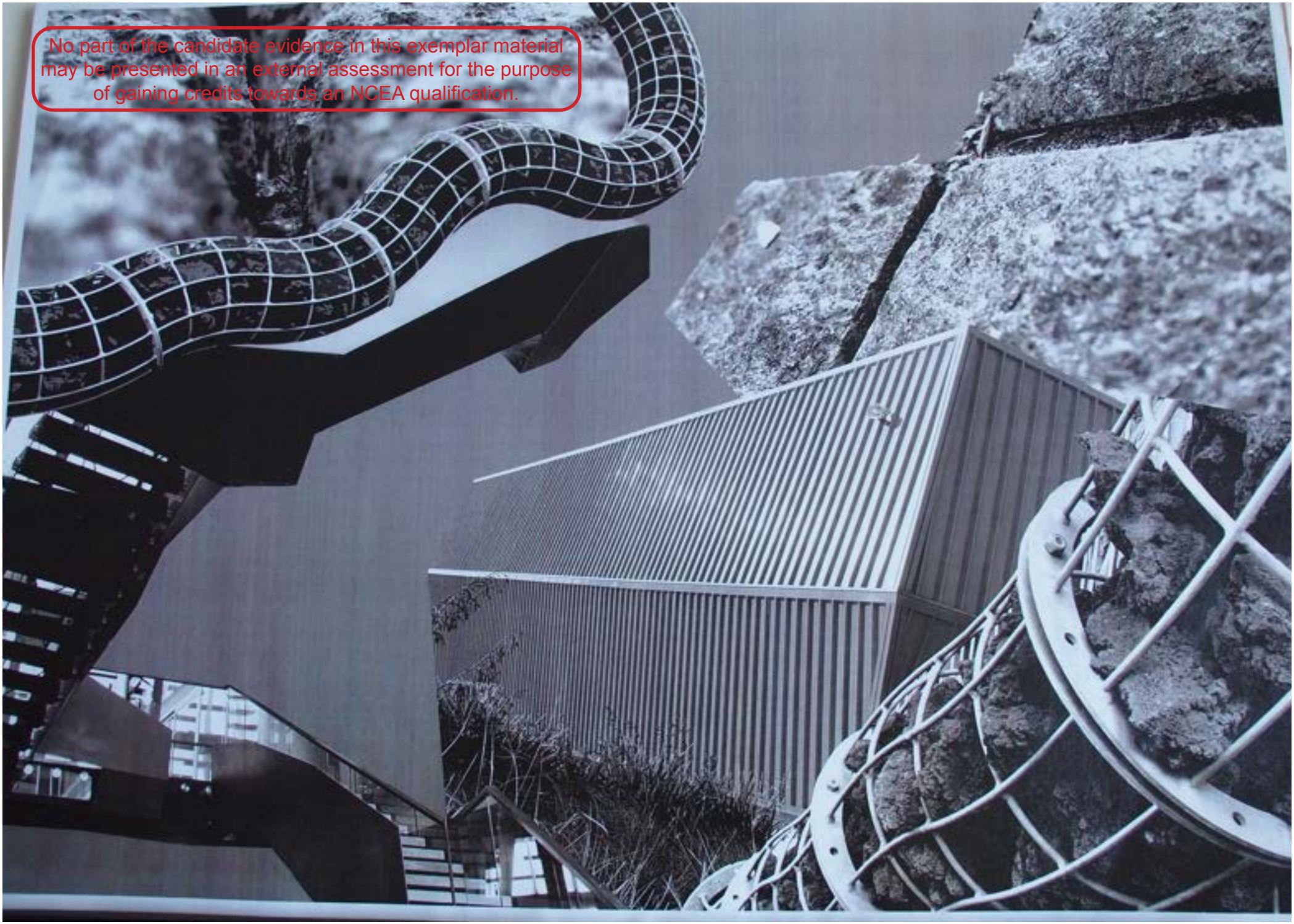
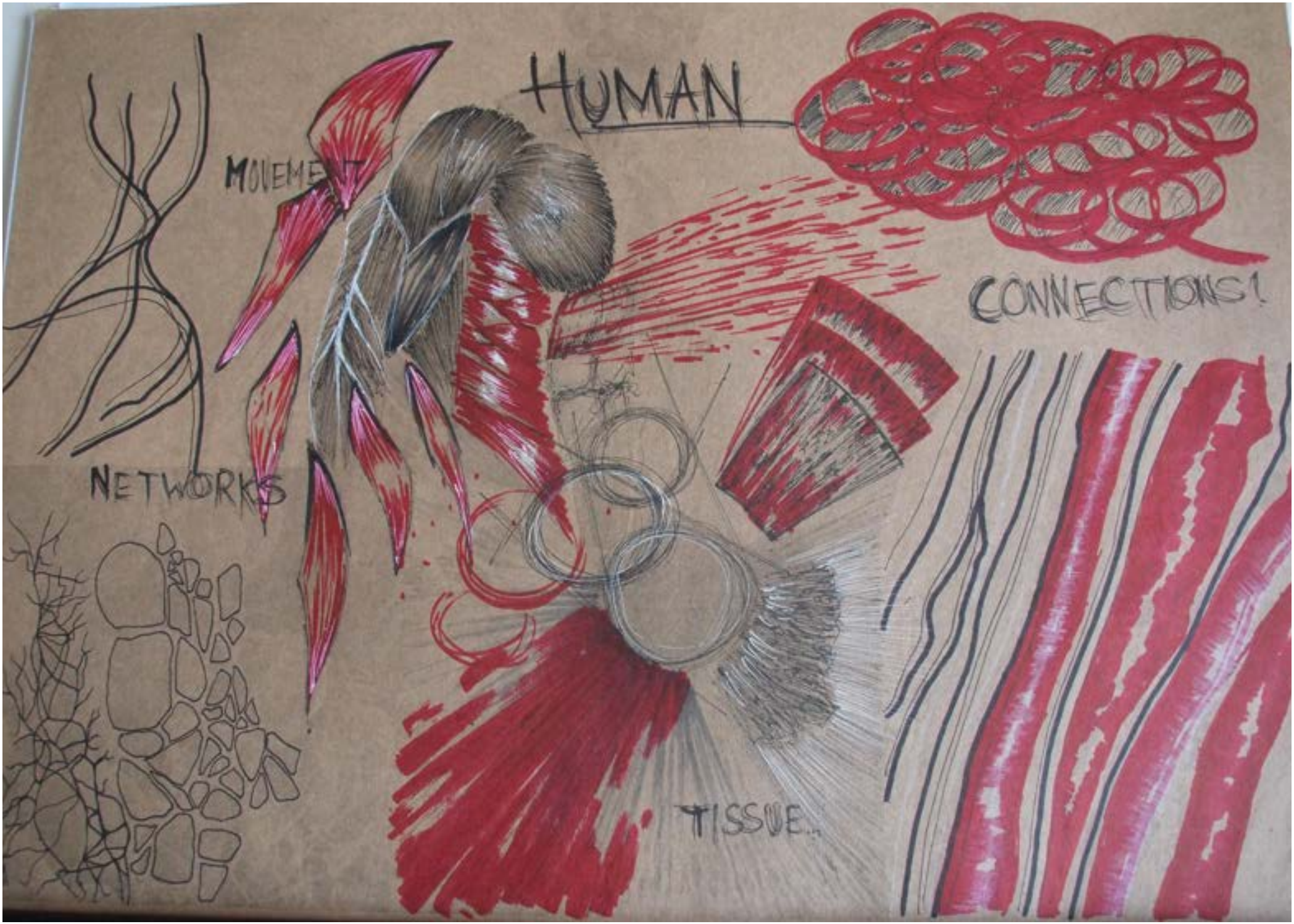


