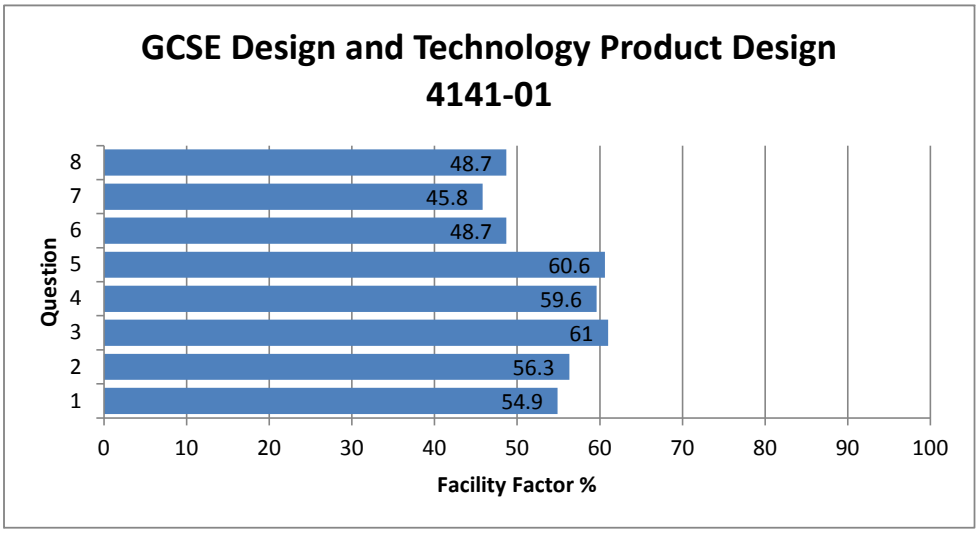
WJEC 2014 Online Exam Review

GCSE Design and Technology Product Design 4141-01

All Candidates' performance across questions

Question Title	N	Mean	S D	Max Mark	F F	Attempt %
1	1981	8.2	3.3	15	54.9	99.8
2	1981	5.6	2.3	10	56.3	99.8
3	1981	6.1	2.1	10	61	99.8
4	1981	14.9	4.6	25	59.6	99.8
5	1981	6.1	2.1	10	60.6	99.8
6	1981	7.3	3.1	15	48.7	99.8
7	1981	9.2	3.8	20	45.8	99.8
8	1981	7.3	3.1	15	48.7	99.8

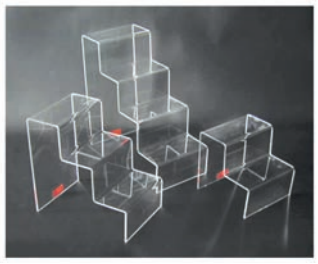
6
7
8



Examiner only

6. This question is about Materials and Components. It is worth a total of 15 marks.

(a) For **each** of the products shown in the table below **underline** the correct material and the correct classification for the material you have chosen. 4 × [1]
An example has been done for you.

Product	*Material*	*Classification*
 **Water Bottle**	HIPs **PET** HDPE	**Thermoplastic** Thermosetting Plastic
 **Torch**	Cast Iron Copper Aluminium	Ferrous Metal Non-Ferrous Metal
 **Display stands**	Acrylic Epoxy Resin Melamine Formaldehyde	Thermoplastic Thermosetting Plastic

(b) Explain why acrylic is a suitable material for the external signage of a shop. [3]

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Examiner only

(c) (i) The spoon pictured below has been modified using a smart material. Name the smart material that has been used. [1]

Name: .....

(ii) Explain the properties of the above named smart material that make it suitable when developing the shape of the spoon handle. [3]

.....

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.....

(d) Describe **one** advantage and **one** disadvantage to the designer, when using blue modelling foam to create a block model prototype such as the computer mouse model pictured below. [4]

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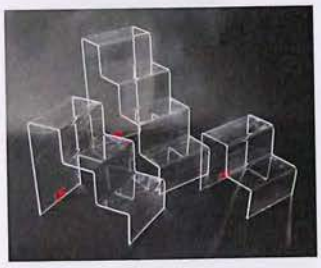 **Display stands**	Acrylic Epoxy Resin Melamine Formaldehyde	Thermoplastic Thermosetting Plastic

(b) Explain why acrylic is a suitable material for the external signage of a shop. [3]

because it is tough and can be shaped easily for different shaped signs and is cheap to make for signs

Examiner only

(c) (i) The spoon pictured below has been modified using a smart material. Name the smart material that has been used. [1]

Name: polymorphe

(ii) Explain the properties of the above named smart material that make it suitable when developing the shape of the spoon handle. [3]

it is easily moulded it can be re moulded and sits any shape. Shape using hot water

(d) Describe **one** advantage and **one** disadvantage to the designer, when using blue modelling foam to create a block model prototype such as the computer mouse model pictured below. [4]

advantage of using blue modelling foam is it is easy to mould and cut and shape. The Disadvantage is that if you can't remould it to change the shape you have to start again

Examiner only

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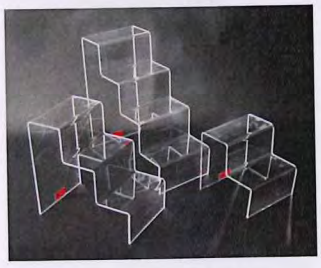 **Display stands**	Acrylic Epoxy Resin Melamine Formaldehyde	Thermoplastic Thermosetting Plastic

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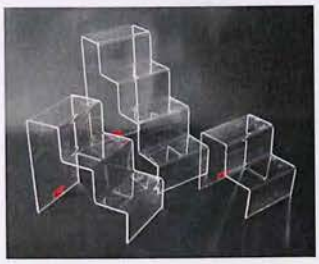 **Display stands**	Acrylic Epoxy Resin Melamine Formaldehyde	Thermoplastic Thermosetting Plastic

(b) Explain why acrylic is a suitable material for the external signage of a shop. [3]

