

CQ

## Theme 2 Going to a festival

(a) How can products be used to market or promote a festival?

CQ

## Theme 3 Going to the zoo

(b) How can products be used to educate young children about endangered animals during their visit to the zoo?



Candidate 2

# 1.2 Specification (8 marks)

Heading	Criteria	Justification	How can this be measured?
Form (FO)	<p>1. The product itself should have a strong, sturdy and stable base to be supporting it.</p> <p>2. The product must be attractive, aesthetically pleasing and unique in looks and colors so that it differs from other products.</p> <p>3. The product should be medium in size, not too small and not too large - (maximum dimensions of 50cm x 50cm x 90cm).</p> <p>4. Should have at least 4 compartments or more for users to be able store and organize their items.</p>	<p>1. This is to ensure that it can withstand weights of different objects without falling apart and that the product won't be as easy to topple / fall over.</p> <p>2. This is so that the product has its own unique selling point and that it would appeal to a wide range of target audiences while competing with other products.</p> <p>3. This allows the product to be moved around easily and not take up a lot of space in a room so that users would see it as a practical product.</p> <p>4. A minimum of 4 compartments for users will enable them to store a wide variety of items and be able to organize their well. In addition, it gives them a wider option for storing options whilst also fulfilling its purpose.</p>	<p>1. Stability of the product can be tested by placing some everyday items or school items such as books to test how the product bears the weight of the items.</p> <p>2. Create a survey to ask for opinions about the design and aesthetic of the product and whether it stands out from other storage products.</p> <p>3. Compare it with other product sizes and measure the amount of space the product would take up. Also, test to see if the product is able to be easily moved around.</p> <p>4. Visually test to see if there are 4 available compartments or area for items to be stored in the product.</p>
Function (FU)	<p>5. Must be able to store different sizes of books (smallest book being 20cm x 10.3cm x 17.7cm, biggest book 27.4cm x 19cm x 21.6cm including an A3 folder - 44cm x 33cm x 3cm).</p> <p>6. It should be easy to take items out of the product and place them into it - storage units should be easy to access.</p> <p>7. The product should contain a range of storage compartment / area that are different in sizes.</p>	<p>5. To ensure that the product is able to hold a wide range of different sizes of books in order to fulfill its storage purpose.</p> <p>6. This is to enhance the performance of the product and to prevent any stress that may be caused to the users. Also, it's so that users are able to get things out quickly without any hassle.</p> <p>7. Besides storing books, the product would be able to store a wider variety of items that are also different in shapes and sizes in order to serve its purpose of being a multipurpose storage unit.</p>	<p>5. This can be achieved and measured by placing all the different sizes of books into the storage compartments.</p> <p>6. Get a few students or adults to test the product by placing their own items into the storage unit and if it is easy to take them out - get feedback from other users.</p> <p>7. Visually check if there are different sizes of storage spaces and place different sizes of objects into them to see if they are easy to access.</p>
User Requirements (UR)	<p>8. The product should be able to provide enough / different compartments and storage areas to fulfil whatever the user needs and want to store in the product.</p> <p>9. The product should have a smooth and aesthetically pleasing finish to it that also makes it attractive looking to targeted audiences.</p> <p>10. The product should be as compact as possible, not allowing any waste of a large amount of space which could be used for storage.</p> <p>11. The product should be light in weight - preferable less than 50.00 kg.</p> <p>12. The product should be able to be cleaned easily without wearing off any layers of surface finish that is applied to on the product. This can be done by varnishing the product.</p>	<p>8. This is so that the user is able to use the product to store a wide variety of items in it without worrying about not having enough compartments.</p> <p>9. This does not only ensure that the product is attractive and will attract buyers, but it will also allow the product to be more durable and resistance to damage.</p> <p>10. The product should be compact so that it appears as a sensible and effective product by providing more storage compartments / space for users instead of having most of the product being made up just for the appearance.</p> <p>11. Having the product being light in weight will enable users to be able to move it around easily within an area and it could prevent them from hurting themselves if they drop it.</p> <p>12. To allow the product to be always kept clean and attractive easily.</p>	<p>8. Create a survey to ask what items consumers would most likely place into the storage unit, afterwards test to see if they are able to fit into the product.</p> <p>9. Research about which finishing techniques will provide the product with an attractive and durable quality finish / create a survey on what surface finish people prefer and gather consumer opinions and judgement about the appearance of the product when it is finished.</p> <p>10. Visually check to see that there is not a huge amount of materials being wasted just for appearance, but being used to create compartments and spaces.</p> <p>11. Physically test the product by weighing it and having different students carry it.</p> <p>12. Try to clean the product and see if there are any difficulties in doing so.</p>
Performance Requirements (PR)	<p>13. The product must be safe to use within a home or office and especially around children. The edges of the product should be slightly curved and not sharp in shape.</p> <p>14. The product and its storage areas should be secure and strong enough to hold heavy loads of objects without breaking or warping (at least 20-25kg).</p> <p>15. The product is able to be practically disassembled, but the main body is permanently joined together.</p>	<p>13. Having sharp corners could cause potential danger risks, therefore due to the safety of the consumers, it would be more preferable for the edges to be slightly curved.</p> <p>14. This ensures durability in the product as it would hold the products in place without causing them to fall off the shelves easily and damaging the objects on it.</p> <p>15. This is so that if there ever is a problem, it can be fixed easily whilst the main body of the product remains strong and is able to withstand heavy weights of different objects.</p>	<p>13. Physically test the product by touching the corners to see if they are curved.</p> <p>14. Test the product by placing a range of items that add up to maximum of 25 kg and see how the shelves perform to withstand the weight on them.</p> <p>15. Try to see if the product is able to be disassembled and reassembled easily.</p>
Material and Component Requirements (MCR)	<p>16. The product should be produced and manufactured with at least 2 different, durable and sustainable materials. These materials could be rubberwood and aluminium.</p> <p>17. The base of the product should not leave marks on the floor it is placed on.</p> <p>18. The product should have a durable and water / water stain resistant finish to it.</p> <p>19. The product should be manufactured in a way that the stored items are close at hand / easy to reach for the user so that items can be taken quickly and easily without any trouble.</p>	<p>16. A range of durable materials ensures that the product will have a long lifespan and make the product look more interesting.</p> <p>17. Consumers who will be using the product would not want their floors to be marked by the product.</p> <p>18. This ensures that if any liquid gets onto the product, it will not damage the product in any way and the durable coating of the product will enable the product to have a longer lifespan.</p> <p>19. This allows customers to be more satisfied with the product and it will fulfil its purpose of being a friendly user product.</p>	<p>16. Research about durable and sustainable materials that are cheap and will suit the product that will be made.</p> <p>17. Ensure that the material used to manufacture the product does not cause stains on floors by placing it on different floor types to try it out.</p> <p>18. Research about what to do to ensure that the product has a water / stain resistant layer on it and then pour water on it to check if it works.</p> <p>19. The product can be used for a few days and have items stored in it to test its functions and to discover any issues or problems that can be fixed.</p>
Scale of Production and Cost (SPC)	<p>20. The product must not exceed the maximum budget of 150RM.</p> <p>21. Materials used should be locally sourced as they are easier to access and are usually cheaper. Woods such as rubberwood and meranti should be considered for usage during manufacturing.</p> <p>22. The product should be able to be batch produced and not just one off in the future.</p>	<p>20. The budget is there to ensure that cost of production is kept to a minimum and that it is low in order to make profit out of it.</p> <p>21. Locally sourced materials will be cheaper and are easier to access as they are widely available compared to woods imported from other countries.</p> <p>22. The product should be realistic and workable so that it can be batch produced in order for it to be produced in groups to allow faster production and output.</p>	<p>20. Calculate the total amount of money needed to buy the materials and produce the product and make sure that it does not exceed the budget.</p> <p>21. Research about local woods and about where you can get them and how they help with sustainability and the environment.</p> <p>22. Compare the product with other existing products and provide a detailed production guide for the product.</p>
Sustainability (SUS)	<p>23. The materials used should not be endangered materials. The materials used could be bought by a self-sufficient wood producer who plants trees of the same ratio they are being chopped down as this would reduce the amount of trees being cut down. This can be materials such as rubberwood and aluminium.</p> <p>24. The waste materials should be able to be recycled if they are not useful, even the materials that are being used in the product should be able to be recycled, reused and repurposed after it has reached the end of its lifespan.</p>	<p>23. This ensures that no contribution is made to the endangerment of wood species or support to deforestation and the release of harmful gases. It also ensures that the amount of trees being cut down is reduced.</p> <p>24. This provides help to the environment so that other objects can be made out of the waste / recycled material without being thrown away. It would also help reduce the Carbon Footprint of a product.</p>	<p>23. Research about the materials that will ensure 100% sustainability and that they are recyclable and not endangered. Also research about where you can find them locally.</p> <p>24. Do research about which materials can be recycled and the pros and cons of using the materials for manufacturing the product. Besides that, research about which materials could easily be reused and repurposed.</p>



