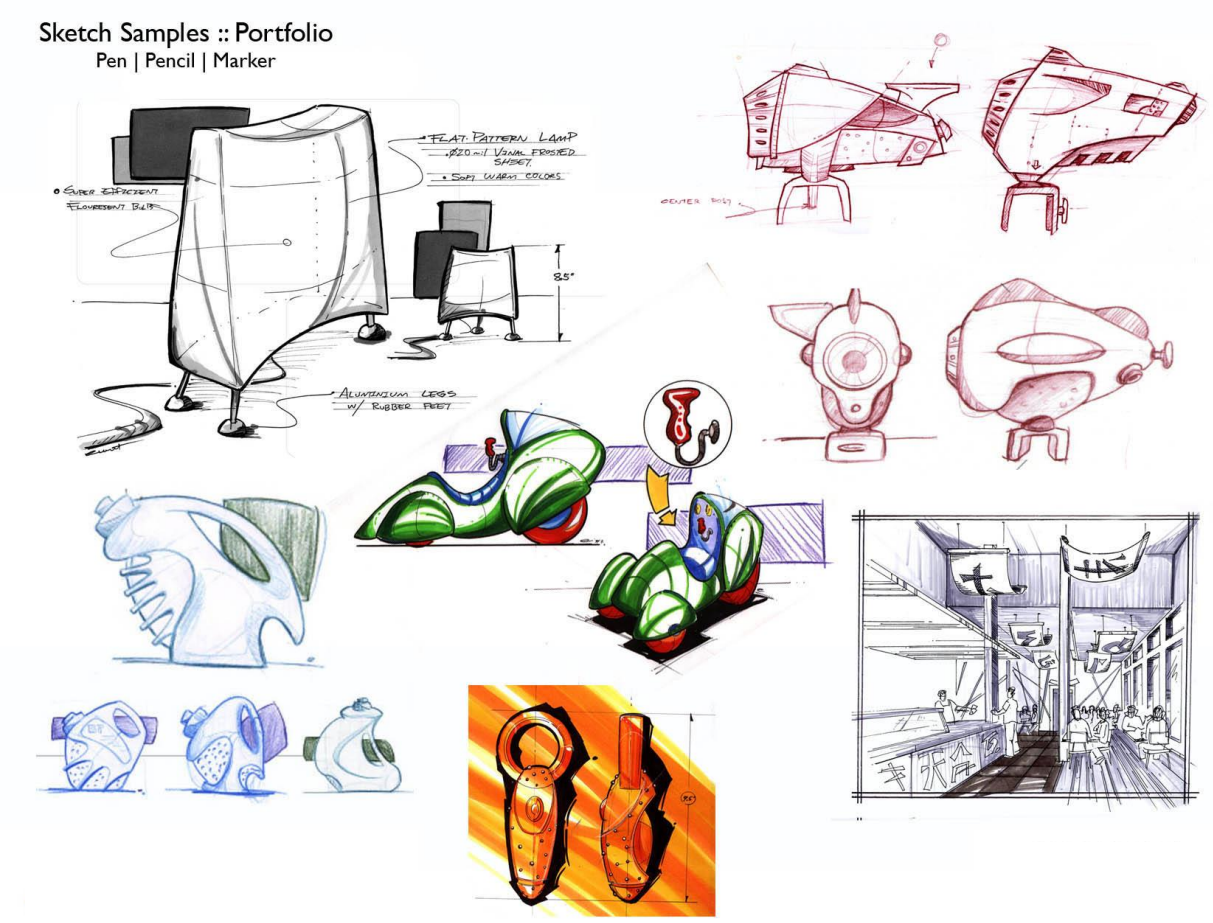
DESIGN & technology



ANDERSON SECONDARY SCHOOL

Secondary One Express/Normal/ Normal Technical Design Journal

This journal belongs to

Table of Content

Parents' Letter

27 June 2017

Dear Parents/Guardians,

SECONDARY ONE DESIGN AND TECHNOLOGY

This letter is to inform you about the subject requirements for **Secondary One Design & Technology**. The abovementioned subject is a coursework subject that consists of the Design Journal and Prototype **which takes up the entire grade** of your child's/ward's final subject grade.

Throughout the lessons, your child/ward must submit their Design Folio on time to his/her subject teachers based on the submission dates given by the teacher. The subject teacher will inform you if your child/ward misses the submission deadline or has submitted sub-standard work. The submission is important as it allows the teachers to guide your child/ward to improve on his/her work and at the same time, monitor the progress.

No marks will be awarded for journal work or parts thereof which are submitted past the deadline.

Please note that your child/ward may be required to attend compulsory consultation sessions with his/her subject teachers after curriculum time to work on his/her coursework.

Lastly, we seek your kind understanding to ensure that your child/ward follows through with the work schedule, to avoid unnecessary delays to ensure on-time completion of his/her work. We hope to seek your cooperation in working together to help your child/ward secure the best results possible in his/her examination.

If you have any query or clarification, please feel free to contact the subject teacher of the class for assistance.

Yours Sincerely,

Mr Sim Lee Yong

HOD / Aesthetics & Technology

Acknowledgement on Subject requirements for Secondary One Design & Technology

To : D&T Subject Teacher

From : Parent's/Guardian's of…….…….. ( ) of Class 1/ __

This is to inform you that I have read your letter dated 27 June 2017 and have understood the subject requirements stated.

Regards,

……

Parent's/Guardian's signature & Date

Introduction

Objective of Lower Secondary D&T

Design & Technology (D&T) is a subject where students learn by doing. Students will get to work on projects that require them to design and make things out of wood, metal and plastics over their Secondary 1 and Secondary 2 D&T lessons.

When working on the D&T projects, students will experience the design process that requires them to:

- ask questions to find out things
- sketch to come up with ideas
- make mock-up to test and visualize ideas
- do simple mathematics to decide on sizes for the projects
- apply simple science knowledge to make ideas work
- integrate coding and simple robotics in the project

Over the 2 years, students will be equipped with problem solving skills so that they have the abilities to apply the skills across all disciplines. Students will also be able to build a link between textbook knowledge and real world application through a themed project in Secondary 2 with the aim of value creation through D&T with innovative solution to real world problems.

Objective of Design-and-Make Project

By the end the project, students should be able to:

KNOWLEDGE APPLICATION DOMAIN

- apply Design Thinking skills acquired from IPW
- apply knowledge and design problem solving skills from D&T to:
  - ✓ define design needs, design brief and design specifications base on relevant research information
  - ✓ make critical decisions on what are needed(based on relevant factors during research) for their designs
  - ✓ apply concept of SCAMPER, shape borrowing and designing to generate and develop ideas
  - ✓ think out of the box and be creative in their designs
  - ✓ sketch in freehand to explore, generate and develop ideas
  - ✓ plan the steps for realizing their prototypes
  - ✓ able to build quick mock-ups to explore and/test ideas
  - ✓ work with resistant and recyclable materials safely when realising their prototypes

COMMUNICATION DOMAIN

- respond to questions raised during the Question-and-Answer session
- communicate well with peers