No part of the candidate evidence in this exemplar material may be presented in an external assessment for the purpose of gaining credits towards an NCEA qualification.


HUMAN
MOVEMENT
CONNECTIONS!
NETWORKS
TISSUE...

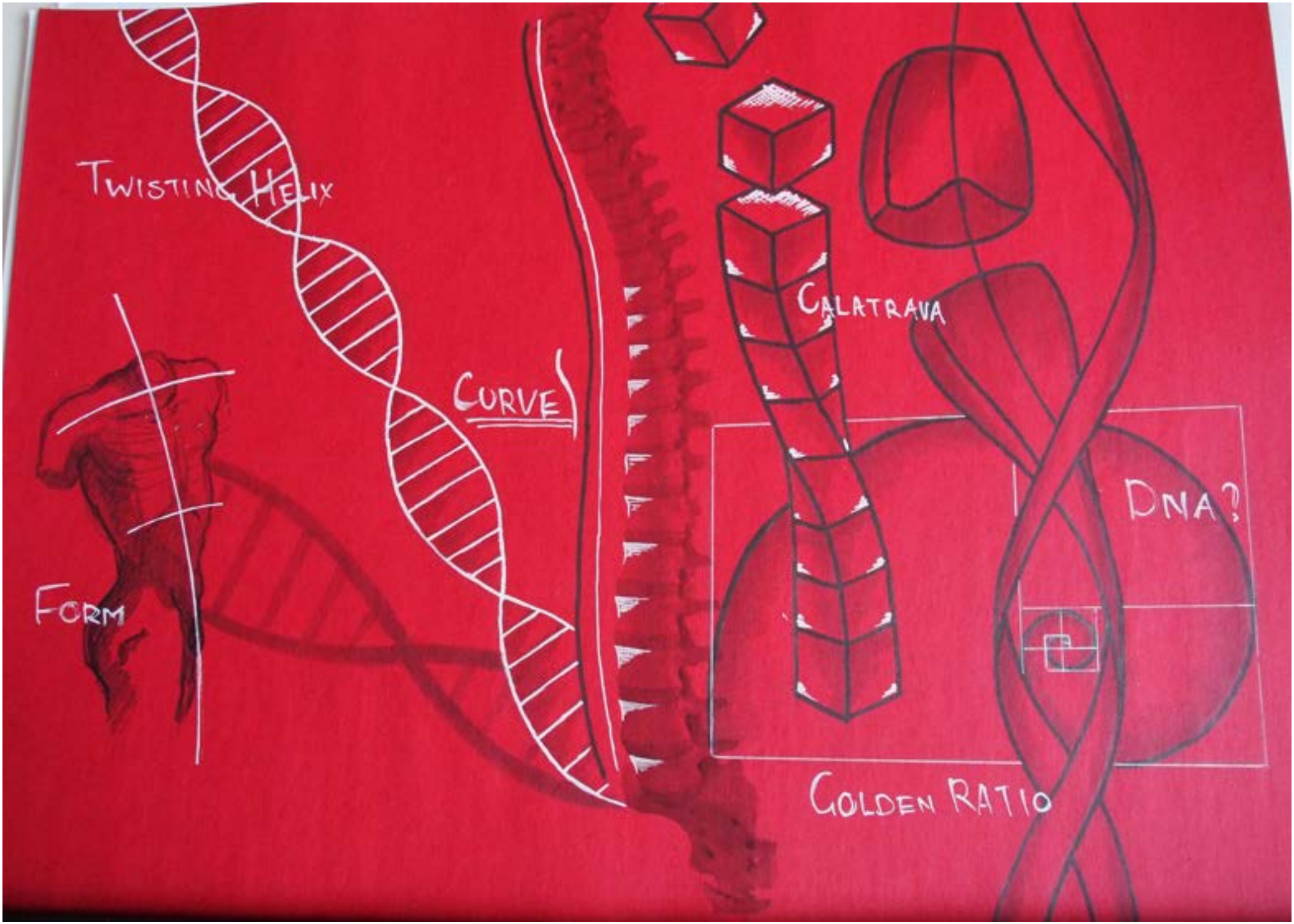
SHAPE
HUMAN
BONES
FORMS
EXPLORATION

EMERGING THEMES

the first theme of my project that i have discovered is the human body and structure, so the word that best explained that to me was exoskeleton. this was because in the first initial images i took, i saw this idea of organic containment, i saw this through the curved caged rocks and metal container that i took photos of as they all had this sense of closing or trapping something behind them, however i noticed these things did not seem forced in the environment as fit into whats around them which is where the word organic came through. another theme that i am noticing is growth which is shown through my intial new ideas and the 3d paper models that i have made. simply put something getting from small to big these two parts parts combined have given me the idea to look into the ideas of movement in the human body and joint movement in the human and mechanical aspects.

IDEATION
(HUMAN)

MOVEMENT
STUDY II


TWISTING HELIX
CURVE
FORM
CALATRAVA
DNA?
GOLDEN RATIO

BRIEF

from my ideation and initial ideas so far i have really been thinking about the human body and how rigid and flexible can work so well together as they are in such contrast. as i am interested into creating a product design i want to relate the human body to the finished product. i have been beginning to think about an area of a few products which i have had personal experience using which have not been redesigned and that is medical rehabilitation instruments such as wheelchairs, crutches, braces and such. this area of products we all know has not been re-thought for many years and crutches for example are extremely uncomfortable for long periods of time and have many problems that can be resolved to create something much more comforting and being very useful. from this i am intending to create an updated version of the crutch that may incorporate ideas from pre-existing products and create a comforting and functional product for all ages that hopefully become a replacement for the existing crutch that's in hospitals currently.