Because it is cheap, it is easy to change it's shape and Mould, and you can do a lot to it, and it is quite strong

Examiner only

(c) (i) The spoon pictured below has been modified using a smart material. Name the smart material that has been used. [1]

Name: Thermoplastic

Thermo setting plastic

(ii) Explain the properties of the above named smart material that make it suitable when developing the shape of the spoon handle. [3]

it is easy to mould, which makes it easier to make into a shape to fit easily into any hand

(d) Describe **one** advantage and **one** disadvantage to the designer, when using blue modelling foam to create a block model prototype such as the computer mouse model pictured below. [4]

One advantage is that it is easy to change the shape of it, and make different patterns on it. A disadvantage is that it may not always be a true representation, and might not show any marks because it is too dark

Examiner only

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(a) For **each** of the products shown in the table below **underline** the correct material and the correct classification for the material you have chosen. 4 × [1]
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3

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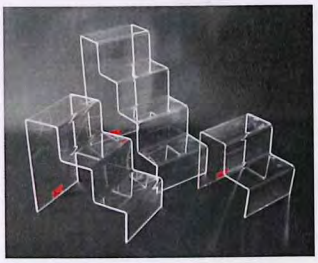 **Display stands**	Acrylic Epoxy Resin Melamine Formaldehyde	Thermoplastic Thermosetting Plastic

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Examiner only

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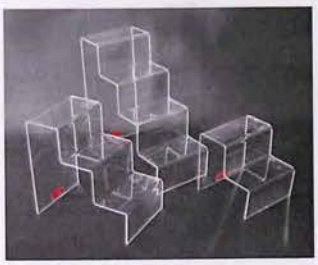 **Display stands**	Acrylic Epoxy Resin Melamine Formaldehyde	Thermoplastic Thermosetting Plastic

(b) Explain why acrylic is a suitable material for the external signage of a shop. [3]

Acrylic is ~~suitable~~ a suitable material because it's hard ~~to~~ so it won't break that easy it's strong & so it will last ~~about~~ for a long time

Examiner only

(c) (i) The spoon pictured below has been modified using a smart material. Name the smart material that has been used. [1]

Name: Polyurthane

(ii) Explain the properties of the above named smart material that make it suitable when developing the shape of the spoon handle. [3]

Because it's a solid and a strong material also ~~b~~ because it's ~~[illegible]~~ a smart material the spoon handle will not get hot and ~~b~~ will not burn you

(d) Describe **one** advantage and **one** disadvantage to the designer, when using blue modelling foam to create a block model prototype such as the computer mouse model pictured below. [4]

An advantage to using modelling foam is that it's easy to mould ~~[illegible]~~ so you could put detail in. A disadvantage is that it's not very strong so it could break very easily

Examiner only

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(a) For **each** of the products shown in the table below **underline** the correct material and the correct classification for the material you have chosen. 4 × [1]
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4

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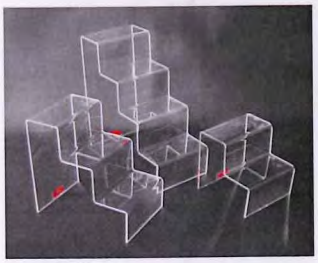
 **Water Bottle**	HIPs **PET** HDPE	**Thermoplastic** Thermosetting Plastic
 **Torch**	Cast Iron Copper Aluminium	Ferrous Metal Non-Ferrous Metal
 **Display stands**	Acrylic Epoxy Resin Melamine Formaldehyde	Thermoplastic Thermosetting Plastic

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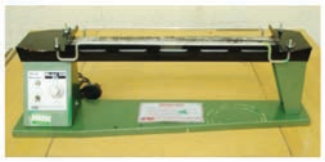
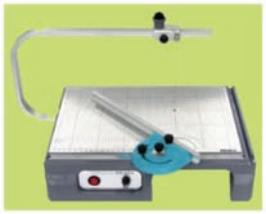
3

9

Examiner only

7. This question is about Tools, Equipment and Making. It is worth a total of 20 marks.

(a) Complete the table by inserting the correct name for **each** piece of equipment and describe its use.

Machine/Equipment	***Use***
A  Name: ..... [1]	.... [2]
B  Name: ..... [1]	.... [2]
C  Name: **Hot Wire Cutter**	.... [2]

(b) State **three** safety precautions you should observe when using machine **B** pictured above. 3 × [1]

Precaution 1: .....

Precaution 2: .....

Precaution 3: .....

Examiner only

(c) The image below shows an acrylic bottle rack. Use **notes** and **sketches** to describe in detail the main stages for manufacturing the bottle rack. *The first stage has been done for you.* [6]

***Stage 1**: Create male and female moulds out of a ridged, heat proof material.*

Examiner only

(d) Explain how testing a prototype before production can impact on the eventual success of a product. [3]

.....

.....

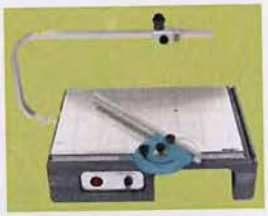
.....

.....

Examiner only

7. This question is about Tools, Equipment and Making. It is worth a total of 20 marks.

(a) Complete the table by inserting the correct name for **each** piece of equipment and describe its use.