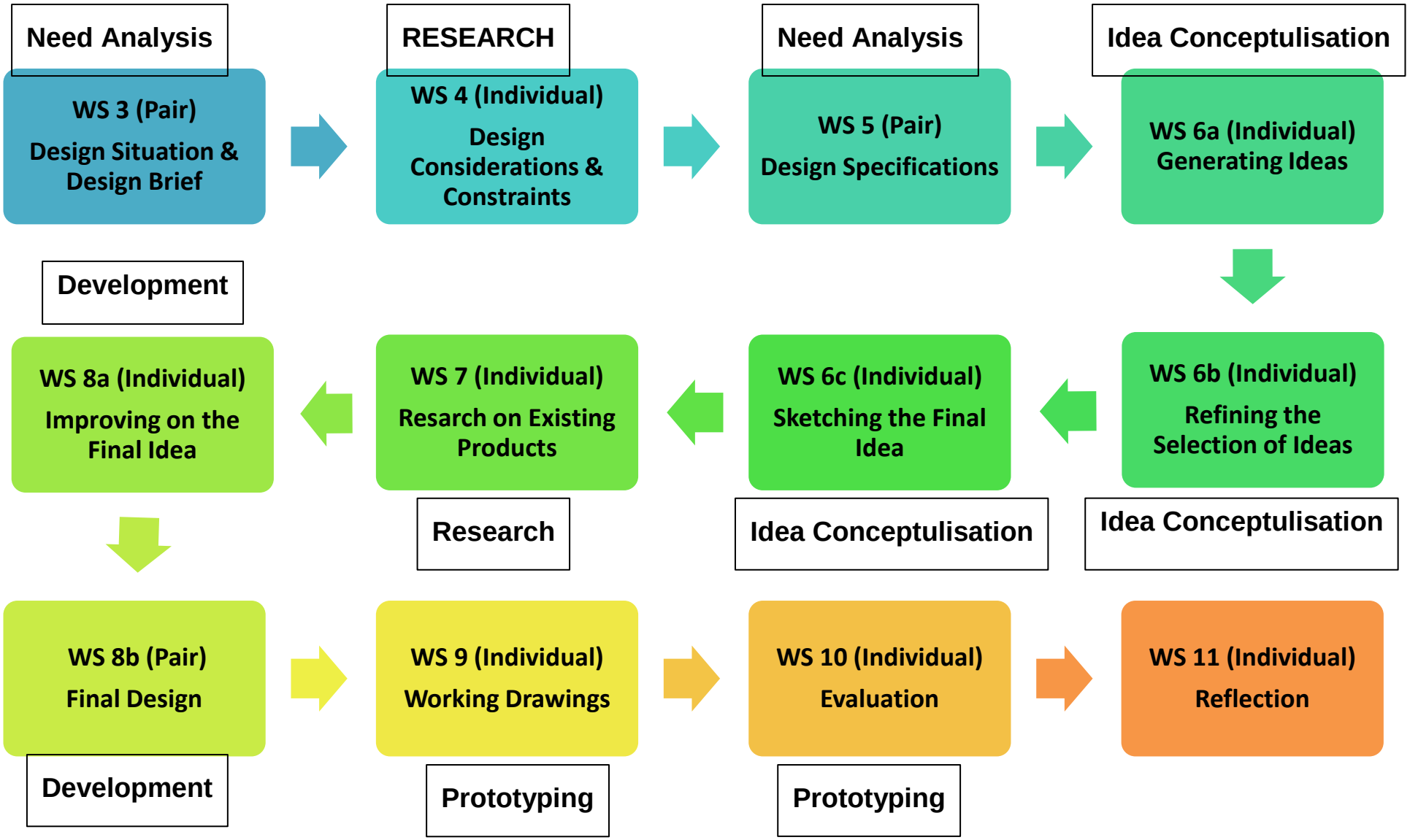
COLLABORATION DOMAIN

- work well as a team
- contribute to the successful completion of the project

INDEPENDENT LEARNING DOMAIN

- monitor their own learning and identify ways to improve
- demonstrate an increase in engagement in learning
- demonstrate a positive and responsible attitude towards learning

Overview of Project



Project Guidelines

Assessment Criteria

No	Title	Marks	Remarks	Assessment
1	Needs Analysis	/ 9m	Pair Work	CA2: 10%
2	Design Considerations & Constraints	/ 10m	Individual Work	CA2: 20%
3	Design Specifications	/ 10m	Pair work	CA2: 15%
4	Idea Conceptualisation (Refining the selection of Ideas)	/ 10m	Individual work	CA2: 20%
5	Idea Conceptualisation (Sketching the Final Idea)	/ 10m	Individual Work	CA2: 15%
6	Research	/ 12m	Individual Work	CA2: 20%
7	Development (Improving on the Final Idea)	/ 30m	Individual Work	SA2: 25%
8	Final Design	/ 10m	Pair Work	SA2: 10%
9	Working Drawings	/ 10m	Individual Work	SA2: 15%
10	Prototyping	/ 20m	Pair Work	SA2: 30%
11	Evaluation	/ 9m	Individual Work	SA2: 10%
12	Reflection	/ 6m	Individual Work	SA2: 10%

Assessment Rubrics

Criteria	Level 0	Level 1	Level 2	Level 3
Needs Analysis **(9 marks)**	**0** No design need and brief stated.	**1 – 3** The design need and brief stated are unrelated, and/or unfocused.	**4 – 6** The design need and brief stated are general and/or superficial.	**7 – 9** The design need and brief stated are clear and concise.
Design Considerations & Constraints **(10 marks)**	Refer to Worksheet 4			
Design Specifications **(10 marks)**	Refer to Worksheet 5 *All points must be well reasoned/explained to score full marks.			
Sketching the Final Idea **(10 marks)**	**0** No sketch of final idea.	**1 – 4** Sketch does not provide a reasonable impression of the final idea.	**5 – 7** Sketch shows a general impression of the final idea.	**8 – 10** Sketch shows an accurate impression of the final idea.
Research **(12 marks)**	Refer to Worksheet 7 *Award marks for logical answer.			
Development **(30 marks)** *10 marks each	**0** No sketch of intended improvement.	**1 – 4** Sketch does not provide a reasonable impression of the intended improvement. Little notes to explain ideas.	**5 – 7** Sketch shows a general impression of the final idea. Some notes to explain ideas.	**8 – 10** Sketch shows an accurate impression of the final idea. Clear notes to explain ideas.
Final Design **(10 marks)**	**0** No sketch of final design.	**1 – 4** Sketch does not provide a reasonable impression of the final design.	**5 – 7** Sketch shows a general impression of the final design.	**8 – 10** Sketch shows an accurate impression of the final design.

Assessment Rubrics

Criteria	Level 0	Level 1	Level 2	Level 3
Working Drawings **(10 marks)**	**0** No working drawings shown.	**1 – 4** Some drawing details provided. Need to make assumption to construct from drawings provided.	**5 – 7** Drawing details provided for construction. Little assumption needed for construction.	**8 – 10** All drawing details provided for construction.
Prototype **(20 marks)**	**0** No prototype submitted.	**1 – 9** Prototype is incomplete or reflects poor making skills. Limited quality control has resulted in minimal level of accuracy and an outcome that barely functions.	**10 – 15** Prototype reflects fair making skills. Average quality control has resulted in few inaccuracies and functions more or less as intended.	**16 – 20** Prototype reflects competent making skills. Adequate quality control has resulted in an outcome that functions as intended.
Evaluation **(9 marks)**	Refer to Worksheet 10			
Reflection **(6 marks)**	Refer to Worksheet 11			

Name: _____ ( ) Date: _____

Class: _____

Worksheet 1 (Individual) Introduction to Design & Technology

Get together with another classmate and discuss the following:

1 What does designing mean to you?

……

……

……

……

……

……

2 Why do design is important in today's world?

……

……

……

……

……

……

3 List down **three** common traits of a designer that you feel is important and briefly explain your choice.

Trait 1: .....

Why? .....

.....

Trait 2: .....

Why? .....

