

KS4 Guided Options



Design and Technology GCSE

Assessments

Paper 1

What's assessed

- Core technical principles
- Specialist technical principles
- Designing and making principles

How it's assessed

- Written exam: 2 hours
- 100 marks
- 50% of GCSE

Questions

Section A – Core technical principles (20 marks)

A mixture of multiple choice and short answer questions assessing a breadth of technical knowledge and understanding.

Section B – Specialist technical principles (30 marks)

Several short answer questions (2–5 marks) and one extended response to assess a more in-depth knowledge of technical principles.

Section C – Designing and making principles (50 marks)

A mixture of short answer and extended response questions.



Coursework

Non-exam assessment (NEA)

What's assessed

Practical application of:

- Core technical principles
- Specialist technical principles
- Designing and making principles

How it's assessed

- Non-exam assessment (NEA): 30–35 hours approx
- 100 marks
- 50% of GCSE

Task(s)

- Substantial design and make task

Assessment criteria:

- Identifying and investigating design possibilities
- Producing a design brief and specification
- Generating design ideas
- Developing design ideas
- Realising design ideas
- Analysing & evaluating

• In the spirit of the iterative design process, the above should be awarded holistically where they take place and not in a linear manner

- Contextual challenges to be released annually by AQA on 1 June in the year prior to the submission of the NEA
- Students will produce a prototype and a portfolio of evidence
- Work will be marked by teachers and moderated by AQA



What careers this course can lead to?

- We have many students who continue into the sixth form to study Product Design at A Level. They then go on to study Product Design or Architecture at Degree level.
- Some students seek an apprenticeship after leaving school in various trade jobs eg Engineering, Plumbing , Bricklaying and Joinery.
- Some students seek a Higher-Level apprenticeship after studying for their A Levels.
- We have many students who go into the armed forces.
- Some of our students have secured top apprenticeships at local companies - Jaguar Land Rover, Airbus, Lever and TTE.



Example of NEA work

- The NEA work begins in June of Year 10 and is completed by March in Year 11.
- Alongside the NEA work you will complete revision tasks for your 2- hour exam which takes place at the end of Year 11.

Please remember this course is not just practical work.

NATURE AND THE ENVIRONMENT



Pictures I have taken of nature and the environment



1

MY PROJECT EXPLORATION

LIVING



2

TEENAGE LIFESTYLE



3

- I like the colours of this chair and I like the shape of it. It is quite a modern design which buyers would be looking for to make their home look more up to date. It will also maximise space because of the storage below the chair which would otherwise be useless. It would be good for a small home that needs extra storage. If I were to change something about this product, I would perhaps make it out of a more comfortable material because it looks like it is made mostly from wood which is hard. I think this would be targeted at young adults.
- I like the shape of this shelf because it is very unique. It is obviously multifunctional because it can be used as a bookshelf and it is a light. It is very fashionable and stylish and could make any room look more modern. I think this product would be good for any age to make the room look better. If I were to improve it, I would make it a bit longer so that you could fit more books on it and you could even extend the wood above the light and insert a flat shelf below it.
- Overall, I think there are lots of options available to do for multifunctional living. You can use a range of materials and you can do lots of designs. If I did do this challenge option, my product would likely be much smaller than these, but I believe I would be able to make it just as useful and space maximising. I would want a design that is colourful and fun. I think a multifunctional product would be something interesting to make and there is a lot of inspiration and room to make it your own.

- I think this product would be useful for teenagers, stereotypically boys, who enjoy sports. I think this product is a good shape but I would change the colour to make it more upbeat and happier. In a stressful period of exams, exercise can relieve stress so a smaller sports equipment storage space would be useful. If I were to change this, I would make it smaller and more suitable for home, as well as making it out of wood to make it look less commercial. I think exercise is very important for teenagers and this would help them a lot.
- I think this phone holder is great for teenage lifestyles because teenagers use their phones a lot and it is a puppy which is cute. It is made of what looks like mahogany and it looks really good with the golden retriever. I think I would make it more flexible to do with which way the phone sits, but other than that it looks very good. I am a teenager and I would definitely use this sort of product.
- Overall, I think teenage lifestyle would be a good topic to choose to explore because I am a teenager so I can relate to the product that I will be making and I can make it to suit my needs. The storage space would be a good thing to make because it is needed at a teenage age but I don't know how I would make it my own. I think teenage lifestyle leaves a lot of room for imagination in it.

NATURE AND THE ENVIRONMENT



5



6



4

- I think this bird box looks very stylish. As well as being kind to nature, it could also look good in your garden. The wood looks like ash or oak which look nice with the vegetation in your garden. A product like this is good for the environment but can also bring enjoyment to someone, especially those living alone, when they see birds going in and out of it. I wouldn't really change anything about this except for maybe making it a bit bigger because it already looks really good. To make it my own, I could add logs to the side of it for bugs to live in. This would probably be aimed at adults who want more wildlife in their gardens.
- A Hedgehog house is good for the environment because it makes sure that hedgehogs have somewhere to go. This one is nice because it is open inside but closed at the front so larger predators can't get inside. I like the colour as well because it blends in with nature so it is well hidden. If I had to change anything about it, I would maybe make it look more attractive because it is a bit plain but I still think it looks really attractive. This would look good in someone's back garden or on a nature reserve.
- Overall, I think Nature and the environment is my favourite option because not only can the product look good, but it can also be environmentally friendly. This is really good because we need to continue to look after our Earth. If I did choose this option, I would likely be able to make something really useful that would look good and there is a lot of room for making it look modern and fresh. This topic would allow me to make a unique product myself.

	Hedgehog house		Bird box		Rabbit Hut	
Picture						
Size?	This Hedgehog house has Dimensions of Length 40cm, Width 40cm, and Height 19cm. The wood is 1.5 cm thick.		The bird box is (which is designed for bluebirds) measures at 12 inches high, 5 ½ inches wide, and 8 inches deep. It is a suitable size for the bluebirds that it is designed for.		The size of the hutch is 20.1 inches in length, 16.5 inches in width and 16.9 inches in height. However, the door is 6.9 inches in width and 10.4 inches in height.	
Material?	It is made of Fir Wood. Fir wood is a soft wood which is seasonal and will alter depending on the weather meaning it will not crack or crumble and it is durable.		It is made of white Cedar that has been wood burned and it is entirely handmade. The wood is brown in colour and looks nice in a garden, surrounded by greenery and plants. White cedar is a dimensionally stable wood that can resist swelling so it is perfect for outdoor use such as in a bird house.		The Rabbit hut is made from Fir Wood and the hut has colourings of red, orange and green. It also has waterproof textured Asphalt shingles so it is durable. Fir Wood is seasoned so will adjust to humidity.	
Price?	The house costs £34.99 because of its special features and unique design. It isn't too expensive and it can be good for the environment and for educational purposes as well.		It costs \$19.99 itself plus extra for shipping costs. It is rather cheap for a product like this especially seen as it has an engraving on the top of the box.		It costs CA\$106.99 which is equivalent to around £63.00. It is functional and it looks attractive!	
Where can you buy it?	You can purchase this hedgehog house from eBay UK.		You can purchase this bird house from eBay but because the product is coming from America, it costs \$38.98 in shipping.		You can purchase this product from Aosom.ca.	
Target Market?	I think the target market for this product could be anyone who wants some more wildlife in their garden. It may especially appeal to those who live on their own so they feel less lonely when they have a hedgehog in their garden.		This product is targeted at adults however, any age person who has a garden may want to buy it to bring more birds to their gardens. I think it would be senior and the older generations that are more likely to buy it though because they are stereotypically the people who appreciate nature the most.		I think anyone who has rabbits or any small animals would buy this product because they need a hut. However, you can even put light objects on the top of it for decoration and it will look modern and neat. It is a secure place to keep your pet and it has a pull-out ramp (which also acts as a door) to help them in and out.	
Special Features?	It is waterproof, it has a predator baffle guard, it is camouflaged, and it can be sprayed with a hedgehog-safe waterproof vanish.		It has an engraving on the roof of the box which turns a simple box into a more complex, detailed looking one really quickly. It also has an easy lift lid so that it can be cleaned easily inside and so that you can see what the birds are doing.		The floor is raised off of the ground to avoid dampness and the roof has a latch so that owners can have easy access to their pets or to clean out the hut. It has a subtle heart shaped lock that makes it easy to handle and it makes a clear, beautiful exterior.	
What do I like?	I like how safe this product is for hedgehogs. The fact that it is camouflaged and has a predator baffle guard means the hedgehogs can live in your garden and the adult hedgehog will be able to keep her babies safe inside of the house.		I like the engraving on the top of the box because it makes the product look more detailed and more professional. I also again like the colour of the wood because I think the lighter colour makes the product look more modern and neater. This makes it more likeable and therefore it will have more buyers.		I like the waterproof sheet on the top of the product which ensures that the animals inside stay dry even when it is raining. I also like that the hut is higher off the ground so that the animals can stay warm and dry. That is really practical.	
What would I change?	I would perhaps install a camera or some way the people who bought the house can see the animals inside without disturbing them.		If I were to change something, I would maybe add another colour of wood to make it even more interesting with two different colours and I would maybe even use some kind of waterproof material.		If I had to change something about this product, I would add an engraving or something to make it a bit more interesting.	
What can I take for my	I would like my product to be waterproof and camouflaged if it is for outdoor use.		I would really love to engrave a picture on the side of my product such as a bird or a flower/plant. I think it		In my product, I could take the raised floor to make my product more successful. I can also again take	

RELEVANT RESEARCH



My Clients (my parents)



Client Profile

This product can be for all ages. It is a product for the garden so it can be in a 20-year olds house or 50-year olds house. It is for birds because they need somewhere to live, especially when it is cold outside. It will blend in with the garden as a bird house, and then will be useful for people to put plants in. This means that it is very versatile and it can be used by animals and humans.

However, the client for this product will generally be those who love wildlife and want to see more of it in their garden. It can also work for anyone who wants more plants and a more environmentally-friendly garden. However, I will be making my birdbox for my parents to go in our garden. My parents are currently 46 years old. They love spending time outdoors on walks with the dog and on holidays away in the caravan. My dad supports Brighton and Hove Albion football team and he would like the bird box to be painted in their colours – blue and white. My mum would like the birdbox to be fence-mounted so that it looks tidy in the garden. From my client interview, I have decided that my birdhouse will be fence mounted and I would like to paint it blue and white or engrave a design on it.

Client interview

Q) How much would you want to spend on a birdhouse?

Client 1) 'The most money I would want to spend on a birdhouse would be £80'

Client 2) 'It depends of the birdhouse and how well they are made. I suppose about £20'

Q) How big would you want the product to be?

Client 1) 'Not too big, not too small'

Client 2) 'It depends of where I am going to put it. I think birds need to feel safe in it so it shouldn't be too big'

Q) Would you want it to be freestanding, fence mounted etc.?

Client 1) 'I don't mind'

Client 2) 'Fence-mounted I think'

Q) Would you want the birdhouse to be colourful? If so, what colour?

Client 1) 'I'd quite like it to be blue and white because they are the colours of the greatest football team in the world – Brighton and Hove Albion'

Client 2) 'It is quite nice to have a bit of colour or a design on it, rather than just wood. The ones that are made to look like an actual house are quite nice'

What is the problem?

My problem is that birds need somewhere to nest and to stay the Winter, where they will be safe from predators. Their predators include: raptors, large gulls and corvids (which mainly take eggs). They need to be able to keep their babies warm and hatch eggs inside of a suitable house. My clients want to attract more wildlife to their garden and so this product will benefit both my clients and the environment.





FURTHER RESEARCH



Ergonomics

Safety – I will ensure that all my edges have been properly sanded down and filed so they are smooth. I will hopefully be able to use a waterproof wood varnish all over the birdhouse so that it remains dry for the birds living inside and so that no paint runs off. This is also a wood finish.

Price – The upkeep shouldn't cost anything unless the light breaks. The clients are happy to pay between £20-£80.

Needs – Birds eat bird food, berries, small insects, worms, etc, and they nest from April to August.

Explanation of findings

So far, I have planned out what I need to research and I have started to research some of them in this section. I have researched the three areas of focus and decided that I would like to make a product based around nature and the environment. I have completed a product analysis in which I reviewed products similar to what I am going to be making, and I have evaluated them in terms of their ergonomics and aesthetics. My clients are going to be my parents and I will be making my product to go in their garden. To ensure that I incorporated all of their wants and needs, I interviewed them to see what they wanted to see in this product. This will help me with the aesthetics of the product and future planning. I did some research on birds so that my product can be as accessible and as usable as possible for them. Finally, I did some ergonomics and anthropometrics research to get a better understanding of what I need to do, and so my product can be more suited to the users needs.

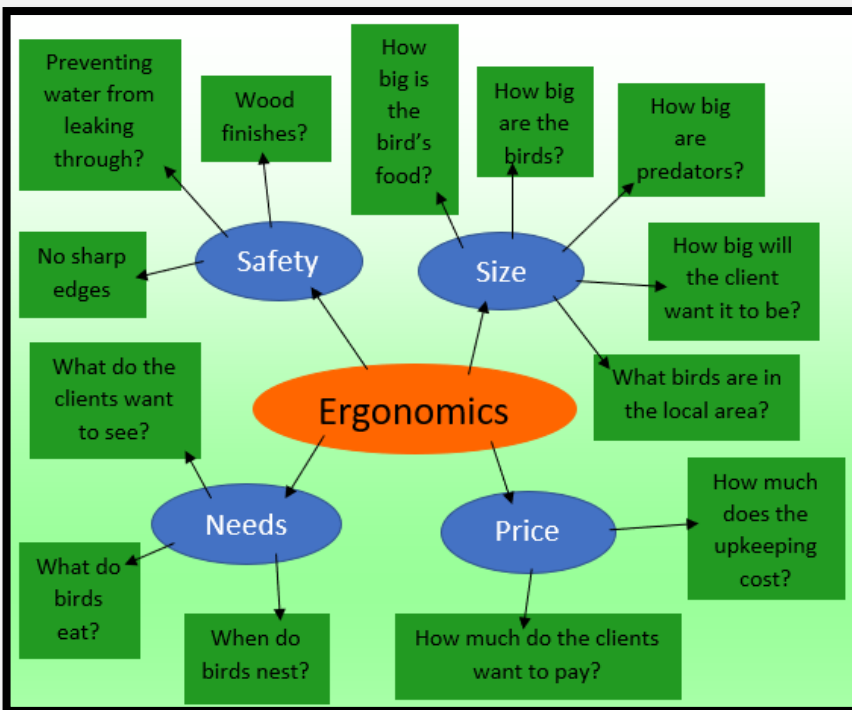


Anthropometrics

The size of the hole is really important to consider when making a birdbox. I need a hole to be big enough for the bird to enter, but too small for predators to get in and harm them. For the Blue Tit, the Coal Tit, and Marsh Tit, the size of the hole should be 25mm and it should be round. For the Great Tit, House Sparrow, and the Tree Sparrow, the size of the hole should be 28mm and round again. These are examples of common garden birds. However, the bird will make do with what it has as they will fix the hole to their liking, and to protect nesting birds, once they have arrived. After measuring the fence in my garden that the house will be sat on, I have come to the conclusion that the amount of space I have is 30cm x 25cm. However, I would like the birdhouse to be smaller than this so that the birds feel safe.