Machine/Equipment	***Use***
A  Name: linebender [1]	used to heat plastics in certain lines and then bend the plastic when heated [2]
B  Name: Scroll saw [1]	used to cut wood and plastic cut out shapes and a ~~Steph~~ Skwiggly lines [2]
C  Name: **Hot Wire Cutter**	used to cut foam blue modeling foam polystyrene gives clean cut and can cut any shape or line [2]

(b) State **three** safety precautions you should observe when using machine **B** pictured above. 3 × [1]

Precaution 1: tie long hair back

Precaution 2: wear safty glasses

Precaution 3: tuck ~~tie in it's~~ loose clothing in

Examiner only

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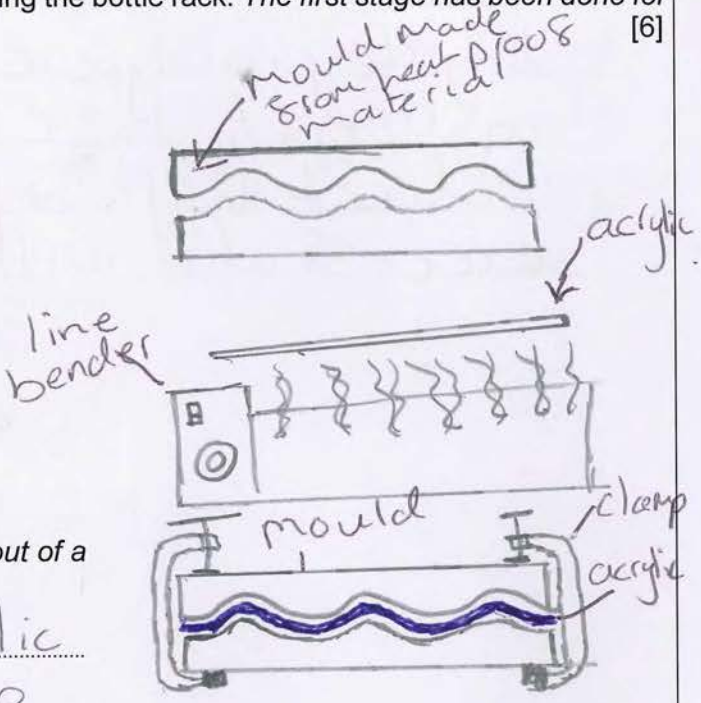


Stage 2: Mark acrylic for where to heat up

Stage 3: Use line bender to heat the acrylic.

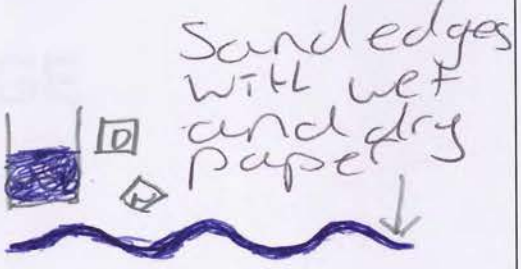
Stage 4: Wearing gloves place hot acrylic into mould.

Stage 5: Clamp moulds to acrylic and let the acrylic cool.

Stage 6: Take acrylic out of mould.

Stage 7: Using wet and dry paper Sand edges of acrylic to get the little scratches out

Stage 8: polish acrylic and put the pieces together



polish acrylic and put pieces together

Examiner only

(d) Explain how testing a prototype before production can impact on the eventual success of a product. [3]

testing the prototype can help decide is things need to be changed or is the product will sell and how ~~Sucee~~ Successful it will be.

Examiner only

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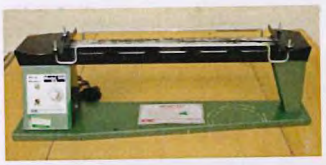
A  Name: linebender [1]	used to heat plastics in certain lines and then bend the plastic when heated [2]
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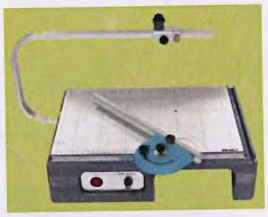
C  Name: **Hot Wire Cutter**	used to cut foam blue modeling foam polystyrene gives clean cut and can cut any shape or line [2]

3

3

2

(b) State **three** safety precautions you should observe when using machine **B** pictured above. 3 × [1]

3

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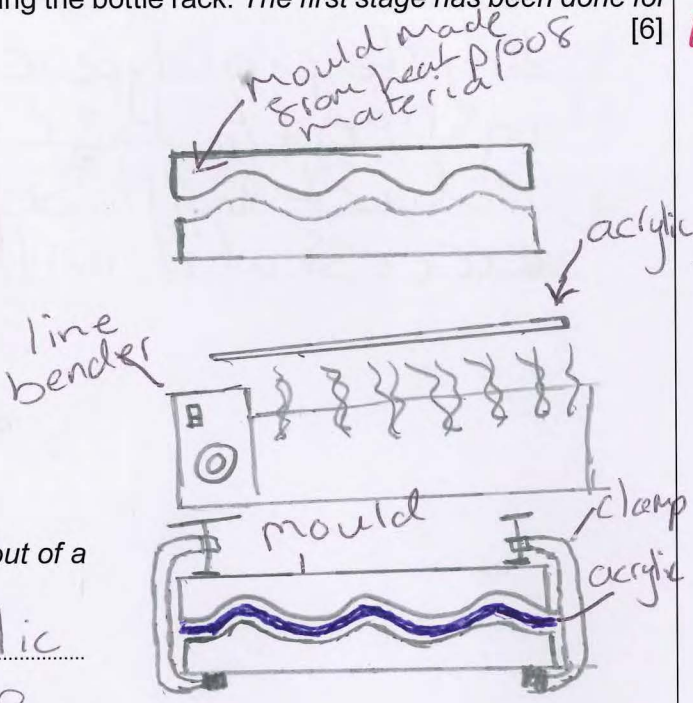
Precaution 2: wear safety glasses

Precaution 3: tuck ~~tie in it's~~ loose clothing in

Examiner only

(c) The image below shows an acrylic bottle rack. Use **notes** and **sketches** to describe in detail the main stages for manufacturing the bottle rack. *The first stage has been done for you.* [6]

4



***Stage 1**: Create male and female moulds out of a ridged, heat proof material.*

Stage 2: Mark acrylic for where to heat up

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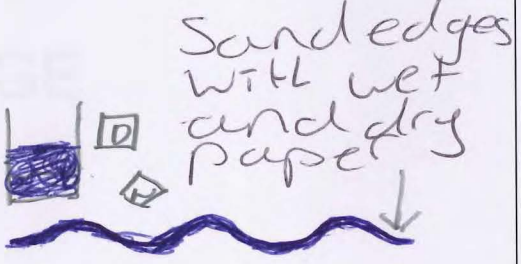
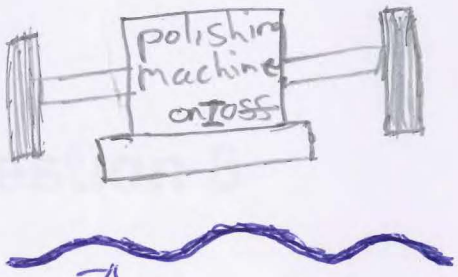
Stage 8: polish acrylic and put the pieces together





polish acrylic and put pieces together

Examiner only

(d) Explain how testing a prototype before production can impact on the eventual success of a product. [3]