TARGET AUDIENCE

Due to the extremely aged existing crutches that are currently out in the hospitals and the versions available for amputee's or people who are permanently restricted to using crutches are extremely uncomfortable. An example of this is shown to the right. For my final product i am targeting it towards those people that are permanently restricted to crutches, i have decided this due to the extremely uncomfortable nature of these standard crutches for any extended period of time. These people are likely to have funding from the government due to their disability meaning that when considering cost it does not need to be kept significantly low due to the need of mass production for hospitals around the world.

EXISTING PRODUCT

TYPES OF USERS

With this target audience there is going to be much more oppurtunity to make a more comfortable, lighter and updated version with features that make the crutches a significant improvement from the existing crutch that is seen everywhere.

SPECIFICATIONS NEEDED:

- COMFORT
- IMPACT ON ENVIRONM
- LIGHTWEIGHT
- GRIP
- ADJUSTABILITY
- SUPPORT
- STORAGE

RESEARCH

Trends:

In today's day and age there are many ever changing trends that wash in and out throughout time however it is the simplistic and naturaltrends that seem to last the longest and keep coming back into fashion. Relating this into crutches however, there has only ever been one kind of crutch that is mass producd into hospitals and private practices. This design does work although it does come with many problems and complaints so a complete rediesign may not be needed but innovation needs to be incorporated.

Old vs New:

Since crutches were invented in 1917 there has not been a huge amount of improvement to them, things such as height adjustability and the types of materials used are the only morerecent adjustments. When comparing it to these newer crutch concepts factors such as comfort, pressure points, grip, look and weight are starting to be considered, however these concepts are not very available to the general public and are more so sold as a product.

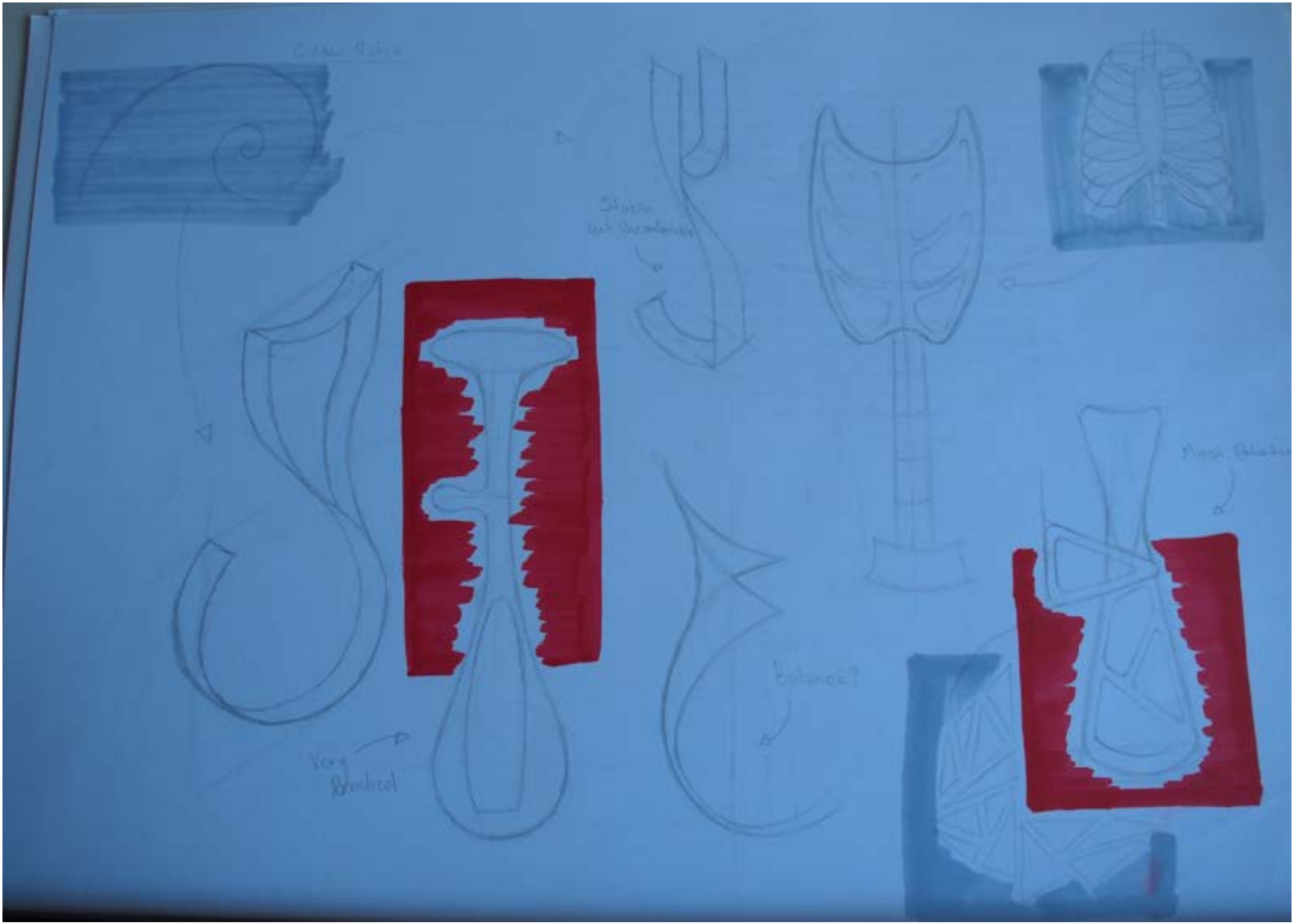
Material Costs:

The three main conventional materials in the crutch have been steel for the main shaft, plastic for the supports and hand rests and rubber for the exchangeable grips on the bottom of the shaft. These materials however being cheaper may need to be considered for newer and improved design as they might have a better functionality with materials such as foams, carbons, lighter weight alloy and leather for long lasting protection.

Future Insights:

For the future of crutches I definitely see a lot more development of this heavily used product. Especially with the existing wide spread crutch you'd find in the nearest hospital, this has been around for a long time and needs to be re-thought, and for those permanent residents on crutches there may be a huge market for trendy and more comforting products.

Notes
FORM
INITIAL IDEA


Very
Balanced
Balance?

Pros:

The bottom of the crutch has a very wide area so when walking on flat ground there is a very unlikely chance of them slipping. Also due to the shape of them as you walk the natural shape will just roll forwards. Another pro about this design is through the cutouts in the lower part it minimises the total weight aswell as using asymmetric angles to provide strength. The contour of the armpit rest is going to be very natural and could provide a good oppurtunity to add some padding for more comfort aswell as taking pressure of the wrist areas.

Cons:

There are many problems with this concept that need to be resolved. Starting from the top of the crutch the shape of the armpit rest is not going to be very comfortble so with more anatomical measures you can fit this to someone much more easily. Then with the hand grip the triangle shape is still not very functional so incorporating some better grips is needed. Also the funtionality of the extremely wide base may not be very handy in small spaces. Another con of the concept is the length of the design, if people were using these on the daily then fitting them in their car is going to be very difficult so maybe making them split into two species would solve this.

Notes:
- Hard wearing
- No shock absorbers

i

ii

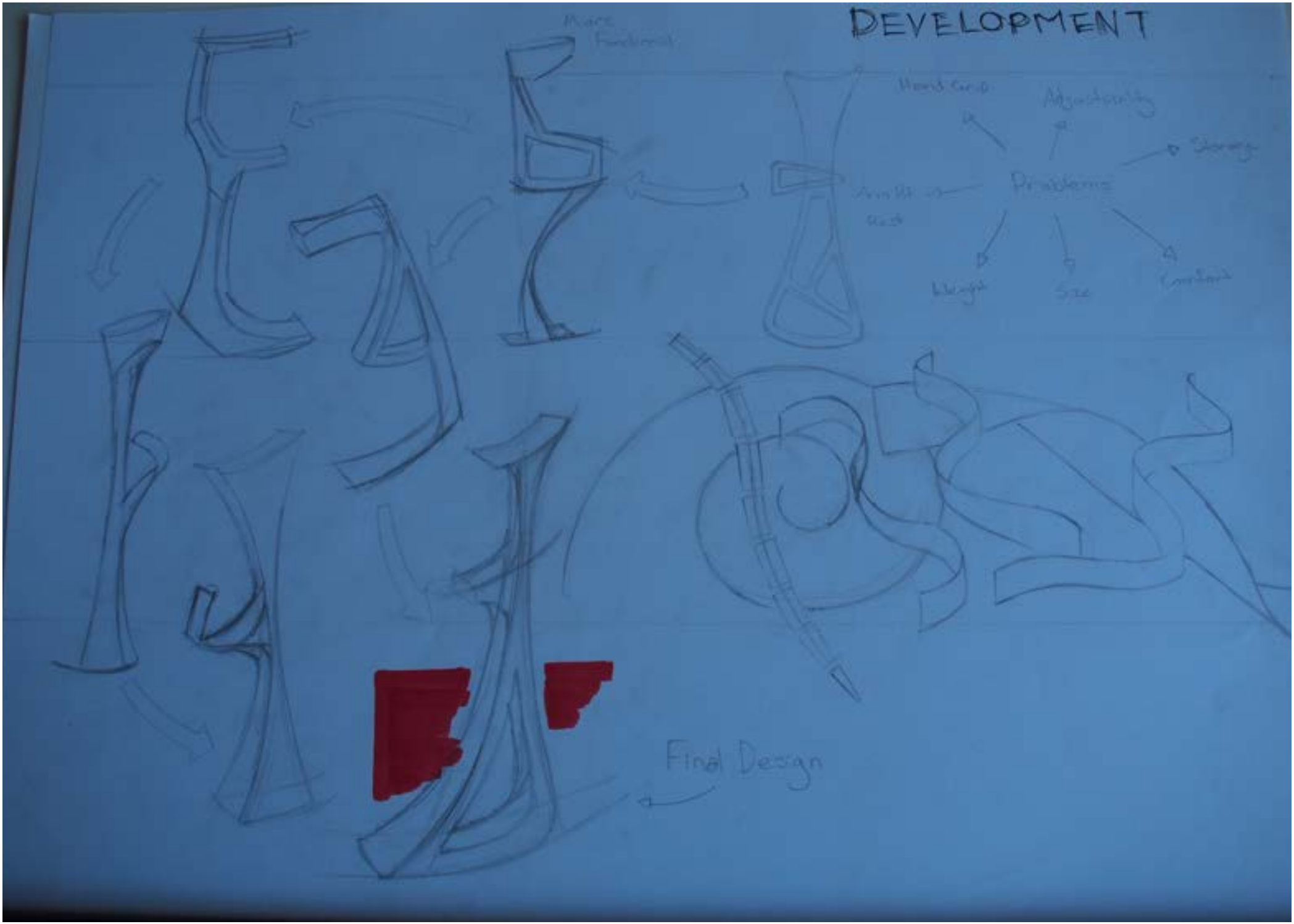
Notes:
- Uncomfortable
- Too Big
- Not Adjustable

