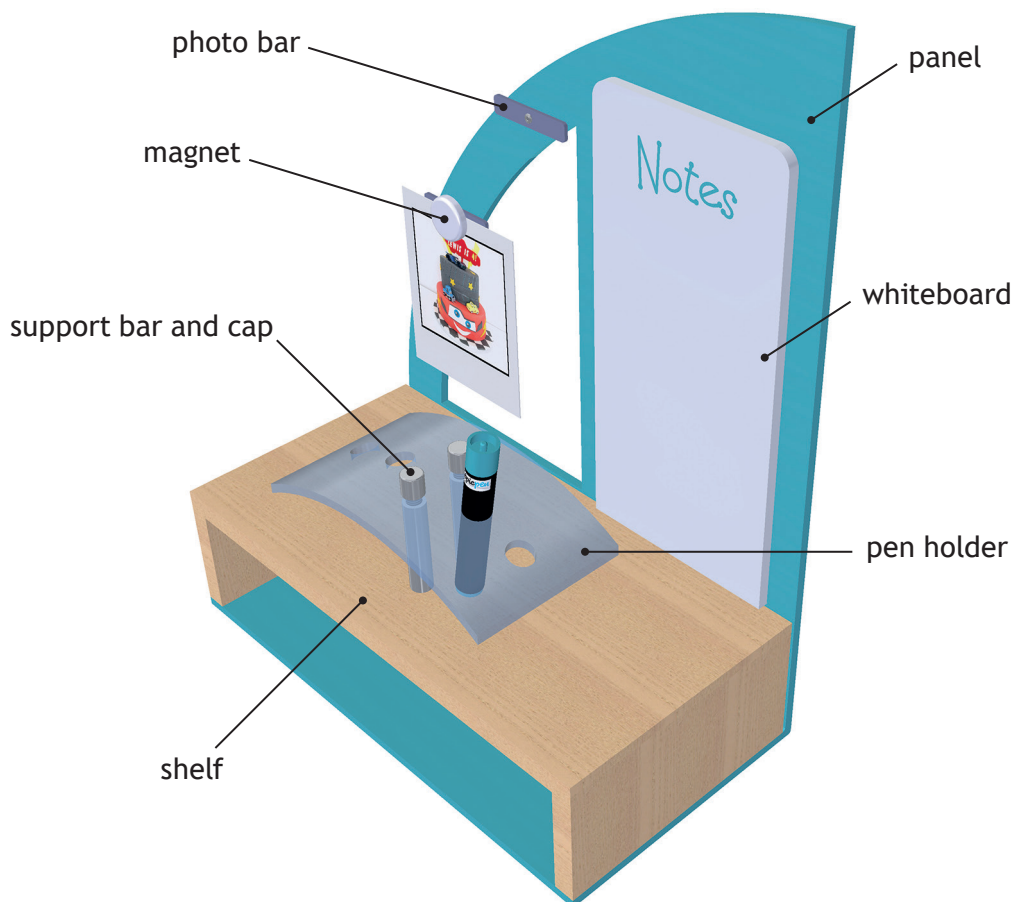
Before leaving the examination room you must give this booklet to the Invigilator; if you do not, you may lose all the marks for this paper.



SECTION 1 — 60 marks

Attempt ALL questions

1. A design proposal for a photo and note display is shown below.



(a) The photo and note display was made from different materials.

(i) Name a suitable silver, non-ferrous metal for the support bars. 1

Magnets were used to hold photos onto the metal photo bars.