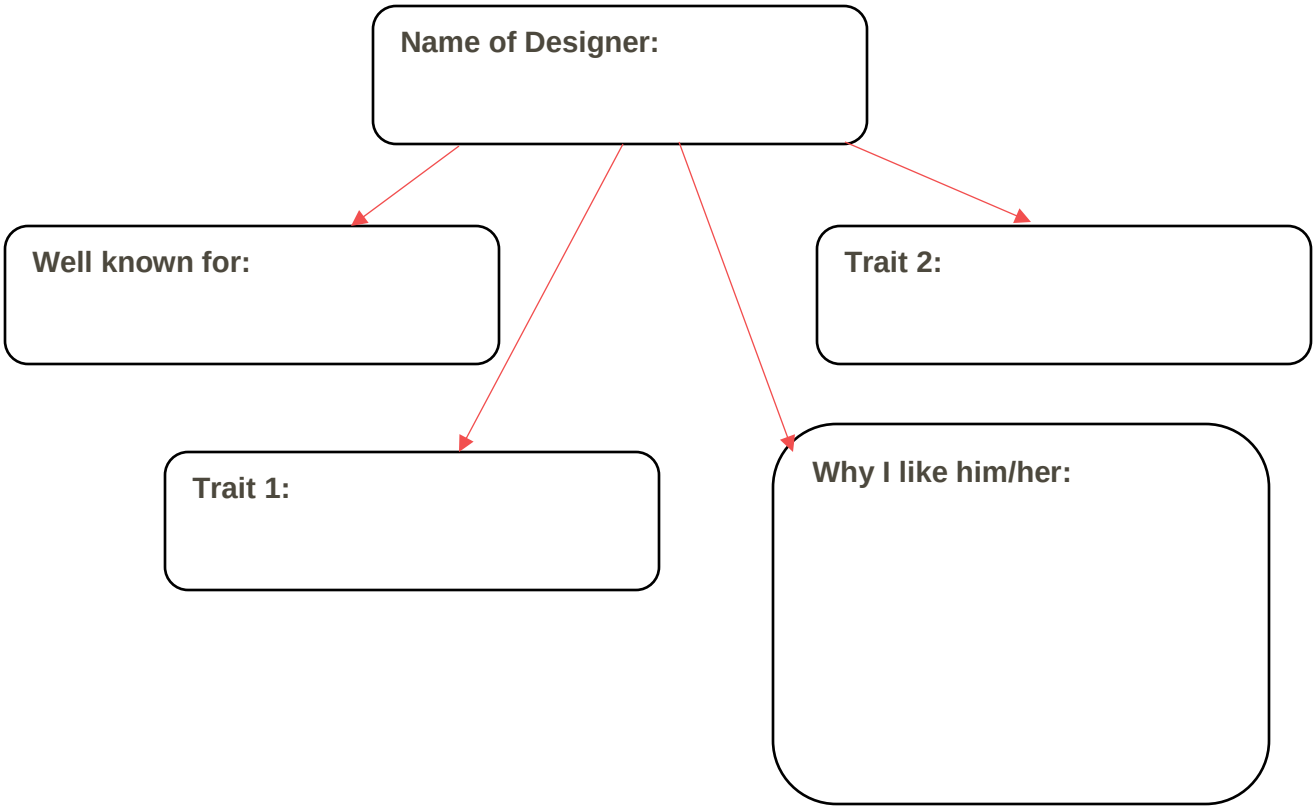
.....

Trait 3: .....

Why? .....

.....

4 Record down your research on your favourite designer below:



Name: _____ ( ) Date: _____

Class: _____

Worksheet 2 (Individual) **Design Process**

1 Name and sketch the **two** tools used to assemble the toy in the boxes below.

Name of tool: _____

Name of tool: _____

2 What went through your mind when trying to put the parts together?

……

……

……

3 Did you have to disassemble in order to continue assemble the toy?

……

4 Did you enjoy assembling the toy? Why?

……

……

……

5 Besides the unclear or incomplete drawings, what other information can you find on the box?

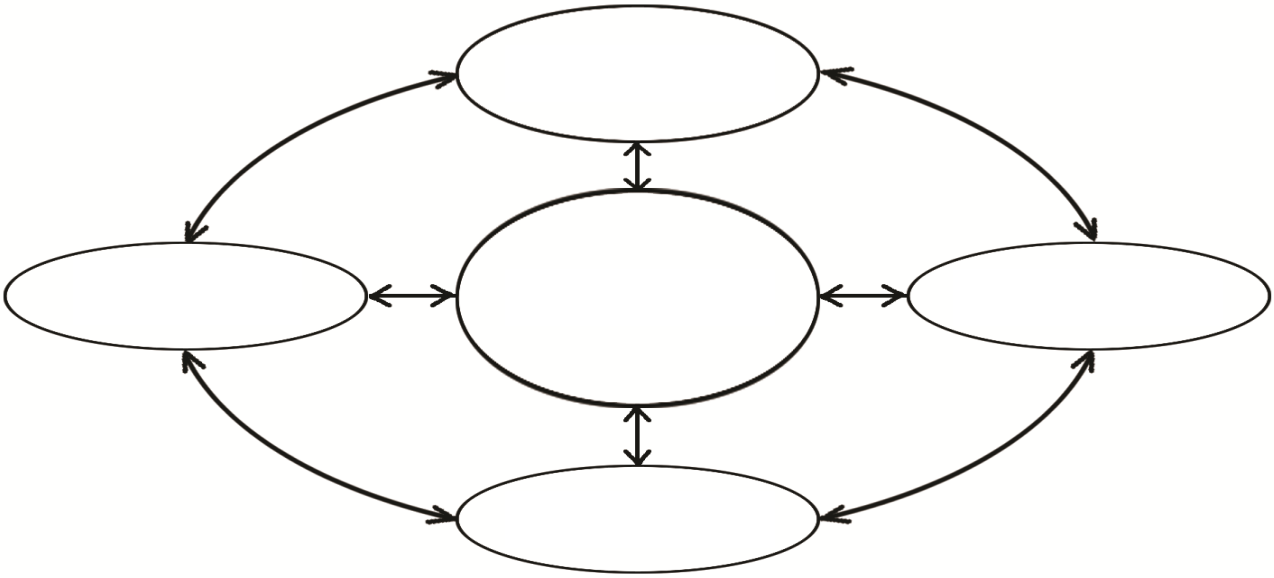
……

……

……

6 Complete the design process model with the following helping words as you watch the video:

development	idea conceptualisation	research
prototyping	needs analysis	



7 Explain what take place in each stage of the design process and write down the corresponding stage in design thinking using the following helping words:

discovery & exploration share meaning & opportunities ideation

get feedback new learning

Need Analysis: ……...

……

It is similar to ……..…… in design thinking.

Idea Conceptualisation: ……...

……

It is similar to ……..…… in design thinking.

Development: ……...

……

It is similar to ……..…… in design thinking.

Prototyping: ……...

……

It is similar to ……..…… in design thinking.

Research: ……...

……

It is similar to ……..…… in design thinking.

8 Write **two** reasons why planning is important in designing.

1……...

……

……

2……...

……

……

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Names: _____ ( ) & _____ ( )

Class: _____ Date: _____

Worksheet 3 (Pair) **Need Analysis** **/ 9 marks**

Discuss with your partner possible scenarios for the need of a display stand write down a possible problem situation and a corresponding design brief.

Tips:

Your problem situation must be able to tell, in 1 to 2 short paragraphs, the following:

1. **Who** is facing/having the problem
2. **What** is the problem
3. **Why** are they facing the problem(s)
4. **When** is the problem happening
5. **Where** is the problem happening
6. **How** you propose to solve this problem (without been specific about the solution)

Your design brief must **clearly** and **briefly** describe what you intend to do to solve the problem situation, i.e.

To design and make an artefact **<u>for who</u>** to be able to **<u>do what</u>** to be use **<u>where</u>**.

Sample Scenario:

Sample Problem Situation:

Peter is a teenager who loves collecting Japanese manga figurines. He owns so many figurines till he has problem displaying them properly such that most of the figurines can be seen clearly from the glass cabinet.

Peter also buys the limited edition figurines at time and with many other figurines, it posed a difficultly for him to make the limited edition stand out from the rest. Thus, a display stand may help him solve this problem.

Sample Design Brief:

To design and make a display stand for figurines collector to display their limited edition figurine in the cabinet.

Problem Situation:

……..

……

……..

……..

……

……..

……..

……

……..

……..

……

……..

……..

Design Brief:

……..

……

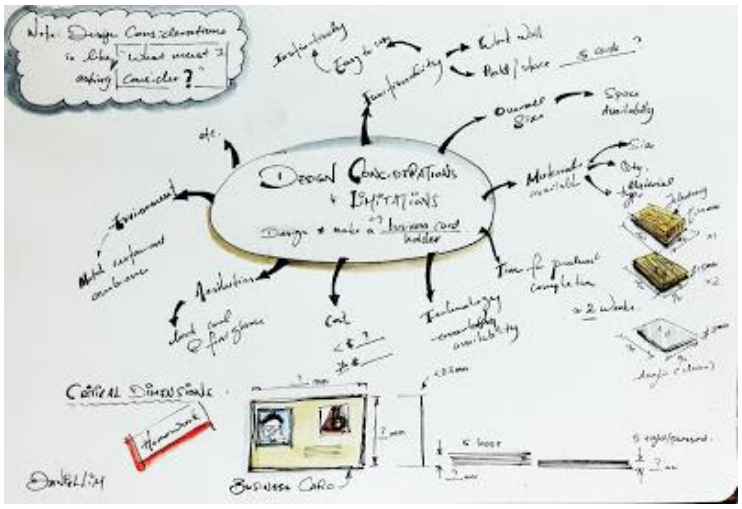
Name: _____ ( ) Date: _____

Class: _____

Worksheet 4 (Individual) **Design Considerations & Constraints** **/ 10 marks**

The Design Considerations & Constraints can be thought as '*what factors should I consider*'. Thinking of it in this way will make completing the task easier.