Candidate 3

## Specification

## 1.2 Specification (8 marks)

User Requirements	Performance Requirements	Materials And Components	Form	Scale And Cost Of Production	Sustainability
The ping pong ball should be shot over 152.5mm trajectory from the device so it clears the net and it still in play.	The launcher must fire ping pong balls successfully over the net and land on the other side of the table, preferably near the end of the table. This is because the user needs to be able to hit the ball back and it should be challenging where possible.	The quality of the materials must be high to make the product look aesthetically appealing to the user and also to increase the durability and lifetime of the product.	The product must look aesthetically appealing to the user in order to look reliable, professional and modern. This is because the user would want a stylish and fully functioning product. This could be done by using professional techniques to join two materials.	The cost for components and materials we do not have in school should not exceed £30.00 because this is my budget. Therefore, the product should be priced between £30.00 and £60.00 because this takes into account the cost of materials / components in addition to existing products.	High Power consumption components will make the product less sustainable. Therefore the motors must turn off after 1 minute of no use and enter a hibernation mode.
The product should measure no more than 300mm x 300mm X 300mm for the product as this is the size of the space in Harry's wardrobe where the device will live when not being used.	The product must have at least a 5 second time delay between activating and launching so that the user has time to move to the other side of the table and get ready before it fires.	The tubing for launching the ping pong ball must allow the ball to be fired accurately. Therefore, it should be about 40mm and must be no smaller, otherwise the ball will not fit. A tube much larger would decrease the accuracy as the ball could sway from side to side.	The product must be large enough to contain all the required components because it is important that it functions, however if it is too large it will not look attractive and will have a greater mass.	The product should be a one-off prototype production because this is my task and I only have enough time to produce one. However, the processes and equipment used should be professional and allow me to easily produce more because this increases aesthetics suitability for larger production in the future.	The product must produce minimal waste to make sure that it contributes less towards landfill. Therefore there is less need to transport waste, leading to a decrease in CO2 emissions. Therefore, the motors and other output components should be efficient and the batteries must be rechargeable.
The device must propel the ping pong balls between 1337mm (half table length and 2344mm (total table distance minus the total 300mm depth of the device) so the ball can shoot and still be in play.	The product must have at least one DC motor to launch the ball. This would put spin on the ball and so 2 motors is preferable. Increasing this could increase the speed of the ball.	If using a relay, solenoid or motor, a back EMF diode and a 1k ohm base-protection resistor must be used to protect the component and the transistor from excess current.	The product could be fixed to the table in some way so that it cannot move when firing because this could cause the ball to be fired wrongly or the casing to be damaged. This should suit the casing and not look out of place.	It may weigh up to 5kg because this is within the range of other existing products and because it is portable at this mass.	The majority of components must be reusable; for example, the IC's must be mounted in IC holders and wires connected to STL's or terminal blocks where possible, so they can be placed using no solder.
It must have three modes so it can be used for learner, intermediate and advanced players at the club.	A mechanism for releasing one ball at a time is required because the user can only return one ball at a time and the balls need to be kept in the hopper when not being launched. This could be done using a solenoid or servo motor.	The product must be reliable and function correctly, therefore the components and materials must be assembled with quality in mind to ensure that it will work properly.	The components must be fixed in place because they should not be moving when in use as this could damage them or make an unnecessary noise.	If this product was to go into mass production in a factory, standard components such as nuts, bolts, glues and other pre-bought parts would be assembled in a production line along with the parts I intend to manufacture. This would keep costs down and would be a reliable source of components.	The PCB should be compact because this minimises the materials and costs involved. A smaller PCB means less photo etch board is used. Copper fill means that less etchant (ferric chloride) is used as less copper needs to be etched. This helps prolong the life of the etchant.
It must hold at least 20 ping pong balls so the user does not need to keep refilling the hopper.	The circuit for the PIC must operate at no more than 5V because a PIC starts to overheat above this voltage and will cause the circuit to stop working.	Strain holes should be used for wires soldered into the PCB as this reduced the stress on the soldered joint and will help prevent the wires from being pulled out of the PCB.	The product should measure no more than 300mm x 300mm for the base as this is the size of the starting zone and the size should be reduced where possible.	The cost of standard components (nuts and bolts, resistors, IC's) could be reduced by purchasing from other manufacturers such as Rapid because it should be as cheap as possible without compromising quality as the user wants something that will work and look good too.	One PCB per sub-system could be used to make each PCB smaller because there would be less tracks that would cross over and debugging the system would be easier if you could identify one PCB that was not functioning.

## Design Brief - Updated

I intend to design and make an electromechanical device which will launch ping pong balls over the table tennis court net successfully. To do this, the product must not be too large and should easily fit on the table or the surrounding area. I am going to use motor drivers, DC motors and a microcontroller to do this. Examples of suitable microcontrollers are the Arduino Uno, Genie 14 and Raspberry Pi. The application of this will be in professional and amateur table tennis practice. This project will be completed by myself. The deadline for this project is Easter half term.



## 2.2 Review of design ideas (8 marks)

Candidate 2

### REVIEW OF IDEAS - BOTTLES

To make sure that I can create and develop to get my final idea, I will need to evaluate the different initial ideas against my specification points and user group requirements.

Design Ideas	Strengths	Weaknesses	Sustainability	Areas for improvement	User group feedback
Idea 1 (Green Bottle)	<p>This design meets most of the specification points because:</p> <ul style="list-style-type: none"> <li>It has a bright, sporty colour scheme that represents energy and motivation.</li> <li>It is ergonomic since it is shaped like an hourglass so that the user's hands can fit into it and is comfortable.</li> <li>It includes a mouthpiece that can be pulled up and down, making it easier to open and drink out of.</li> <li>The bottle can stand without any support.</li> <li>It is made out of polycarbonate, preferably recycled, which is lightweight, flexible, waterproof, sturdy and durable. Can also be reused since it is a plastic.</li> <li>It can stand without any support therefore it can be put somewhere flat.</li> </ul>	<p>The label looks kind of awkward right at the centre of the green bottle, and the handle would take more time to make, and even though it looks good, it is an additional feature that I do not need.</p>	<p>Generally speaking since the material is made out of polycarbonate, which is derived from crude oil, means that it is not sustainable.</p>	<p>The way I am going to manufacture the cap is something to think about and this will be included in my development points. I will have to remove the handle since it is not necessary and I believe that the cap is tight enough to hold the liquid inside.</p>	<p>My user group feedback says that the bottle is easy to hold, and the colour scheme is bright and that it fits my specification points. Also the logo is bold and it is easy to see and recognise.</p>
Idea 2 (Red Bottle)	<p>This design meets most of the specification points since:</p> <ul style="list-style-type: none"> <li>The colour of this bottle (red and grey) are used because red is a bright colour, but to make it more appealing to the user, rather than having an opaque bottle, I decided that it would be better if I made them transparent but with a tint of red and grey.</li> <li>The bottle has circular grooves to enhance the ergonomic features, and the colour scheme swaps from red to grey to, again, attract my target market.</li> <li>It is easy to open and drink out of as you can pull the mouthpiece up and down. The mouthpiece is coloured grey at the top and red at the bottom to further make the design more unique.</li> <li>The bottle is made out of polycarbonate, and the cap which, after doing some research, I've realised that it could be made out of high density polyethylene, and you can get recycled versions of these.</li> <li>It can be stood up on its own without any support.</li> <li>The mouthpiece can be dispensed easily so that only an adequate amount of fluid comes out, and so the customer can drink out of the bottle with ease.</li> </ul>	<p>The colour of the logo and the brand name looks odd especially on the red part of the bottle, and it won't appeal to my audience as much. There are no methods to how I am going to be making the circular grooves.</p>	<p>Polycarbonate is made from crude oil, means that it is not sustainable and leads to climate change. I will need to use recyclable materials instead.</p>	<p>I need to think of ways of how to make the circular grooves, and also some ways to make the mouthpiece of the bottle. Also, I will need to think of other colours to use for the logo and the brand name. These will be the main talking points and will go under my developed designs.</p>	<p>They think that the bottle is well-designed and unique from what is there in the market. They've also it is easy to hold and that the logo stands out.</p>
Idea 3 (Blue Bottle)	<p>This design meets most of the specification points since:</p> <ul style="list-style-type: none"> <li>The bottle is unique from what is there in the market, and also to have a sporty colour combination. I have achieved this by having blue raindrops printed around the outside and the inside of the bottle, and the colour blue is a hydrating colour that reminds the user of water.</li> <li>It includes a hole inside the bottle with grips around the side to make it super ergonomic.</li> <li>There is a flap, which makes it easier to flip the straw attached to the bottle, and I've made it better by making the flap an average size of the thumbs of the majority of the population so that any customer can use it.</li> <li>There are grips added incorporated along the neck of the bottle in order for the lid to be able to be tightly closed.</li> <li>It has a hole in the bottle, with grips added around the inside of where the user's hands will fit in, so that it is comfortable and so that it is comfortable to hold in the user's hands, especially during a physical activity.</li> </ul>	<p>The cap looks as if it is hard to make since there are so many parts that will be fiddly when making it, especially the straw. Also, the purple logo and the label look somewhat odd on the bottle and out of place.</p>	<p>The material for the bottle is polycarbonate therefore it is not very friendly for the environment therefore it has to be made out of recycled plastic.</p>	<p>For the label and the logo, I will have to think of a better colour to match the bottle itself, and think of some ways to create that hole made in the middle of the bottle and also ways to add grips. I might have to think of alternative cap ideas that are easier to make as well as ergonomic for the user (e.g. the cap has to be easy to open and drink out of).</p>	<p>Overall, my peers think that this bottle has a unique shape, and since it has a handle added inside the bottle, it makes it easy to hold. The originality of the image will make the product recognisable and successful.</p>