Images of location of problem



Materials Research:

- **Red wood** - I think redwood would be a good choice to make my main body (box) of the birdhouse and the sides of the roof garden. This is because Redwood is one of the strongest wood's nature has to offer and it can even resist splitting. This is good because when it is outdoors, it will go through a lot of weathering, which hopefully this wood will be resistant to. Secondly, it is quite a light wood, making it easy to move around it can easily be cut and sawed using regular tools. This means it is a suitable wood to be working with at school and I will be able to cut it without it splitting as I do so. Lastly, it has natural tannins (chemical stains) which make the wood durable and suitable for outdoor use. These tannins are also good for animals and can have beneficial effects on digestion and performance if they are incorporated into the animal's diet. This makes them useful and safe. The wood costs around \$800 per 144 cubic inches, making it affordable in small amounts. Whilst you can buy red wood in the UK, it is imported from Europe and Sweden etc., making them a little hard to get hold of. This is one option of wood I could use.
- **Cedar Wood** - I think Cedar wood would be another good choice for the birdhouse because it is fantastic for outdoor use (as it is often used in decking) and it is easier to get hold of than Red Wood. It is a soft wood, which means it should be inexpensive, and it is durable and resistant to moisture. This means that even in the UK's wet environment, it will not break or crack. Also, it resists rotting and resists insect infestation much better than most woods. This will be useful in a birdhouse because it is outdoors and there will be insects that take shelter inside of it. Cedar wood is easy to work with and very reliable for building furniture etc. This makes it perfect for my birdhouse and for use in school. It costs around £3.72 per foot but can cost less depending on where you buy it from. It is available in the UK and some is even grown here!
- **Galvanised Screws** - Galvanised screws will be useful when attaching the roof garden to the birdhouse and maybe for other uses as well. They will be able to resist rusting because the steel is covered in zinc meaning that the oxygen and moisture won't be able to reach the steel in order to rust it. They require less maintenance than regular screws and they will last longer. They are corrosion resistant too. Galvanised screws would be better than regular steel screws because they will last longer and they will remain in place. This means that the birdhouse will be stable for longer too, increasing the products life. This is good for the environment. Galvanised screws are cheap too because they cost around 50p per screw. Although this is more expensive than a plain steel screw, it is worth the extra cost for a product which is more durable.
- **Pond Liner or Heavy-Duty Polythene Lining** - This will go on top of the bird box but below the roof garden so that no water seeps through the roof and the animals inside can stay dry. Pond liner or Polythene liners would do because both are plastic and therefore waterproof so that they would work. Pond liner costs around £17.50 per square metre and the Heavy-Duty Polythene liner is very cheap, making these both affordable and options.
- **Finishing Vanish** - Finishing vanish is useful because it enhances the natural grain colour of the wood. However, it is not something that is needed. It also can protect the wood from the sunlight and water which will be good for making my product last longer seen as it is used outdoors. I think we already have this in school as well so it is obviously easy to get a hold of.
- **Soil and Plants** - Soil and plants will go in the roof garden. This is what will make my hedgehog house original as well as colourful and pretty, whilst still blending in with the environment.

FURTHER RESEARCH



Overall, from section A of research, I have decided that I want my product to be a fence-mounted, blue and white birdhouse, which is also a flower pot. The flower pot will be above the roof of the house. This makes it environmentally friendly because it brings more wildlife to a garden, in terms of birds and plants. I am also thinking about adding something else onto the product, such as a bird bath, a bird feeder, or a solar powered light. This is because it will make it more environmentally friendly, sustainable, and it will better suit the needs of the clients and intended users.

Bird Research

Many birds like to nest in bird houses including: Blue Tits, Finches, Sparrows, Swifts, Swallows, Blue Birds, Robins and Woodpeckers, etc. They are generally attracted to the sense of security that a birdhouse provides. Colours that represent food (like red) can draw birds to bird houses, as well as there being an availability of food, e.g. worms, in the area. A bird bath can also attract them because they can use that to wash in and drink from. Finally, birds need to feel safe if they are to live in a bird house. This can be done by being surrounded by shrubs and plants which they can take into the house and protect themselves from bad weather.

I want my birdhouse to combine these two ideas together and some other aesthetics to create an environmentally friendly product that suits the needs of my clients and the animals.

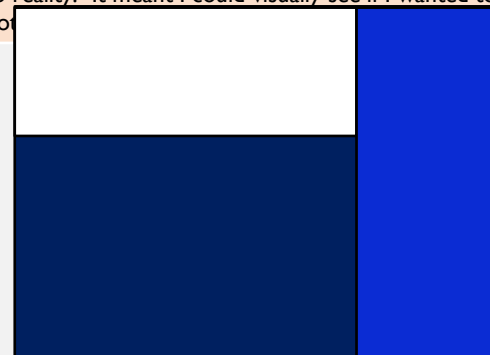




SUMMARY OF FINDINGS



Slide number	What did I do?	How is this useful?
2	I researched each topic that we have been given and I found products that are in each topic. I also wrote a summary of each topic suggesting what I could do if my product was based around that theme.	This allowed me to understand the possible things that I could make for each theme, and it allowed me to choose which one I wanted my product to be based around.
3	I completed a product analysis for 3 different products that are similar to what I am going to make. I did one on a hedgehog house, one on a birdhouse, and one on a rabbit hut.	This highlighted the pros and cons of each of the products, so that I have an idea about what not to do, in order to make my product successful. It also allowed me get some ideas about what I might need to think about, as well as some ideas that I could perhaps include in my product.
4	I made a spider diagram so that I know what I need to research. I then also explained what my problem is and did some client research and an interview with them.	This will be good to look back at further into the project so that I know I have covered everything with enough detail. I will also be able to meet the needs and wants of my clients because my interview helped me understand what they would like to see in it.
5	I researched ergonomics and anthropometrics, then I inserted some photographs of the location of the problem, then finally, I explained my finding so far.	Doing anthropometrics and ergonomics research allowed me to understand what my product will need to have and roughly how big it should be. My explanation of findings allowed me to evaluate where I was up to and what I had left to do.
6	I completed some materials research, a summary of Section A, and an initial sketch of what my product could potentially look like.	My materials research allowed me to work out what materials would be available for me to use, and which would be most fitting for an outdoor product. My Summary of Section A allowed me to see that I had included everything I needed to. Finally, my initial sketch was useful because I saw the idea in my head come to reality. It meant I could visually see if I wanted to change anything about it or not.



DESIGN BRIEF AND SPECIFICATION

Design Brief

I have decided that I am going to make a birdhouse with a roof garden on top of it. The design will be blue and white and it may also have an engraving on it. I will be making it for birds, such as Blue Tits but my clients are going to be my parents. The birdhouse will be fence-mounted at the back of our garden and it will roughly be about 28cm x 16cm in size. This is to ensure it is secure for the birds and to ensure that it fits nicely on the fence.

Design Specification

• Who are the intended users of the product?

The intended users are my parents. The product will go in my back garden against the fence. I have interviewed my parents so that I have more of an idea about what they would like to see in the product.

• What will the product be required to do?

The product will be required to house garden birds, and provide them with warmth in the Winter, and a safe place for them to stay with their new born babies during the Summer months. It also needs to be able to hold plants to make the garden more environmentally friendly and to make my clients garden more environmentally friendly. The product is multifunctional because it is a birdhouse and a plant pot, at the same time.

• What are the maximum and minimum sizes of the product?

The maximum size of my product is about 25 cm x 25 cm. This is because this is roughly the amount of size I have on my fence to put the fence-mounted bird house on. I am thinking about doing the birdhouse sized 28cm x 16cm. I think the minimum size I would do the entire product is 25cm x 15cm.

• What materials would be the most suitable to use and why?

The most suitable materials to use would be: Redwood (because it is the strongest wood nature has to offer and it can resist splitting), Cedarwood (because it is durable and resistant to moisture), Galvanised screws (because they won't rust when it rains), pond liner (because it is waterproof to keep the birds dry), finishing varnish (protects the wood from sunlight and water), and soil/plants (to go in the roof garden).

• What production methods will I use?

I will use one-off production for the front and back pieces of wood, and the bottom piece of wood. However, I am going to use batch production on the laser cutter to make the two sides of my birdhouse and to make the roof panel. I will also use batch production to make the sides of my roof garden.

• Are there any special design features to be incorporated into the product?

I am perhaps going to put an engraving onto the box to make it look more detailed and professional. The product is also going to double up as a plant pot/roof garden on the top of the house, and I am thinking about adding something else to the design such as a solar powered light or a bird feeder.

• What are the safety requirements related to the product?

Safety requirements that are related to my product are: finishing varnish needs to be safe for the animals, there can't be any sharp edges, there needs to be no water seeping through from the roof, and the entrance hole needs to be just big enough for the bird to enter, but hopefully not for predators to enter. It also needs to be strong enough to prevent the roof garden from collapsing through into the house.

• What image needs to be portrayed by the product?

The image that needs to be portrayed is a welcoming image that is homely for the birds, and then it needs to look nice and be suitable for a garden. It needs to be suitable for the clients and the birds and the aesthetics needs to be colourful to brighten up the garden and make the box welcoming.

• What economic factors need to be considered?

I need to consider the price of the materials and components, which I have already researched, and then the price of the product methods that I will use e.g. the laser cutter.

• Where will the product be used?

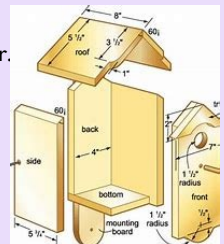
The product will be used by the client and the birds in my garden. It will be located at the back of my garden, on my garden fence.

• What colour schemes will be used on the product?

I will be painting the birdbox white and blue striped because that is what my client wants. I may also add an engraving for extra detailing.

• Does the product need to be strong, durable or reliable?

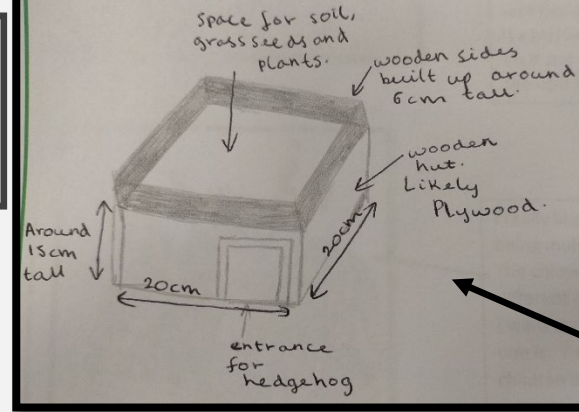
The product needs to be strong to keep the roof garden from caving in and it needs to be durable to survive through bad weather.



