Leaving Certificate Technology

TECHNOLOGY SUBJECTS SUPPORT SERVICE

Core Module Resource:

Communications and Graphics Media

Task: Developing design sketching through warm up drawing exercises

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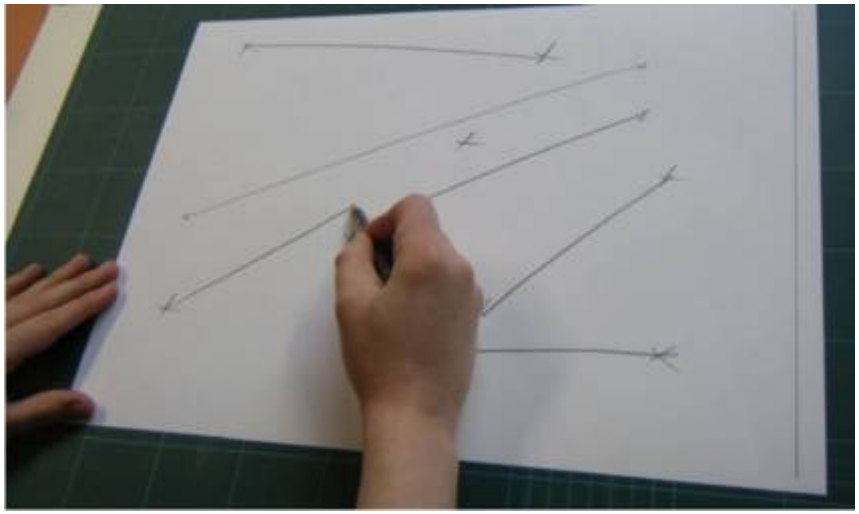
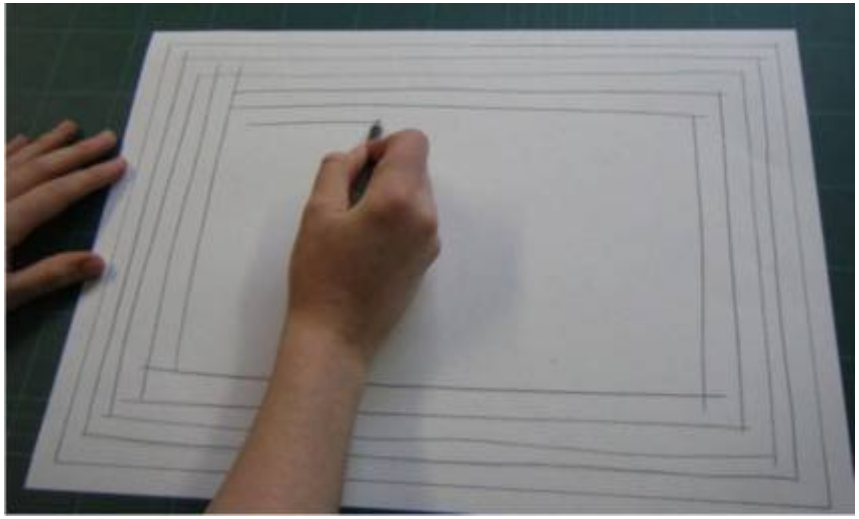
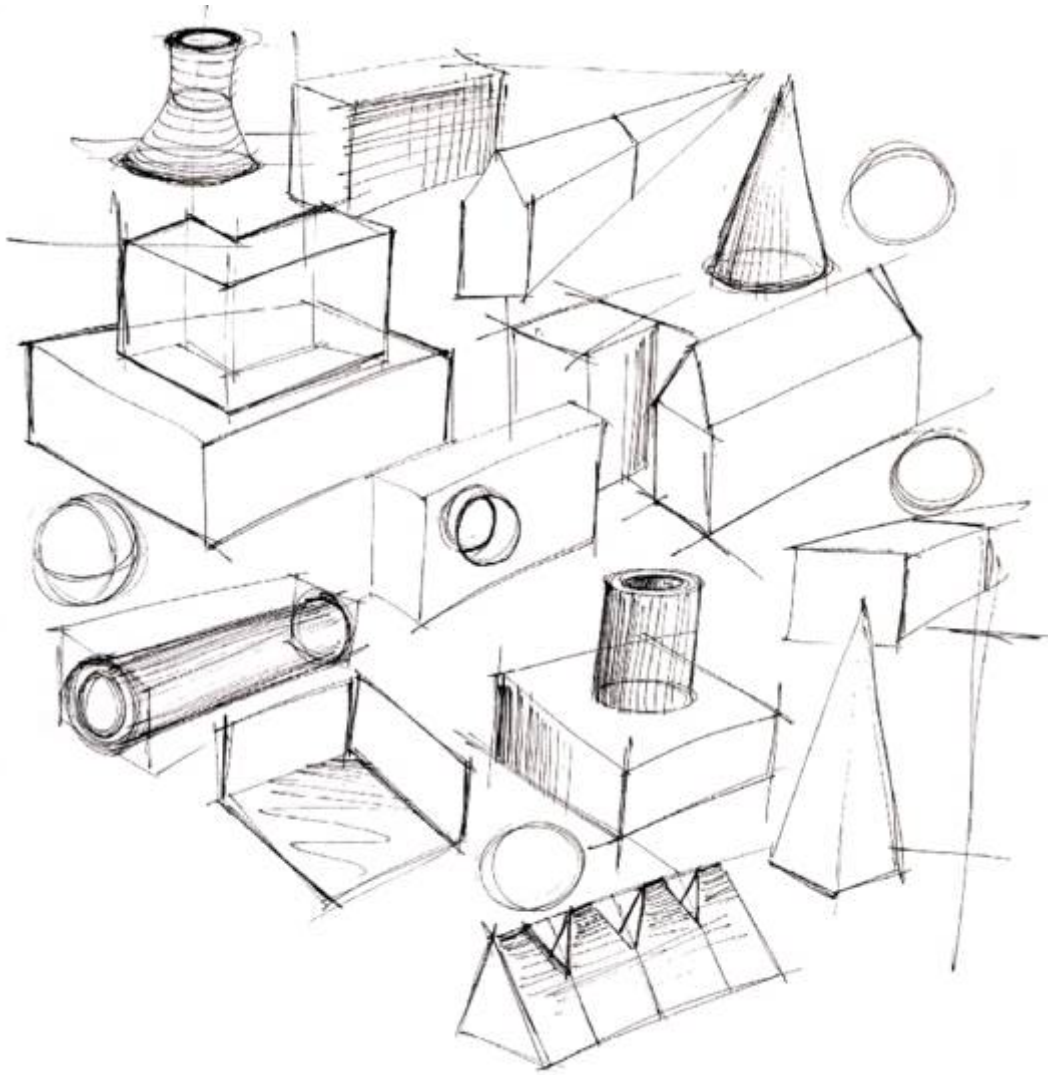
1 Draw 2 points a distance from each other.
Connect the points using 1 straight line.



2 Draw a 10mm border using a ruler.
Freehand, repeat this border towards the centre of the sheet



3 Fill all the white space on an A3 page with a range of basic shape
Focus on different viewing angles and speed of sketching.