# 2.2 Review of design ideas (8 marks)

Candidate 4

2.2 Review	Idea 1	Idea 2	Idea 3	Idea 4
<p><b>User</b></p> <p>Shot over 152.5mm No larger than 300 X 300 X 300 Shoot between 1337 &amp; 2344 3 speeds Hold 20 ping pong balls</p>	<p>This design would be 300 X 300 X 200 so it does not meet this point. It only has one speed setting so it does not meet this point. The hopper should hold 20 ping pong balls. I am unsure whether it will adjust the set distance and height.</p>	<p>This should fix the distance however in the current position it is difficult to see whether the ball would cross the net due to the direction tunnel being too low and not angled. This case is 300 X 150 X 300 so comes within the parameters. The circuit only has one speed setting but holds more than 20 balls.</p>	<p>This device should fire balls over the net and the distance of the table as the pipe is angled upwards. The case is no larger than 300 X 300 X 300, currently it is 300 X 150 X 200. The circuit does not have 3 speeds so this would need to be amended. I don't think the magazine would hold 20 ping pong balls either.</p>	<p>This design should shoot 5 balls over the net and over the distance. The casing is 200 X 200 X 300 so smaller than the 300 X 300 X 300. The circuit has 2 speeds. The device will hold 10 balls but I doubt it would hold 20 ping pong balls.</p>
<p><b>Performance</b></p> <p>Shoot over the net 5sec delay At least one dc motor Release one ball at a time No more than 5v</p>	<p>The distance of the ball being fired is difficult to tell, however the tube is high so should may give it a better chance of going over the net. It does not have a 5sec delay but does have a dc motor. The circuit has a solenoid that releases a ball at a time. It does run off 9v not 5v.</p>	<p>This may not shoot over the net as the ejector is not angled up. The circuit does not allow for a 5 sec delay, but has two DC motors and runs off 9v. There is no opportunity to release balls one at a time.</p>	<p>This design should shoot a ball over the net as the PVC pipe is angled upwards. The delay comes from the logic monostable so gives a 5sec delay. The circuit also contains one dc motor and the solenoid will release one ball at a time. The circuit should run off 5v.</p>	<p>This should shoot balls over the net but would depend on the angle or height of the PVC pipe. There is a 5sec delay built into the PIC. It has two dc motors connected to the H-bridge. The solenoid allows it to release one ping pong ball at a time and the circuit runs off of 5v.</p>
<p><b>Materials</b></p> <p>Quality materials / aesthetically pleasing 40mm tubing Diode Reliable components Strain holes</p>	<p>The materials should be made of a high quality as I will source them from school. It does use a 40mm PVC pipe. The circuit uses a diode and will use reliable components and strain holes.</p>	<p>The product will be made of quality materials as I will get them from school. It will use a 40mm PVC pipe for the ejector tube. The circuit uses a diode over the relay and will be made of reliable components and the PCB will have strain holes</p>	<p>The product will be made of high quality materials as I will source these from school and Mr Price doesn't buy any old rubbish. My client Harry thinks it looks good and particularly likes the magazine look. The design uses 40mm tubing. The circuit uses a diode as well as will use reliable components. I will use strain holes on my PCB.</p>	<p>The design will be made of high quality materials as these will be sourced from the D&amp;T department. It is aesthetically pleasing but Harry didn't really like the design. It uses 40mm tubing for the ball to be fired from. The circuit uses a diode over the solenoid and the h-bridge doesn't seem to need them. I will use reliable components from a reputable dealer and the PCB will use strain holes.</p>
<p><b>Form</b></p> <p>Aesthetically pleasing Large enough to contain the components Fixed to the table Components fixed down No larger than 300 X 300 X 300</p>	<p>This design looks nice and has some good feedback from my client Harry. The case looks like it is big enough to contain the components, and the components will be fixed down. The case is not yet fixed to the table - I will need to look into this further.</p>	<p>The design is aesthetically pleasing and liked by my client Harry. The case could be quite small as it is quite small and compact with the inner workings of the system too. The components and PCB will be bolted down. The case is not fixed to the table.</p>	<p>My client likes the design and thinks it looks aesthetically pleasing. He thought there was enough space to contain the components and any components will be fixed down. The case is no larger than 300 X 300 X 300 but it is not fixed to the table.</p>	<p>Although the casing is aesthetically pleasing, the client did not like it as much as the others. The casing does however look large enough to contain the components. Components will be fixed down. The casing is smaller than the 300 X 300 X 300. The casing will be fixed to the table however this does not show this.</p>
<p><b>Scale of Production &amp; Cost</b></p> <p>Cost no more than £30 / Sell for £80 One-off 5kg Use of bought-in components</p>	<p>The components look like they would come in under £30. The case will be made as a one-off and use components and bought-in components. I am unable to tell if it weighs less than 5kg.</p>	<p>The circuit should cost less than £30 however the casing looks quite complex especially the hopper which would be made from veneer or flexply. It would be made as a one-off product and use bought-in parts where possible, however I am unable to check it is less than 5kg.</p>	<p>The product should cost no more than £30 and sell for £80. It will be made as a one-off product and use bought-in components. I think this one looks like it would weigh less than 5kg more than the others.</p>	<p>The design should cost no more than £30 and sell for £80. It will be made as a one-off product and use bought-in components where possible. It looks like it will weigh 5kg or less.</p>
<p><b>Sustainability</b></p> <p>Motors off after 1min Minimal waste Reusable components Compact PCB One PCB per system</p>	<p>The motors do turn after a 1min period as it uses the monostable technology. I will try to use as little material as possible and a compact PCB as well and use reusable components and a separate PCB for each sub system of the circuit.</p>	<p>The motors will not turn off after 1 min, but I will use as little waste as possible and a small and compact PCB. I will use reusable components where I can on the PCBs.</p>	<p>These motors will turn off after 1min due to the time delay. It will use minimal waste and a compact PCB. I will also look to use one PCB per system. The PCB will use reusable components where possible.</p>	<p>The motors will be programmed to turn off after 1min. The casing will minimise waste and the PCB will be compact and use reusable components. I will use one PCB for every process making the footprint smaller.</p>
<p><b>Harry's Comment:</b></p>	<p>I really like the casing even if it is a little tall, however the circuit is a little simple and needs more speeds. I also need a 5sec delay.</p>	<p>I really like the casing but Peter tells me it will be too expensive. The circuit also has one speed setting but has two motors.</p>	<p>I didn't think I wanted to know the number of balls fired, however I quite like the idea of this now. I liked the casing especially the magazine but this could put the cost up.</p>	<p>I really like this circuit. It does everything I want but does need another mode, however two might be enough. I don't really like the casing though, but I do like the fact it travels left and right.</p>
<p><b>Harry's Choice</b></p>	<p>I would like casing idea one but I would need it a little shorter and the circuit 4 is the best as it gives me speed settings and Peter assures me its more powerful than the others.</p>			



## 2.3 Development of ideas into a chosen design (12 marks)

Candidate 3



As soon as my design was ready I cut it out of the original piece it was in



I then drilled the holes for the components, stress relief and screw holes



After that I then started to sand down the edges of my circuit



Then I decided to start to put the components in the circuit



After that I then made some wires for the power supply by first stripping the wires



Then by twisting the wires to make the joint wires stronger



After that I then soldered in all of my I needed to put in my gene chip



After that I then soldered all of my I needed to put in my gene chip



After I soldered all of my components in I then cut out all of my mistakes



Throughout my practical I picked up on a lot of mistakes and I figured out how to improve them:

- I found out that I needed to include different coloured wires as I don't know which wire is positive and which is negative for the L.E.Ds
- I need to replace my flying wire with a 0k resistor
- I need to spread out the terminal blocks as I have not been able to fit wires as there have not been a gap



## 2.3 Development of ideas into a chosen design (12 marks)

Candidate 1

### DEVELOPMENT – MODELLING



Since the design was pretty straight-forward and that it was obvious to how to model it just by looking at the design, I didn't use CAD to draw a rough template of it, but I decided to model it straight-away from scratch. Plus, this is only a development for the bottle, and I will be exploring ways to make the cap later on, so as a result, I will make the cap separately from the bottle.