2

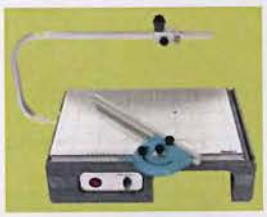
testing the prototype can help decide is things need to be changed or is the product will sell and how ~~Succes~~ Successful it will be.

17

Examiner only

7. This question is about Tools, Equipment and Making. It is worth a total of 20 marks.

(a) Complete the table by inserting the correct name for **each** piece of equipment and describe its use.

Machine/Equipment	***Use***
A  Name: Heat rail [1]	It can heat up a MDF material to make it easier to change the shape [2]
B  Name: band saw [1]	It is used to cut materials finely such as wood or plastics like acrylic [2]
C  Name: **Hot Wire Cutter**	It heats wires to make them easier to cut [2]

(b) State **three** safety precautions you should observe when using machine **B** pictured above. 3 × [1]

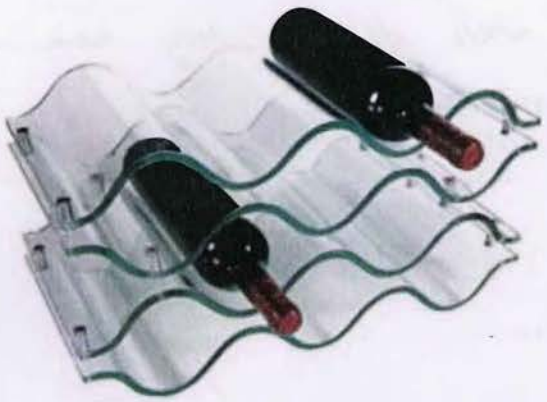
Precaution 1: Protect your hands, keep them far away from the saw

Precaution 2: use protective goggles for any debris

Precaution 3: keep your hair and clothes away from the saw

Examiner only

(c) The image below shows an acrylic bottle rack. Use **notes** and **sketches** to describe in detail the main stages for manufacturing the bottle rack. *The first stage has been done for you.* [6]



***Stage 1**: Create male and female moulds out of a ridged, heat proof material.*

1. First you have to cut the acrylic to the correct size.

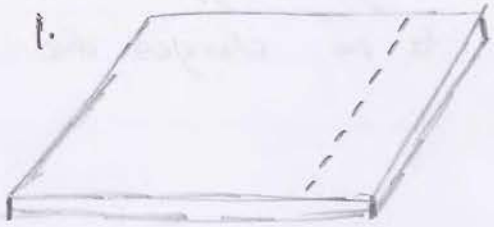
2. Second Then you have to smooth the edges of the acrylic so they're not rough

3. Then you must bend the acrylic to the correct shape that you want by heating it

4. Then drill the holes into the acrylic of where you want the fixtures to be

5. Finally, you must connect each piece of acrylic together

1.

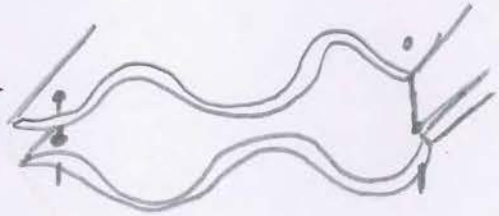


2.

3.

4.

5.



Examiner only

(d) Explain how testing a prototype before production can impact on the eventual success of a product. [3]

If any problems are found, they can be fixed straight away, also the whole design may have to be changed due to problems.

Examiner only

7. This question is about Tools, Equipment and Making. It is worth a total of 20 marks.

(a) Complete the table by inserting the correct name for **each** piece of equipment and describe its use.

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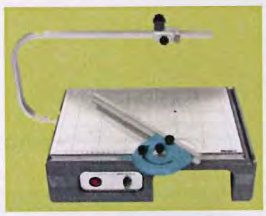
C  Name: **Hot Wire Cutter**	It heats wires to make them easier to cut [2]

2

1

0

(b) State **three** safety precautions you should observe when using machine **B** pictured above. 3 × [1]

3

Precaution 1: Protect your hands, keep them far away from the saw

Precaution 2: use protective goggles for any debris

Precaution 3: keep your hair and clothes away from the saw

Examiner only

5

(c) The image below shows an acrylic bottle rack. Use **notes** and **sketches** to describe in detail the main stages for manufacturing the bottle rack. *The first stage has been done for you.* [6]

***Stage 1**: Create male and female moulds out of a ridged, heat proof material.*

1. First you have to cut the acrylic to the correct size.

2. ~~Second~~ Then you have to smooth the edges of the acrylic so they're not rough

3. Then you must bend the acrylic to the correct shape that you want by heating it

4. Then drill the holes into the acrylic of where you want the fixtures to be

5. Finally, you must connect each piece of acrylic together

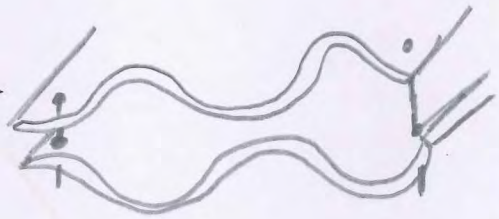
1.

2.

3.

4.

5.



Examiner only

(d) Explain how testing a prototype before production can impact on the eventual success of a product. [3]

If any problems are found, they can be fixed straight away, also the whole design may have to be changed due to problems.