(ii) Name a suitable metal for the photo bars. 1



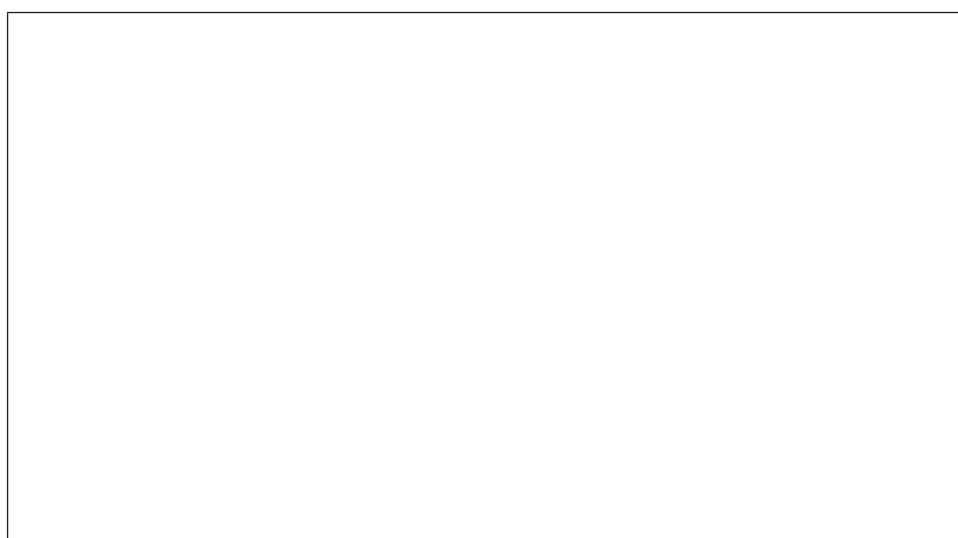
1. (continued)

- (b) The photo bars were dip coated.

Describe how the photo bars would be dip coated, with reference to workshop tools and equipment.

You may use sketches to illustrate your answer in the box below.

2



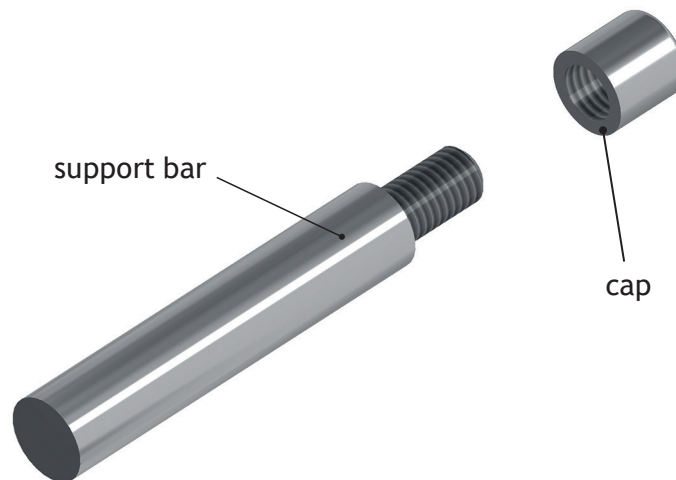
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* X 8 1 9 7 5 0 1 0 3 *

1. (continued)

(c) The support bars and their caps were manufactured on a centre lathe.



- (i) Outline **two** safety checks that must be carried out on the centre lathe **before** the parts are manufactured.

2

The end of the support bar was machined on the centre lathe **before** threading as shown below.



- (ii) Name **two** of the processes carried out on the centre lathe to produce the machined features.

2

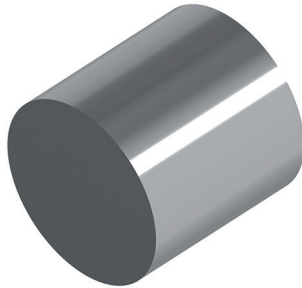


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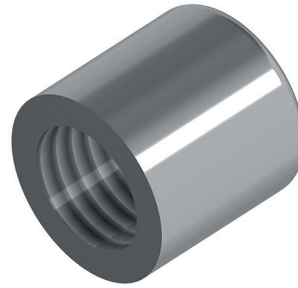
1. (c) (continued)

The cap was manufactured from a blank as shown below.

blank



finished cap



(iii) Describe how the finished cap would be manufactured from the blank, with reference to workshop tools and equipment.