Task: Developing design sketching through warm up drawing exercises

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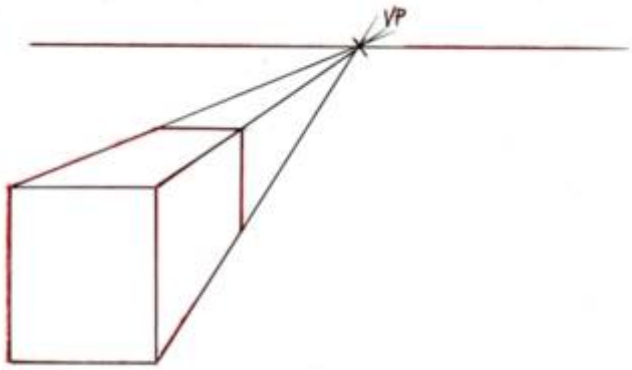
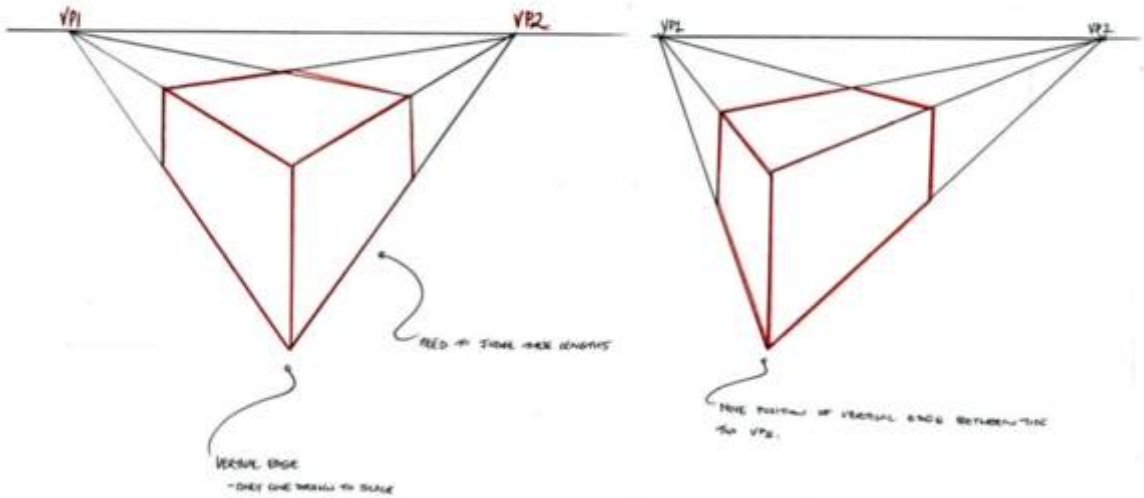
1 Single Point Perspective

Draw *Horizon Line*, Draw single *Vanishing Point*, Project lines



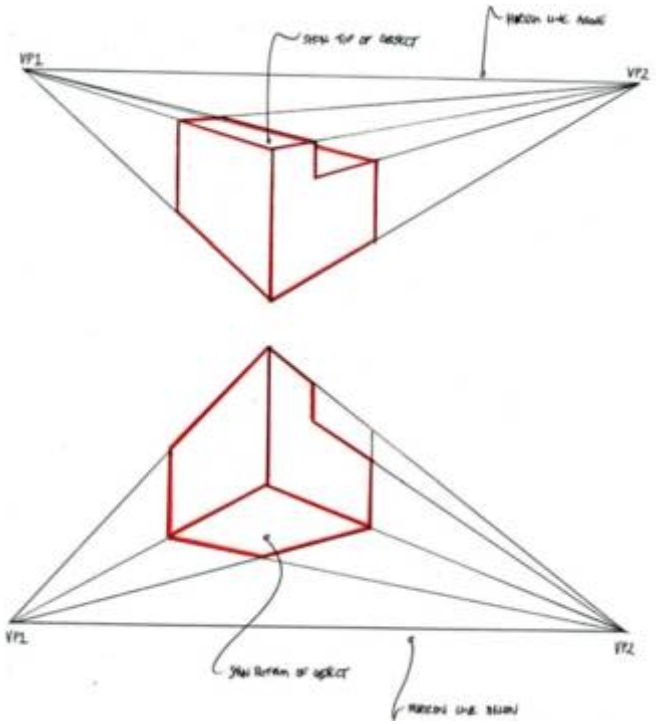
2 For two point perspective, Draw horizon line, draw 2 vanishing points, project lines

Move Viewing edge to the left to change orientation.

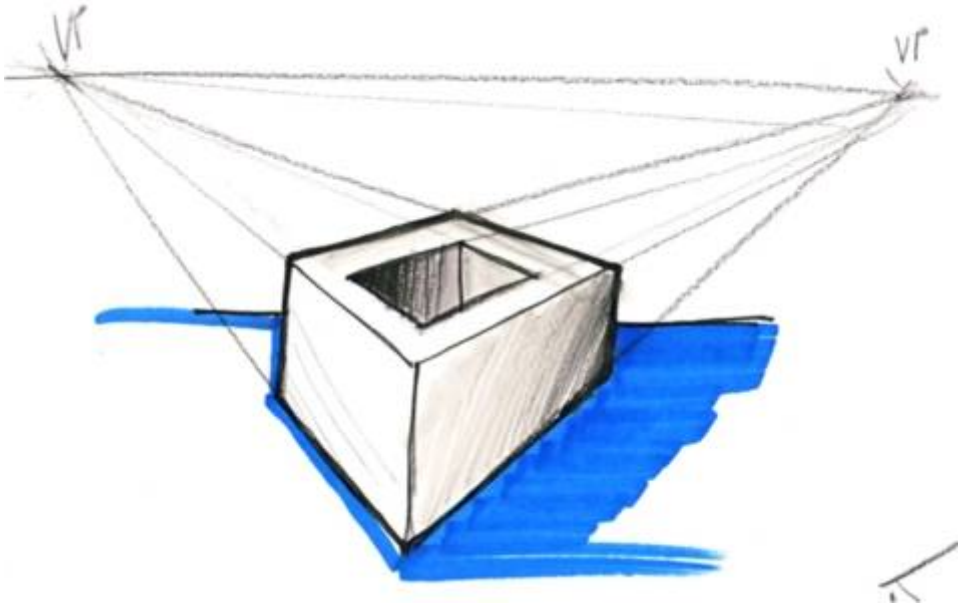


3 Draw *Horizon Line above to see the top surface of the object*

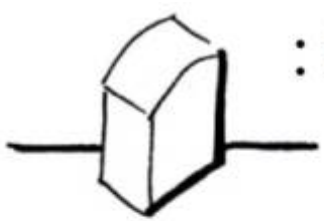
Draw Horizon Line below to see the bottom surface of the object.



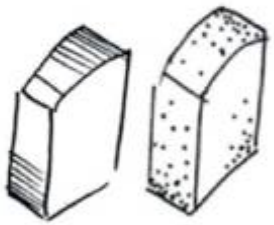
4 Sketch shape with cut-out detail. Choose a light direction and render with contrasting colour background.