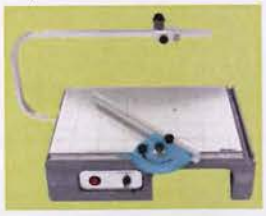
1

12

Examiner only

7. This question is about Tools, Equipment and Making. It is worth a total of 20 marks.

(a) Complete the table by inserting the correct name for **each** piece of equipment and describe its use.

Machine/Equipment	***Use***
A  Name: ..... [1]	It is electrical .... [2]
B  Name: Saw ..... [1]	This machine is used to cut acrylic. It is electrical ..... [2]
C  Name: **Hot Wire Cutter**	The This machine is to wire that has been heated up. ..... [2]

(b) State **three** safety precautions you should observe when using machine **B** pictured above. 3 × [1]

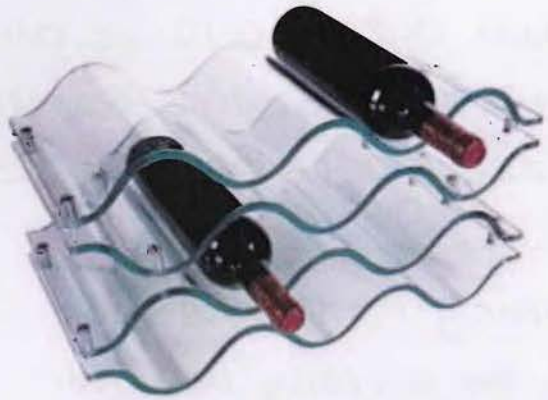
Precaution 1: .....

Precaution 2: Wear go eye protection so acrylic doesn't come off.

Precaution 3: ~~Where~~ wear gloves so you don't burn

Examiner only

(c) The image below shows an acrylic bottle rack. Use **notes** and **sketches** to describe in detail the main stages for manufacturing the bottle rack. *The first stage has been done for you.* [6]



***Stage 1**: Create male and female moulds out of a ridged, heat proof material.*

Stage 2: Then place the acrylic into the mould to create the shape (repeat 3 times)

Stage 3: You will then have to start to create the joints to attach the acrylic together, you will need 12 in ~~total~~

Stage 4: Once all the acrylic sheet's are ready you will have to drill 12 holes into it using a hand drill. 6 holes ~~one~~ on each side

Stage 5: you will then have to test your rack to make sure it's safe and can hold weight.

Stage 6: you don't have to give it a finish because it's all ready.

Examiner only

(d) Explain how testing a prototype before production can impact on the eventual success of a product. [3]

Testing a prototype can make a big impact on the success because if you didn't test it and put the product on the market and something went wrong it would be a control issue and it could lead to the baissness ~~beign~~ being sued and the company could end up being closed if it was ~~so~~ a really bad error

Examiner only

7. This question is about Tools, Equipment and Making. It is worth a total of 20 marks.

(a) Complete the table by inserting the correct name for **each** piece of equipment and describe its use.

Machine/Equipment	***Use***
A  Name: ..... [1]	It is electrical ..... [2]
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C  Name: **Hot Wire Cutter**	The This machine is to wire that has been heated up. ..... [2]

(b) State **three** safety precautions you should observe when using machine **B** pictured above. 3 × [1]

Precaution 1: .....

Precaution 2: Wear go eye protection so acrylic doesn't come off.

Precaution 3: ~~Where~~ wear gloves so you don't burn

Examiner only

3

(c) The image below shows an acrylic bottle rack. Use **notes** and **sketches** to describe in detail the main stages for manufacturing the bottle rack. *The first stage has been done for you.* [6]

***Stage 1**: Create male and female moulds out of a ridged, heat proof material.*

Stage 2: Then place the acrylic into the mould to create the shape (repeat 3 times)

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Stage 5: you will then have to test your rack to make sure it's safe and can hold weight.

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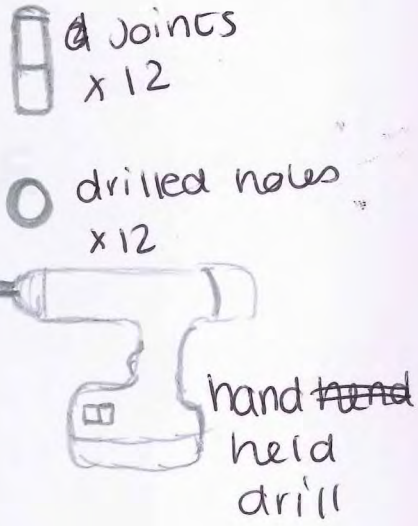


Turn over.

Examiner only

(d) Explain how testing a prototype before production can impact on the eventual success of a product. [3]

Testing a prototype can make a big impact on the success because if you didn't test it and put the product on the market and something went wrong it would be a control issue and it could lead to the baissness ~~beign~~ being sued and the company could end up being closed if it was ~~so~~ a really bad error

3

8

Examiner only

8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

(a) (i) State the meaning of CAD. [2]

Computer A ..... D .....

(ii) Name **one** CAD software package that you have used in Product Design. [1]

.....

(iii) Describe **two** disadvantages of using CAM when developing a prototype.

Disadvantage 1: [2]

.....

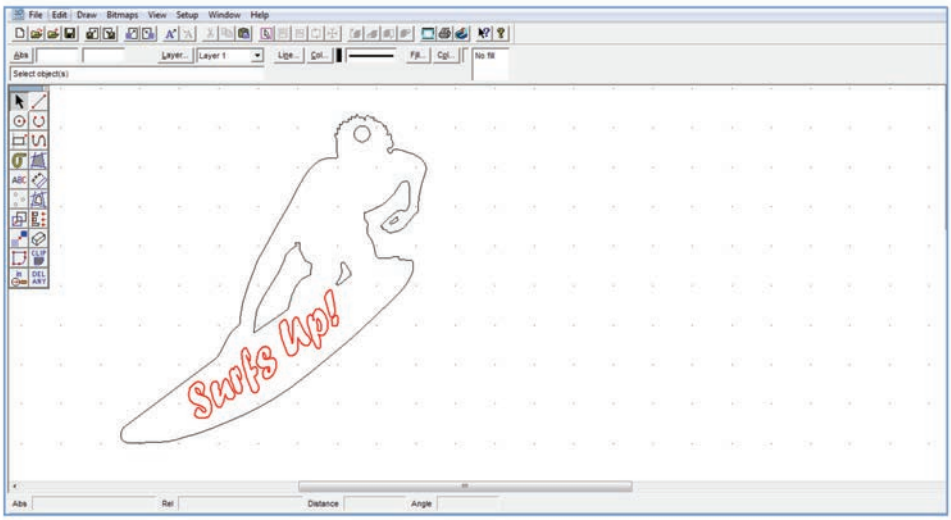
.....