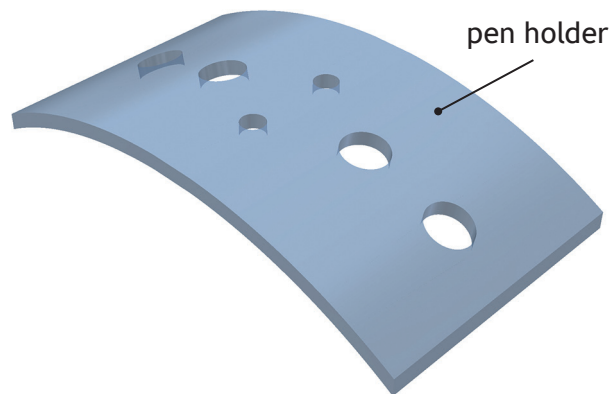
You may use sketches to illustrate your answer in the box below.

3



1. (continued)

(d) The pen holder shown below was made from acrylic.



(i) State **two** reasons why acrylic is a suitable material for the pen holder.

2

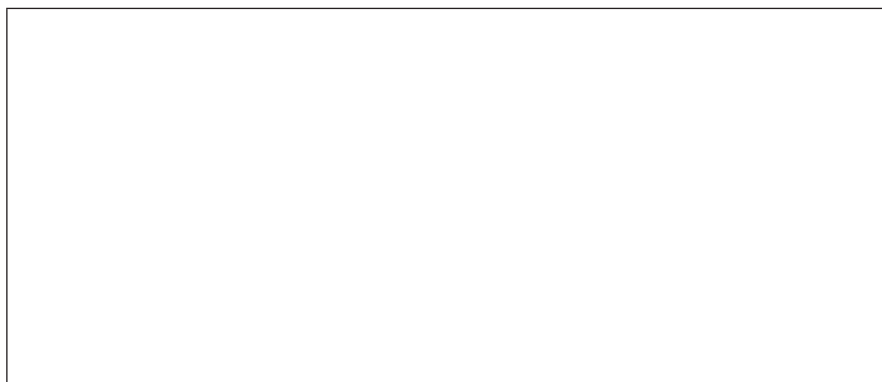
(ii) Outline **one** method of preventing the acrylic from cracking during drilling.

1



* X 8 1 9 7 5 0 1 0 6 *

1. (e) (i) (continued)



(ii) Name a suitable light-coloured softwood for the wooden shelf. 1

(iii) Outline **two** reasons why varnish is a suitable finish for the shelf. 2

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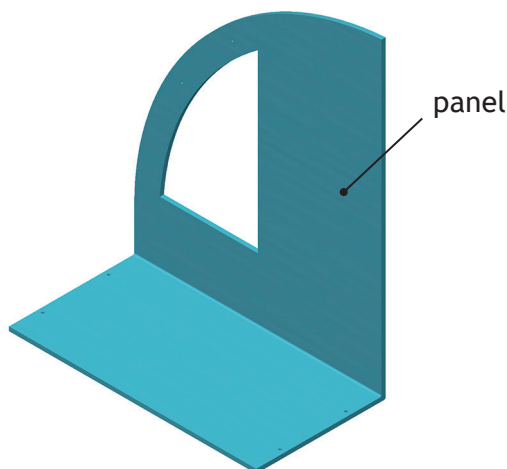


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1. (continued)

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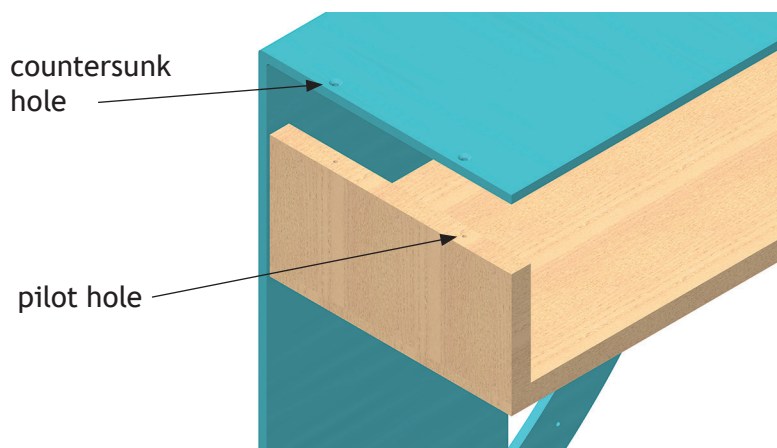
(f) The panel was manufactured from acrylic and bent as shown below.