iii

Notes.
- Awkward Angle
- Strain on Wrists
- Could break off

CHOSEN CONCEPT

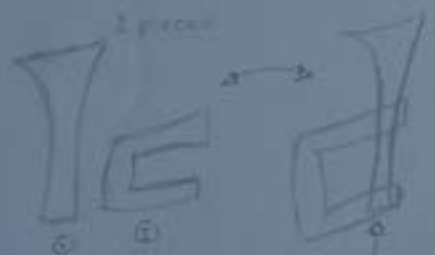
DEVELOPMENT



Methods For Storage

With this design there are currently two ways to take it apart which will make storage very hard and also to prevent damage. This will not fit in the box, another cost is for the manufacturing process and that making this design in one piece will be extremely difficult so splitting it up into multiple parts will allow for more design accuracy as well as it makes break easy can be replaced also easier than having to replace the whole piece.

Possible Suction Point



2 pieces

Can slide infill

①

②

Area P.I. Rest

The other major problem for comfort in the impact rest area currently is that it is rather cumbersome or gripping to could slide around. Changing this part of the critism is most definitely needed to improve overall functionality.

Current

- Ergonomically uncomfortable
- Sharp in some areas
- Slippery, shape will need your hands moving

- Filled with bright Mesh providing support
- Mesh cushioning so there is no pressure forming from mesh