Disadvantage 2: [2]

.....

.....

(b) The CAD key ring pictured below has been designed to be manufactured using a laser cutter.



(i) Explain why **two** different coloured lines have been used in the design. [2]

.....

.....

.....

Examiner only

(ii) Describe the process of setting up a laser cutter to cut the design from a 3 mm acrylic sheet. [3]

.....

.....

.....

.....

.....

(c) The perfume bottle pictured below was developed using 3D rapid prototyping. Discuss the advantages of using 3D rapid prototyping. [3]

.....

.....

.....

.....

.....

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END OF PAPER

Examiner only

8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

(a) (i) State the meaning of CAD. [2]

Computer A ied D esign

(ii) Name **one** CAD software package that you have used in Product Design. [1]

pro desktop

(iii) Describe **two** disadvantages of using CAM when developing a prototype.

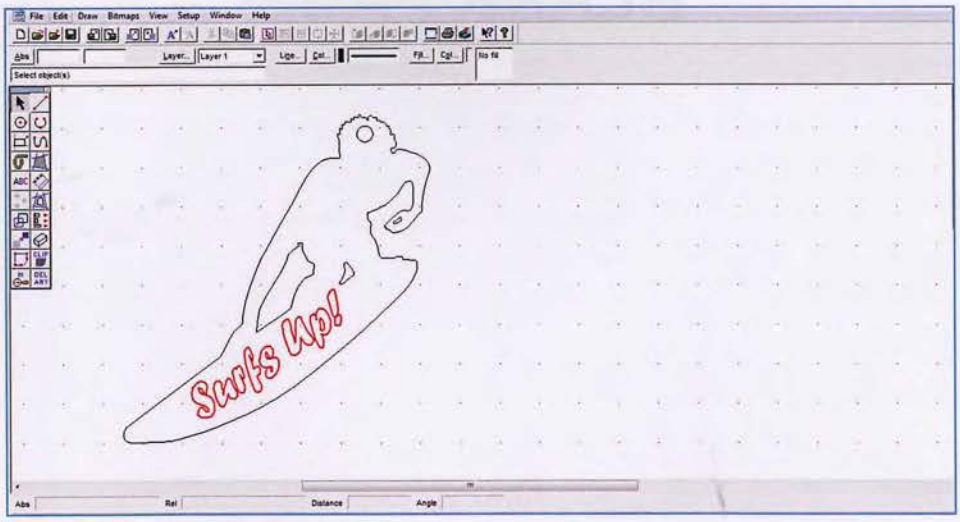
Disadvantage 1: [2]

if one ~~pro~~ part is wrong all will be wrong

Disadvantage 2: [2]

need to know how to use it to use the full potential of the programme

(b) The CAD key ring pictured below has been designed to be manufactured using a laser cutter.



(i) Explain why **two** different coloured lines have been used in the design. [2]

Black line is what is to be cut with the laser cutter and red is what will be engraved

Examiner only

(ii) Describe the process of setting up a laser cutter to cut the design from a 3mm acrylic sheet. [3]

the design must be drawn using Corel draw the laser cutter but must be set to 3 mm material must be selected and thickness speed laser must travel at what lines must be cut and what is to be engraved and then ready to cut press play

(c) The perfume bottle pictured below was developed using 3D rapid prototyping. Discuss the advantages of using 3D rapid prototyping. [3]

it produces exact size product in 3D can be held to see is it feels right can also be used with different colours can also print different shapes and designs

END OF PAPER

Examiner only

8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

(a) (i) State the meaning of CAD. [2] 2

Computer A ...ied... D esign

(ii) Name **one** CAD software package that you have used in Product Design. [1] 1

pro desktop

(iii) Describe **two** disadvantages of using CAM when developing a prototype.

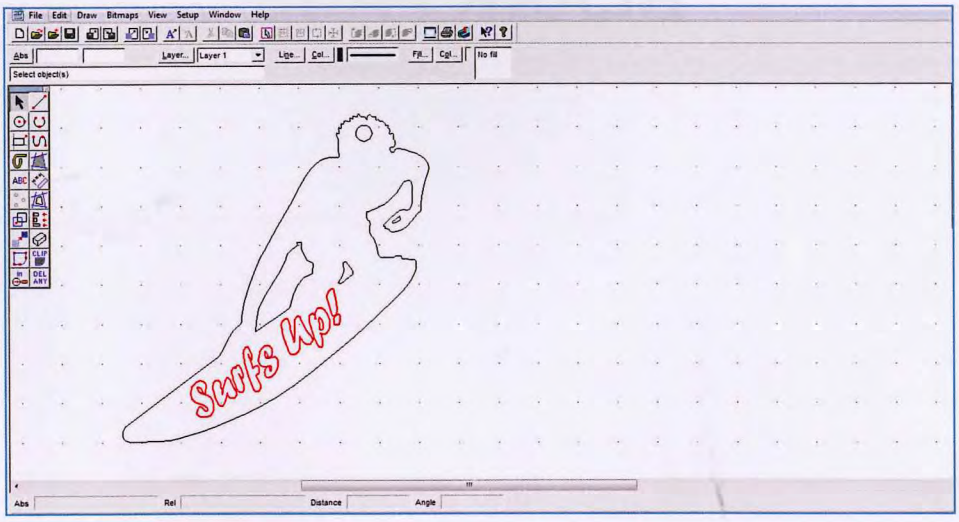
Disadvantage 1: [2] 0

if one ~~pro~~ part is wrong all will be wrong

Disadvantage 2: [2] 1

need to know how to use it to use the full potential of the programme

(b) The CAD key ring pictured below has been designed to be manufactured using a laser cutter.