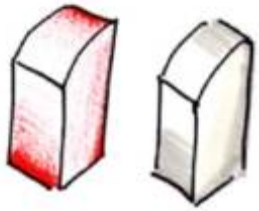
Task: *Quick sketching techniques to enhance design ideas.*



- Horizon Line
- Solid Outline



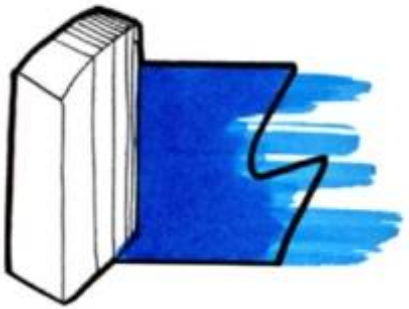
- Dashed Line
- Dot Intensity



- Colour Pencil Rendering
- Cool Grey Marker Rendering

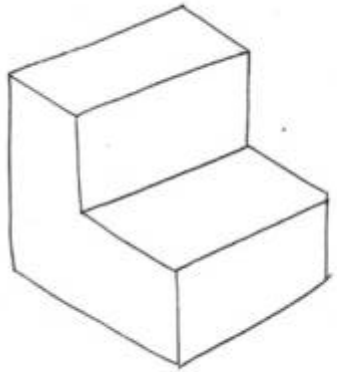
- Block Filled Background

- Drop Shadow Effect



Task: *Developing a design using crating techniques / Cut-out Task*

1



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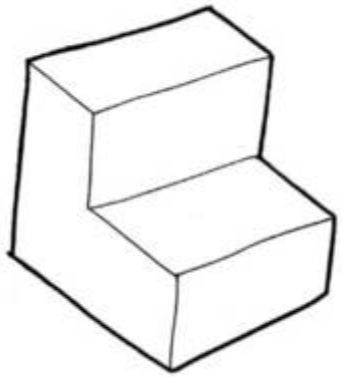

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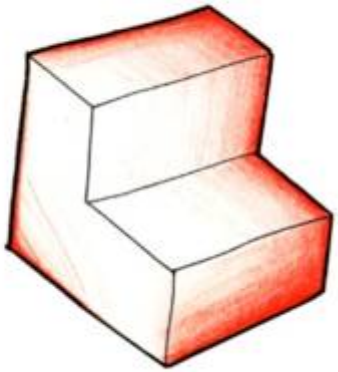

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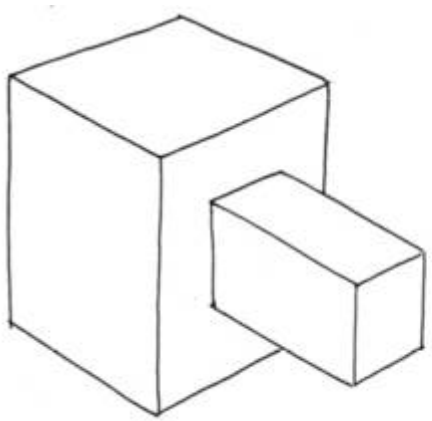
Task: *Developing a design using crating techniques / Add- On Task*

1



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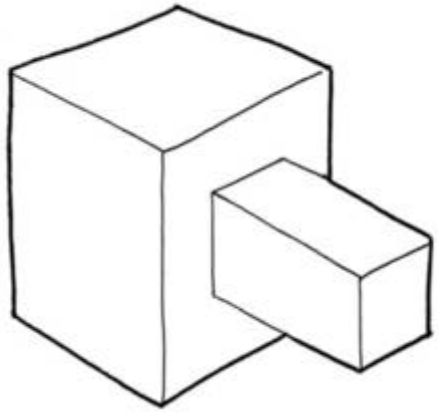

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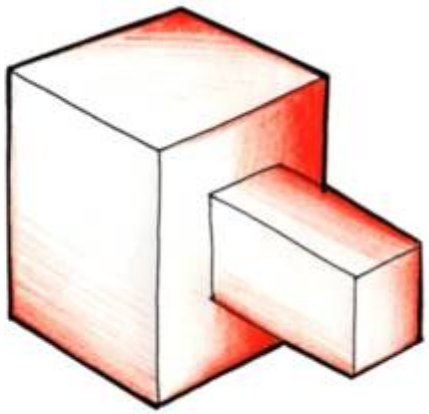

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Task: *Developing a design using crating techniques / Concave Task*

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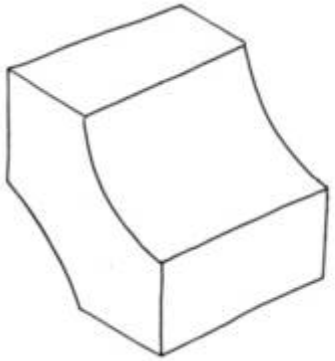

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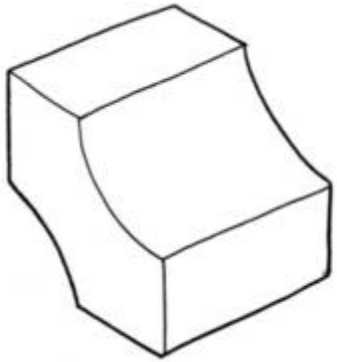

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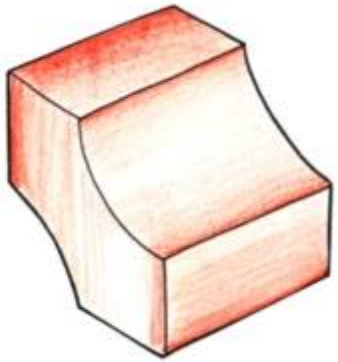

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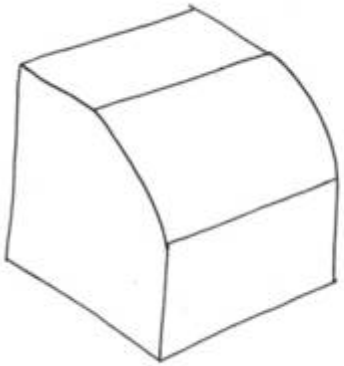
Task: *Developing a design using crating techniques / Convex Task*

1



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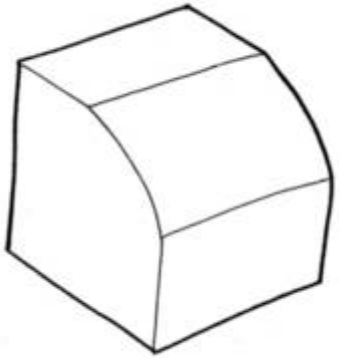

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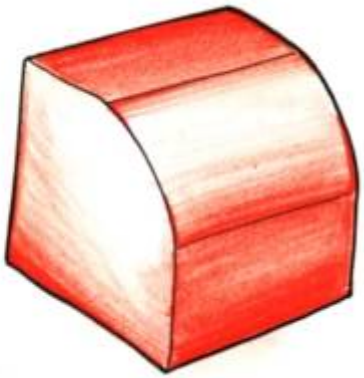

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Task: *Developing a design using crating techniques / Combined Tasks*

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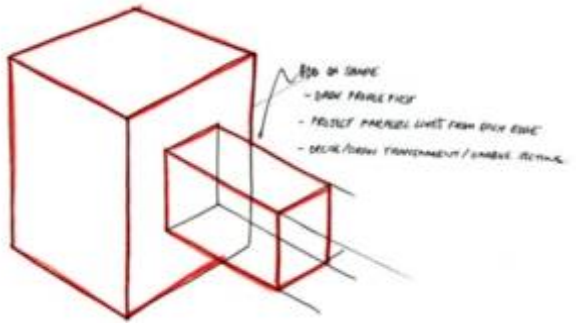

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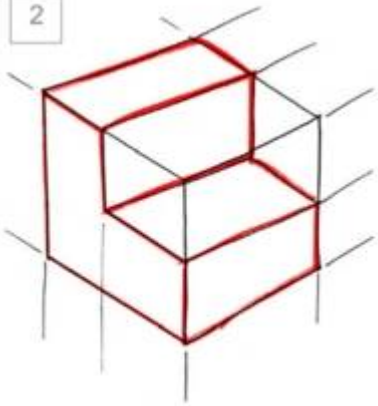