In order to make a model of the bottle I used Styrofoam since it was easy to cut through and mould, remains its shape after the shape has been changed and it is lightweight, and this means that I can transform it into any kind of shape, and even carve in the smallest details (i.e. the grips inside). I tried to model this bottle as close as I can to the 3<sup>rd</sup> bottle that I have drawn in my "Design Ideas" section.

To make this, I got a thick piece of Styrofoam and from there I drew the basic shape of the bottle and I cut the shape on a cutting machine. I made the hole in the middle by using the pillar drill. Then in order to make the ergonomic grips I used a round file and a half round file to neaten up the edges.

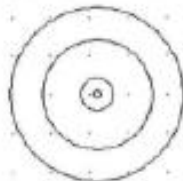
### BOTTLE MODEL:

#### Pupil Feedback

"I like the idea of having a hole, with grips, inside the bottle; it is a really good idea especially when you are doing a physical activity as it prevents the bottle from falling off. However, the grips were a bit too small and too close to each other. So perhaps you should enlarge the grips slightly."

### CAP MODEL:

Below shows a model that I have experimented out by using Styrofoam, since it is easy to shape, glue and paint over as it is so easy to cut into.



Plan View

In order to make this, I worked out the dimensions that I would require so that I am not wasting any material, which is not economically and environmentally friendly.

#### Advantages

When making the top mouthpiece of the cap, I made sure to add an in-dent by using a thin file in order to make it more ergonomic and easier for the user to hold onto and open in order to drink.

I used the anthropometric data, which is on the next page, in order to work out the finger width of an average male and female, and this information is required so that I know how thick I have to make the bottom part of the cap so that my customers will be able to open the lid with ease.

#### Disadvantages

After I decided on the measurements and made the model, I realised that the mouthpiece and the cap was overall too small for my target market. Even though the user's thumb fitted perfectly onto the bottom part of the cap, I feel the need to make that part and the mouthpiece only a slightly bigger and thicker to suit the ergonomic requirements for these groups of people. I will do this by slightly enlarging each section of the cap to scale. Also it was difficult to shape the in-dent, and to make it even on all sides.

#### Advantages

By doing so helped me get a better understanding of how thick I have to make my material out of, how wide I have to make the grips in order to make it more ergonomic, and the mechanism I have to go through to achieve this shape. I now got a better understanding of the method that I have to undertake in order to make the shape of the bottle.

#### Disadvantages

I found out that the grips were not large enough for the fingers of my target market to hold onto, even though it was the average measurement of both the finger width of men and women. This means that it could slip off quite easily, so it might as well be a safer option to enlarge the grips by a small amount. Also, I need to make the bottle slightly bigger, since my specification recommends me to produce a bottle that could possibly hold 750ml of liquid.



#### Pupil Feedback

"I really like how you have added a hole in the middle and made one handle bigger than the other, making it more ergonomic to hold. The lid is also quite realistic, and I like how you have added a little in-dent on the mouthpiece. To improve it, I would recommend you to make the bottle and the cap slightly larger, so that it is more to-scale with an existing sports bottle. Also, add a thumb grip on the outside of the bottle"



# 2.3 Development of ideas into a chosen design (12 marks)

Candidate 4

## Sheet 13 : Development - Final Developed Idea



The top of the product will be formed by heat forming. It will consist of 3 outer layers and 2 inner layers. It will be formed by vacuum forming as seen in the pictures above. I did a model work for this by cutting out a piece of aluminium that will help shape the filler of my product. Then, I stuck 5 pieces of plywood together with glue. We were then clamped down by a G clamp to ensure that it is secure and stable properly. I then used tape to help bend the plywood and to make sure that it stays in the shape. Lastly, I glued it into the bag which I was left to be processed.

**Conclusion**  
All the four pieces of plywood were formed successfully and fairly efficiently. I will use this plywood to make the top of my product. I will use 3 pieces of plywood (2 inner and 2 outer), each being thick to form a total thickness of 20mm.

Initially, I was planning on having the two drawers slide out of acrylic only and not add any slides as it would be easy to slide the acrylic drawer in and out of the storage compartment even without drawer slides. However, I like the idea of having the front made out of acrylic whilst the sides are aluminium.

**Conclusion**  
I have decided to use drawer slides for the two drawers in my product. Although they may increase the cost of the design, they will allow the drawers to slide easily in and out of the storage unit without much friction created as well as providing smooth movement for users. This helps make customer satisfaction and it meets the specifications of the product being easy to use.



The finger joints were fairly easy to do, however it is very time consuming to wait for a turn in the band saw machine. Finger joints are very attractive and they are known to be very strong since as they interlock each other. Therefore, for the two of my acrylic drawers, I have decided to use finger joints and glue to join them together. I will also create finger joints for the sides of my product and the body of the left for side of my product. Pictures shown above.



Housing joints may be time consuming as it might be hard to get rid of the extra wood and is also in the section that has been cut out. Also, the sawing of the joint takes a long time and mistakes may occur. However, the joint is fairly easy to create and it is a strong joint that can be easily reinforced by glue. As a result of that, I will be using housing joints as main joints of my product. As seen above, the housing joints need to be made for my product.

### Final developed idea



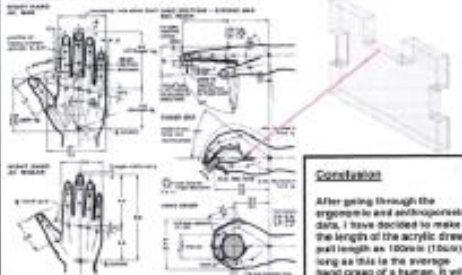
I tested varnish on plywood and rubberwood as I want my product to have a quality surface finish. It is very easy to apply the varnish on the surface of the woods and it did not take up that much time. The varnish brings out the darker shade of the wood which may seem as appealing to many consumers. Also, varnish is fairly cheap and it is very available as it is available in school.

I also tested wax polish on rubberwood to compare it with varnish. Wax polish provides a finish that produces a dull gloss shine for the wood. It is also very easy to apply onto the wood and it does not take up a lot of time, which again is similar to varnish.

**Consumer 1**  
Della : "I really like them both, they both look very similar and they really bring out the color of the wood, which makes it very appealing."  
Oliver : "I prefer the wood to have the varnish finishing as it allows the wood to have a darker shade of color which is much nicer than the light color of the wood."  
Russell : "Both finishes are very attractive as they make the wood have a very high quality surface finish as well as making it look very elegant."

**Conclusion**  
Although both methods of finishing are fairly similar, I have decided to use varnish instead of wax polish. This is because it would be easier to use varnish as other students would also be using it, therefore it will be easier to get hold of it. Also, wax requires frequent re-application to re-application to retain its look and protection, it can also be damaged by heat that will leave white rings. Wood varnish does not cover the grain of the wood however, but in fact varnish soaks into the wood finish to enhance the natural wood color in furniture and also protects it from dirt, sunlight and water. Varnish offers one of the most natural looks of any other wood finishes available. Varnish is also easy to apply, hence I have chosen to use varnish to ensure that my product is durable and meets the specification of having a quality surface finish.

WOOD DATA	WAX	FINISH	WAXES	FINISHES	FINISHES	FINISHES	FINISHES	FINISHES	FINISHES	
Test length	80	75	82	82	85	75	81	78	82	78
Test width	52	48	55	52	58	52	52	55	58	52
Wax length	42	42	52	52	42	42	42	42	42	42
Wax width	32	32	32	32	32	32	32	32	32	32
Wax height	22	22	22	22	22	22	22	22	22	22



**Conclusion**  
After going through the ergonomics and anthropometric data, I have decided to make the length of the acrylic drawer pull length as 100mm (100mm) long as this is the average hand grasp of a human. It will have the height of about 15mm as this is also the average of a hand grip. I have made it slightly bigger so that a wide range of users are able to access the drawer without difficulty.



Centre Lathe Work



Tapping and Threading

My two aluminium bars will be joined to the wood through the process of tapping and threading. I have chosen this because it is fairly easy to do. Because the rubberwood is 20mm thick, I will use a M8 screw as that is the easiest for it to be screwed in. At the top part of the layer consists of four pieces of thin plywood, each being 6mm thick, it will also have a thickness of 20mm. Therefore, I will be using four of the M8 screws to secure the aluminium bar in place.