My new design idea

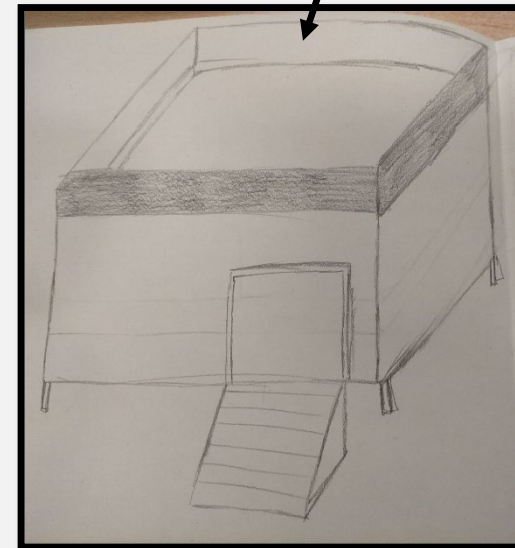
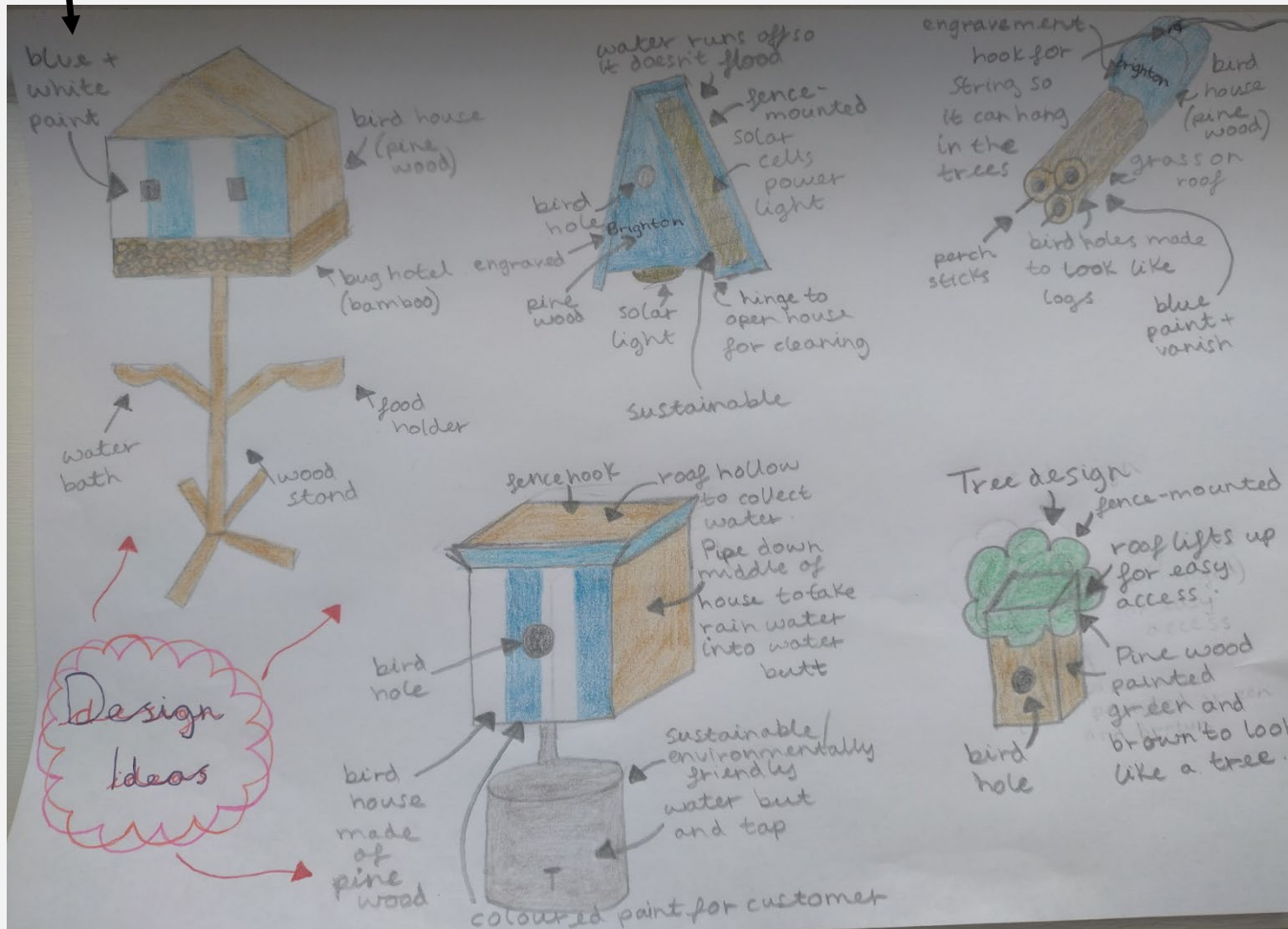
I changed my design idea to a bird house/ bird box. These are some of my sketches and ideas.

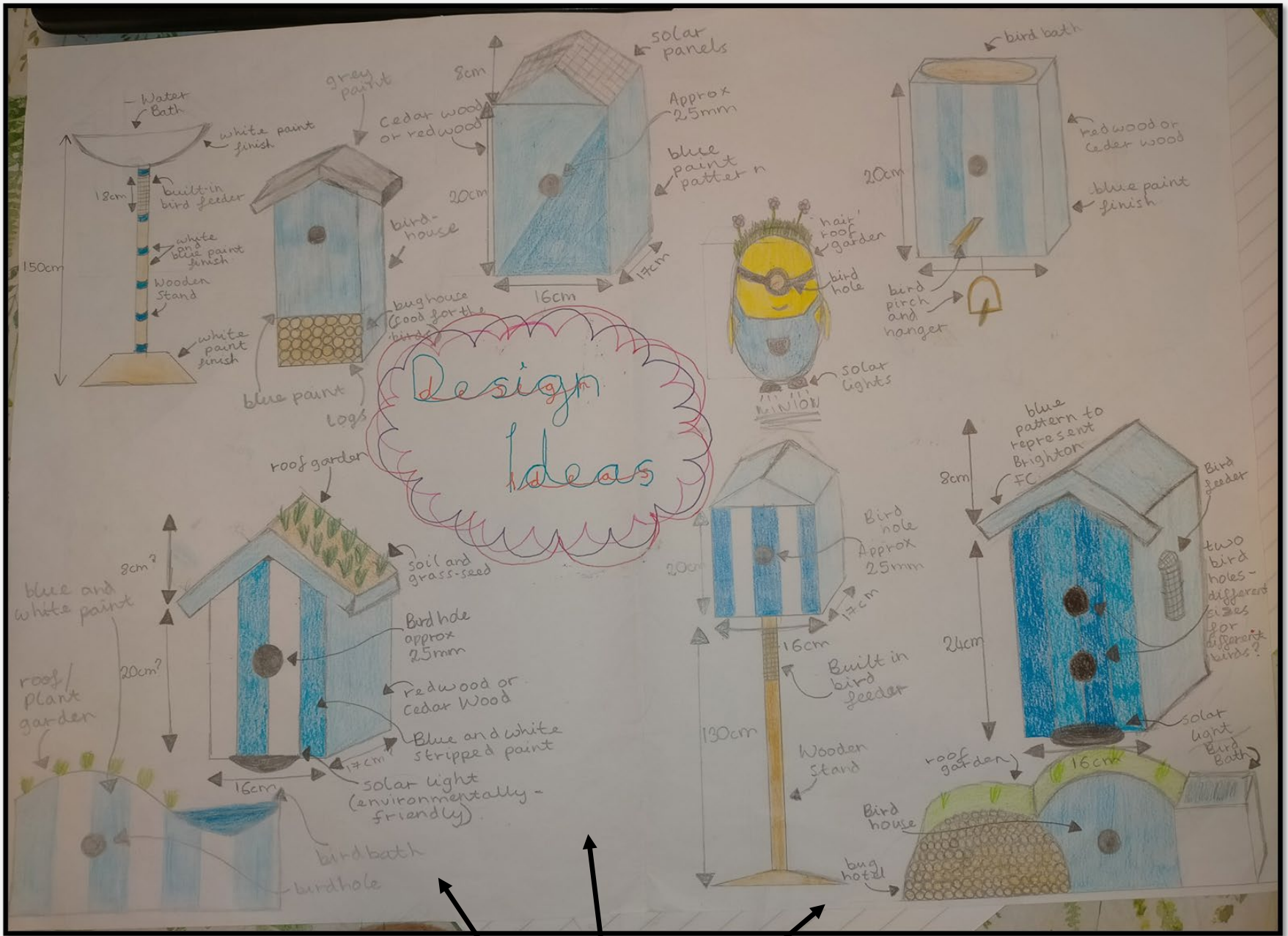
DESIGN IDEAS



My initial design ideas

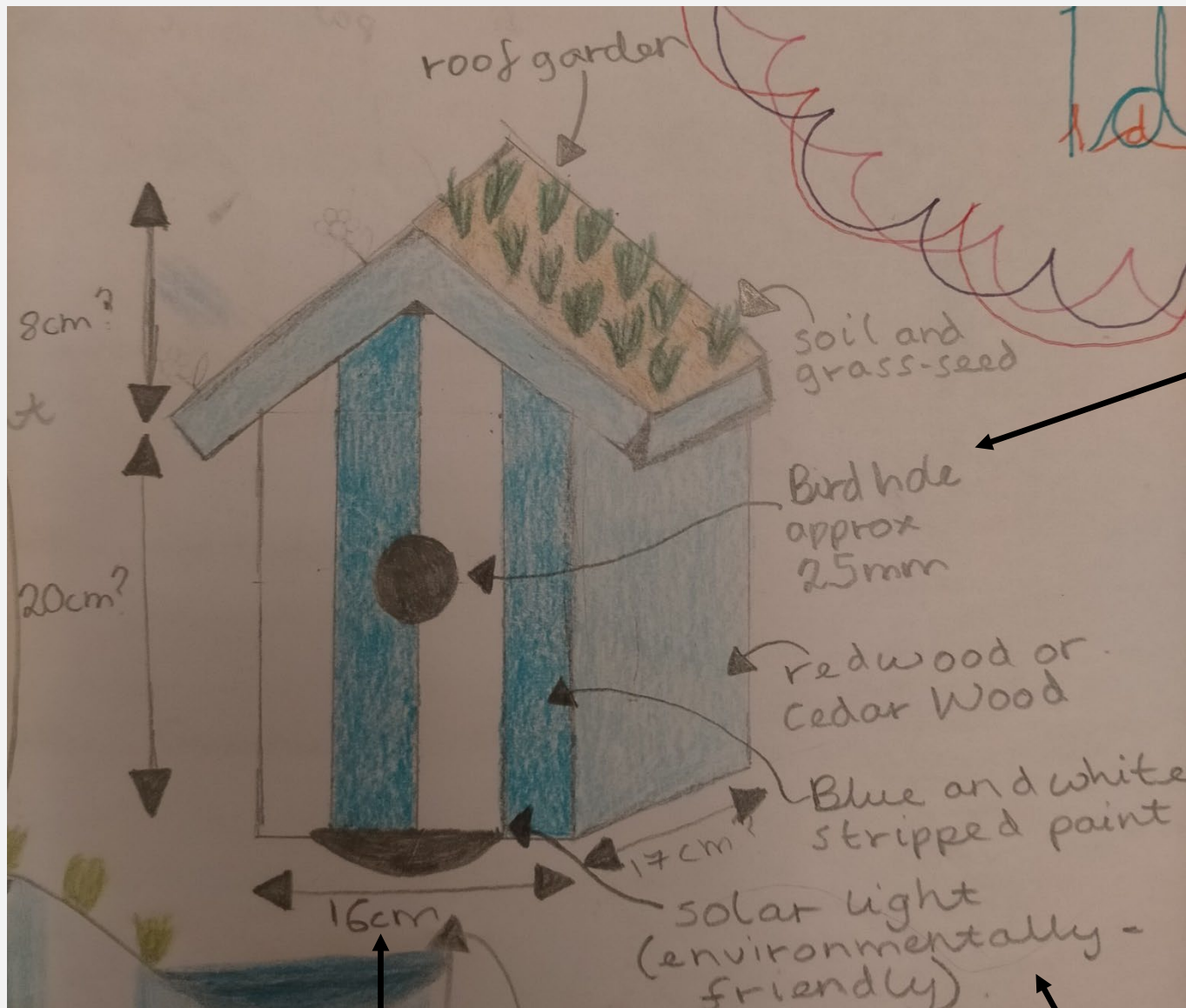
My initial design idea was to make a hedgehog house with a roof garden. However, when I started research into it, I discovered that Hedgehogs don't like living in houses that are man-made. They prefer to make their own houses and so I changed my design to a birdhouse. These are the sketches I did of my original idea before I changed it.





More design Ideas

IDEA I

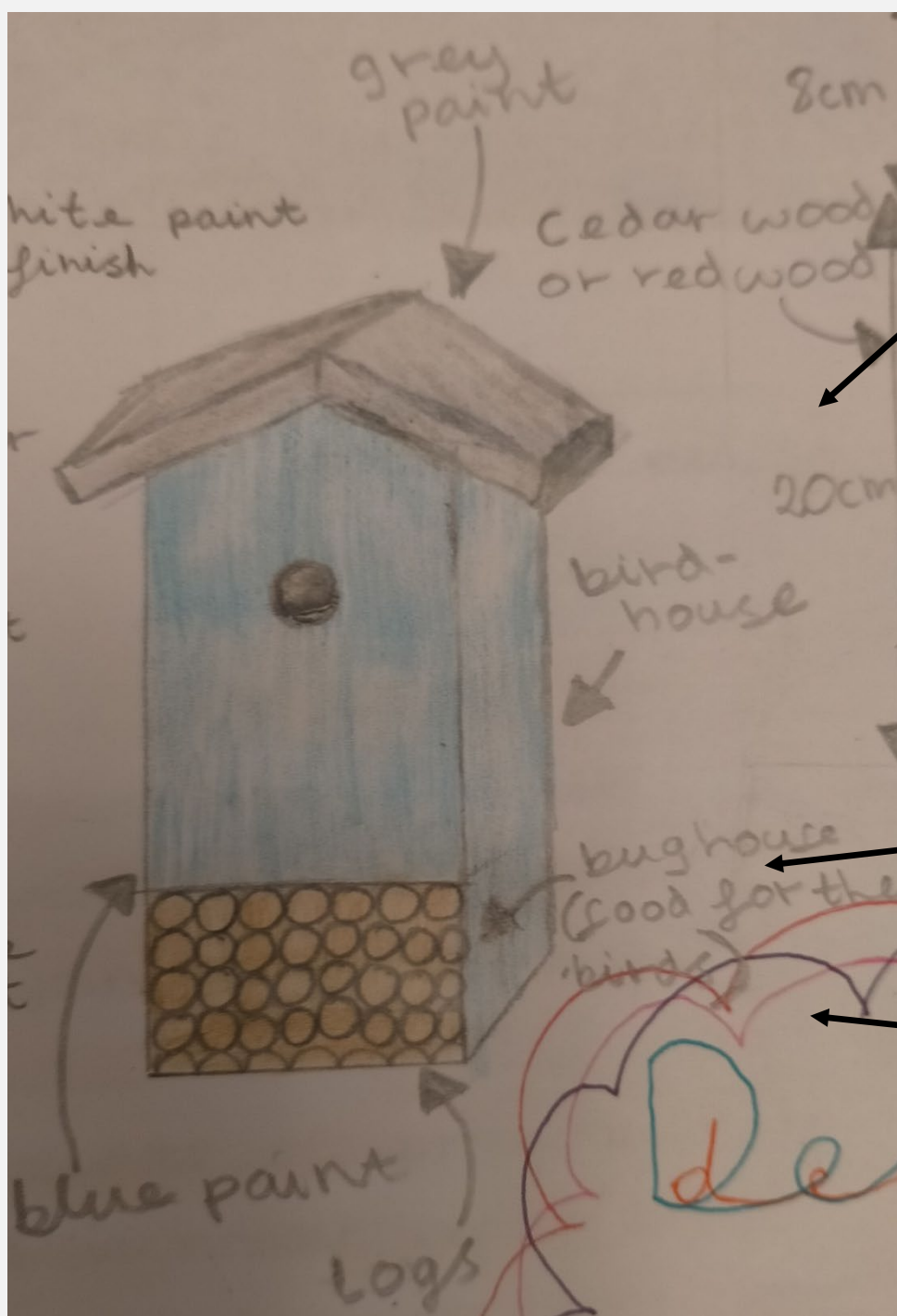


This birdhouse is 160mm x 170mm x 280mm in volume. It has a bird hole with a 25mm diameter so that the bird can get in easily, and predators can't. The roof of the house is also the base of a roof garden. The roof garden will bring wildlife to the garden, which solves my problem, and there will also likely be insects and bugs in it. This means that the birds have an easy food supply. There is a solar light located on the base of the house which will benefit the customer and it is environmentally friendly because it is naturally generated. The panel will be on the roof. The house will fit nicely on the fence at the back of my customers garden because it is the right size, and it painted with blue and white stripes. This is because it is what my customer suggested. The house is pleasant to look at and so will bring birds to the garden and look nice in the garden too.