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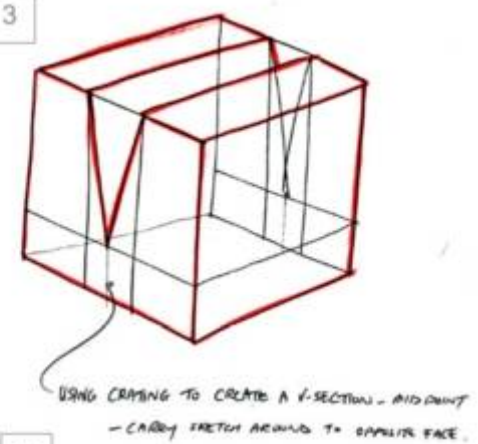

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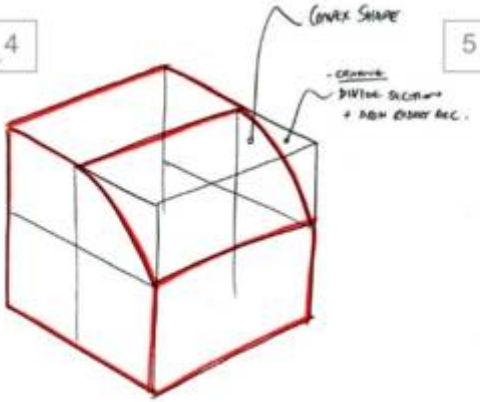

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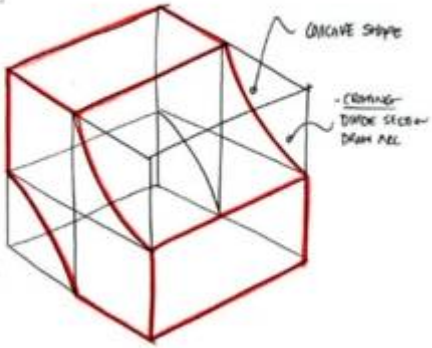
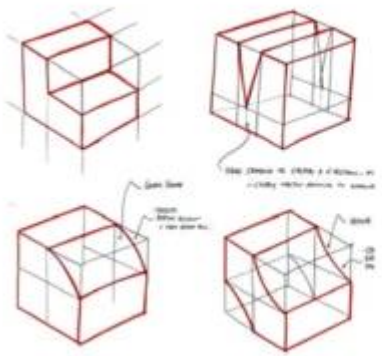


Task: *Developing a design using crating techniques / Toaster Sketch Task*

Warm up sketches



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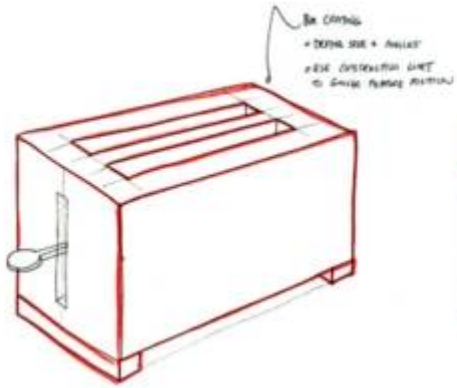

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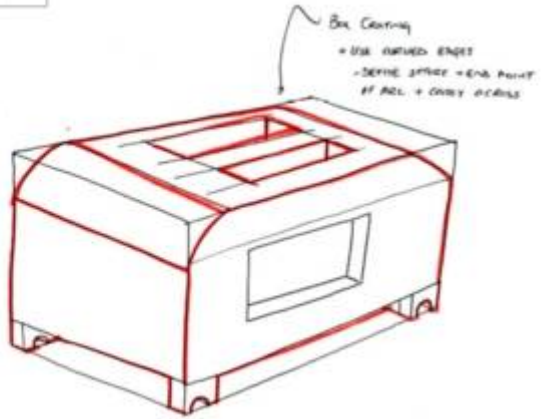

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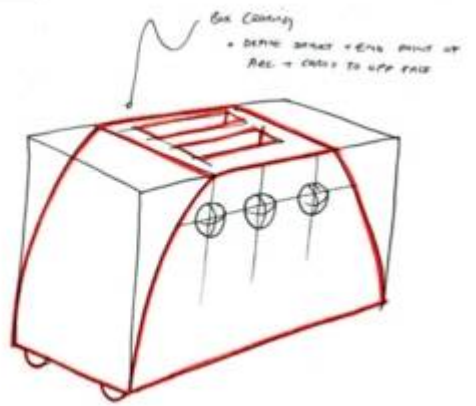
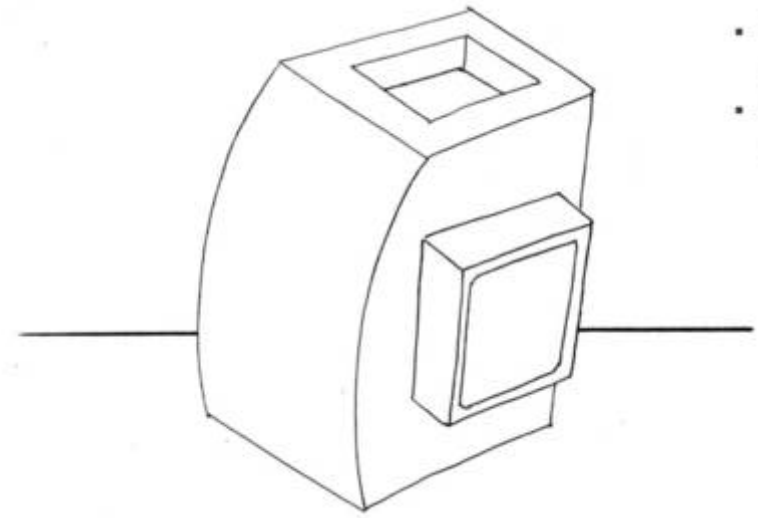
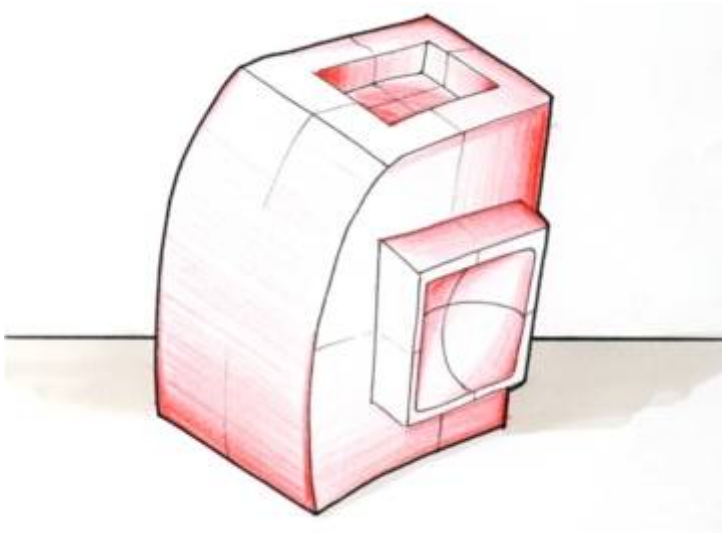


Contour Lines Drawing Task: Using crating and contour lines to shows surface changes on a 3D sketch.