(i) Explain why **two** different coloured lines have been used in the design. [2] 2

Black line is what is to be cut with the laser cutter and red is what will be engraved

Examiner only

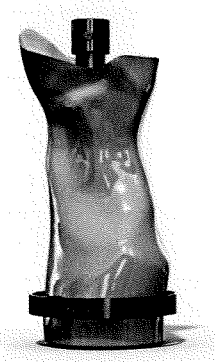
(ii) Describe the process of setting up a laser cutter to cut the design from a 3mm acrylic sheet. [3]

2

the design must be drawn using coreldraw the laser cutter but must be set to 3mm material must be selected and thickness speed laser must travel at what lines must be cut and what is to be engraved and then ready to cut press play (laser cutter)

(c) The perfume bottle pictured below was developed using 3D rapid prototyping. Discuss the advantages of using 3D rapid prototyping. [3]

2



it produces exact size product in 3D can be held to see is it feels right can also be used with different colours can also print different shapes and designs

END OF PAPER

10

Examiner only

8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

(a) (i) State the meaning of CAD. [2]

Computer A nimated D esign

(ii) Name **one** CAD software package that you have used in Product Design. [1]

Pro desktop

(iii) Describe **two** disadvantages of using CAM when developing a prototype.

Disadvantage 1: [2]

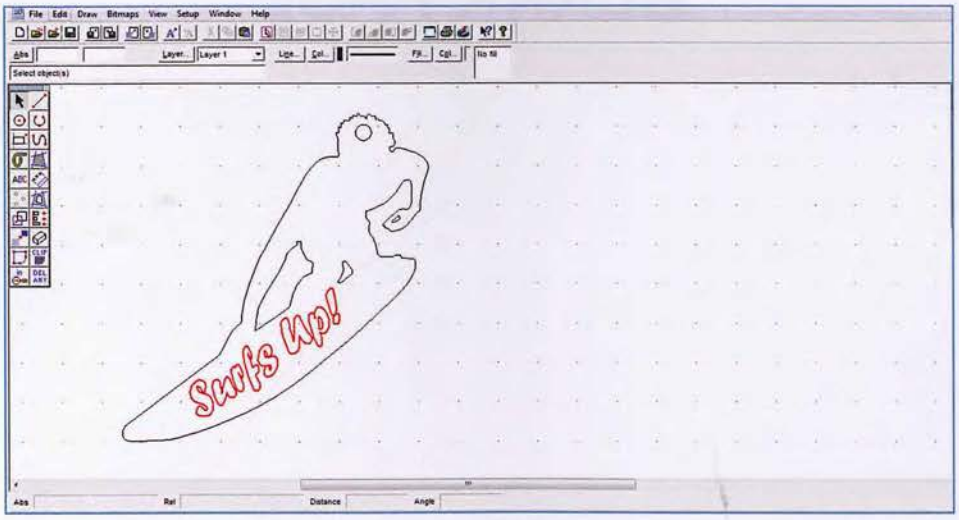
You have a 3D model of the design

It may not represent the actual size

Disadvantage 2: [2]

You cannot test using it because it is not opt Made

(b) The CAD key ring pictured below has been designed to be manufactured using a laser cutter.



(i) Explain why **two** different coloured lines have been used in the design. [2]

Because different lines represent different things, Black may represent cutting whereas red may represent etching.

Examiner only

(ii) Describe the process of setting up a laser cutter to cut the design from a 3mm acrylic sheet. [3]

First you have to make a model shape on 2D design. Then you have to insert the 3MM acrylic. Then you have to input what you want the laser cutter to do.

(c) The perfume bottle pictured below was developed using 3D rapid prototyping. Discuss the advantages of using 3D rapid prototyping. [3]

One advantage is that it is done quicker than other manufacturing processes. Another advantage is that it gives you a full 3D model of what it will look like.

END OF PAPER

Examiner only

8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

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Computer A nimated D esign

(ii) Name **one** CAD software package that you have used in Product Design. [1] 1

Pro desktop

(iii) Describe **two** disadvantages of using CAM when developing a prototype.

Disadvantage 1: [2] 0

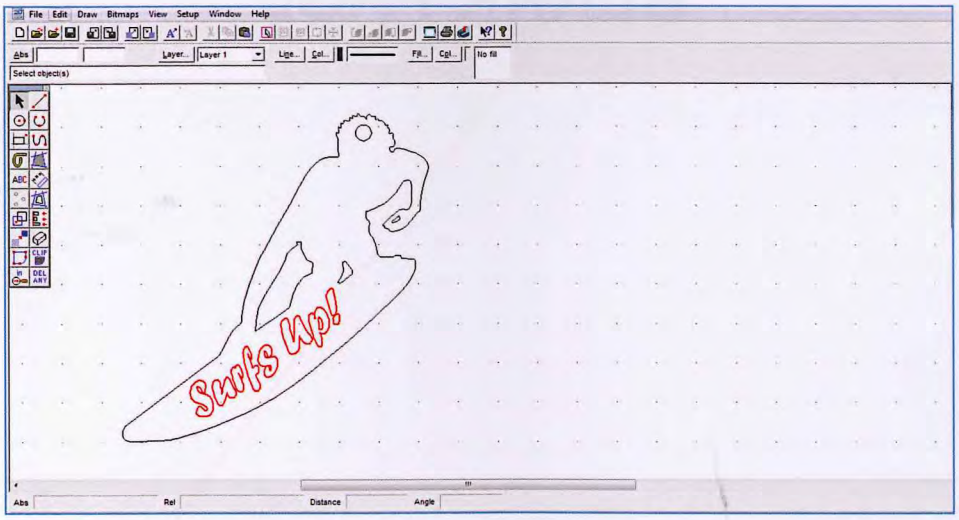
~~You have a 3D model of the design~~

It may not represent the actual size

Disadvantage 2: [2] 0

You cannot test ~~Using~~ use it because it is not yet Made

(b) The CAD key ring pictured below has been designed to be manufactured using a laser cutter.