Constraints refers to factors that will 'restrict' you in making the product. Some factors that are considered as constraints are for example, time, cost, size etc.



Example:

Imagine you need to plan for a class outing. You will need to plan and create a list of stuffs you need to do (or *consider bringing*). You do not need to go into the details yet but generating an initial list from which you can work out in details later. For example, you'll need to consider to '*bring some bottled drinks*', then '*plan the routes to the destination*', etc.

In a similar way, you would have already chosen a particular type of 'display' or 'holder' you want to design for. Recall your **Design Brief**. Now think, "*I want to **design and make a ...***" so "*what are the things/factors I must '**consider**'*?"

Tips:

To help you better understand what is wanted or needed for your solution, you should consider the following design factors:

Users:
- Who are the users?
- How would they be using it?
- What they value the solution for?

Functions:
- What does the product have to do?
- Are there any special features that the design must incorporate? For example, does the product need to be flexible or waterproof.

Aesthetics:
- Does the product require a special appearance?
- Does it need to have an ergonomic form?

Size:
- What is the area of the space that the product is to be placed?
- What is the overall size of the product going to be?

Materials:
- Are any special materials needed?
- Will maintenance be a problem?
- Will there be any safety issues?

Design Considerations & Constraints

Functions (What does the product have to do? Any special feature?) (2 marks):

Aesthetics (What special Appearance/Colour) (2 marks):

Safety (What safety feature must I consider?) (2 marks):

Size (How big the product should be?) (2 marks):

Others (2 marks):

Names: _____ ( ) & _____ ( )

Class: _____ Date: _____

Worksheet 5 (Pair) **Design Specifications** **/ 10 marks**

Design Specifications is like a 'wish list', a list of very specific instructions that comes from your list of design considerations. If you remember, your list of factors which you need to consider, they are not detailed at all.

For example, I need to consider that the product must be able to display a figurine but I have not specified the size of the figurine. I will have to be very specific to say that the product must be able to display a figurine with a maximum size of 50mm x 50mm x 100mm.

Below are 3 specifications that you can modify to suit your product:

- The display should make the assembled toy stand out when put on display.
- It would be displayed on a study table or shelf at home.
- It should be made of plastics and wood.

Discuss with your partner and generate a list of specifications for the product that you will designing.

Record down your specifications on the next page. Provide a reason or explanation for each specification stated.

Design Specifications

1. Function (how should it works?) (2 marks):

2. Aesthetics/Appearance (how should it looks?) (2marks):

3. Safety (What are the safety precautions/features?) (2 marks):

4. Size/weight (Overall dimension) (2 marks):

5. Other Feature (2 marks):

Name: _____ ( ) Date: _____

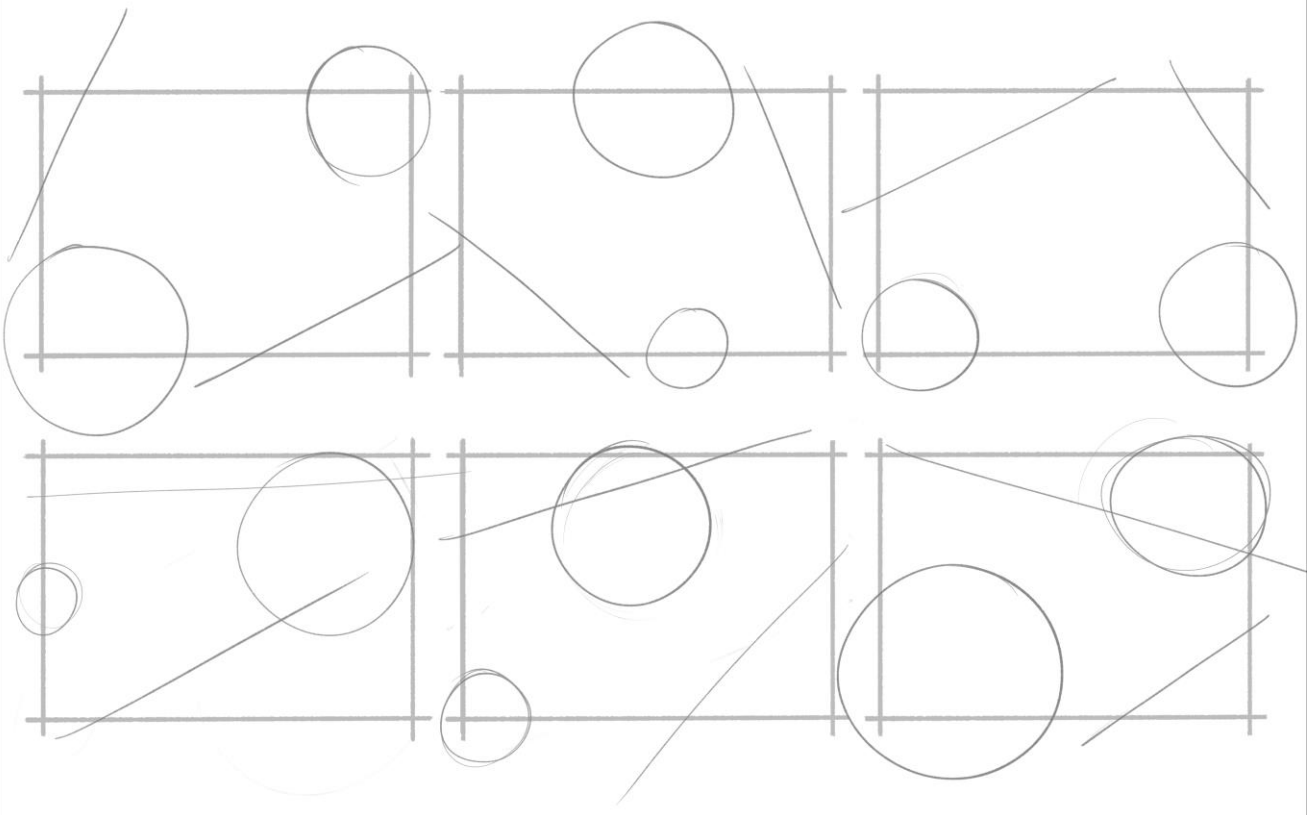
Class: _____

Worksheet 6a (Individual Idea Conceptualisation

Generating Ideas

You will be using a simple and quick method to generate ideas – by drawing lines and circles. The objective is for to become comfortable and confident in sketching.