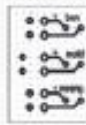
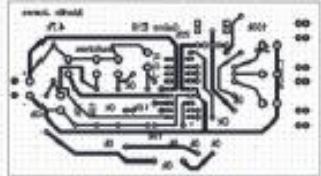
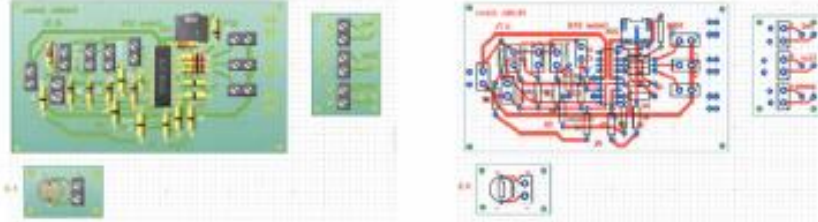
As I want my aluminium bars that hold the layers of my wood to look more of art, I will use the centre lathe machine in order to create scoring patterns such as the pattern above and to the right. I will do this at each end of each of the aluminium bars to make it more appealing and attractive. As creating scoring patterns on metals are fairly easy and do not take too long, I should be able to complete what I want to achieve within a short amount of time.

**Overall Opinions :**  
Consumer 1 : "I think that the product has a very modern look and it is very aesthetically pleasing. I like the finger joints as I think they look very attractive as well as the idea of creating the patterns on the aluminium bars."  
Consumer 2 : "I really like the idea of having varnish for the surface finish as I really think it brings out the nice dark shade of the wood. I like that the product has multiple separate compartments to store a wide range of objects of different shape and sizes. I would definitely buy this product!"





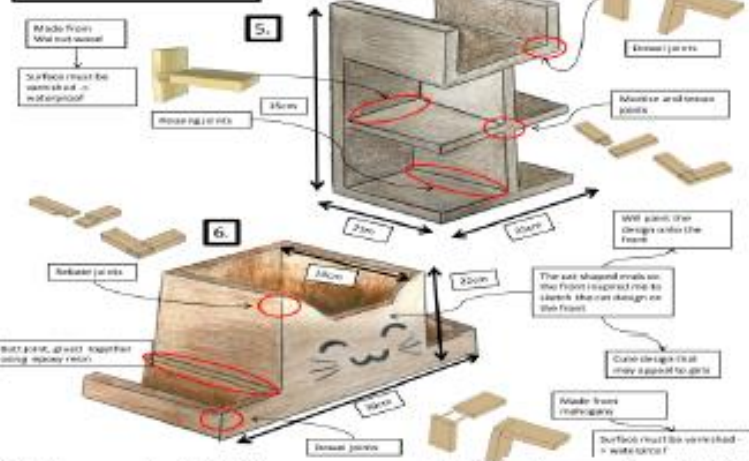
# 2.4 Communication of design ideas (8 marks)



**Component list:**

- 2k resistors (x5)
- 100k resistor (x1)
- 10k resistors (x4)
- 22k resistor (x1)
- 2k resistors (x3)
- 2pin terminal block (x3)
- 6.7k resistor (x1)
- 9V battery (x1)
- Download socket (x1)
- Generic USB chip (x1)
- 1.8V DC/DC
- SPST Switch (x1)

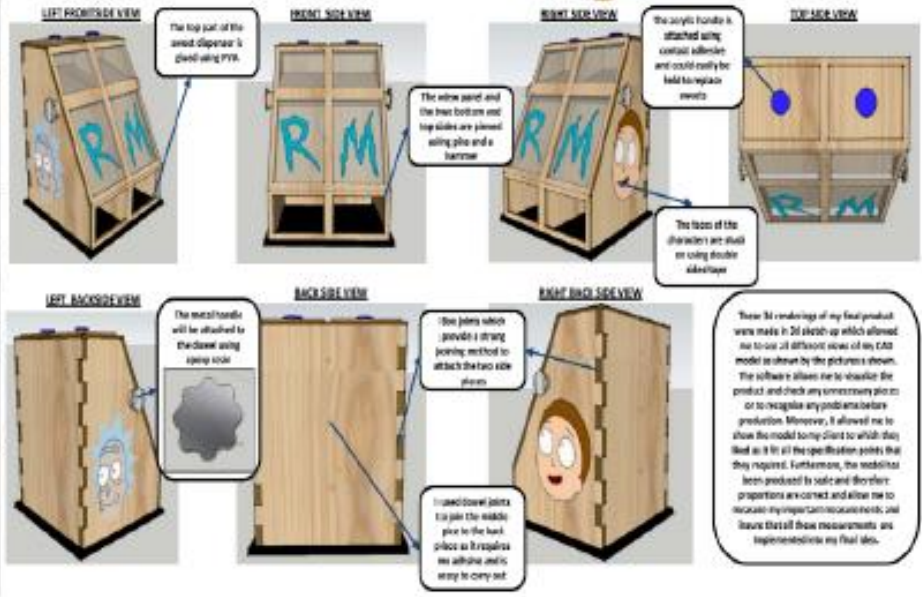
**Initial Ideas**



**Initial Designs**

This is a collage of various sketches, notes, and diagrams related to the design process. It includes:

- Hand-drawn sketches of a person and a box.
- Technical drawings and diagrams.
- Notes and annotations in various colors.
- Small photographs of components and prototypes.



These 3D renderings of my final product were made in 3D sketch up which allowed me to use 10 different views of my CAD model to show by the pictures shown. The software allows me to visualize the product and check any unnecessary pieces or to recognize any problems before production. Moreover, it allowed me to show the model to my client to which they feed in it for all the specification points that they required. Furthermore, the renderings have been produced to scale and therefore proportions are correct and allow me to measure my paper can measurements and ensure that all these measurements are implemented in my final idea.



## 2.5 Review of chosen design (6 marks)

Candidate 1

### Review

This page reviews my initial ideas and if they match my specification points. It will show me what my target market thinks of my ideas.

#### Specification points

1. Product will store jewellery safely
2. Product will be sold at £50.00 to £60.00
3. Product will store 6 or more different types of jewellery
4. Product will be easy to clean
5. Processes and tools used to make product are all available in school workshop
6. Targeted towards teenagers aged 13-18 years old
7. Will showcase some jewellery (when closed) so it'll be obvious it carries jewellery
8. Be around 250x150x150mm when closed
9. Must be able to hang necklaces 250mm in height
10. Must be made out of at least one recyclable material

#### Conclusion

The idea that best meets the specification points is idea 3. I have asked 2 people on their thoughts about my ideas and their favorites were ideas 3 and 5. This is because idea 3 is most ecofriendly and practical and idea 5 very safe. In my opinion my favorite is idea 3 because it I find it the most aesthetically pleasing and it fits my specification points perfectly.

#### User Feedback

Person 1: In my opinion I prefer idea 3 as it is the most eco-friendly and I feel very strongly against global warming and it is definitely the most attractive and practical one out of them

Person 2: I really like idea 5 as it seems easy to use and it will keep my jewellery safe as it has a lock

YES NO

Spec	Idea1	Idea2	Idea3	Idea4	Idea5	Idea6
1	YES	YES	YES	YES	YES	YES
2	YES	YES	YES	NO	YES	NO
3	NO	YES	YES	YES	YES	YES
4	YES	YES	YES	NO	YES	YES
5	YES	NO	YES	YES	YES	YES
6	YES	YES	YES	YES	YES	YES
7	YES	NO	YES	YES	NO	YES
8	YES	YES	YES	YES	NO	YES
9	YES	YES	YES	YES	NO	YES
10	YES	YES	YES	YES	YES	YES
SCORE	9/10	8/10	10/10	8/10	7/10	9/10

#### Sustainability

My initial ideas are made from two main materials: MDF and acrylic. Acrylic can be easily recycled at the end of its life however in order to gather acrylic, the environment will be harmed. This is because acrylic is a plastic which is made by extracting oil. This harms the environment as this process releases greenhouse gasses into the atmosphere. I also use MDF a lot throughout my initial ideas. MDF is not recyclable, it ends up being incinerated. To add MDF is not harmful to make. Overall MDF is more environmentally friendly than acrylic. My most sustainable storage unit is no.3 as it uses the most MDF and the least acrylic. The least sustainable storage unit is no.1 as it uses the most acrylic and least MDF.