I really like the shape of this design and that it benefits the environment as well as being multi-functional.

9/1
0

IDEA 2

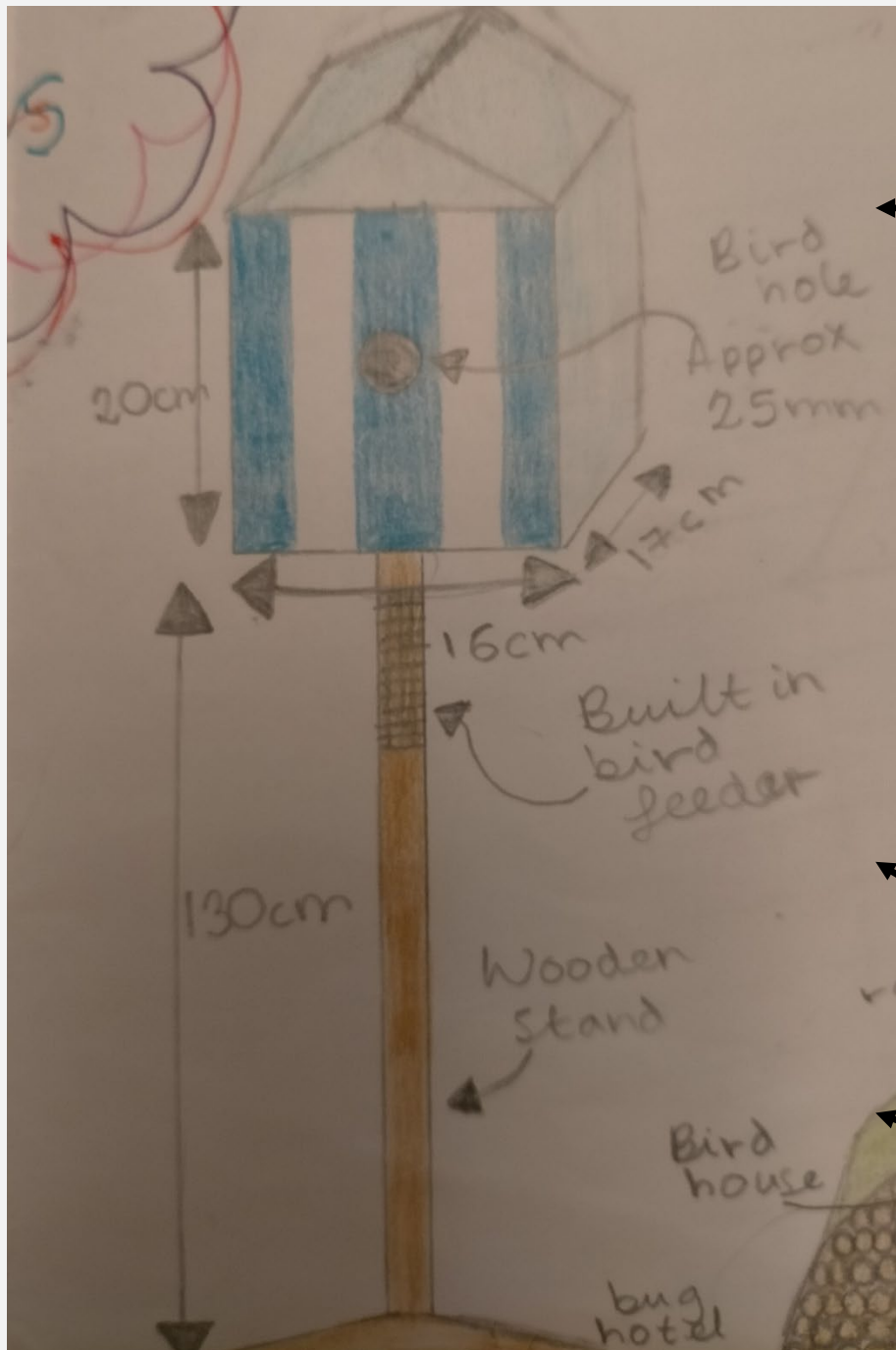


This birdhouse will be 160mm x 170mm x 280mm and it will have a bird hole with a diameter of 25mm. It has a triangular roof so that water will run off of it and then the birds inside will stay dry. Below the house is a bug house and this will help the birds because it means they can easily get food. This means that in the Winter, they won't have to travel far and they can stay dry. The house will be painted blue to meet the request of my customer because it is one of the colours he suggested. The house will sit nicely on the fence, bring more wildlife to the garden, and it will ensure that the birds are safe inside.

I really like this idea because it makes life easier for the birds and I like the shape of the roof. However, I prefer the coloured stripes to a solid colour so if I did this idea, I would use white and blue paint to decorate the house with.

7/1
0

IDEA 3

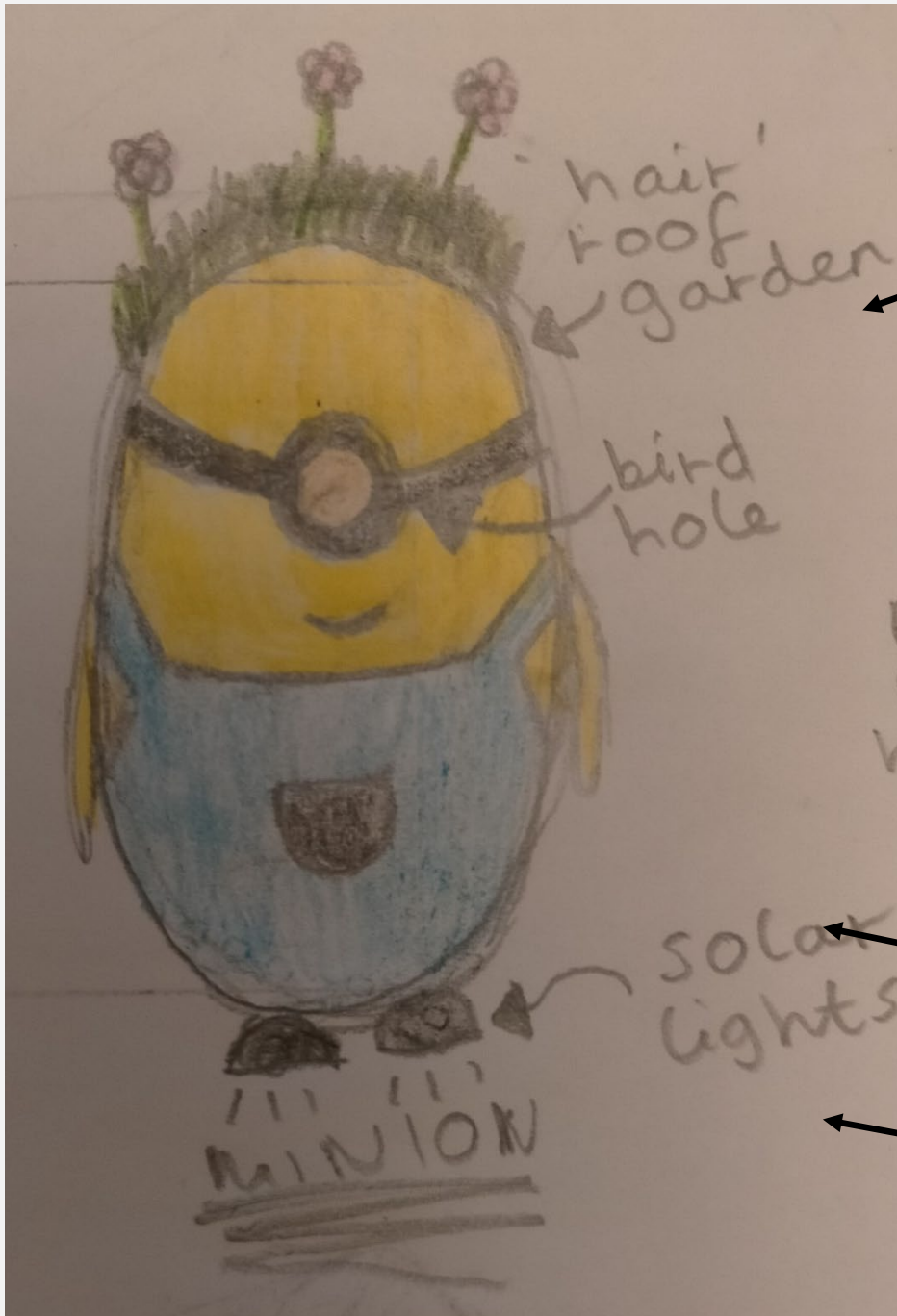


This birdhouse is free-standing rather than fence-mounted so it is a bigger product. The house would have a volume of 160mm x 10mm x 250mm and the bird hole would have a diameter of 25mm. The roof is triangular which again means that water would run-off it easily and so this will prevent water seeping through into the inside of the house. The stand will be 1300mm tall and will have a bird feeder built into it near to the top. This will mean that the birds have food right below their home so they can access it easily and safely at any time. The wooden stand would be finished with varnish to protect it from weathering, and the house would be painted blue, and then have blue and white stripes on the front of it. This is to meet the request of my customer who requested those colours because of the football team he supports.

I like this idea because of the decorations and finishes on the house which make it look of higher quality. I like the idea of incorporating the birdfeeder into the stand however, I prefer fence-mounted houses because I think they look more presentable.

8/10

IDEA 4



This house is rounded rather than square like the rest of the houses. The idea behind it is that it's supposed to look like a minion. It will likely be 200mm tall and around 140mm horizontally. The minion's 'eye' is going to be the bird hole to enter the house and it will have a diameter of 25mm. The minion's 'hair' is going to be plants as the minion will have a small box inside of the head that will be the base of the roof garden. It will have two solar lights on the bottom of the house, which can be used by the customer, and these will look like the minion's 'feet'. The house will then be painted yellow with a blue jumpsuit shape on it to give the illusion that it is supposed to be like a minion, as well as black paint as the 'goggles' around the eye. This makes the product more fun and family friendly to have in a garden, whilst still solving the problem by attracting more wildlife.

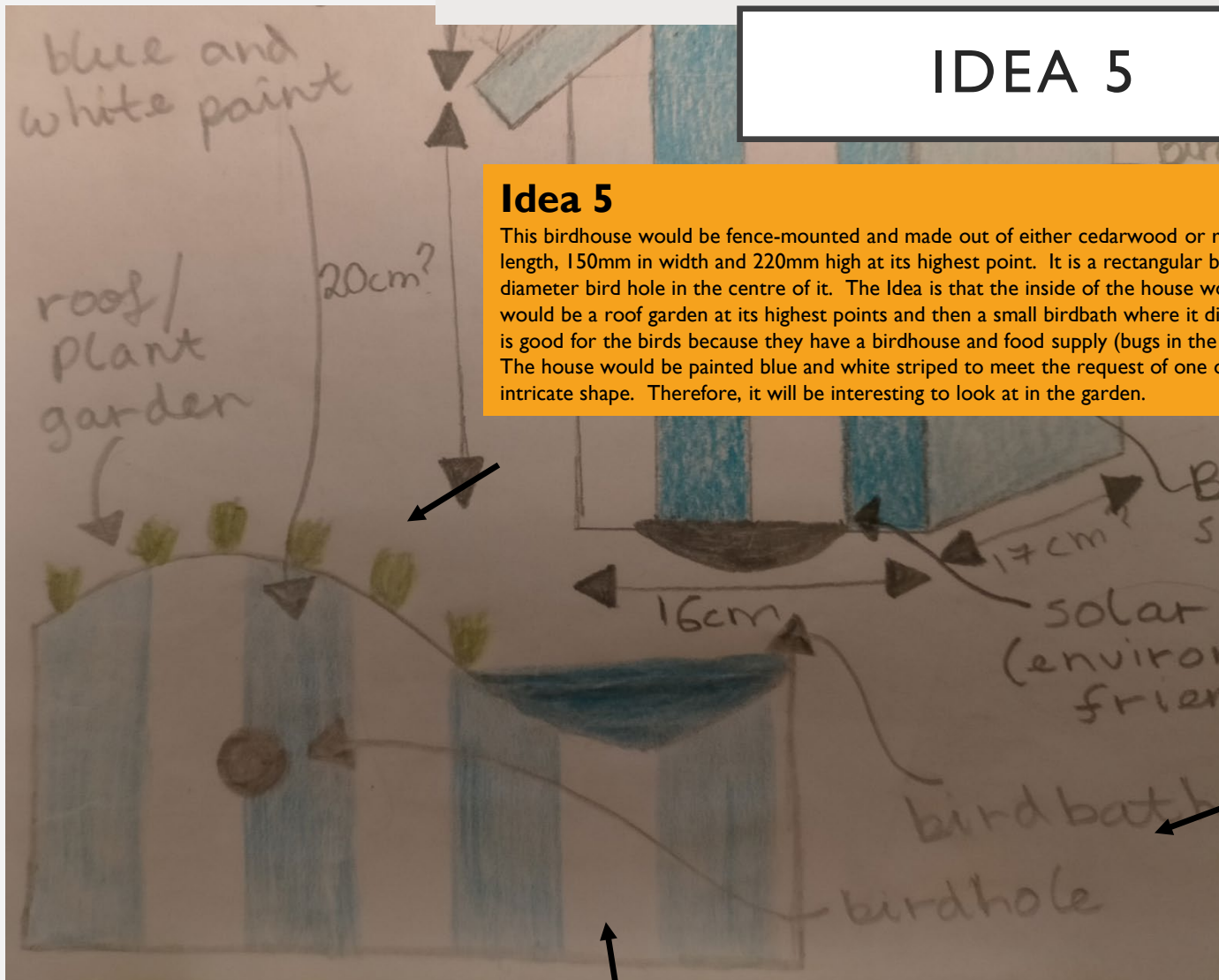
I like this idea because it is colourful and more original than the other ideas. It has a different appearance and use which makes it quite interesting to look at.