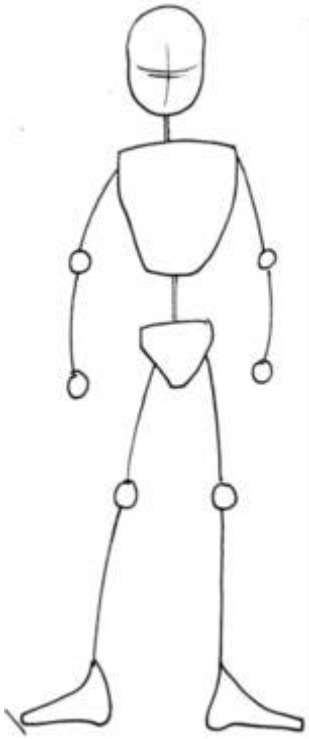


- Use thin fine line pen and crating techniques to add on and subtract surfaces
- Draw a horizon line to ground the sketch on the page.



- Contour lines are thin lines which are used to plot the changing surfaces of a drawing.
- Imagine a piece of string placed over each edge and then pencil in its direction.
- The technique is particularly useful for concave and convex surfaces which can be difficult to represent.
- To render, choose a light source, determine the dark and light areas and use a colouring pencil to graduate the tone from the dark areas towards the light.

Task: *Figure Illustrations to represent scale in drawings*



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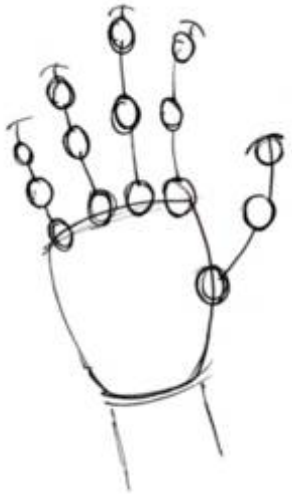
Task: Hand *Illustrations to represent scale in drawings*

1



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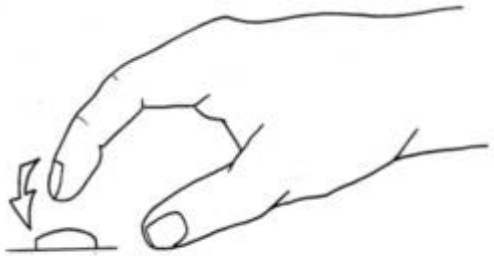
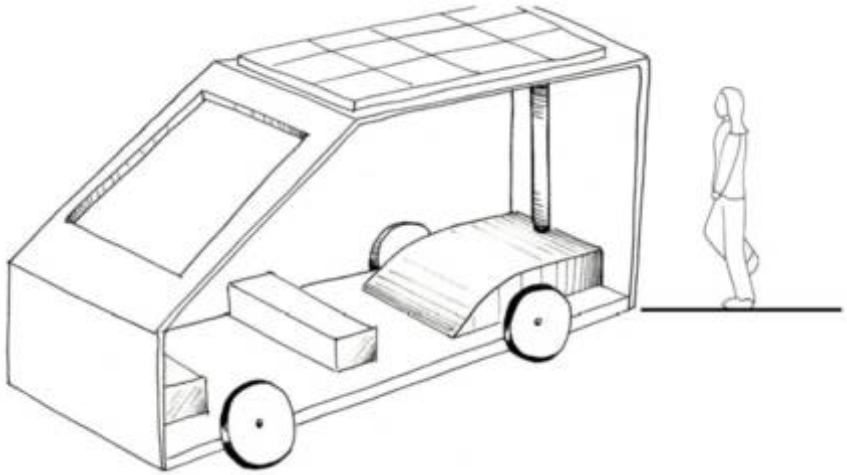


3

Task: *Using graphic illustration to communicate scale in your drawings.*

1



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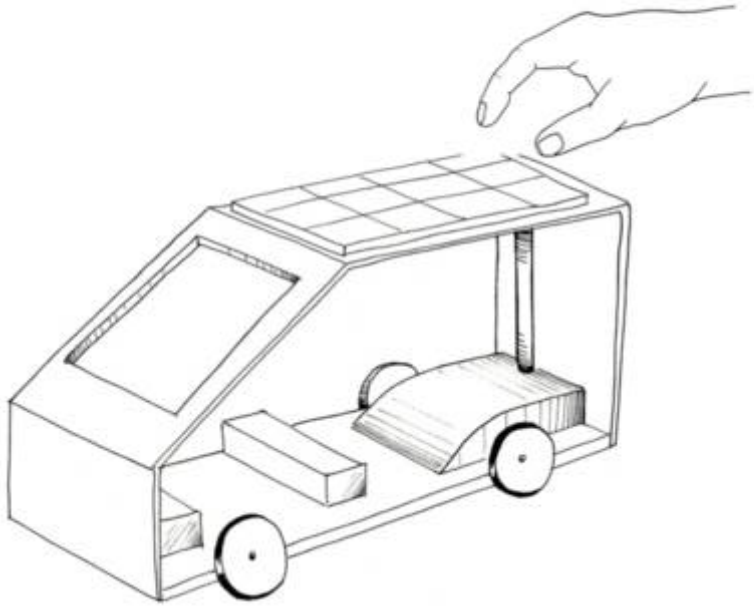

Communication and Graphic Media

Task: *Rendering Materials Exercises*

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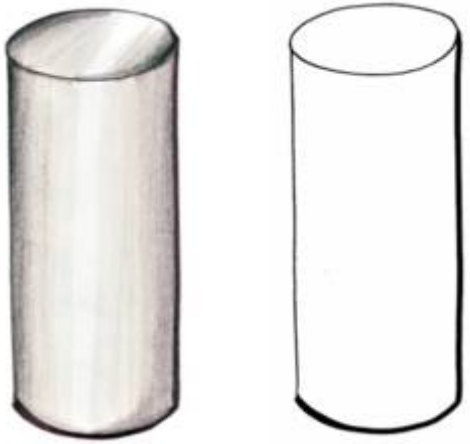
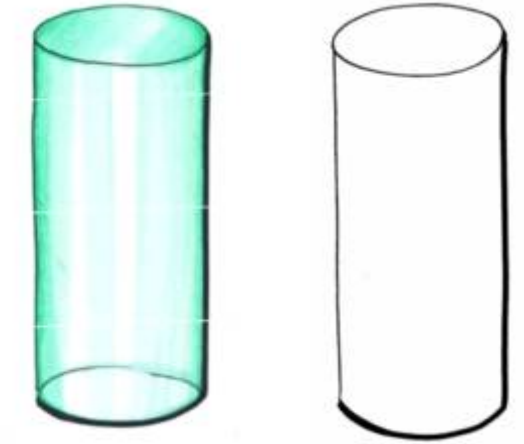
Low Gloss Material

- Uses: Metals, Low Gloss Plastics
- Leave highlighted areas white
- Equipment
  - Black fine line pen
  - Grey marker/ grey/ black pencils
  - White pencil



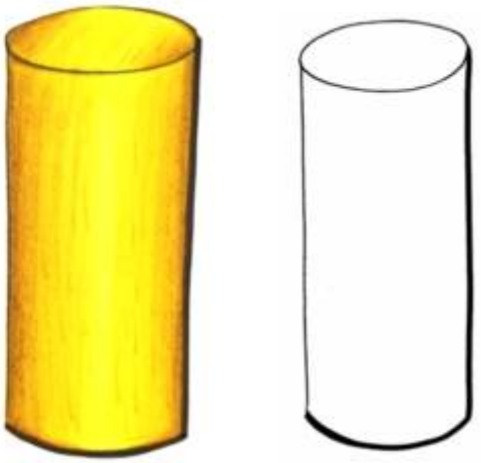
Transparent Material

- Uses: Glass, translucent plastics
- Minamal application of colour
- Draw inside detail
- Equipment
  - Black fine line pen
  - Aqua msrker/ aqua pencils
  - Chalk pastels
  - White pencil