(i) Explain why **two** different coloured lines have been used in the design. [2] 2

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Examiner only

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END OF PAPER

5

6

Examiner only

8. This question is about ICT, CAD, CAM, Systems and Processes. It is worth a total of 15 marks.

(a) (i) State the meaning of CAD. [2]

Computer A ided D esign

(ii) Name **one** CAD software package that you have used in Product Design. [1]

2D design

(iii) Describe **two** disadvantages of using CAM when developing a prototype.

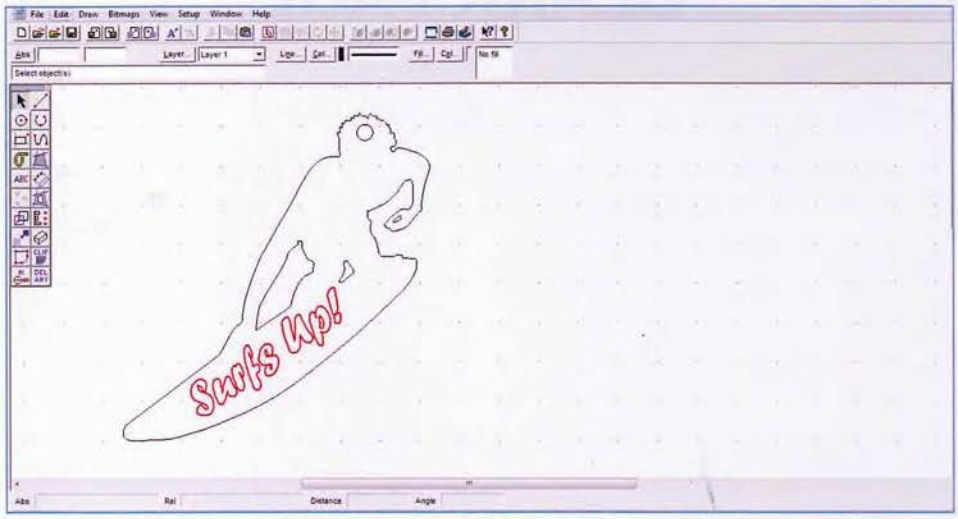
Disadvantage 1: [2]

it's easy ~~mark~~ to make a mistake with the measurments

Disadvantage 2: [2]

You have no controll over a product whilst if it was being made by hand you would.

(b) The CAD key ring pictured below has been designed to be manufactured using a laser cutter.



(i) Explain why **two** different coloured lines have been used in the design. [2]

Two ~~Colour~~ Colours have been used to So that one colour shows ~~the~~ whats being cut out and one show the engraving

Examiner only

(ii) Describe the process of setting up a laser cutter to cut the design from a 3mm acrylic sheet. [3]

First thing you would do is pick out your acrylic then place it in the machine then you would change the setting on the machine to make sure it's as [redacted] how it needs to be cut /engraved and then press start.

(c) The perfume bottle pictured below was developed using 3D rapid prototyping. Discuss the advantages of using 3D rapid prototyping. [3]

A- The advantages of using 3D rapid prototyping is that you would be able to analyse what the product ~~would~~ would look like from all angles

END OF PAPER

Examiner only

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(a) (i) State the meaning of CAD. [2]

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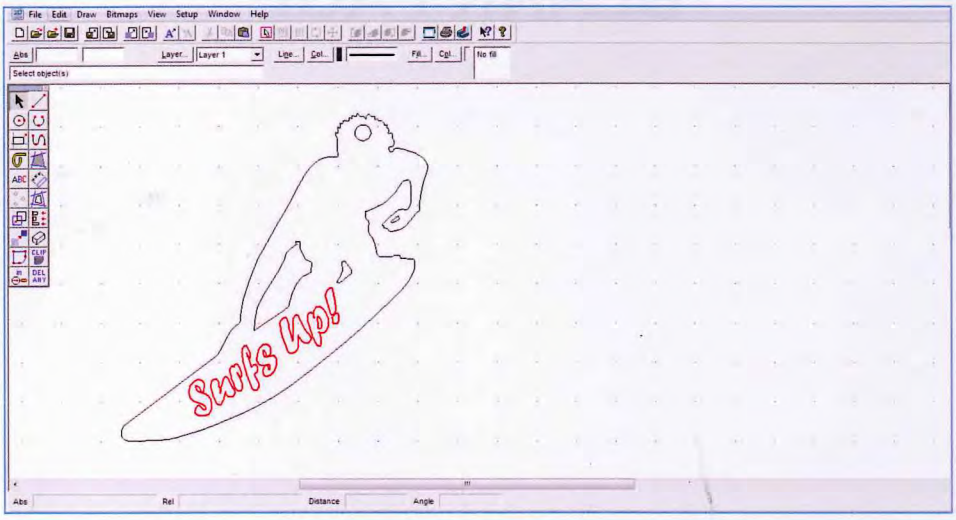

(i) Explain why **two** different coloured lines have been used in the design. [2]

Two ~~Colour~~ Colours have been used to So that one Colour shows ~~the~~ whats being cut out and one show the engraving

Examiner only

(ii) Describe the process of setting up a laser cutter to cut the design from a 3 mm acrylic sheet. [3]

2

First thing you would do is pick out your acrylic then place it in the machine then you would change the setting on the machine to make sure it's as ~~[illegible]~~ how it needs to be cut /engraved and then press start.

(c) The perfume bottle pictured below was developed using 3D rapid prototyping. Discuss the advantages of using 3D rapid prototyping. [3]

1

A. The advantages of using 3D rapid prototyping is that you would be able to analyse what the product ~~would~~ would look like from all angles

END OF PAPER

9