Examples



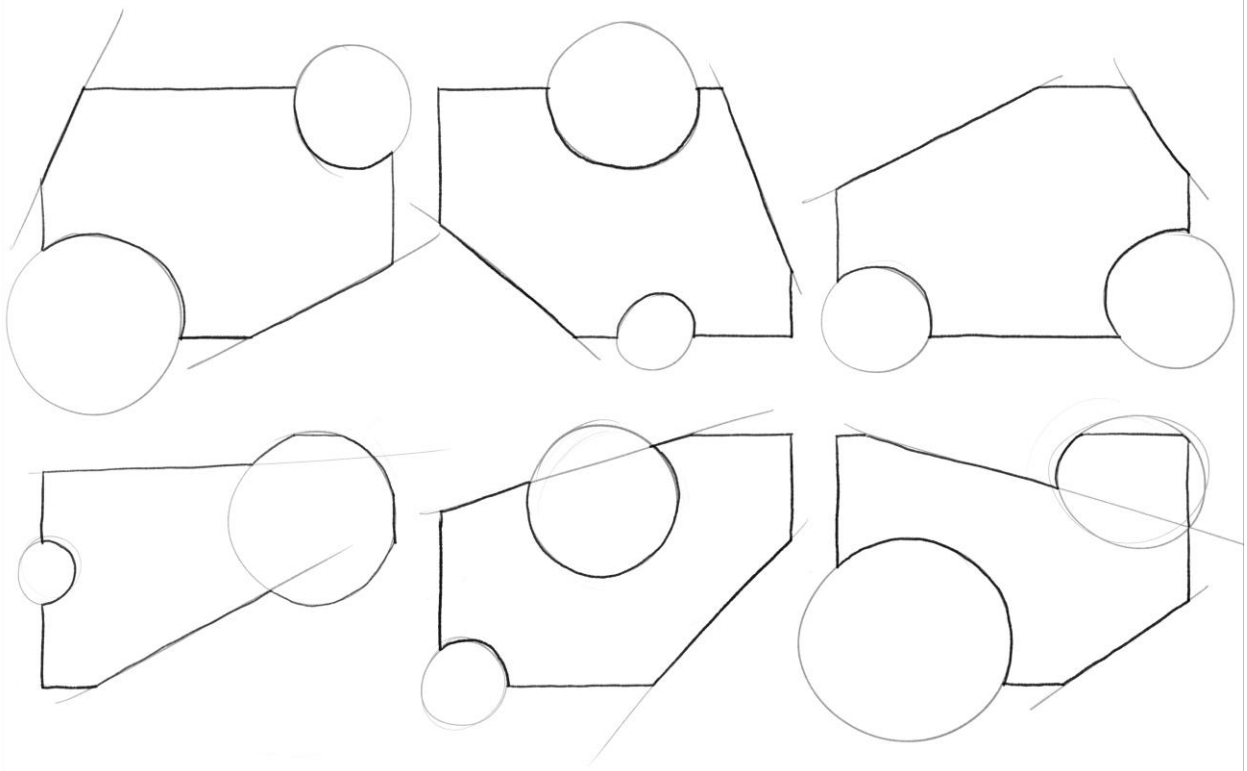
Tips:

When drawing lines and circle, pay attention to the following:

- hold your pencil in a way that you can have a good view of the pencil tip
- lock your wrist and swing your arm so that the straight lines you draw will be straight not curved
- visualize in your mind the lines and circles you want to draw and draw them lightly
- draw over the lines and circles that form an interesting shape using a little more pressure so that the shapes will stand out