Wood Effect

- Uses: Vary background colour to suit wood
- Use colouring pencil to layer tones
- Equipment
  - Black fine line pen
  - Yellow marker/ brown pencils
  - White pencil

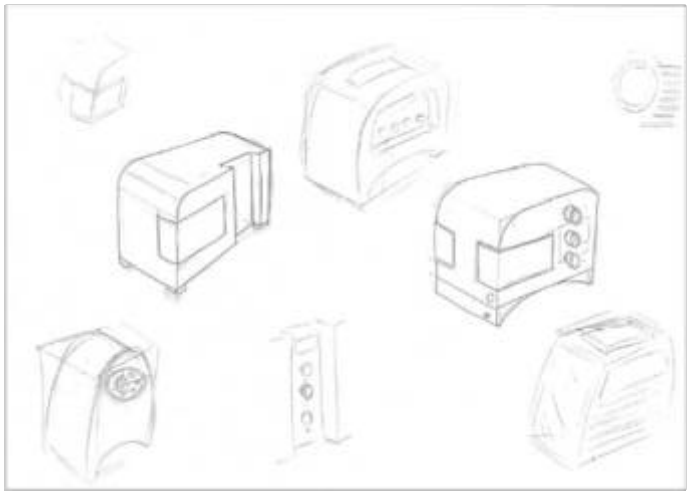


Tonal Exercise

- Choose ight source
- 3 surfaces, light, medium and dark.
- Marker base. Cool grey 1, 3, 4
- Layer with black colouring pencil.

Task: *Techniques to enhance design sheet layout*

1



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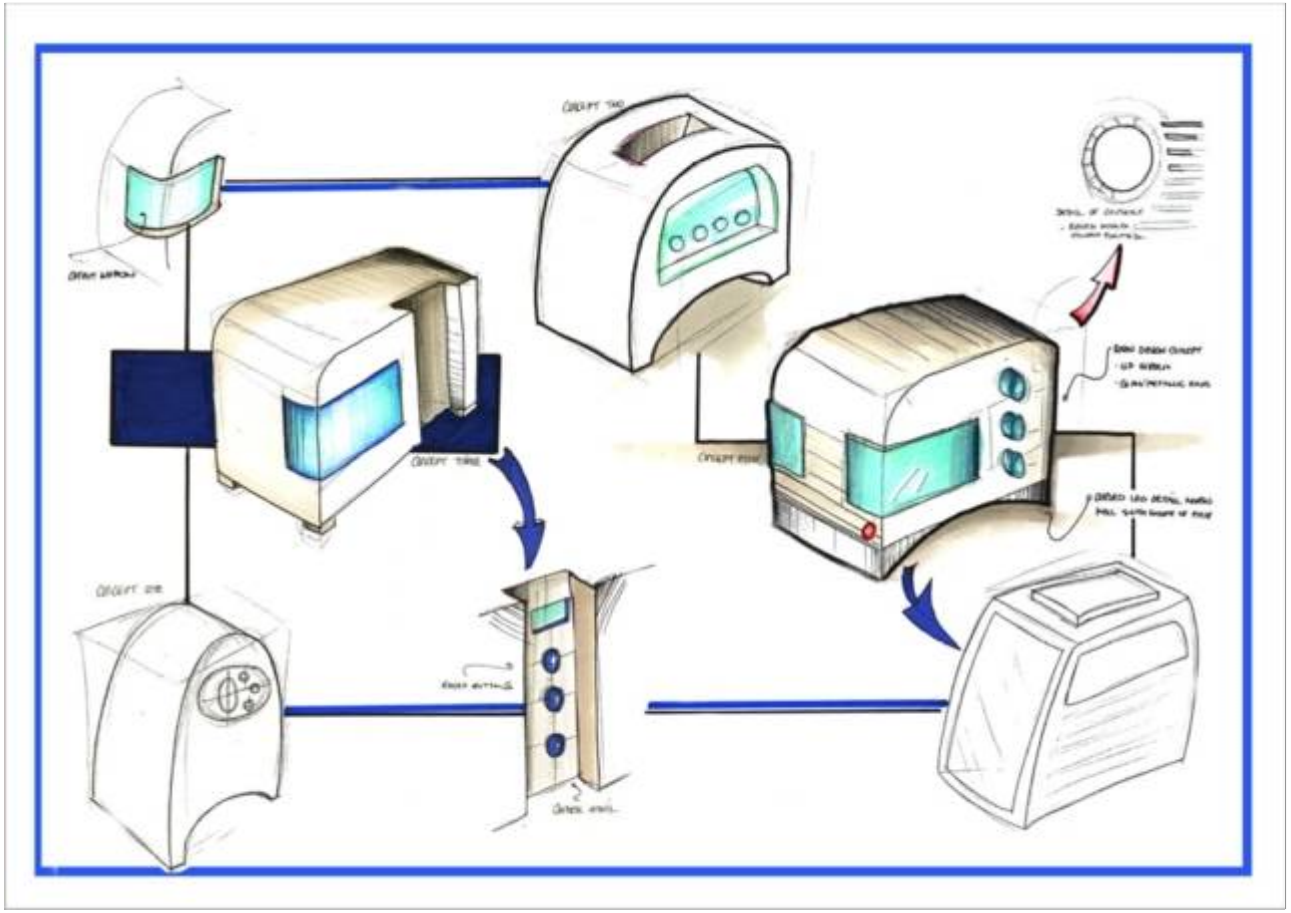
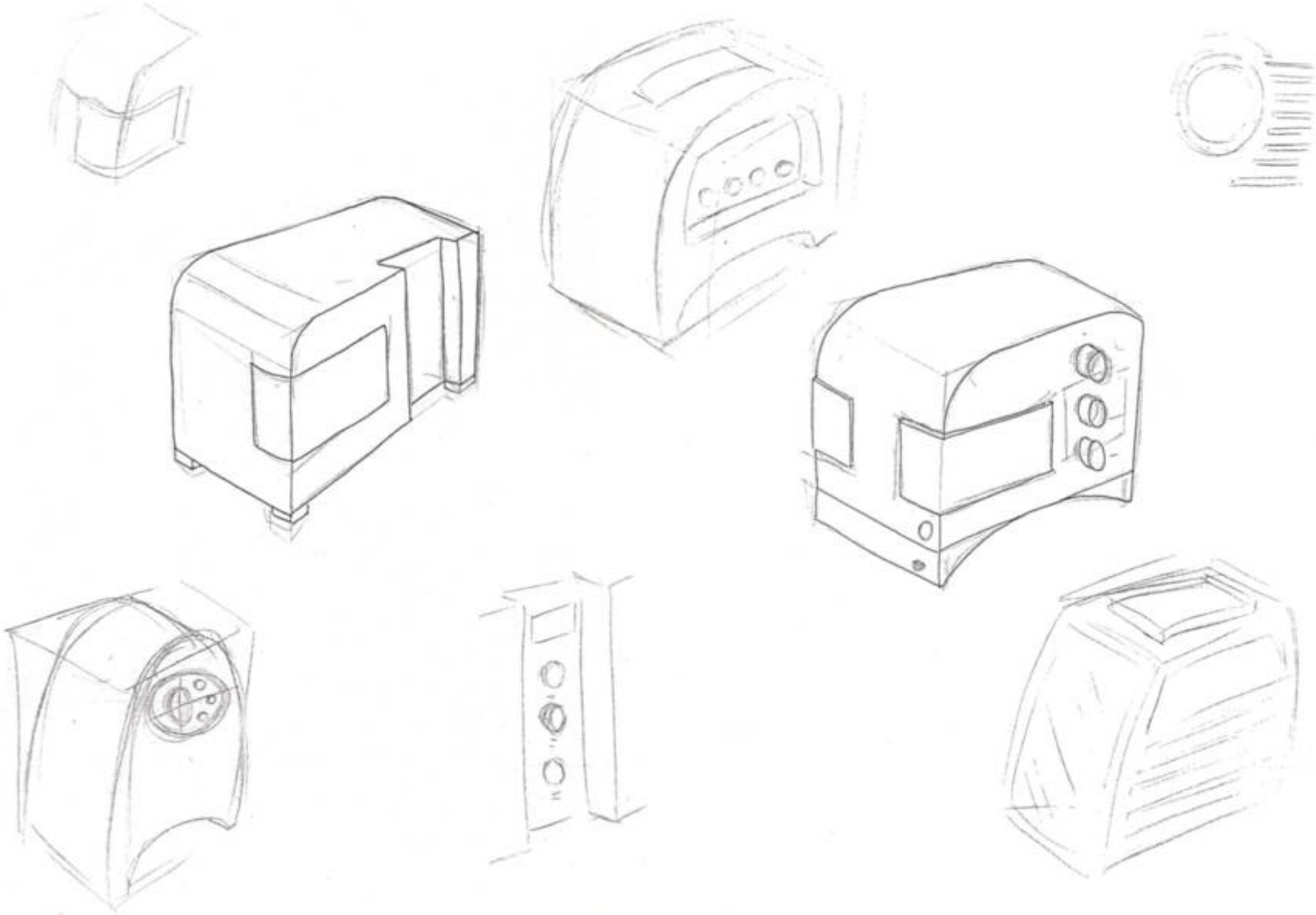
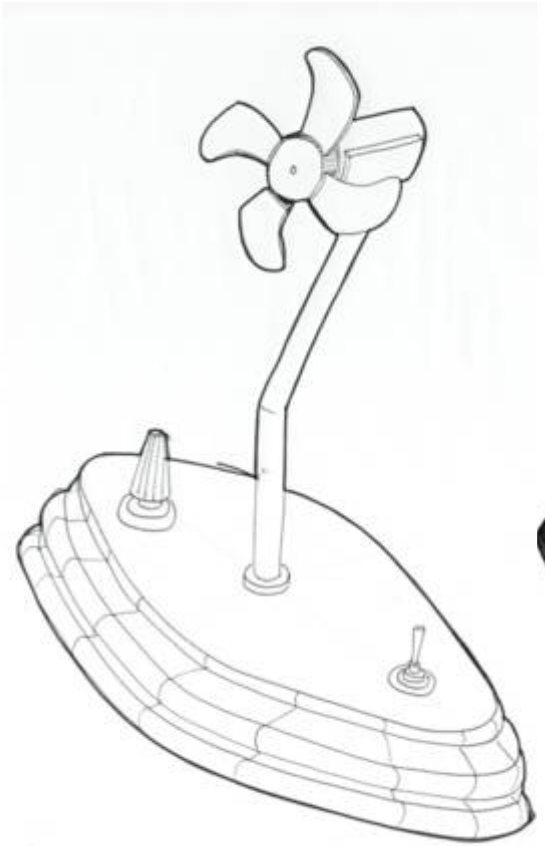