New

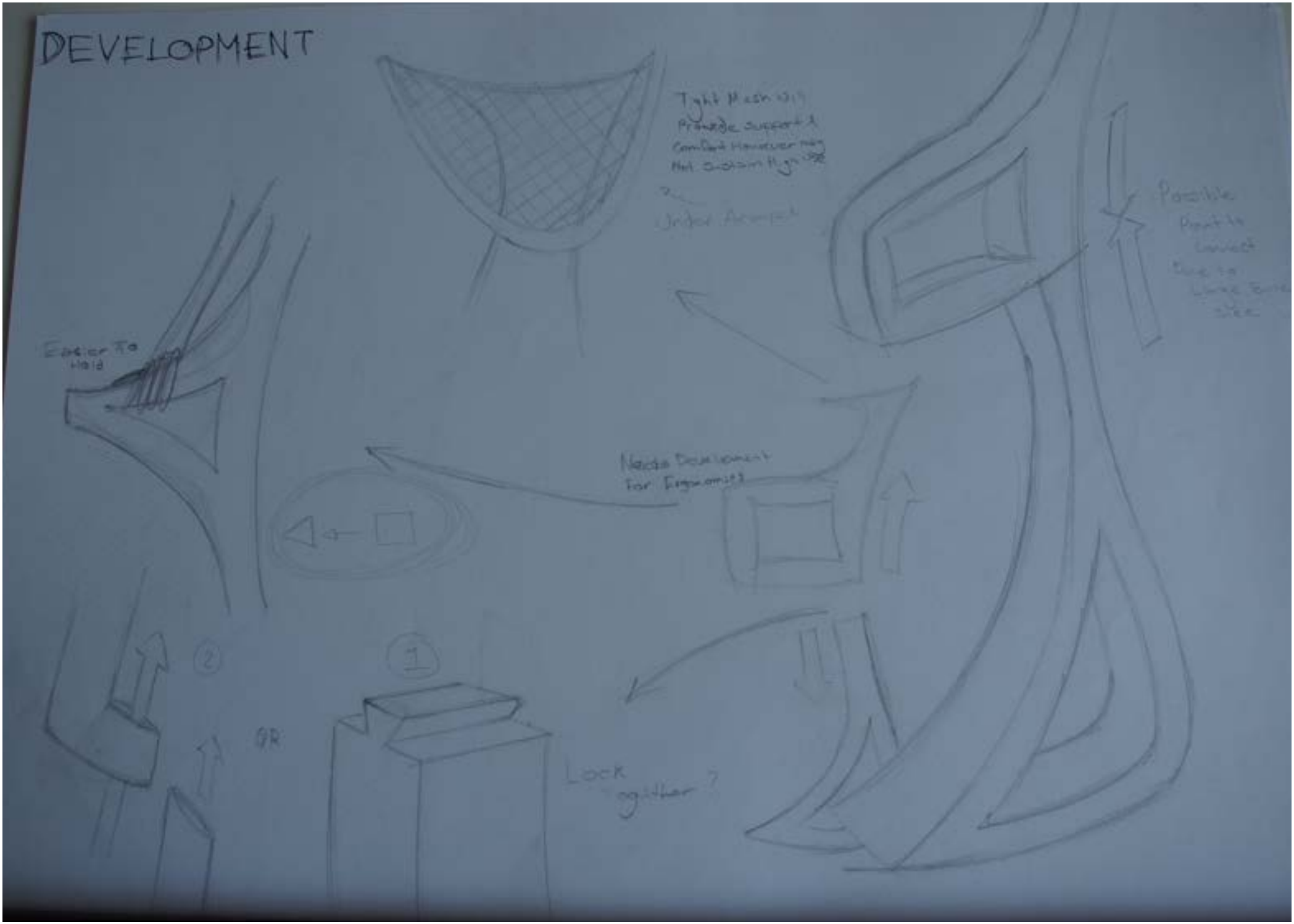
Insert / Slide out

OR

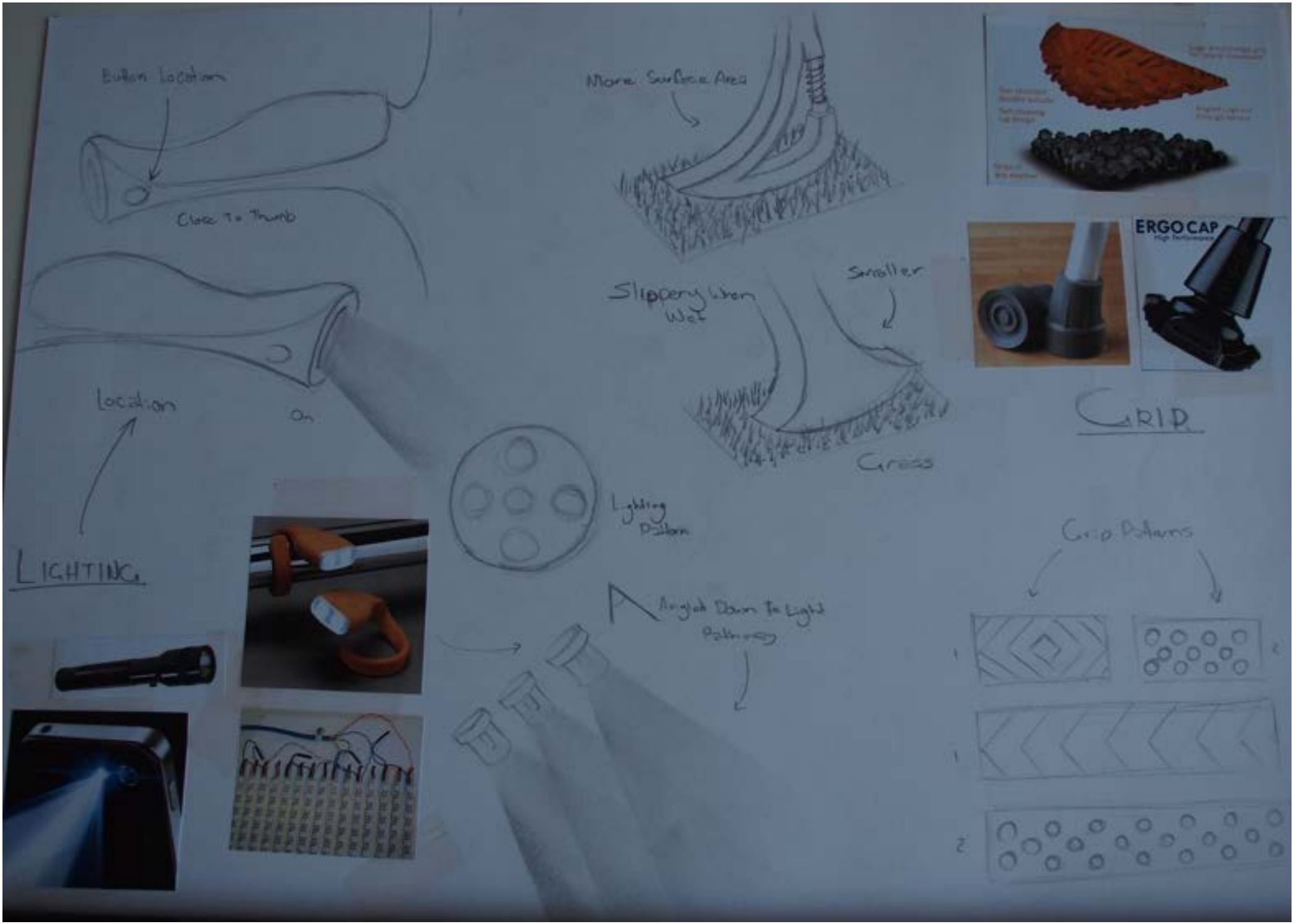
Sliding Mechanism

DEVELOPMENT

DEVELOPMENT



Shape of Mesh
Mesh Material
Chargable Rubber wrap
15cm
15cm
15 cm
ARM REST


Button Location
Close To Thumb
Location
on
LIGHTING
More Surface Area
Slippery When Wet
Smaller
Grass
GRIP
ERGOCAP
Lighting Pattern
Angled Down To Light Pathway
Grip Patterns
1
2
1
2