Examples

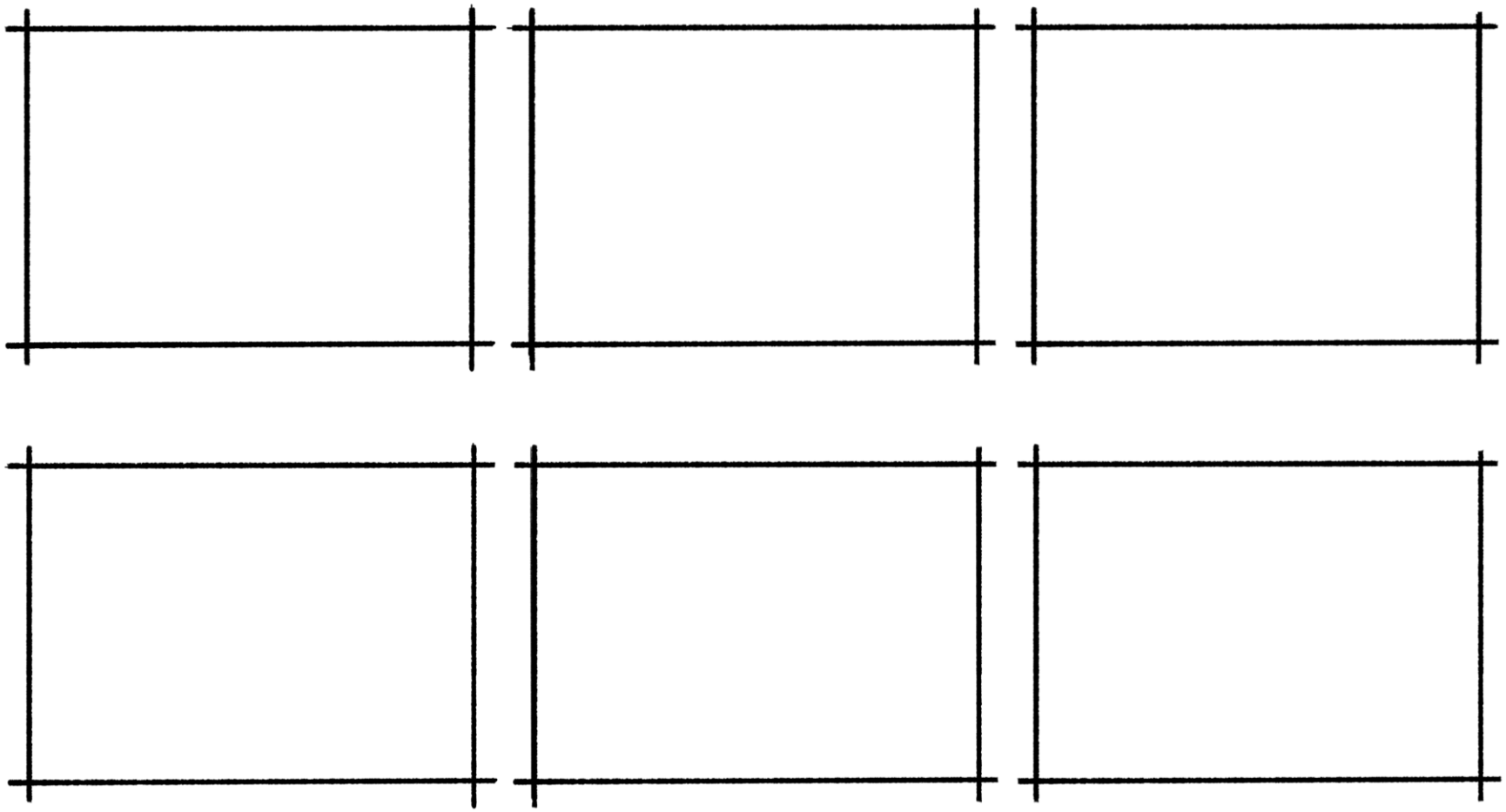
Interesting outlines darkened



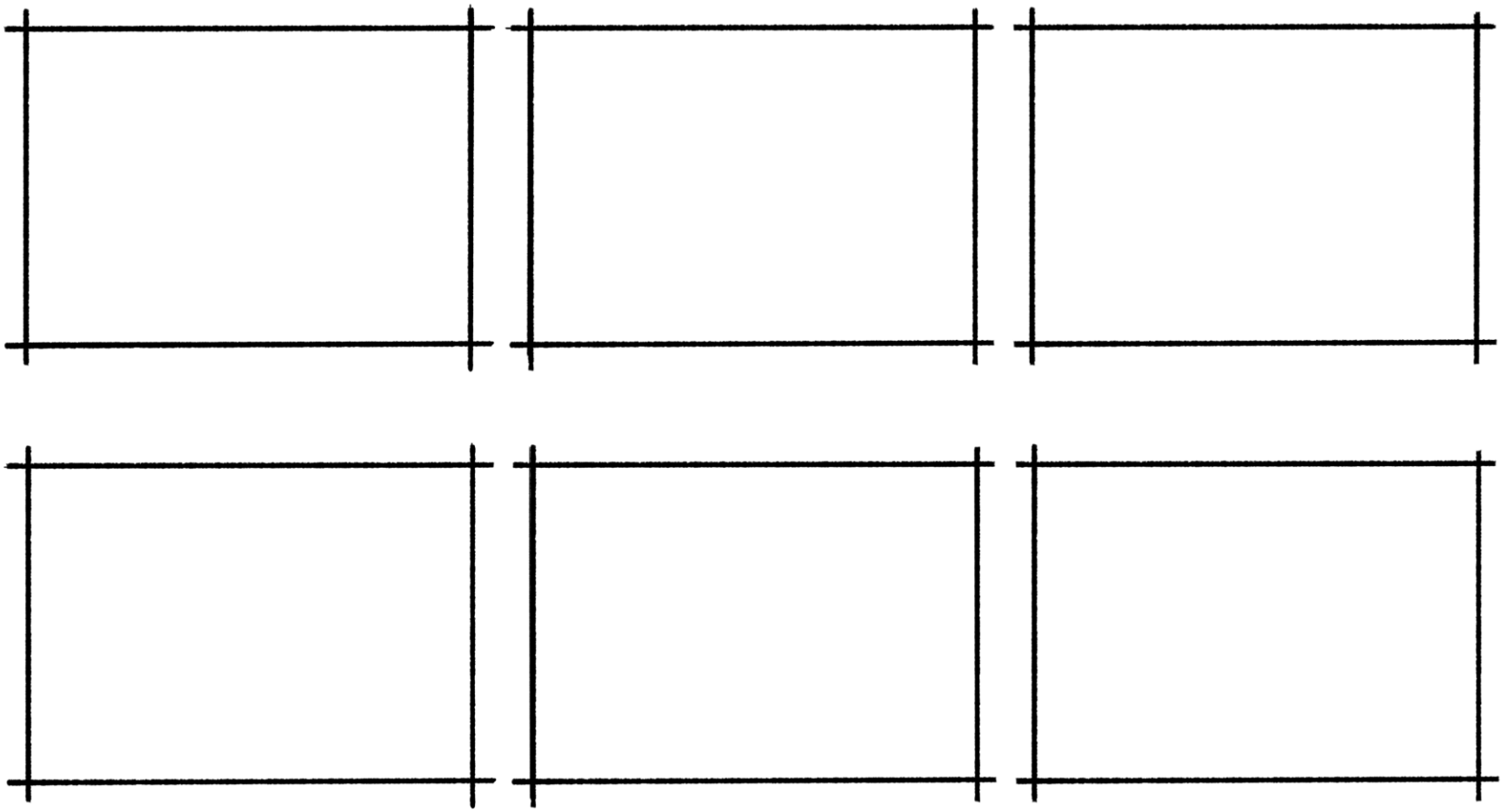
Carry out your own idea generation process, on the next page, by following the combination of lines and circles progressively as follows:

- two lines and two circles
- three lines and two circles
- two lines and three circles
- three lines and three circles
- lines, curves and ellipse

Idea Generation



Idea Generation



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Name: _____ ( ) Date: _____
Class: _____

Worksheet 6b (Individual) **Idea Conceptualisation** **/ 10 marks**

Refining the selection of ideas

Study the two mock-ups that you and your partner have made, give comments and ask questions. Record the discussion points in the comparison table below.

No	Sketch of Idea	Good points	Bad points

No	Sketch of Idea	Good points	Bad points

Name: _____ ( ) Date: _____

Class: _____

Worksheet 6c (Individual) **Idea Conceptualisation** **/ 10 marks**

Sketching the final idea

At this stage, you and your partner would have decided how your product would be like. You would also have identified the useful features you wish to adopt and adapt. Sketch the idea below. Includes short notes, to explain your idea.

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Name: _____ ( ) Date: _____

Class: _____

Worksheet 7 (Individual) **Research** **/ 12 marks**

After you and your partner have decided on final design, the next stage is to improve the final idea. Before you start improving the final, you should also carry a research to find out whether there are existing products that can solve the problem.

Tips:
Ask yourself questions about the products such as the following:

- Can they do what they are supposed to do?
- What materials are they made from?
- How do they look like?
- Are they safe to use?
- How do they work?
- Are they reliable?

Search for two products online and print out their photos on a piece of A4 paper and label them Product 1 and Product 2.

Compare the good and bad features of the two products by asking questions about the products. Record your questions and answers in the table below.

Questions to ask about product	**Product 1** [5 marks]	**Product 2** [5 marks]

Questions to ask about product	Product 1	Product 2

From the evaluation you have done, identify **one good feature** that you may want to adopt for your design and **one bad feature** that you would avoid in your design from either one of the products.

Good feature: ……

……

……

……[1 mark]

Bad feature: ……

……

……

…… [1 mark]