- Define Space – *Page Border*
- Use quick *sketching techniques* to communicate surface detail.
- Add *block boxes* to key sketches
- Link thought progression with *connecting Lines* and *graphic arrows*
- Limit *colour* range
- Add *Annotation* to explain design features

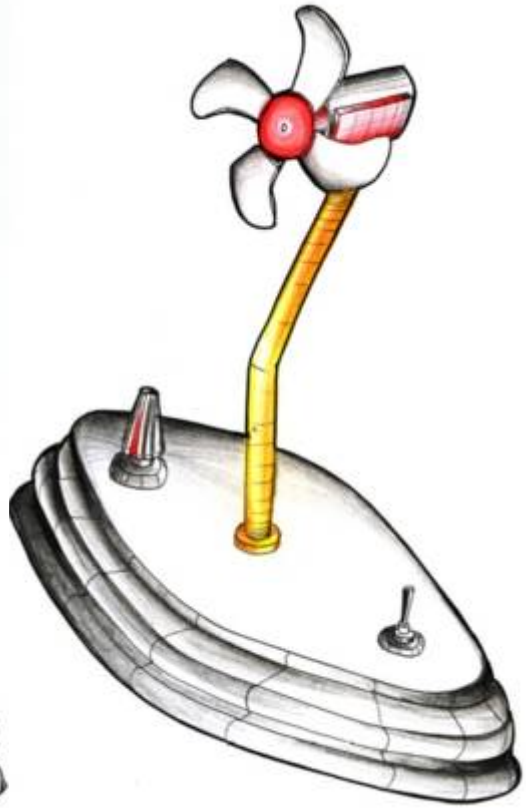


Task: *Pencil and Marker Rendering / Desk Fan Task*

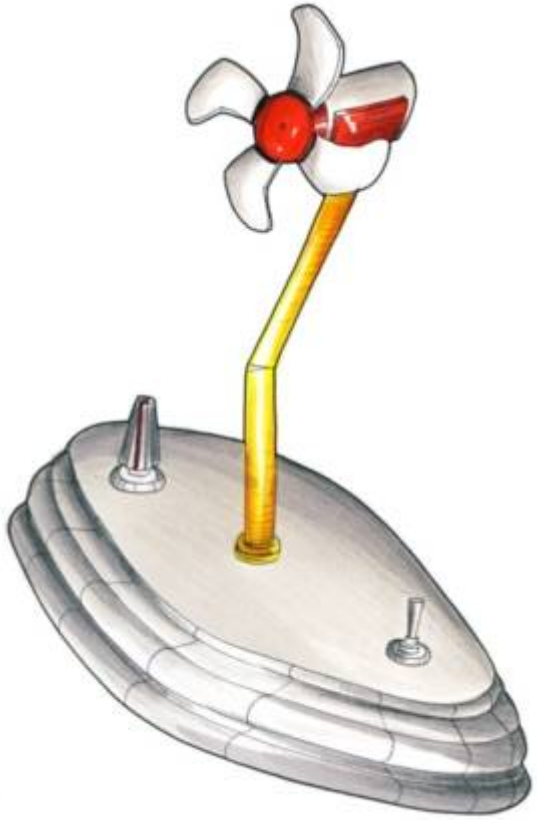
Colour Swatches



1. Fine Line and Black Outline

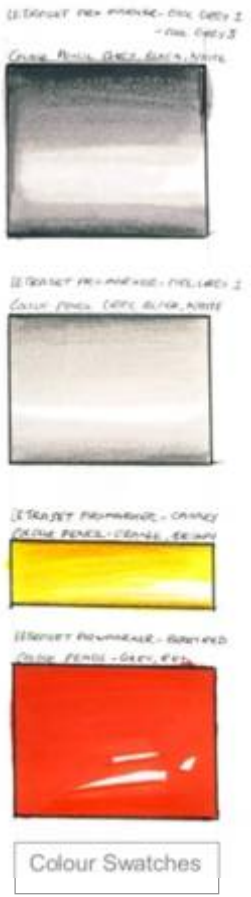