# 3.1a Manufacture – selection of materials




Candidate 1

(8 marks)

## PLASTICS COMPARISON (DETAILED)

PLASTIC TYPES:	ACRYLIC	HIPS
<b>APPEARANCE:</b>	 <p>Acrylic plastic is extremely transparent (transmits 92 percent of white light) and is quite smooth.</p>	 <p>High impact is a thin plastic which has a matte finish with a smooth texture. It is also available in many colors.</p>
<b>ADVANTAGES</b>	<ul style="list-style-type: none"> <li><b>Easily worked with:</b> With a little heat, it's easy to shape and mold therefore less energy is wasted whilst using acrylic, moreover it decreases the time needed to produce the sweet dispenser.</li> <li><b>Lightweight:</b> acrylic weighs 50 percent less than glass, making it easier to handle and making the sweet dispenser less heavy and easily movable.</li> <li><b>Transparent:</b> Acrylic maintains its optical clarity and doesn't yellow, remaining transparent. This is important for my sweet dispenser as it will display sweets.</li> </ul>	<ul style="list-style-type: none"> <li><b>Cheap:</b> HIPS are much cheaper than acrylic therefore costing less to produce my sweet dispenser.</li> <li><b>Good processability:</b> HIPS is easily cut by many tools such as a fretsaw. This decreases the amount of time needed to produce the sweet dispenser.</li> <li><b>Reduction of costly operations:</b> HIPS has the ability to manufacture products with irregular shapes and complex geometry means less need for costly operations like machining and welding.</li> </ul>
<b>DISADVANTAGES</b>	<ul style="list-style-type: none"> <li><b>Prone to scratching:</b> As acrylic is a plastic with a smooth texture, after contact with sharp objects, over time the acrylic gets scratched therefore making it unsuitable for small children for my sweet dispenser.</li> <li><b>Poor chemical resistance:</b> Acrylic is not chemically resistant as after contact with corrosive chemicals, the acrylic corrodes causing a matt finish.</li> </ul>	<ul style="list-style-type: none"> <li><b>Brittle:</b> Over time High impact polystyrene becomes brittle after exposure of UV light which could lead to cracking and stress on the plastic used for my sweet dispenser.</li> <li><b>Very expensive to recycle:</b> HIPS is quite expensive to recycle therefore making it unsustainable to use for my sweet dispenser.</li> <li><b>Dangerous fumes are given off when burnt:</b> This is a safety precaution as if you burn HIPS dangerous fumes could be inhaled.</li> </ul>

## METALS COMPARISON (DETAILED)

METAL TYPES:	ALUMINIUM	MILD STEEL (ALLOY)	PEWTER
<b>APPEARANCE:</b>	 <p>Aluminium is a relatively soft, lightweight and shiny metal.</p>	 <p>Bright drawn mild steel has a smooth, bright surface.</p>	 <p>Pewter has a color of charcoal grey and looks like silver when polished.</p>
<b>ADVANTAGES</b>	<ul style="list-style-type: none"> <li><b>Can be easily drawn into thin sheets:</b> This allows me to incorporate small amounts of aluminum into my dispenser.</li> <li><b>Can be recycled:</b> Aluminum could be recycled therefore being sustainable to use for my sweet dispenser.</li> <li><b>Easily Cast:</b> Aluminum could easily be casted as it has a low melting point.</li> </ul>	<ul style="list-style-type: none"> <li><b>Mild steel can be cut, bent and twisted into any desired shape:</b> This allows me to use incorporate mild steel into any theme.</li> <li><b>Can be recycled:</b> Mild steel could be recycled therefore making mild steel sustainable.</li> <li><b>Cheap:</b> The least expensive of all steel types, mild steel is made of 0.2% carbon making it cheap.</li> </ul>	<ul style="list-style-type: none"> <li><b>Easily cut:</b> Pewter could easily be cut which decreases the time needed to produce my dispenser.</li> <li><b>Low melting point:</b> Since pewter has a low melting point, it's easily formed into shapes needed.</li> <li><b>Could be polished:</b> Pewter could be polished to look similar to silver (a much more expensive metal).</li> </ul>
<b>DISADVANTAGES</b>	<ul style="list-style-type: none"> <li><b>Can be oxidized:</b> aluminum will oxidize. (appears as white residue). Aluminum must be powder coated (expensive).</li> <li><b>Can corrode:</b></li> </ul>	<ul style="list-style-type: none"> <li><b>Not that strong for its weight:</b> mild steel isn't strong for its weight therefore making my product weak and heavy.</li> <li><b>Rusts easily:</b> Since mild steel can rust easily it won't be suitable.</li> </ul>	<ul style="list-style-type: none"> <li><b>Scratches easily:</b> the only disadvantage of pewter is that it scratches easily therefore making it unsuitable for my sweet dispenser.</li> </ul>



# 3.1a Manufacture – selection of materials

Candidate 2

(8 marks)

## POSSIBLE MECHANISMS

### 1. SPRINGS

#### INTRODUCTION

Springs are mechanical devices that store and dissipate energy. Like gears there are a number of different types of springs. A typical spring is a tightly wound coil or spiral of metal that stretches when you pull it (apply a force) and goes back to its original shape when you let it go again (remove the force). In other words, a spring is elastic.

The spring is located under the head and pushes sweets up and out of the top of this sweet dispenser. The spring is quite firm and effective in dispensing sweets.



#### HOW I COULD USE IT

I could use springs by placing a spring under a character's mouth and when pulled down, a sweet fills into a drilled hole in a piece of wood and when the spring retracts back the sweet could be collected similarly to the example shown.

This sweet dispenser uses a spring mechanism to dispense sweets and is done by attaching the spring to a piece of mdf which carries 1 sweet, this sweet is then ejected as the spring is stretched.



### 3. GEARS/RATCHETS

#### GEARS

Gears are one of the most common and diverse types of mechanical devices. Gears are simple to make by using a 3D printer or a laser cutter. This could be used for easily and quickly dispensing sweets. The dispenser would have 2 gears and as 1 gear collects 1 sweet at a time and dispenses it as the client rotates the other.

The sweet dispenser uses multiple gears to dispense the sweets. Firstly, as the client rotates the first gear, the other gear begins to rotate faster causing the gear under the jar to spin which collects sweets in the tooth allowing the client to collect them.



This is a picture from a previous dispenser and shows a ratchet used to prevent rotation in the opposite direction.



#### RATCHETS

Ratchets are similarly common mechanisms. The advantage about ratchets is that they lock in one direction allowing the client to continue to dispense sweets without jamming the sweets.

### 2. CAMS

#### INTRODUCTION

Cams are mechanical devices that convert rotational motion into linear motion. There are many different types such as pear cams, snail cams, and circular cams. Different designs result in different types of motion in the cam follower.



Different designs result in different types of motion in the cam follower.

#### HOW COULD I USE IT

- I could use CAMS for dispensing sweets by incorporating it in a rotation dowel mechanism. CAMS work by controlling the movement of the dowel to control the dispensing of the sweets from the dispenser.

The CAM is used in this sweet dispenser by using a circular piece of wood which, when rotated, carries sweets to the collection compartment.



### 4. LEVERS

#### INTRODUCTION

A lever is a mechanical device used to transmit and amplify force by fixing the input and output about a fulcrum or pivot point. (defined by [www.creativemechanisms.com](http://www.creativemechanisms.com)). It works by when lifting the barrier between the sweets and the gap below allowing sweets to flow freely although when the lever is released the barrier lowers and prevents any further flow of sweets.

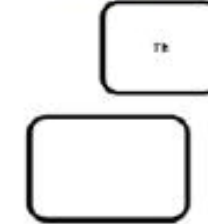


The lever is pulled to allow the pathway to open therefore allowing the sweets to be dispensed.

Different sweets could be.

#### HOW COULD I USE IT

I could use levers for my sweet dispenser to dispense sweets at portions that the client wants. Levers allow the client to choose the amount of sweets needed which complies with my clients needs. Moreover levers are easy to use as they use a pivot action therefore it won't bother the client.