8/10

IDEA 5

Idea 5

This birdhouse would be fence-mounted and made out of either cedarwood or redwood. It would be around 350mm in length, 150mm in width and 220mm high at its highest point. It is a rectangular birdbox with a curved roof and a 25mm diameter bird hole in the centre of it. The idea is that the inside of the house would be a birdhouse and then the roof would be a roof garden at its highest points and then a small birdbath where it dips into a bowl shape. This means that it is good for the birds because they have a birdhouse and food supply (bugs in the roof garden) right above their head. The house would be painted blue and white striped to meet the request of one of my customers, and it will be an intricate shape. Therefore, it will be interesting to look at in the garden.



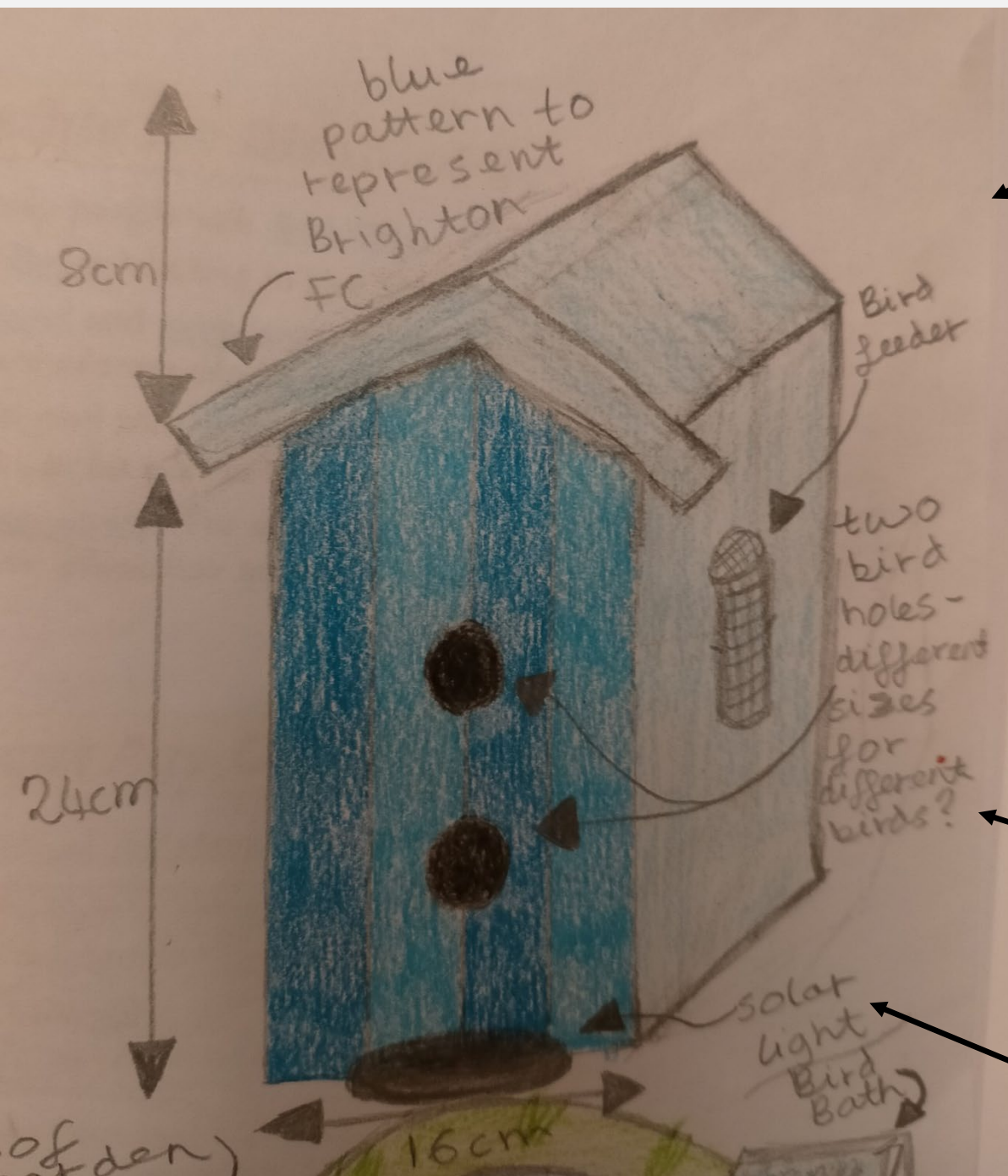
8/10

I like this idea because it is quite unusual and so quite interesting. It would likely be quite challenging to make because of the interesting shape however, that would hopefully make it more popular to buyers.

IDEA 6

This house is a rectangular shape, and is 320mm in height overall, 160mm in length and 130mm in width. It has two bird holes on the front of it and goes into different houses. The bird holes will each be different sizes so they are for different birds. One of them will have a diameter of 25mm. The house will have a triangular, pointed roof and will be made out of cedarwood or redwood. There will be a bird feeder attached to the side of the house so that the birds have easy access to food. There will also be a solar light on the bottom of the fence-mounted house which will be useful for my customers to use. The house will be painted light blue all around, except for the front, which will be painted with stripes of different shades of blue.

I like this idea because it is simplistic and will look good in any garden. However, it isn't a good idea to have two different types of birds living so close to each other, and sharing the same bird feeder. It could work if it only had one bird hole and was one big house.

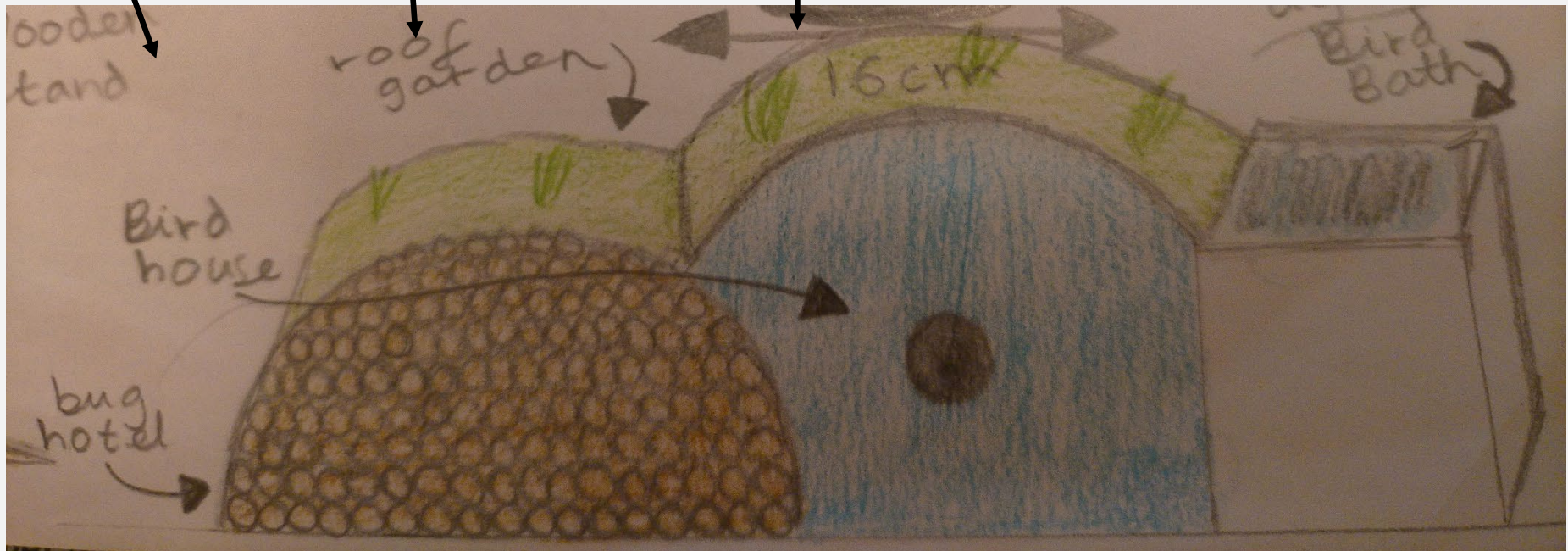


IDEA 7

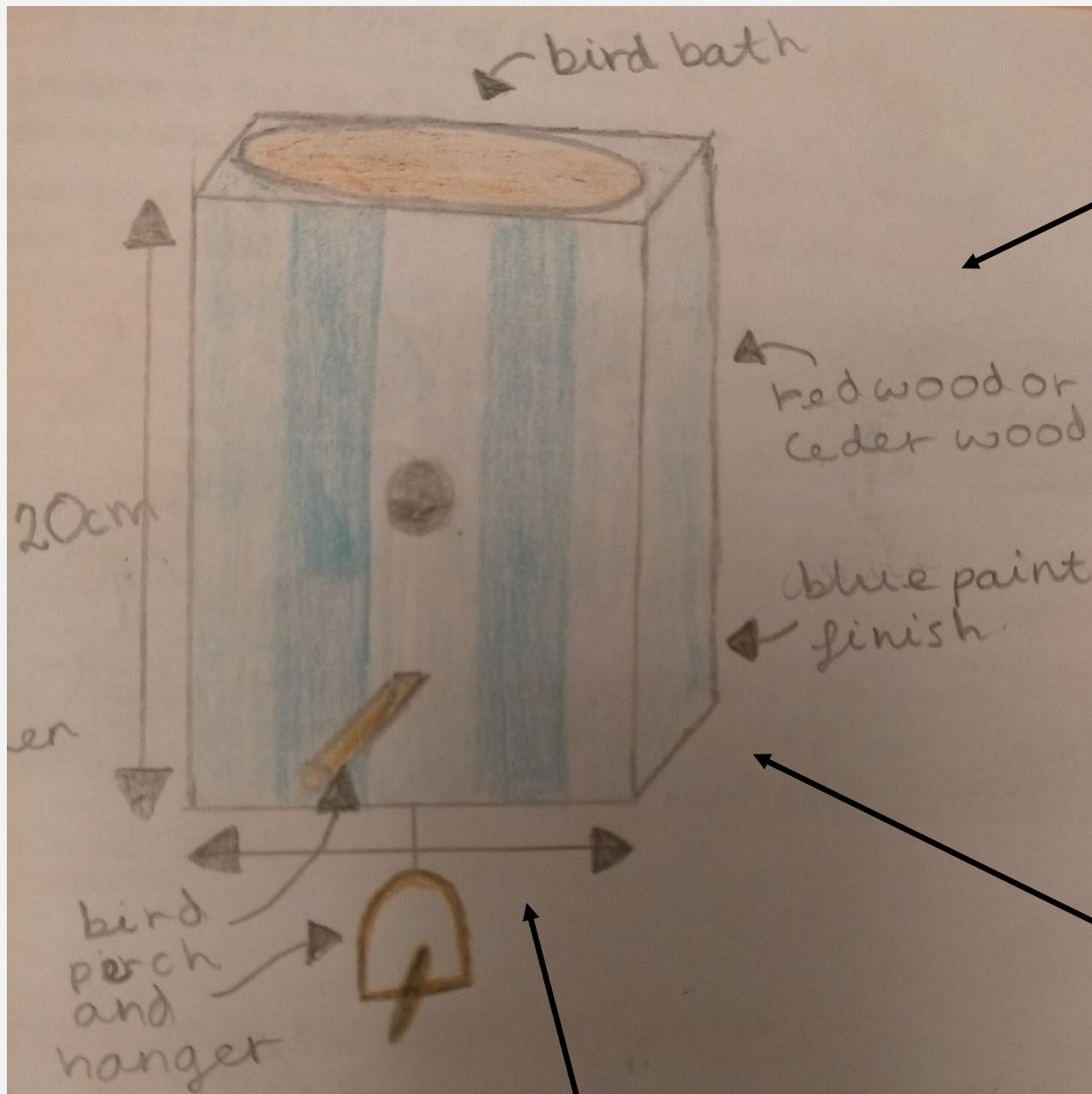
This birdhouse is similar to idea 5. The birdhouse could be placed on the floor, but is probably best being fence-mounted. It will be roughly 350mm in length, 220mm in length and 150mm in width. It is one product which is separated into three different sections. The first is a semi-circle shape and it will be filled with little logs – it is a bug hotel. The second section is also a rounded shape and this is the bird house. The final section is a rectangle shape and it is a bird bath. There is also a grass layer/roof garden on top of the bug hotel and bird house. The front of the birdhouse will be painted blue and the bird bath will be painted white to again match the colours requested by my customer. The bird hole will have a diameter of 25mm and the birds will have quick access to the bird bath to wash, and the roof garden and bug hotel for food. This makes it very ergonomically useful for the birds. It will all be made out of either redwood or cedarwood.

I like this birdhouse because it is a very unique design. It is unlike any birdhouse I have ever seen before. I think it will be quite difficult to get all the measurements correct for every individual part and then still get them to fit together. It would look good in the location the product will be going in.