IMPACT

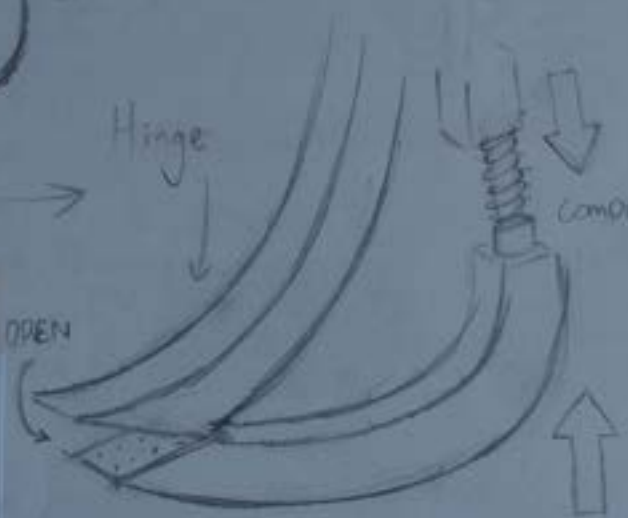
OR

Air Compression

✓ • Expensive

✓ • Maintenance

✓ • Impact



Exchangeable for Different Weights

Spring/Forks

✓ • Cheaper

✓ • Impact

✓ • Changeable

2.0

Smaller

Extended vs Compressed

CARBON FIBRE

This specific material is extremely lightweight and strong for the size to weight ratio. For the main construction of the crtuch this would be a great material to use however it can get quite expensive in large quantities. For the construction of the crutch carbon fibre works best by being molded in a heat press meaning that the body would have to be made in different parts except this material could keep the overall size down.

RUBBER

This material is very commonly used for hand grips and is inexpensive. However after use of this daily it can wear down over time but is easy to peel off and replace with a strong adhesive onto the main construction of the crutch, so might be a very reliable option for the hand grip.

TYRE RUBBER

For the sole of the crutch you will need something very hard wearing that will provide grip in all different weather conditions and types of terrain. this is why i have chosen rubber as there is really no other option for a replaceable sole that will last long periods of time. Using a compund as hard wearing as tyres will be great to last long periods of time.

LIGHTWEIGT WOOD

Another option for the main consruction of the crutch is wood. This material has great properties and will last for long periods of time however if it was solid it becomes quite heavy meaning that it would not solve the solution of being lighweight and would be hard to use all day long.

FOAM

This material is very good for comfort however over time if peoples hand got sweaty or were using it a lot then it would wear down quickly. but if this was to be placed underneath the rubber or silicone than it woulnt get damaged quickly and would still provide comfort.

ALLOY METAL

The third option for the main material of the crutch is metal alloy, this material is extremely strong and will last a very long time, due to this being what the existing crutches are made out of this option we know wouldnt be too heavy and would survive a long lifetime however for my product to fit my brief I need it to be lightweight and functional for long time users.

SILICONE

Silicone is a great material as it can be molded to add grip however if someones hads were sweaty it would become quite slippery however it provides much more comfort than normal rubber and could be used as a substitute for it.

MATERIALS

ERGONOMICS

Human Data:

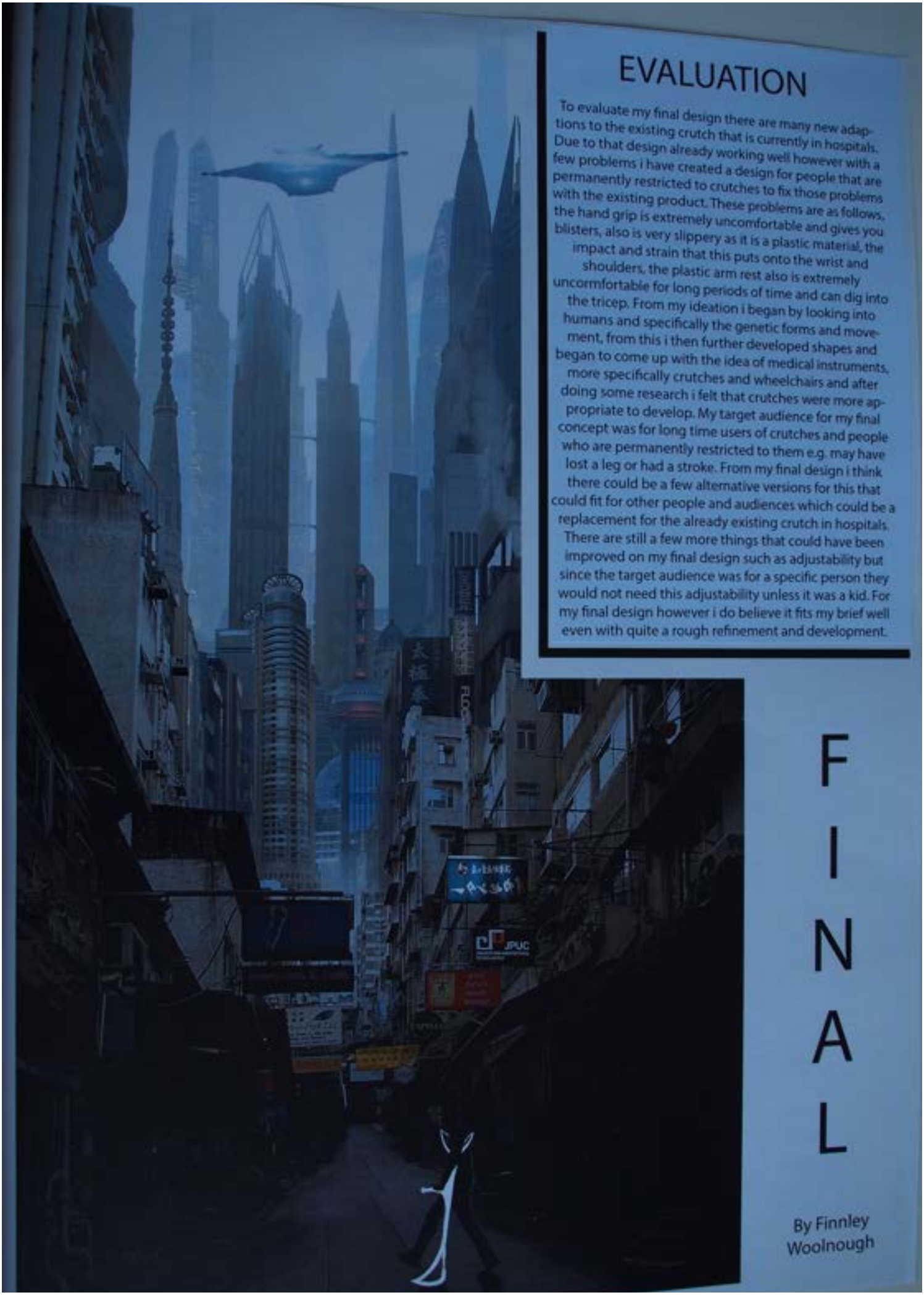
Average male height: 5ft 9in
Female height: 5ft 4in
Leg length: 85.4cm
Arm length: 63.5cm