(i) State why a strip heater was used instead of an oven to heat the acrylic panel before bending.

1

Pilot holes were created in the wooden shelf.



(ii) Explain why pilot holes were used.

2



1. (f) (continued)

- (iii) State why the holes on the underside of the panel were countersunk.

1

The whiteboard was joined to the panel using an adhesive.

- (iv) Explain why an adhesive was used rather than screws.

2

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* X 8 1 9 7 5 0 1 1 1 *

2. An office chair was researched by a designer.



(a) A user trip is a research technique that designers can use to gather information.

(i) Outline **three** pieces of information about the office chair that could be gained from a user trip.

3

(ii) Name an alternative research technique.

1



2. (continued)

(b) Morphological analysis is an idea generation technique used by designers.

(i) Describe the key stages of morphological analysis.

You may use sketches to illustrate your answer in the box below.

3

(ii) Name an alternative idea generation technique.

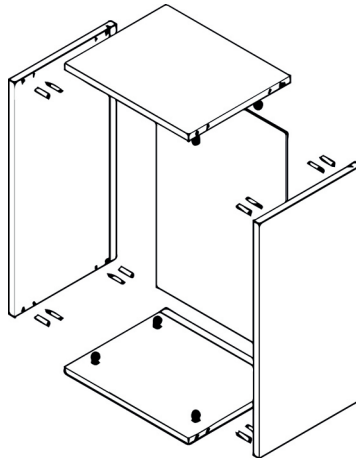
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3. Different graphic techniques can be used throughout the design process.



exploded view

(a) Outline **two** pieces of information that can be gained from an exploded view.

2

(b) Outline **two** reasons for using sketching when generating ideas.

2



* X 8 1 9 7 5 0 1 1 4 *

5. A range of factors have been considered in the design of the cooker shown below.



You must give different examples in (a) and (b).

- (a) Describe how safety has influenced the design of the cooker.

2



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7. The design of products can be influenced by branding and the target market.

(a) Outline **two** benefits of selling a product under a brand name.

2

(b) Describe what is meant by market pull.

1

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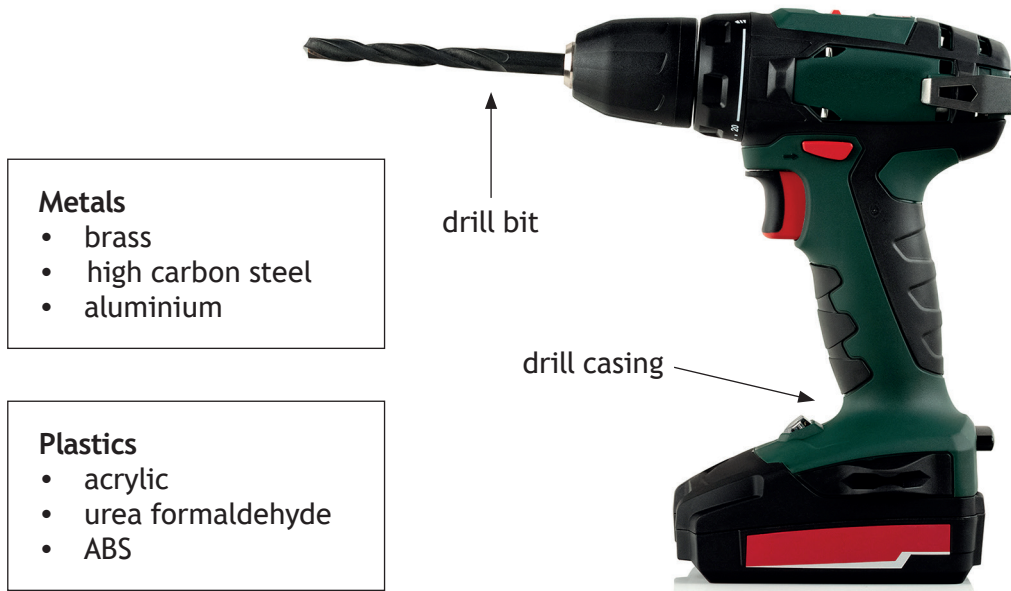


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SECTION 2 — 20 marks

Attempt ALL questions

8. The cordless electric drill and drill bit shown below have been produced using a range of materials and processes.



- Metals**
- brass
 - high carbon steel
 - aluminium

- Plastics**
- acrylic
 - urea formaldehyde
 - ABS

- (a) Select appropriate materials for the drill bit and drill casing from the lists provided and state why they would be suitable.