8/10



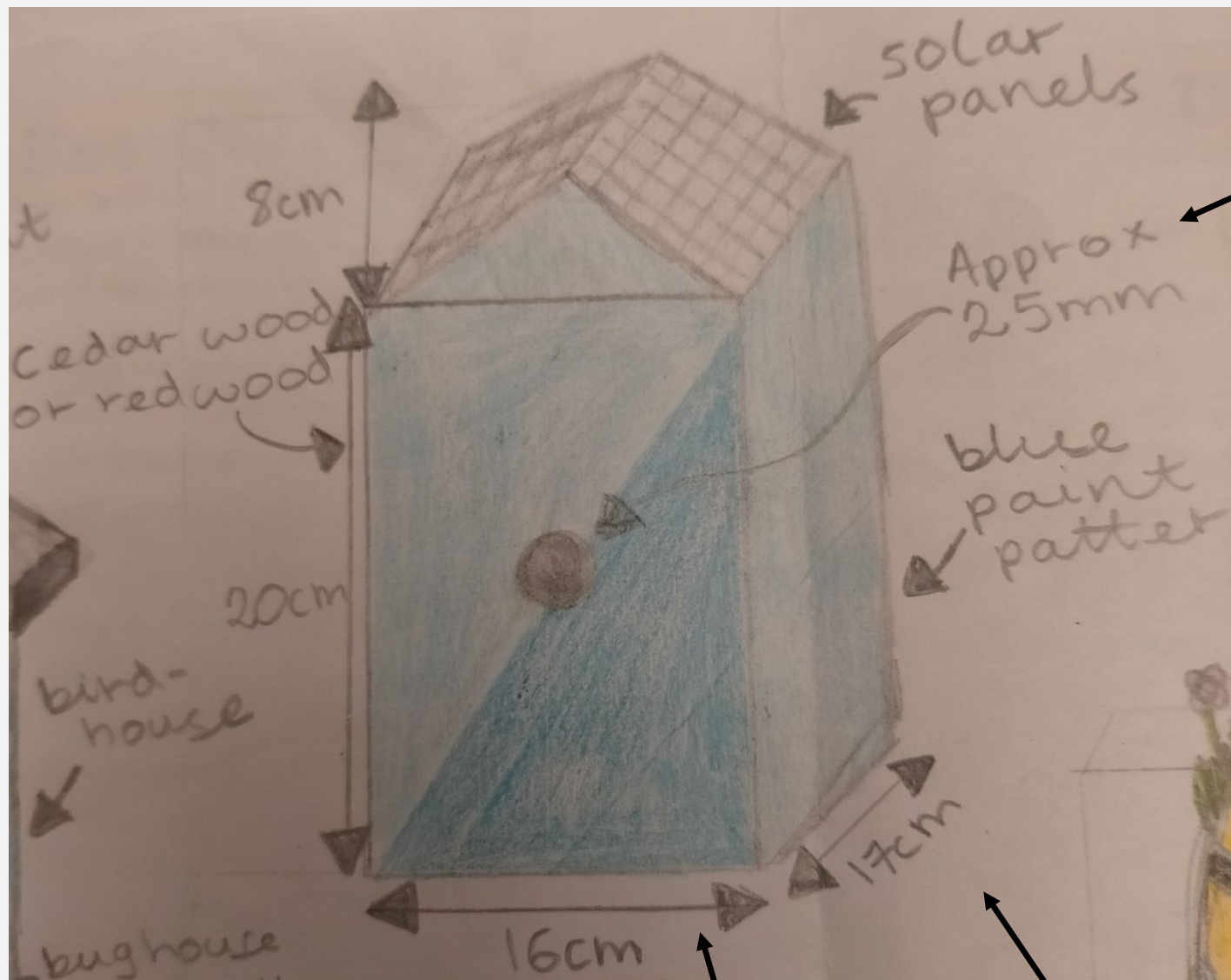
IDEA 8



This birdhouse is a rectangular shape. It is 200mm in height, 150mm in length and 80mm in width. It doesn't have a roof and instead has a birdbath on top of the house. This will refill easily whenever it rains. It will either be made out of cedarwood or redwood and will be finished with stripes of paint in two different shades of blue, in order to meet the request of my customer. There will also be a bird perch just below the bird hole (diameter 25mm so that it is the correct size for the bird but predators are unable to enter). A bird hanger will also be hung from the base of the fence-mounted house to make the house look more interesting.

I like the idea of the design because it would look nice in a garden due to its colours and bird hanger. However, the bird bath could overflow and it could be dangerous for the birds inside of the house.

IDEA 9



The birdhouse will be made out of either cedarwood or redwood and it will have a bird hole with diameter 25mm. The length of the house will be 160mm, the height will be 280mm at its highest point, and the width will be 170mm. It will be a rectangular house with a pointed triangular roof so that water can easily run off of it. The roof will be solar panels and this energy could be used to power a light or anything that the customer would like it to do. The front of the house will be painted two different shades of blue, and split diagonally for the paint. The rest of the sides will be painted the lighter shade of blue.

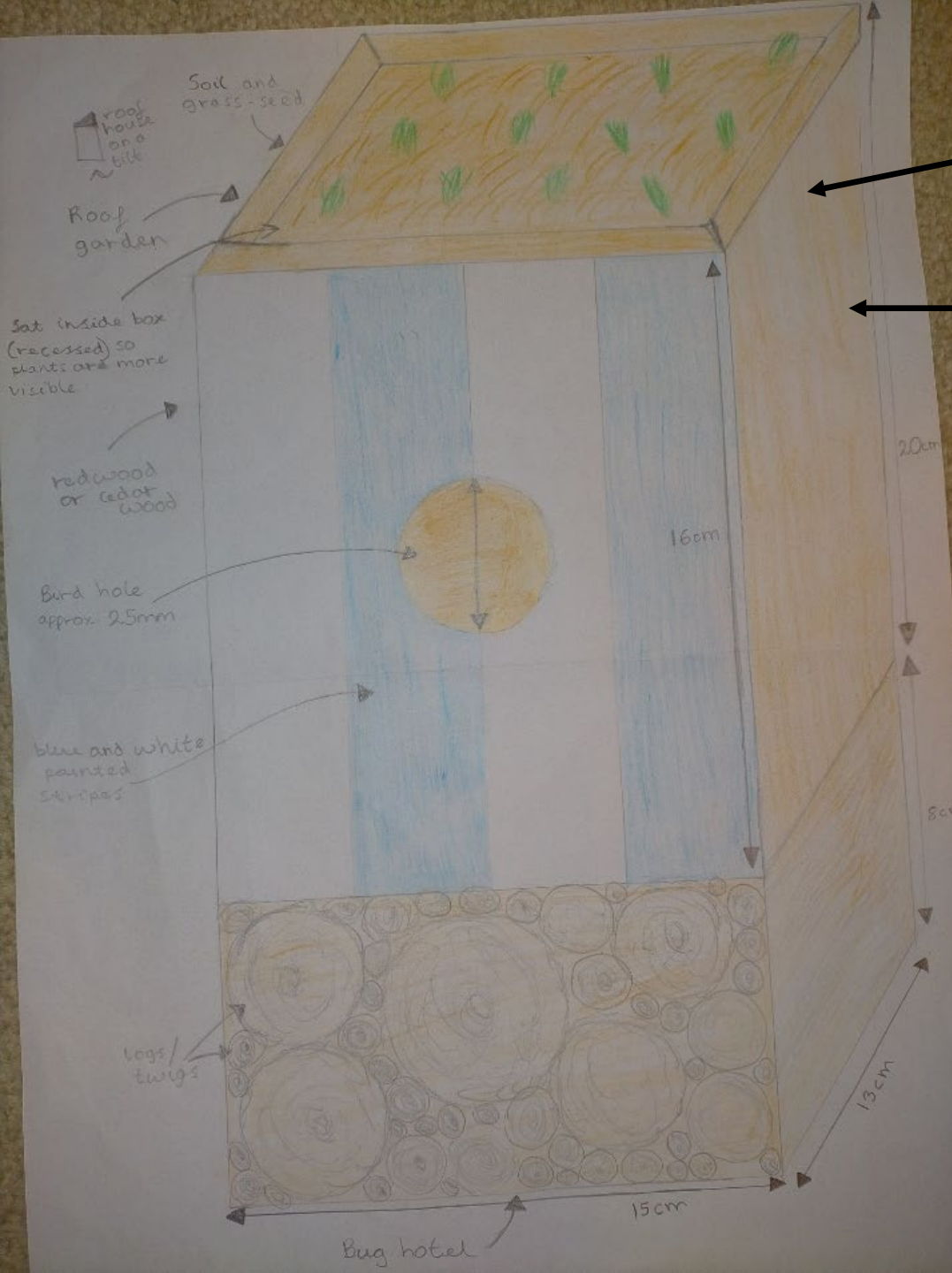
I like this house because it is useful for the birds inside of it and the customers who will have it in their garden. I think the solar panels would be more useful being a roof garden though because if we needed them for light, we can simply get a separate solar light.

7/10

IDEA 10

This last idea is not a birdhouse. This is a water bath and it is on a stand. The entire design will be made out of either cedar wood or redwood and it will be free-standing. The design will have an overall height of 1500mm. The stand will have a built in bird-feeder at the top of it and just below the water bath. It will also be decorated with white and blue paint in stripes to finish it. The water bath will be painted white as well as the stand on the floor, which will also be painted white. The birdfeeder will be 180mm tall within the stand. So, this design would be a water bath and bird feeder together and would stand up on its own, rather than being attached to the fence.

I like this idea because it looks good and the colours are nice, but my clients want a fence-mounted product so it wouldn't be suitable.



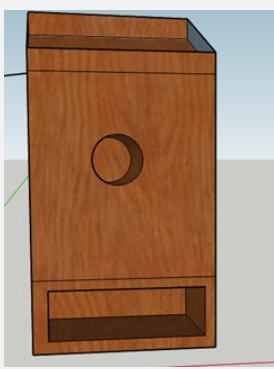
My final design ideas including anthropometric measurements. It is a birdhouse with a tilted roof garden, above it, and a birdhouse below it. This means that it is good for the environment, and it meets the needs of the birds by providing them with a warm place to live, and food.

Knockdown-fittings - I could use dowels in my project to hold the wood together for the sides, top and bottom of my birdhouse and bug hotel. This is because they will create a permanent fixing and it will make the entire structure stronger. Strength is essential for the house because it needs to be able to last through winter and harsh weathering without breaking or weakening.

Cutting List

Part no.	quantity	Description of part	Length mm	Width mm	Thickness mm	material
1	X1	Front of birdhouse. It is a rectangle with a bird hole (diameter 25mm) in the centre.	160	150	10	Redwood or Cedar wood
2	X1	Back of birdhouse. Rectangle.	200	150	10	Redwood or Cedar wood
3	X2	Sides of birdhouse. Two trapeziums - horizontal base, 	200 on one side (left of image) and 160 on the other side (right of the image)	130 horizontally, 140 on this line below 	10	Redwood or Cedar wood
4	X1	Roof of house. Rectangle.	130	130	10	Redwood or Cedar wood
5	X2	Base of house/roof of bug hotel/base of bug hotel. Rectangle.	150	130	10	Redwood or Cedar wood
6	X2	Sides of bug hotel. Rectangle.	130	80	10	Redwood or Cedar wood
7	X1	Back of bug hotel. Rectangle.	150	80	10	Redwood or Cedar wood
8	X1	Front of bug hotel. Rectangle with the centre cut out 10mm from the	150	80	10	Redwood or Cedar wood
		outside of the rectangle all the way around.				

My Cutting List – all the parts I need for my product including measurements, quantities and descriptions.



MAKING PLAN



Step 1 – Firstly, I will need to plan out my design on paper, including measurements and materials. I will also plan the design out as a CAD design. This is so that I can see my design from all angles and I can ensure that it is all correct. I will be able to make any adjustments that are needed at this point as well so that I can guarantee my final product matches my plan. I could also make a model of the bird house at this stage to ensure I am entirely happy with my design.

Step 2 – Secondly, once I am sure about the product I will be making, I will research and decide on materials, sizes and colours, whilst considering the cost of it and the amount of time I have.

Step 3 – After that, I will cut out the wood for the different sides of the bird house, and also the roof. To do this, I will use the laser cutter to get an accurate cut and this will ensure that all the pieces fit together accurately when it comes to assembling the bird house.

Step 4 – Once the wood has come out of the laser cutter, I will use a file and sand paper to get rid of any rough edges.

Step 5 – Next, I will join all of my pieces of wood together, starting with the sides of the house. I will assemble the front, back, and two sides initially, and then once that is strong, I will add the roof, the bottom, and the walls of the bug hotel. Lastly, I will screw in place the sides of the roof garden. They will all be screwed together using a hand drill and galvanised screws so that they don't rust.

Step 6 – The next step will be to paint the box using blue and white paint. I will use a ruler and pencil to draw on boundary lines, and then I will use the paint and a brush to decorate the house. Once the paint is dry, I will add 2 coats of varnish to the outside of the house to protect it from weathering and to keep the paint vibrant. This will also ensure that no rough edges emerge.

Step 7 – Then, I will add a hook to the back of the house so that it can be hung up on the fence, I will add in small logs to the bug hotel, and finally, I will add soil and grass seed to the roof garden. The bird house will then be ready to go outside in the garden and it will encourage more animals to come into the garden.



FINAL DESIGN SPECIFICATION



Design Specification

• **Who are the intended users of the product?**

The intended users are my parents. The product will go in my back garden against the fence. I have interviewed my parents so that I have more of an idea about what they would like to see in the product.

• **What will the product be required to do?**

The product will be required to house garden birds, and provide them with warmth in the Winter, and a safe place for them to stay with their new born chicks during the Summer months. It also needs to be able to hold plants to make the garden more environmentally friendly and to make my clients garden more environmentally friendly. The product is multifunctional because it is a birdhouse and a plant pot, at the same time. It also needs to be able to house bugs below who will provide food for the birds as well as being good for the garden.

• **What are the maximum and minimum sizes of the product?**

The maximum size of my product is about 28 cm x 25 cm. This is because this is roughly the amount of size I have on my fence to put the fence-mounted bird house on. I am thinking about doing the birdhouse sized 28cm x 16cm. I think the minimum size I would do the entire product is 25cm x 15cm.

• **What materials would be the most suitable to use and why?**

The material that I used was plywood because it is suitable for use outdoors and it is affordable. Glue is also suitable to hold the box together because it will be protected by a final varnish. Pond liner or a different water proof material will also be useful. Pine wood was used for the back panel of the house because it looks nice.