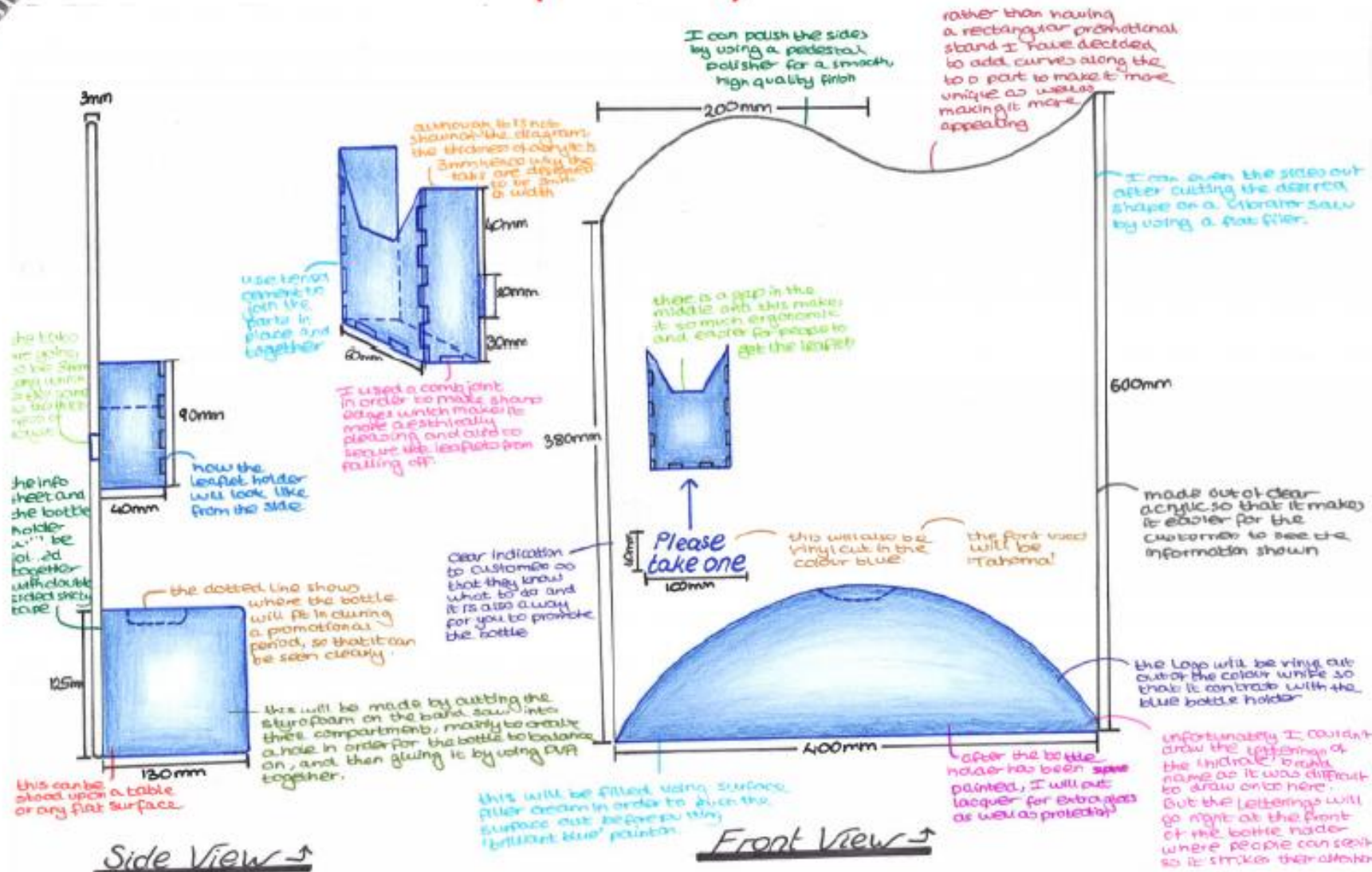




# 3.1a Manufacture – selection of materials

Candidate 3

(8 marks)





# 3.1b Manufacture – skills & processes (16 marks)

Candidate 1

### Manufacturing Processes

**Task 1:** I began to design the product by first drawing the parts. I used a mouse to draw the parts on a computer screen. I used a mouse to draw the parts on a computer screen. I used a mouse to draw the parts on a computer screen.

**Task 2:** After I had the parts, I used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 3:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 4:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 5:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 6:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

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**Task 10:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 11:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 12:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

### Manufacturing Processes

**Task 13:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 14:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 15:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 16:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 17:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 18:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 19:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 20:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 21:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 22:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 23:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 24:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 25:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 26:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 27:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.

**Task 28:** I then used a laser to cut the parts. I used a laser to cut the parts. I used a laser to cut the parts.



# 3.1b Manufacture – skills & processes

Candidate 2

(16 marks)

While making my prototype waistcoat, I kept record of all the steps I took. I will now document them on this page.

## Prototype of the Waistcoat



I laid out the pattern pieces to be traced and cut out carefully.



I sewed together pattern pieces 1 and 3 together for each side then overlocked. However the overlocker snagged a piece of my waistcoat and tore it, this wasnt a cause for concern as it was only the prototype.



Here is my pieces 1 and 3 sewn and overlocked together.



I then measured 1.5cm on my interfacings so I could sew with more precision.



I then sewed all the pieces together.



The pieces were sewn together and were then attached to the waistcoat.



I laid out all the pattern pieces on my fabric, ready to be traced using chalk and then cut out carefully.



After I had cut out all the pieces, I got the pattern pieces labelled 1 and sewed the seams together on each piece separately. I then overlocked them.



I then got the pieces labelled 3 and sewed them on and overlocked them.



The armholes (pieces 7 and 8) had to be placed together to match.



I then sewed the armholes together and sewed them on to the waistcoat. I then overlocked them and overlocked.



This is the picture of my waistcoat after it has all been overlocked.



I arranged my interfacings and sewed the pieces together and then overlocked.



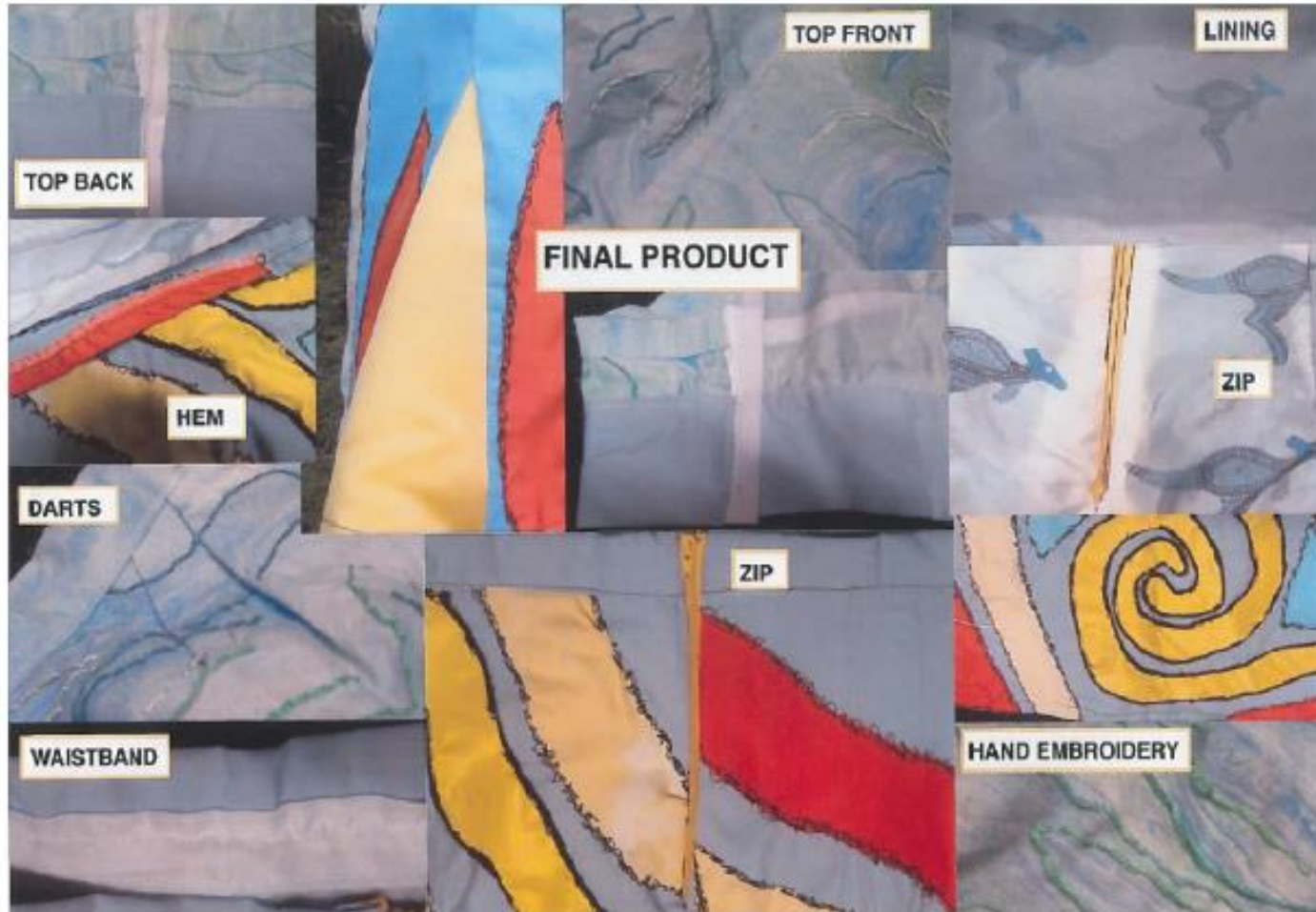
After sewings them on to the jacket, I hand stitched all the loose ends on to the jacket for a neat finish.



## 3.2 Quality and accuracy (12 marks)

Candidate 1

This is how my prototype meets my specifications.....