A different material and property must be given for each item.

- (i) Drill bit. 2

Metal _____

Suitable because _____

- (ii) Drill casing. 2

Plastic _____

Suitable because _____



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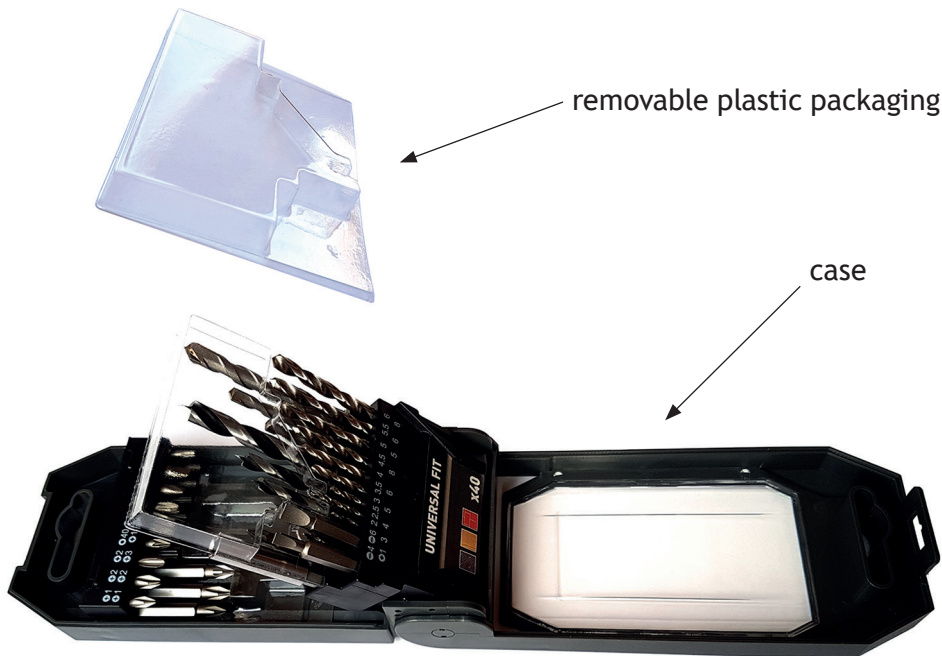
8. (continued)

(b) The drill casing was mass produced using injection moulding.

State **two** features that would identify that the casing has been injection moulded.

2

(c) To provide protection during transport, removable plastic packaging was used to support the drill bits within their case.



The packaging was vacuum formed around a pattern that contained features such as tapered sides and rounded corners.

State a different manufacturing reason for each feature.

(i) Tapered sides.

1

(ii) Rounded corners.

1



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9. Modern technology has allowed us to 3D print products such as artificial hands.



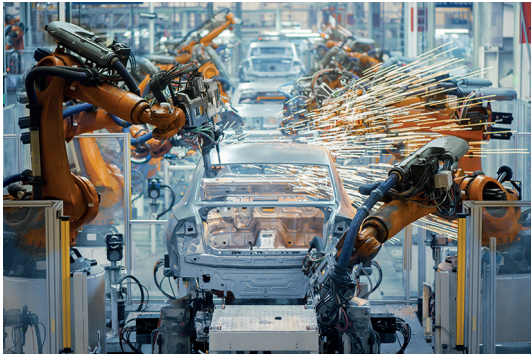
Describe **three** benefits of using a 3D printer to design and manufacture products.

You may refer to artificial hands in your answer.

3



11. Modern design and manufacturing technologies have had an impact on society and the environment.



You must give different examples in (a), (b) and (c).

Describe the impact of these technologies on

(a) the supply of products.

2

(b) the workforce.

2



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11. (continued)

(c) pollution.

2

[END OF QUESTION PAPER]



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ADDITIONAL SPACE FOR ANSWERS



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