• **What production methods will I use?**

I will use one-off production for the front and back pieces of wood, and the bottom piece of wood. One-off production is useful because it allows you to shape and size each piece uniquely so that it fits perfectly with the design idea and other pieces.

• **Are there any special design features to be incorporated into the product?**

The product is also going to double up as a plant pot/roof garden on the top of the house, and it is also a bug hotel. It will be a fence mounted house and will be painted blue and white before being varnished.

• **What are the safety requirements related to the product?**

Safety requirements that are related to my product are: finishing varnish needs to be safe for the animals, there can't be any sharp edges, there needs to be no water seeping through from the roof, and the entrance hole needs to be just big enough for the bird to enter, but hopefully not for predators to enter. It also needs to be strong enough to prevent the roof garden from collapsing through into the house.

• **What image needs to be portrayed by the product?**

The image that needs to be portrayed is a welcoming image that is homely for the birds, and then it needs to look nice and be suitable for a garden. It needs to be suitable for the clients and the birds and the aesthetics needs to be colourful to brighten up the garden and make the box welcoming.

• **What economic factors need to be considered?**

I need to consider the price of the materials and components, which I have already researched, and then the price of the product methods that I will use e.g. the bandsaw.

• **Where will the product be used?**

The product will be used by the client and the birds in my garden. It will be located at the back of my garden, on my garden fence.

• **What colour schemes will be used on the product?**

I will be painting the birdbox white and blue striped because that is what my client wants.

• **Does the product need to be strong, durable or reliable?**

The product needs to be strong to keep the roof garden from caving in and it needs to be durable to survive through bad weather.

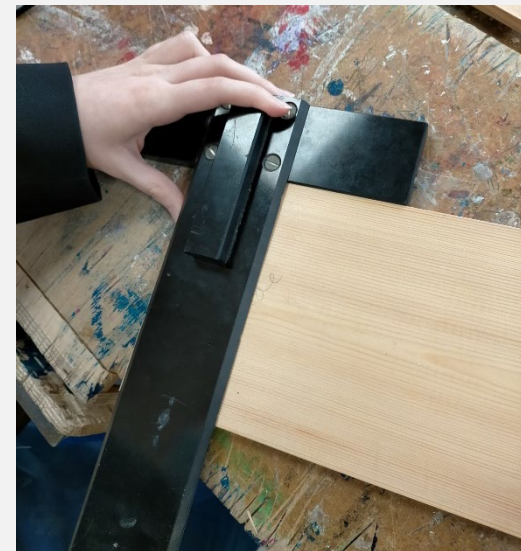
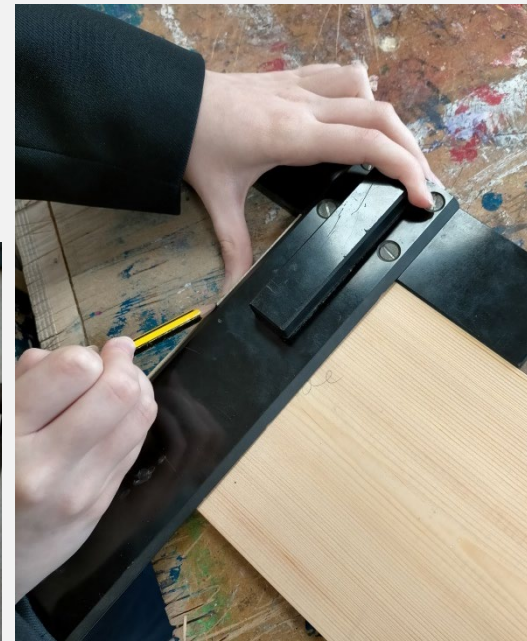


DIARY OF MAKING

1. Firstly, I decided on the material to use for my project. I decided on pine wood because it is strong, water and chemical resistant and it has high impact resistance.

2. Secondly, I marked out my wood with a pencil using my cutting list and final design idea for measurements. I used a tri-square to ensure that the lines were straight and at a 90 degrees angle.

3. I then cut my wood out using a bandsaw. Once they were cut out, I went around each piece with a file and sand paper in order to remove all rough edges and make sure they are smooth and safe for use (to prevent splinters etc). This was also done to guarantee a nice finish.

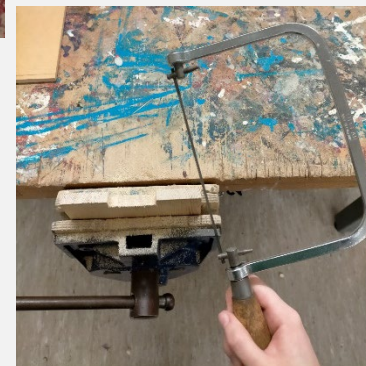
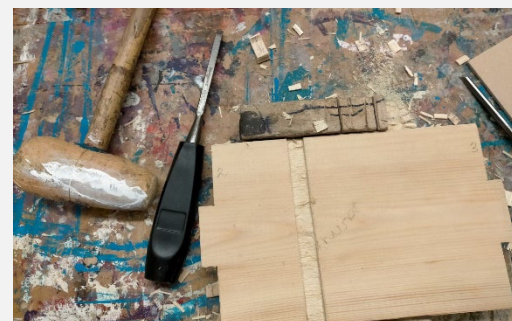
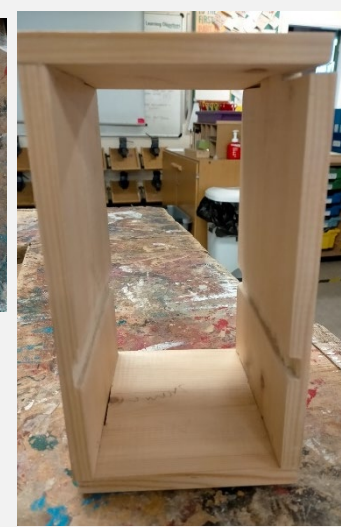


DIARY OF MAKING

4. Next, I marked out the edges of the wood for a jigsaw joint. I used a bandsaw to cut the edges out and a file and sandpaper to smoothen them down.

5. Then, I cut a groove into both sides of the house for my back panel to slide into. After that, I marked out a line for a ridge in the sides of the house. I marked out how deep I wanted it to go and then used a chisel and sandpaper to cut it out.

6. Then, I cut another piece of plywood out to sit in the slot and act as the base of the house and the roof of the bug hotel.



DIARY OF MAKING

7. After that, I cut out a groove down the back of the house.

8. Then, I used some pine to cut a piece to sit as my back panel in the groove. I cut it with the bandsaw and originally cut it too small. Once I tried for the second time, it fit in correctly.

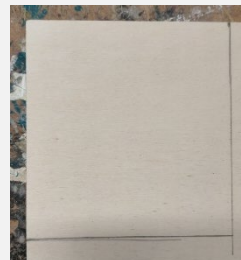
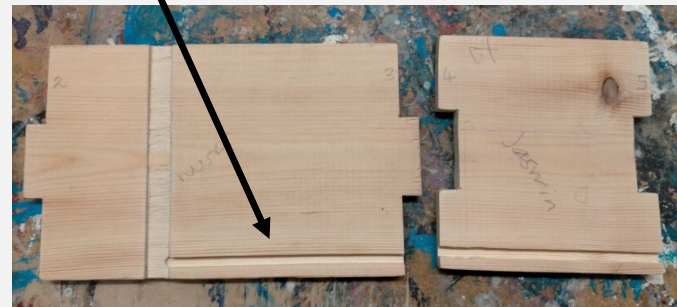
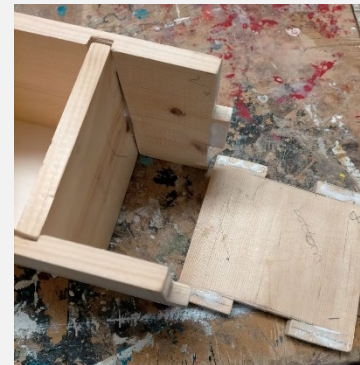
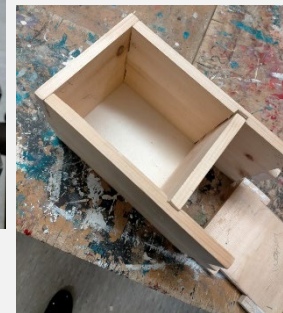
9. After that, I glued it all together and used a tri-square to ensure that all the edges were straight. I used a vice and clamps to keep it all in the right position whilst it dried. Then, I used sand paper and a file to smoothen the edges down.



Quality assurance



Groove

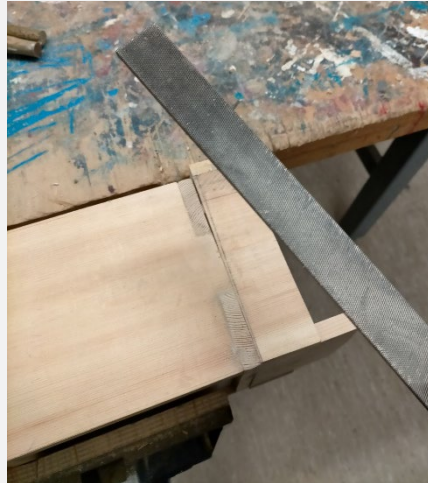
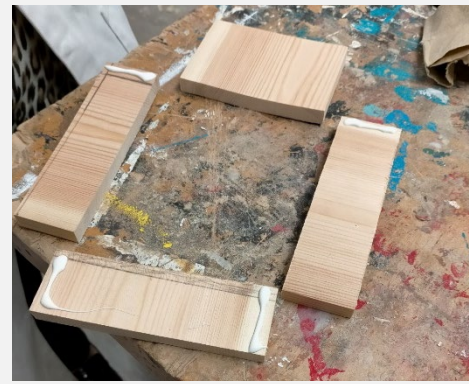


DIARY OF MAKING

10. Once everything was smoothly finished, I went round the box with wood filler (made of PVA glue and wood shavings) to fill in any gaps and holes in the design. I also used a file to ensure the wood filler was smooth and wasn't sharp.

11. I then worked on making the roof garden part of the design. I marked out the plywood to the desired size and then cut it using a saw and the band saw. I made it so that the back piece of wood was taller than the sides of the front to give it some shape. Also, my fence hook will go on the back of the roof garden. I also filed and sanded each part of these down too.

12. The next step was to glue the four pieces of wood together for the roof garden so I did this by gluing them at 90 degree angles from one another and then leaving them in the vice to dry in the correct position. After 24-hours, the glue had dried and I glued this to the roof of my box, where it needs to be.

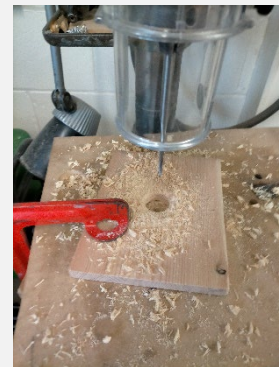
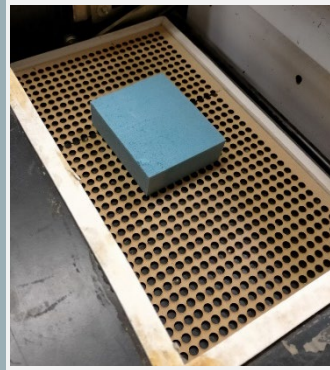


DIARY OF MAKING

13. Once I had got to this point, everything that needed to be glued together was, so I used the electric sander to ensure that the entire box was flat and that there was no wood sticking out.

14. I got some more plywood and measured out a door for the front of the house using measurements from the product in front of me. Once I had cut it out on the band saw, I used the pillar drill to drill a 25mm diameter hole into the centre of the piece of wood then painted it striped using blue and white acrylic paint and masking tape. Before drilling the bird hole, I tested the pillar drill on a scrap piece of wood to ensure I knew how to use it and that it was the correct sized hole. I then drilled a hinge to the front of the box which allows for easy access to the house.

15. I decided that doing a vacuum for the roof garden would be useful because it would stop water from seeping through. I cut out a mould using a polystyrene block, then I tried three times to make vacuum using the vacuum forming machine but it was unsuccessful as it continued to get stuck to the sides of the mould. Instead, I cut out a piece of acrylic for the sides and bottom of the roof garden.