Name: _____ ( ) Date: _____

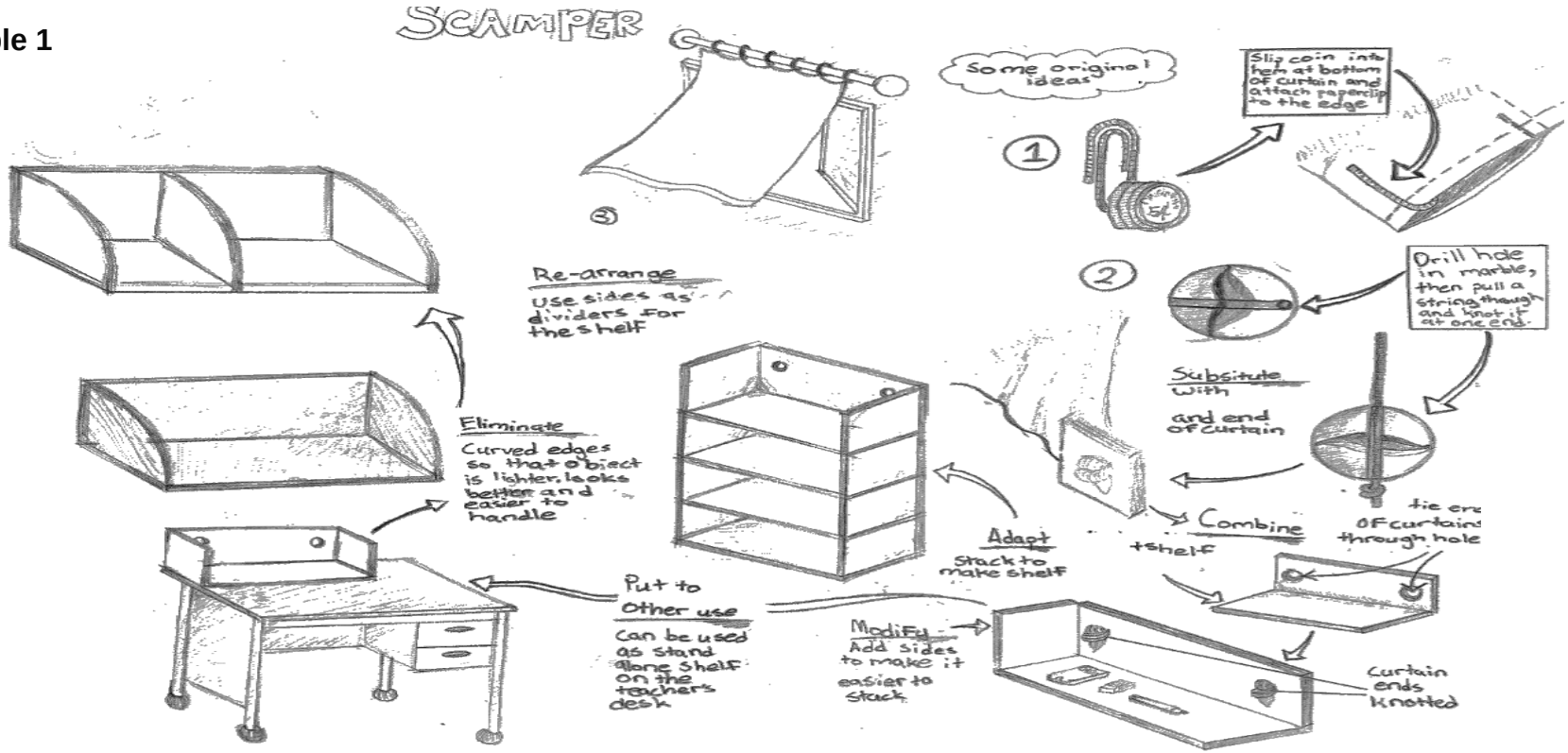
Class: _____

Worksheet 8a (Individual) **Development** **/ 30 marks**

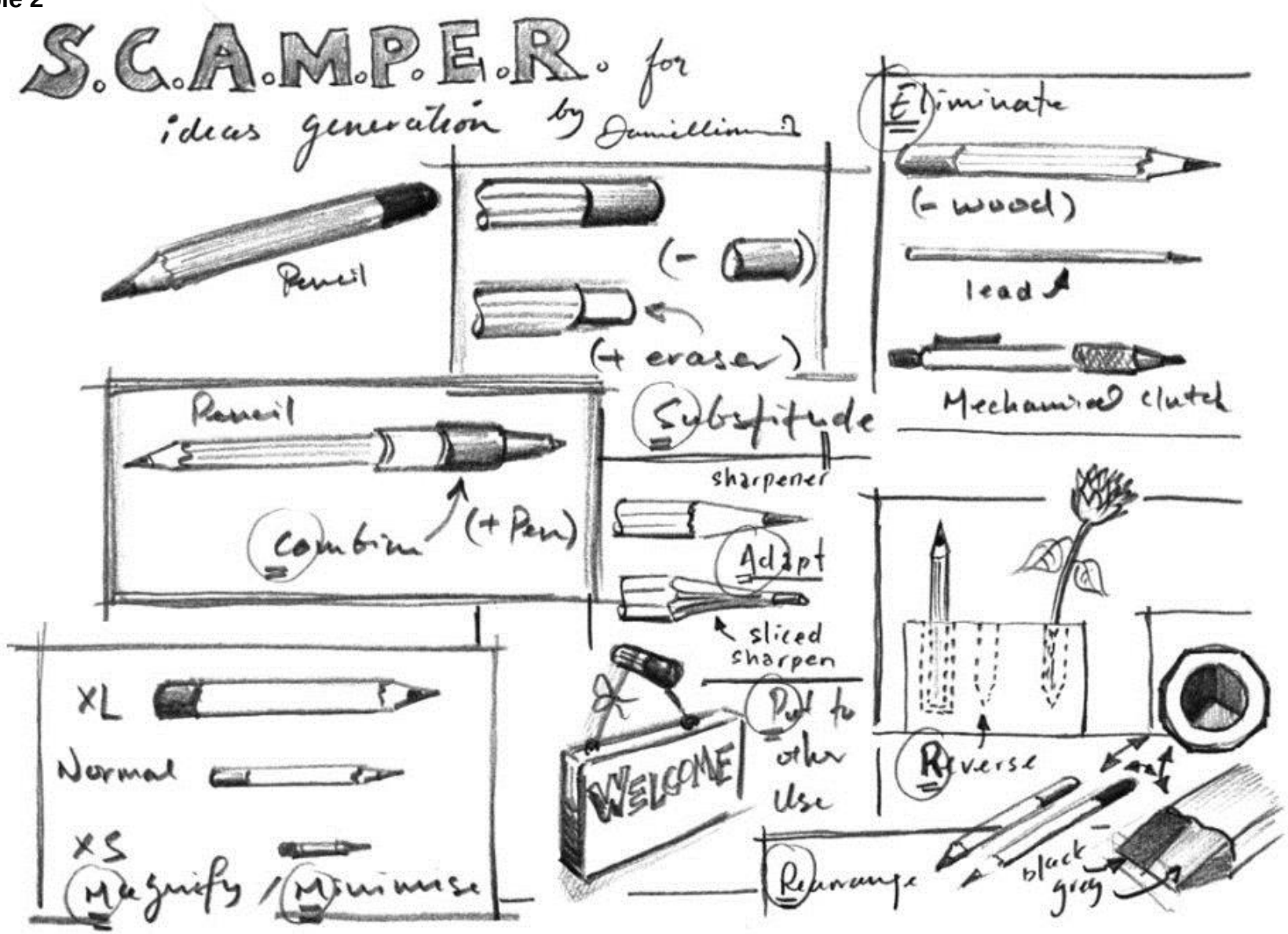
Improving on the final idea

After you and your partner have decided on the final idea, research on existing product. Now, brainstorm ways to improve and refine your design. You may use '**SCAMPER**' to help you and record the suggestions for improvements in the design sheets.

Sample 1



Sample 2


S.C.A.M.P.E.R. for
ideas generation by
Pencil
(-)
(+ eraser)
Eliminate
(- wood)
lead
Mechanical clutch
Pencil
Substitude
sharpener
Combine
(+ Pen)
Adapt
sliced
sharpen
XL
Normal
XS
Magnify / Minimise
WELCOME
Put to
other
Use
Reverse
Rearrange
black
grey

Improving the function of the product		
		Substitute
		Combine
		Adapt
		Magnify/ Minify
		Put to other use
		Eliminate
		Reverse/ Re-arrange

Improving the shape/form of the product		
		Substitute
		Combine
		Adapt
		Magnify/ Minify
		Put to other use
		Eliminate
		Reverse/ Re-arrange

Improving the function of the product		
		Substitute
		Combine
		Adapt
		Magnify/ Minify
		Put to other use
		Eliminate
		Reverse/ Re-arrange

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ANDERSON SECONDARY SCHOOL

Lower Secondary Design & Technology

Names: _____ ( ) & _____ ( )

Class: _____ Date: _____

Worksheet 8b (Pair) **Final Design** **/ 10 marks**

Combine the improved features from Worksheet 8 and sketch your final design in the space below. Include short notes to explain your final design.