## 3.2 Quality and accuracy (12 marks)

Candidate 2

### QUALITY OF FINISH

*The finish of my sweet dispenser is an essential part of the manufacture of my product as it could appeal to be aesthetic and high quality to my client. Moreover, the finish of the product could also help protect the product by protecting the wood and the paintwork which could be beneficial as it increases the reliability and maintainability of the dispenser. The product must also be fully functional (which was tested in my evaluation) which is also one of my specification points and is important to the purpose of the product.*

Before having to varnish I had to ensure that the initial surface of my dispenser was smooth by using sanding blocks and glass paper. After using glass paper I applied 1 coat and allowed it to dry although it came out rough there fore using wire wool which removes all the rough impurities on the surface which gives a smooth surface for more coats of varnish

After laser cutting both character heads, I had to paint the colours according to the actual colours of the show (this was done by mixing various shades to obtain the needed one) and used a coat of varnish to give it a smooth and shiny finish



The base was done by using a large mdf piece a painting it black with multiple coats and then using a top varnish



The R and M from the logo of the show have also been sanded using a circular sander and also painted these with blue paint



After reusing old acrylic circles I then using a file to remove large scratches and then using wet and dry to remove small scratches and used polish and a cloth to make the surface smooth and shiny.



Moreover after casting the handles, I used 600 grade sand paper and water to sand the large scratches then turning to 1200 grade to remove small scratches until there are no scratches and repeat with polish and reused t-shirt (which is more sustainable) which gives the handle



The other character rick was damaged which affected the quality which made me repaint it to ensure the finish was to a high standard



I have used varnish to create a smooth and aesthetic surface finish on the wood in my piece. Moreover, the varnish creates a protective coat on the wood to protect the wood and give a smooth surface which is safe for my client to feel. Although this required multiple coats and the use of wire wool and glass papers



#### SAFETY CONSIDERATIONS

All steps were carried out using aprons to prevent dust and liquids to come in to contact with my clothes and to prevent any clothes to jam the machines



Moreover any steps of manufacture which included using machinery and release of residue such as dust particles, I used safety goggles to prevent entry into the eyes

Moreover I ensure that when working with hot materials and sharp materials, I used gloves to prevent injuries and wounds



Lastly, when using toxic materials such as spray-paint, I used a gas mask to prevent inhalation of toxic fumes



## 4.1 Testing and evaluation (6 marks)

Candidate 2

### Testing

### Testing against a commercial product

#### Testing Against the Design Specification

Design Specification Point	Test	Result
My product must reflect the theme of nature.	I gave my product and mood board to my target market and have asked them if they could make a few links between my dress and my mood board to fit the theme.	My target market have all said that they could clearly link my mood board to my dress and the fabrics and theme all linked together.
I have decided that I wanted my dress to be for prom.	I have shown my product to a variety of people and have asked them to what event would they wear it to.	My target market have said that they would wear this dress to prom as it is most suited for this event.
My dress must be a dark color.	I gave my product to different users and have asked them what shade color they would consider my dress is.	My target market have all said that my dress is to be considered as a dark color and have said that it fits my design specification.
My dress must be a long length dress	I showed my product to different users and have asked them what length they consider my dress to be.	Everyone that I have asked from my target market have said that my dress is to be considered as a long length dress because it goes all the way down and touches the floor.
My dress must be durable.	I rubbed the dress a few times to test the durability of my dress.	As a result I could clearly see that the dress has stayed together and did not fray so this shows my dress is durable and strong.
My dress will be morally acceptable	I have analysed and asked the suppliers where the product is from and how the fabric is made to test the morality of my dress.	As a result, I got the information that my dress is locally made and I know my dress is morally acceptable because I have made the dress myself so I know myself it is morally acceptable.
My dress will be socially acceptable.	I have asked different users what they think of my dress and have asked them to tell me if it is socially acceptable.	I got the impression that my dress is socially acceptable as it is for a special event and is for a suitable event.



This is a product that I have found on the internet that I believe is similar to my product. It is a one shouldered dress and this product is made from chiffon. This dress cost 182 pounds and it is quite expensive as a very expensive and luxurious fabric has been used to produce this dress. There is several sizes that come in US and UK and European sizes that consumers can choose so that they choose their size so that the dress will fit them. This dress has a ruch embellishment and a back zipper as a component. My dress is slightly different added some extra components like my beads that are scattered over my dress and my zipper is placed at the side of my dress. In my opinion my dress is better as a product because it saves up more money as it is made from polyester and is not made out of high classy fabrics so that it is shown as a better product. In my opinion I think my dress will sell faster in the market because consumers want to save up money and my product has a much cheaper fabric but still has the same effect as the shown dress.

#### Target Market Opinion

Questions	User 1	User 2	User 3	User 4
What do you like about this dress?	I like the shoulder of the dress because I think it is unique and not many dresses you see have these kinds of straps so a new trend could be created.	I like the components on the dress because they look very nice and have a nice effect towards the product.	I like the silhouette of the dress because it looks very modern and yet has some nice classy features.	Personally, I like the color of the dress because the dress fits in with natural forms and looks very nice because red is a very common nice color to use.
What is the best feature of the dress?	The beads	Straps of the dress	The length of the dress	The color of the dress.
Would you make any changes/improvements?	If you added more sequins to the dress and if you added more construction techniques.	If the dress had something more unique like a slit to complete the look of the dress.	I would have added more construction techniques to the skirt. For example I would have added more beads to the skirt.	I would have changed the length of the dress because in my opinion the design of this dress suits a shorter length.
Where would you imagine this dress would be worn?	I would imagine myself wearing this dress to prom.	I would imagine myself wearing this dress to prom.	I would wear it to a fancy party.	I would wear this dress to prom.
What do you think inspired the design of this dress?	Natural forms	Roses	Flowers	Roses



## 4.1 Testing and evaluation (6 marks)

Candidate 2

### Evaluation

#### Evaluating my Product

I had another look at my specification and have analysed all my essential criteria to ensure I have met most or all of them. The first specification was to make the dress suited for prom. From my testing I have asked many several people and they all said it looks like a prom dress and is very suited for prom. My second criteria said it will have to be a dark colour. I have also asked people and they said that the shade of red I used for my dress is a dark colour, so therefore I know it fits my criteria. My third criteria stated that it will be a long length dress. From my testing everyone has said they considered it to be long in length because it flows all the way down and touches the floor. My fourth criteria said it will be durable and from my testing I know it is also durable because I rubbed the dress and nothing fell apart or fell apart and nothing started to fray, so I know it is durable. My fifth criteria said that my dress has to link in with natural forms and I have asked many several people and they all think that my dress is suited for natural forms in some shape or form so I know that my criteria is met. My last criteria said that my dress must be morally and socially acceptable. In my opinion my dress is both morally and socially acceptable because I have made the dress and bought my fabric locally. It has no harm towards animals and is very environmentally friendly. My dress is socially acceptable because it is suited for the occasion, I have said that my dress will be worn at prom and so therefore it is referred to as socially acceptable whereas if a person was to wear it to school, it would be referred to as a not very socially acceptable dress. So my dress is socially acceptable as the event makes the criteria fit altogether.

#### Improvements I could make to my product

If I had the opportunity to make improvements for my dress I would have added more construction and decorative techniques on my dress. I would have made it from a more flowy fabric so that it can look more elegant and it can fit the purpose better. If I could make any improvements generally I would add more construction techniques and decorative techniques so that my dress can have a better appearance and a better image. I would have also added more beads and design to my skirt as my skirt is very plain. To make the skirt of my dress better I could have used applique or hand embroidery so that it can look much nicer and have a better appearance. If I had extra time I could have gathered improvements from my target market and I could have applied all the suggested improvements on to my dress so that it would be a perfect dress for my target audience. I could have used self criticism and other people's opinions and applied it to my dress to make it reach the standards of my target market.

#### Evaluating the way I have worked

In my opinion I did work efficiently but there were some areas of improvement in the cases of time management and organisation. In most areas I used my time very efficiently whereas in other areas I could have been more efficient. I was organised to an extent I could have been more organised but I was organised because I took all the thing and components I needed for my dress and laid them out at the start of each lesson so that I could save time and be more organised. I was organised to an extent because I ran out of fabric as I was working through my dress which made me unorganised. I found it difficult to sew over ruffles at the start but as I kept sewing I found it easier to sew over. However the ruffles were very thick and I personally difficult to sew over them. I also found that when I had to piece my dress together it was particularly difficult as it was hard to match up all the small parts and pieces together. If I had the time again I would read over instructions first and I would figure out what pieces went together to save time and make my dress in time. I would have researched and read a bout the pieces being fit altogether rather than doing it along the way which is to be considered harder.

#### My Product in use



In my opinion my dress does its job because it's a dress that can be worn to prom and it's a dress that many people would wear to prom. This dress fits in with all my essential criteria and does its job. It is durable and I have decided for my prom dress to be durable because it would be a long time that u are wearing the dress and it has to be durable so that it comforts the target market. My dress fits in with the theme of natural forms and I have chosen natural forms and it can be linked to a lot to do with nature and many people from my target market would be pleased with the outcome of my dress. It mainly does its job and is a dress that is categorized for prom. It can be worn to other special occasions but it is mainly a dress to be worn to prom.