Plastic Mesh → Provides comfort and breathability

Silicone → hand grip provides grip and comfort

Light provides visibility at night →

The height of this is a few centimetres longer than the average arm length. This is to take the weight off the wrist which solves the problem of getting sore wrists and not being able to have comfort while in use.



EVALUATION

To evaluate my final design there are many new adaptions to the existing crutch that is currently in hospitals. Due to that design already working well however with a few problems i have created a design for people that are permanently restricted to crutches to fix those problems with the existing product. These problems are as follows, the hand grip is extremely uncomfortable and gives you blisters, also is very slippery as it is a plastic material, the impact and strain that this puts onto the wrist and shoulders, the plastic arm rest also is extremely uncormfortable for long periods of time and can dig into the tricep. From my ideation i began by looking into humans and specifically the genetic forms and movement, from this i then further developed shapes and began to come up with the idea of medical instruments, more specifically crutches and wheelchairs and after doing some research i felt that crutches were more appropriate to develop. My target audience for my final concept was for long time users of crutches and people who are permanently restricted to them e.g. may have lost a leg or had a stroke. From my final design i think there could be a few alternative versions for this that could fit for other people and audiences which could be a replacement for the already existing crutch in hospitals. There are still a few more things that could have been improved on my final design such as adjustability but since the target audience was for a specific person they would not need this adjustability unless it was a kid. For my final design however i do believe it fits my brief well even with quite a rough refinement and development.

FINAL

By Finnley Woolnough

Assessment Schedule – 2019

Design and Visual Communication: Initiate design ideas through exploration (91627)

Achievement Criteria

Overall level of attainment for 91627	Achievement	Achievement with Merit	Achievement with Excellence
M	*Initiate design ideas through exploration.*	*Initiate design ideas through **insightful** exploration.*	*Initiate design ideas through **extensive** exploration.*

Evidence

Not Achieved	Achievement	Merit	Excellence
No source is material evident. Source material is not interpreted using visual communication strategies or taken into alternatives and variations. Design ideas are not derived from the alternatives and variations.	Use an **experience**(s) to generate **starting ideas**; using visual communication strategies to **interrogate and re-generate** ideas towards **design ideas**. Inspirational sources (**experiences**) are present. These could include mood / inspiration boards, compilation of images, collage, designer studies, modelling, observational drawing, photographs, etc. From inspirational sources, visual communication strategies are used to experiment, play and manipulate shape (2D) and form (3D), exploring **alternatives** and **variations** to generate **starting ideas** • **Alternatives** are distinct, different, contrasting or have divergent shapes / forms. • **Variations** are adaptations, alterations and modified versions of a shape / form. Alternatives and variations are visually **interrogated and re-generated** which lead towards **design ideas**. • **Interrogated and re-generated** refer to the thinking and visual communication of shapes / forms that are re-examined / critiqued, selected, and re-drawn. • **Design ideas** must have identifiable functional and aesthetic qualities.	Use visual communication strategies to analyse and identify an **emerging train of thought** and **re-interpret ideas** to form design ideas. Through the **reinterpretation** of design ideas an **emergent train of thought** is evident. • **Reinterpretation** of design ideas is applying thinking and visual communication that is purposeful and meaningful in its connection to its context. • **Emerging train of thought** is where a theme is developing with a perspective (viewpoint) and direction (intention) in either a functional / aesthetic / contextual or thematic way.	Use visual communication strategies to challenge thinking and **extend and transform ideas** to form design ideas. The train of thought of design thinking is **further extended / transformed**, which challenges and / or moves beyond the predictable design idea. • **Transform ideas** means the design idea has been seen in a new way.

Note: Visual communication strategies may include but are not limited to: abstraction, recombination, repetition, rotation, reflection, simplification, de-construction, truncation, exaggeration.

Merit Exemplar 2019

Subject	Design and Visual Communication	Standard	91627	Overall grade	M

Annotation

Pages 1–8 shows the starting points and design thinking coming from architecture and the human skeletal form and inner body structure. Forms and shapes are pulled from these sources and visually explored and played with. Pages 9–14 has the introduction of the brief, research of existing products, and begins to re-examine by re-generating earlier forms and shapes into design ideas and brings in the context of a crutch. Pages 15–23 shows a continued train of thought emerging and the design ideas being re-interpreted. There is some communication around functional detailing of the products context, use, user, and construction. The visual communication starts well, but does fluctuate and some aspects of the design idea aesthetics and function are not communicated clearly. This submission is a Merit. The re-interpreted design idea does not transform beyond or show the design in a new way.