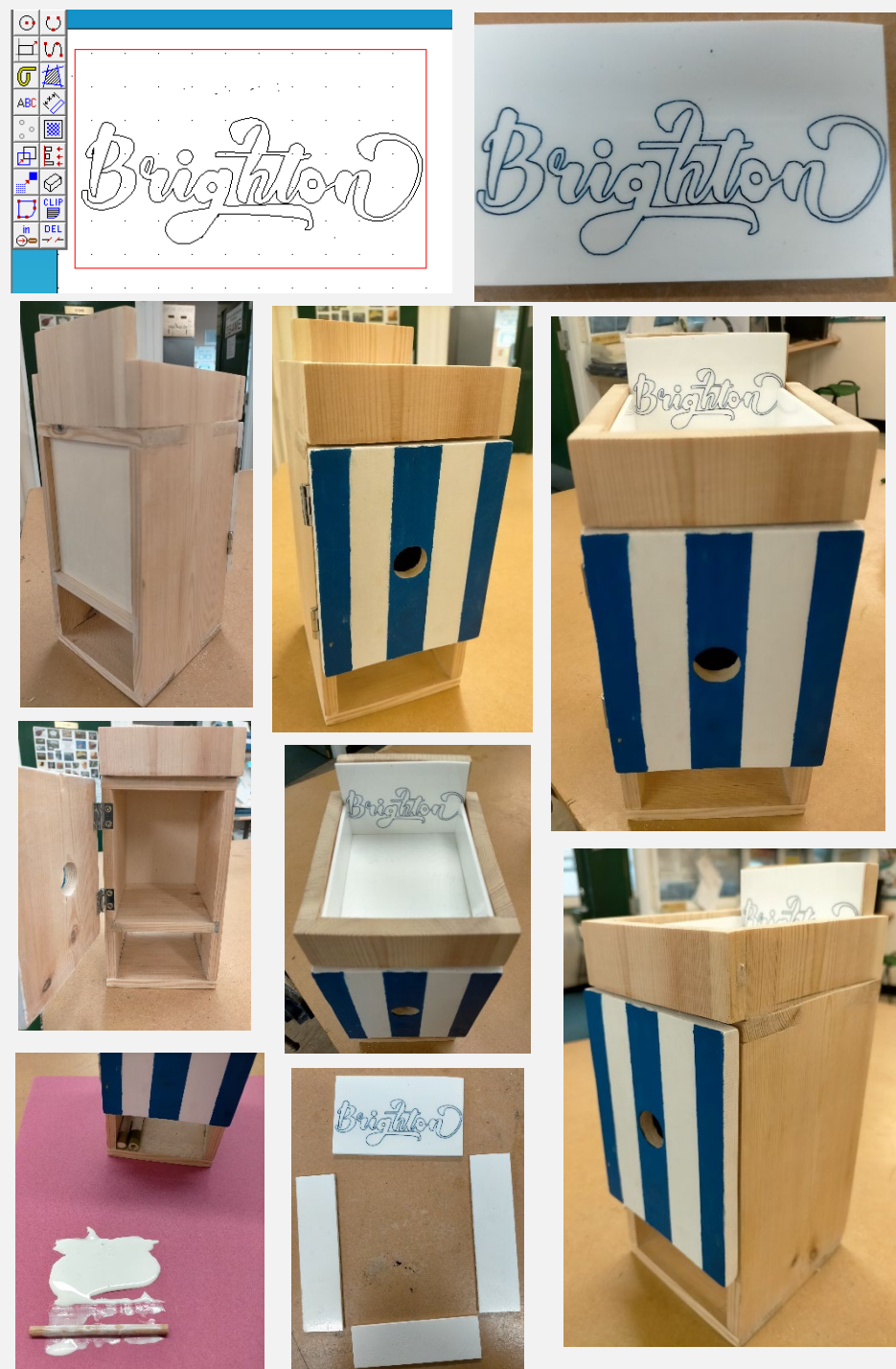


DIARY OF MAKING

16. After that, I decided to engrave the word 'Brighton' into the acrylic on the back of the roof garden. I used 2D design to make the image and then I used the laser cutter to engrave it. I used a blue white board pen to colour in the engraving so that it was visible and matched my design.

17. I used double-sided sticky tape to attach the acrylic to the sides and the bottom of the roof garden to make the inside of the box waterproof. I attached a fence hook to the back to hold it up on the fence using a drill bit and a pilot hole.

18. Then, I cut my bamboo to the correct length and then rolled them in glue so they stuck in place. Finally, I painted the box with a clear varnish to protect it from weathering. (I didn't get to apply the varnish due to time lost from covid)



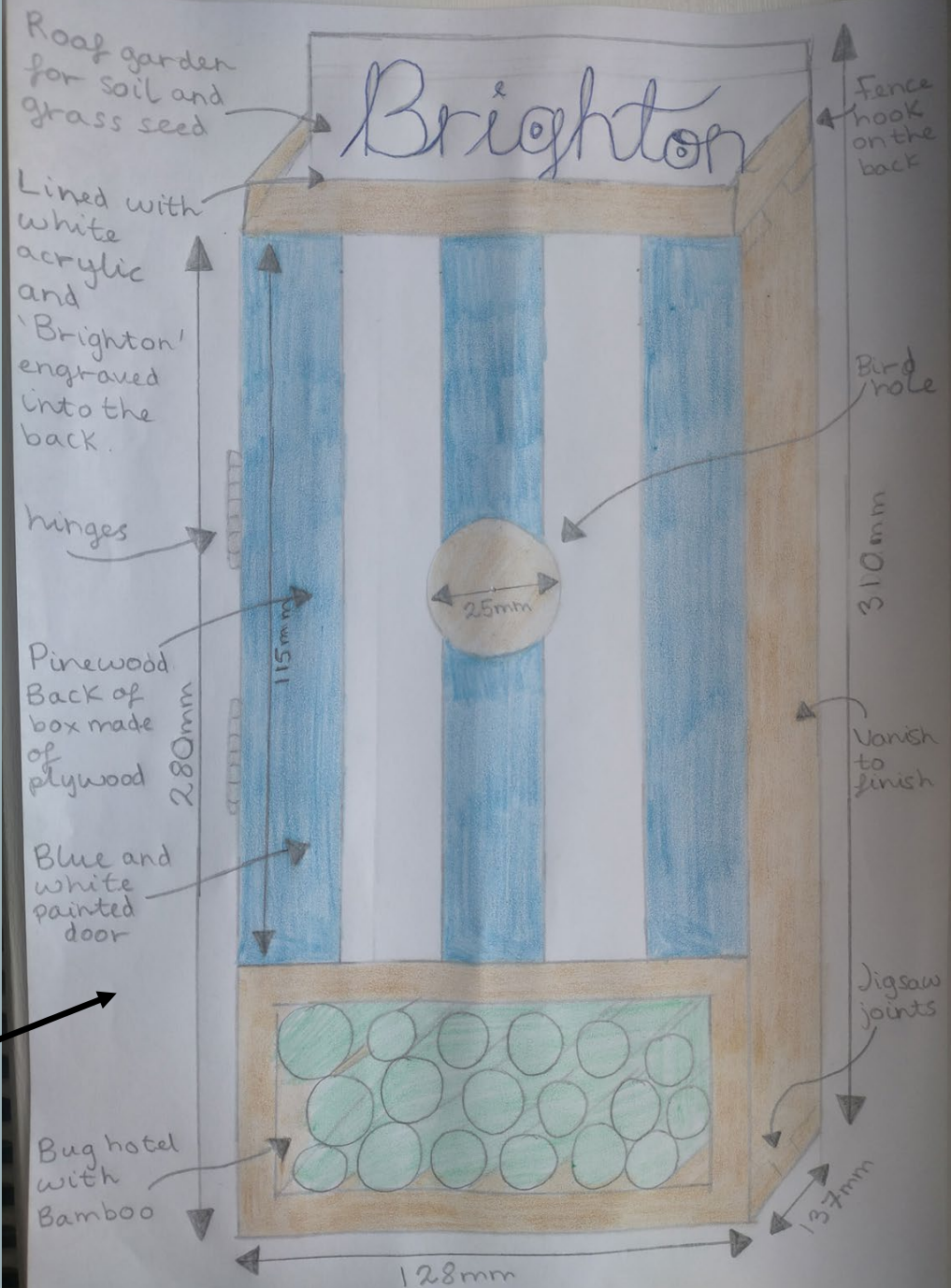
FINAL PRODUCT

This is my final product. Although it has changed slightly from my original idea, it is now better suited for my customers. I am very happy with the result of the house and I am proud of myself for doing something better than I thought I ever could.

The house is a birdhouse, with a plant garden above and a bug hotel made of bamboo below. I have added colour to the door and an engraving on the roof garden to make it



Re-design



Evaluation

- **Who are the intended users of the product?**

The intended users are my parents. The product will go in my back garden against the fence. I have interviewed my parents so that I have more of an idea about what they would like to see in the product.

The intended users are still my parents and I have painted the door blue and white and engraved 'Brighton' onto the house as requested by my dad. The house is also fence-mounted with a hook because that is what both my parents wanted.

- **What will the product be required to do?**

The product will be required to house garden birds, and provide them with warmth in the Winter, and a safe place for them to stay with their new born babies during the Summer months. It also needs to be able to hold plants to make the garden more environmentally friendly and to make my client's garden more environmentally friendly. The product is multifunctional because it is a birdhouse and a plant pot, at the same time.

I have met this criteria because the house is functional as a birdhouse, roof garden and a bug hotel. It welcomes more wildlife into the garden and it is a perfect home for birds (specifically Blue Tits and Marsh Tits).

- **What are the maximum and minimum sizes of the product?**

The maximum size of my product is about 25 cm x 25 cm. This is because this is roughly the amount of size I have on my fence to put the fence-mounted bird house on. I am thinking about doing the birdhouse sized 28cm x 16cm. I think the minimum size I would do the entire product is 25cm x 15cm.

My product is small enough to fit on the fence in the garden yet still big enough to house birds and be functional. The bird hole has a 25mm diameter which is the correct size for the birds that the house has been made for.

- **What materials would be the most suitable to use and why?**

The most suitable materials to use would be: Redwood (because it is the strongest wood nature has to offer and it can resist splitting), Cedarwood (because it is durable and resistant to moisture), Galvanised screws (because they won't rust when it rains), pond liner (because it is waterproof to keep the birds dry), finishing vanish (protects the wood from sunlight and water), and soil/plants (to go in the roof garden).

I have not used Redwood or Cedarwood in my project because the school is unable to supply it. However, I have instead used Pine wood which is still good for outdoor use, waterproof and durable. I also haven't used galvanised screws because I used jigsaw joints instead as they showed more technique. I used finishing vanish to make the product smooth and protect the wood. Instead of pond liner, I attempted to make a vacuum for the roof garden but it didn't work so I used acrylic to line it. I added bamboo to my design as the wood in the bug hotel.

- **What production methods will I use?**

I will use one-off production for the front and back pieces of wood, and the bottom piece of wood. However, I am going to use batch production on the laser cutter to make the two sides of my birdhouse and to make the roof panel. I will also use batch production to make the sides of my roof garden.

I used one-off production for all of my product because it was easier for me to do that. I used the laser cutter to engrave 'Brighton' onto the back of the roof garden, and I attempted to use the vacuum forming machine. I also used a pillar drill for the bird hole and the bandsaw to help me cut out the wood.

- **Are there any special design features to be incorporated into the product?**

I am perhaps going to put an engraving onto the box to make it look more detailed and professional. The product is also going to double up as a plant pot/roof garden on the top of the house, and I am thinking about adding something else to the design such as a solar powered light or a bird feeder.

The product has a hinge for the door, and it is multifunctional as a roof garden, bug hotel and a bird house. It has an engraving on the roof garden too!

- **What are the safety requirements related to the product?**

Safety requirements that are related to my product are: finishing vanish needs to be safe for the animals, there can't be any sharp edges, there needs to be no water seeping through from the roof, and the entrance hole needs to be just big enough for the bird to enter, but hopefully not for predators to enter. It also needs to be strong enough to prevent the roof garden from collapsing through into the house.

I have met the safety requirements as I have used the sanding machine, a file, a vanish and the bird hole is the correct size. The product is strong enough for it's intended purpose.

- **What image needs to be portrayed by the product?**

The image that needs to be portrayed is a welcoming image that is homely for the birds, and then it needs to look nice and be suitable for a garden. It needs to be suitable for the clients and the birds and the aesthetics needs to be colourful to brighten up the garden and make the box welcoming.

I have achieved this with my product as it is colourful (blue and white) and welcoming for lots of wildlife.

- **What economic factors need to be considered?**

I need to consider the price of the materials and components, which I have already researched, and then the price of the product methods that I will use e.g. the laser cutter.

The price of my materials were minimal and affordable.

- **Where will the product be used?**

The product will be used by the client and the birds in my garden. It will be located at the back of my garden, on my garden fence.

The product will still be used in my garden on the back fence, so I have achieved this.

- **What colour schemes will be used on the product?**

I will be painting the birdbox white and blue striped because that is what my client wants. I may also add an engraving for extra detailing.

I have an engraving and my door has been painted blue and white striped to support my client's football team.

- **Does the product need to be strong, durable or reliable?**

The product needs to be strong to keep the roof garden from caving in and it needs to be durable to survive through bad weather.

My product is strong and reliable. It is made out of a pine which is durable and it is vanished to make it waterproof and to protect it.





EVALUATION



- Overall, I really like my product. I like the size of it because it isn't too big, and the colours make the box very eye catching. The multifunctional appeal of the design is effective and makes it more appealing for buyers. I am happy that I was able to complete it and I am proud of myself for doing it quite well.
- I had a few problems along the way. One problem was that I cut out the back piece of wood too small, as my measurements were wrong. To fix this, I re-measured and re-cut the wood so that it fit correctly. Another problem I had was when I attempted to make a vacuum for the roof garden. The first time I did it, the plastic wasn't straight, and the second and third time the plastic got stuck to the foam block and it got stuck. Finally, I adjusted my ideas and used acrylic to line the roof instead. I was also able to engrave this so I actually prefer what I have done now.
- I think the product is quite successful. It is made out of wood which is a renewable materials and so it has had minimal impact on the environment. Also, it is good at its job as it can be used as a birdhouse, a roof garden/plant pot and a bug hotel. I think it will appeal to customers because it is a nice shape and the wood is a pretty colour.
- I would buy my product because it looks nice in a garden and it is good for the environment. It fulfils its purpose and solves my problem in that it attracts more wildlife to the garden.
- I have learnt lots of skills whilst making the product. These include: using the laser cutter, 2D design, using the vacuum forming machine, how to finish different materials, and about jigsaw joints.
- Whilst making my product, I was introduced to many new tools and equipment. I used a tenon saw, pillar drill and chisel to cut out my wood pieces and then glue to stick them together with the joints. I used the vacuum former to attempt to make a vacuum, and the laser cutter to engrave a design into acrylic. The bandsaw helped me drill a perfect bird hole into the door and I finished my design with a file (wood and acrylic), sandpaper (wood) and wet and dry paper (acrylic). I used the electric sander to help me ensure a good finish. Finally, I used a tri square to achieve quality assurance and clamps to hold my product together whilst it was drying.
- If I made the product again, I would probably use a different type of wood so that the colour was more unusual. I would also add a clasp to keep the door shut and possible a back to the bug hotel, even though that isn't needed. If I had the opportunity, I would try to redo a vacuum and make it successfully this time.
- I have really enjoyed the experience of making my project and the DT course as a whole. I have learnt lots of skills which will be useful in the future. I also think that using machines and trying new things has helped me gain confidence in myself. I enjoyed designing the engraving on 2D design as well as learning how to use the laser cutter. Using the bandsaw was also fun. My favourite part of the project was designing my ideas because I enjoy being creative and thinking of lots of possible ideas that I could challenge myself to do.

FINAL PRODUCT!