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ANDERSON SECONDARY SCHOOL

Lower Secondary Design & Technology

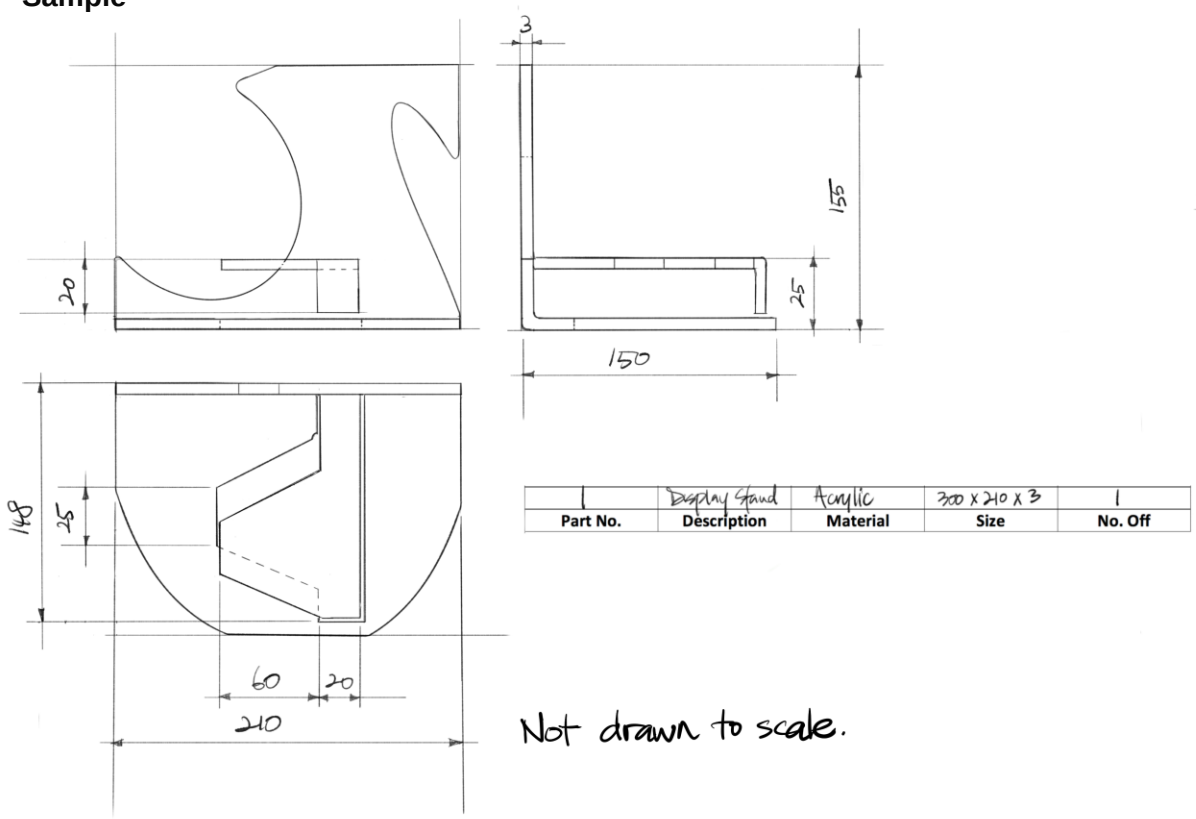
Name: _____ ( ) Date: _____

Class: _____

Worksheet 9 (Individual) **Working Drawings** **/ 10 marks**

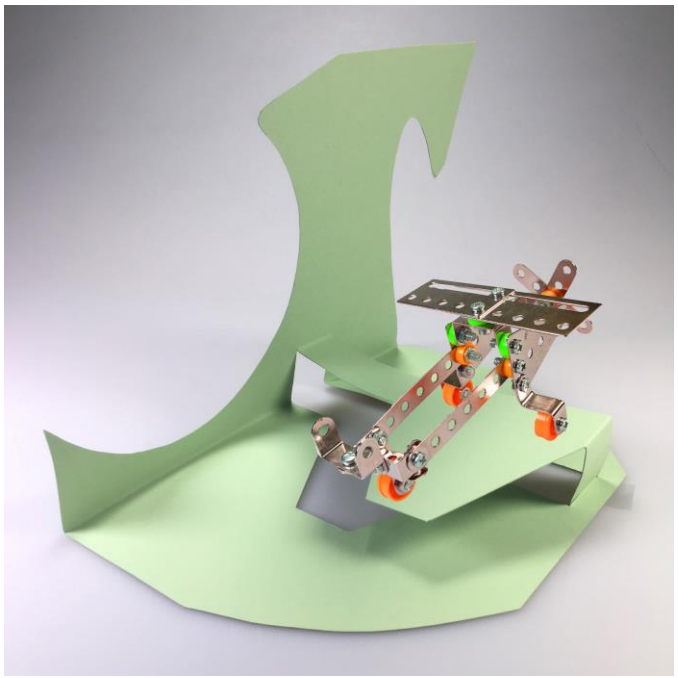
The next step in the development is to produce a working drawing which is required reference during prototyping. To do so, a mock-up of the final design can be measured to obtain the necessary dimensions like the overall height and width and details of the design.

Sample



1	Display Stand	Acrylic	300 x 210 x 3	1
Part No.	Description	Material	Size	No. Off

Not drawn to scale.



Working Drawings

Name: _____ ( ) Date: _____

Class: _____

Worksheet 10 (Individual) **Evaluation** **/ 9 marks**

Evaluation measures the success of your design project in solving the problems identified at the beginning of the project.

Now, compare your solution to the design specifications you set out earlier.

Specification	**Evaluation** [5marks]

Personal Evaluation

One way to improve your solution is to ask yourself questions about your after your evaluation and testing. Write down your answer to these questions. Be honest with your answer.

1. How is my solution different from other products current available? [1mark]

……...

……...

……...

……...

2. What is one good feature of my solution and why do I think so? [1mark]

……...

……...

……...

……...

3. How can my solution be improved? [1mark]

……...

……...

……...

……...

4. Is my solution reliable? [1mark]

……...

……...

……...

……...

ANDERSON SECONDARY SCHOOL

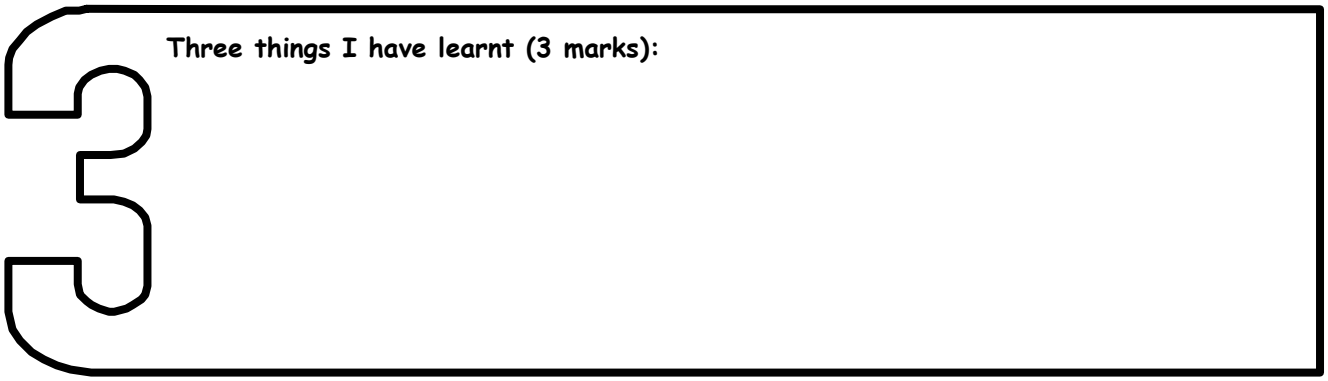
Lower Secondary Design & Technology

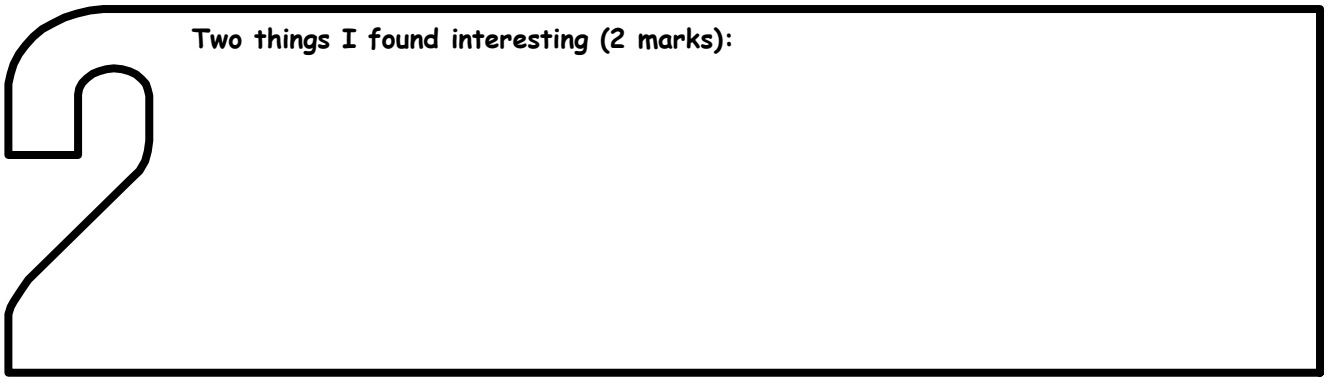
Name: _____ ( ) Date: _____

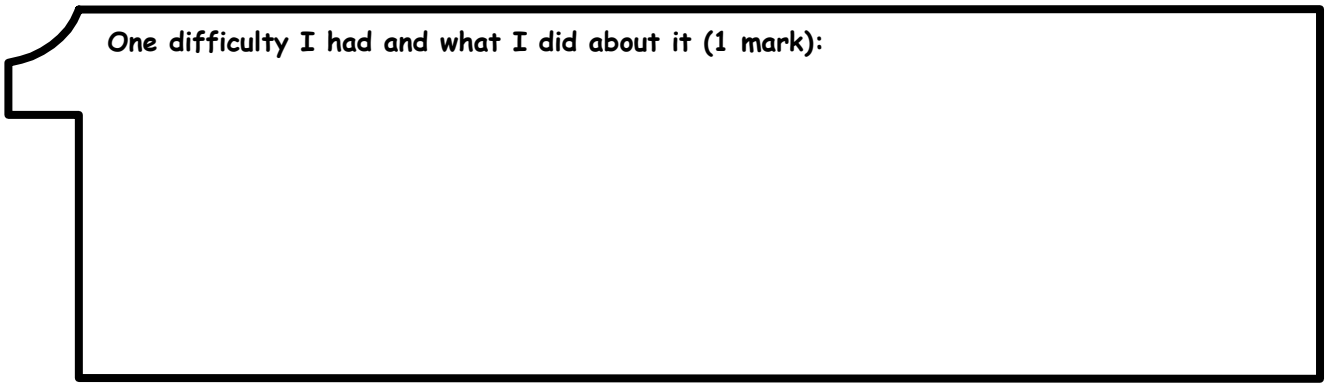
Class: _____

Worksheet 11 **Reflection** **/ 6 marks**

Thinking Back . . . . Looking Ahead:







End of Journal