2. Colour Pencil Rendering

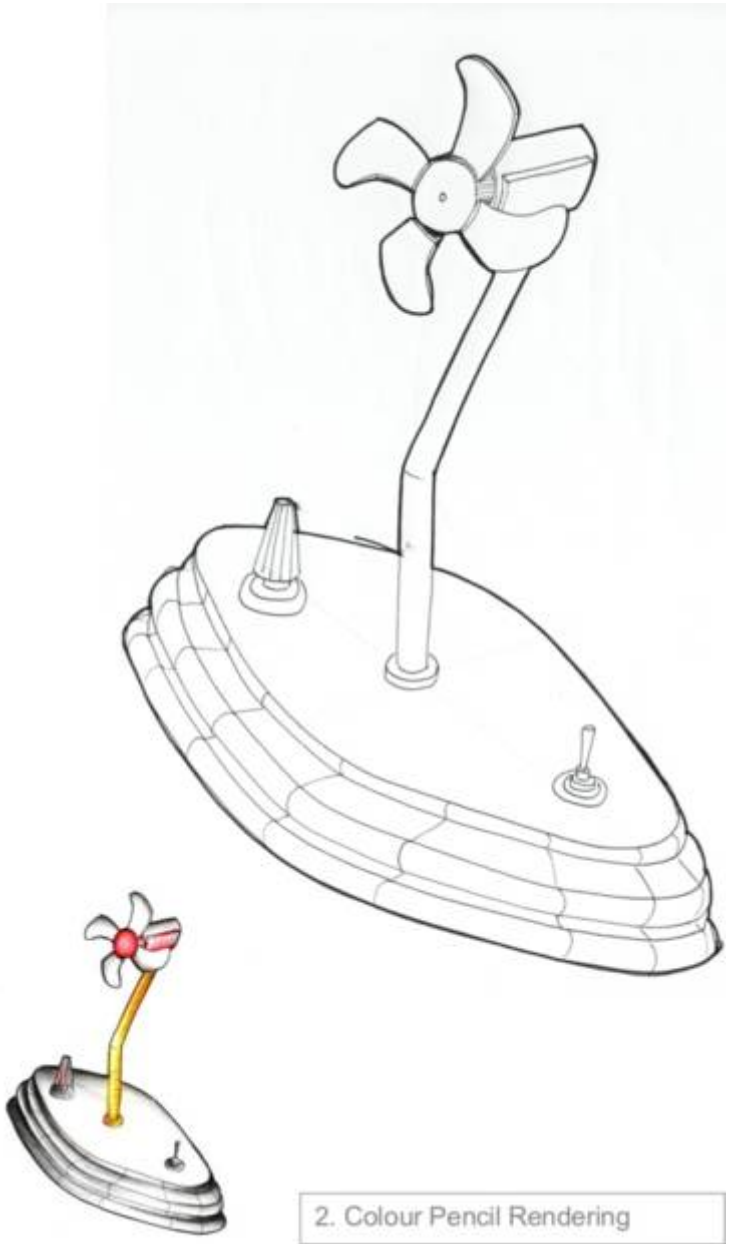


3. Pantone Marker Rendering

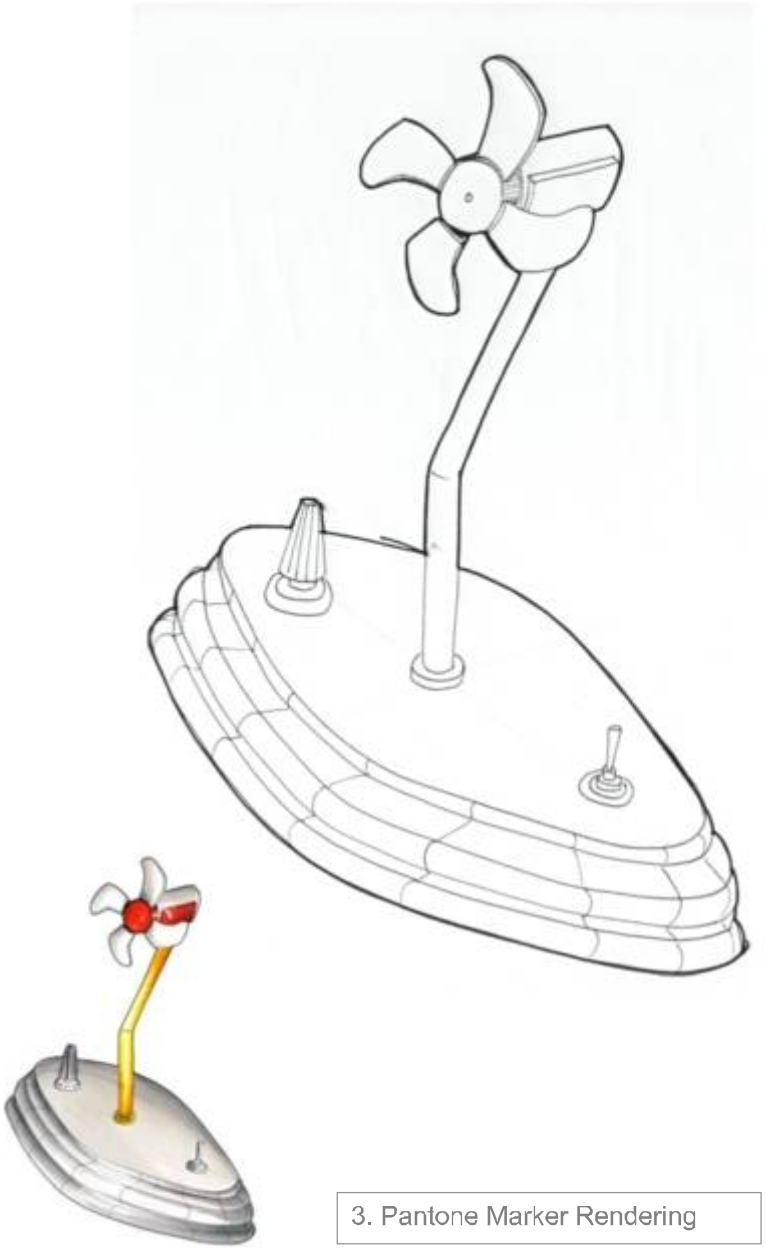
Task: *Pencil and Marker Rendering / Desk Fan Task Template Sheet*



Colour Swatches



2. Colour Pencil Rendering



3. Pantone Marker Rendering

Vehicle Drawing Task: Using crating and presentation techniques to develop a design idea.

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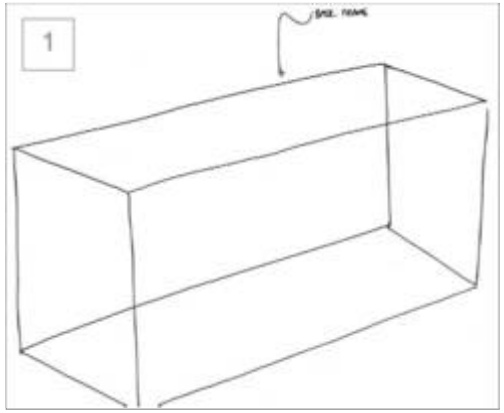
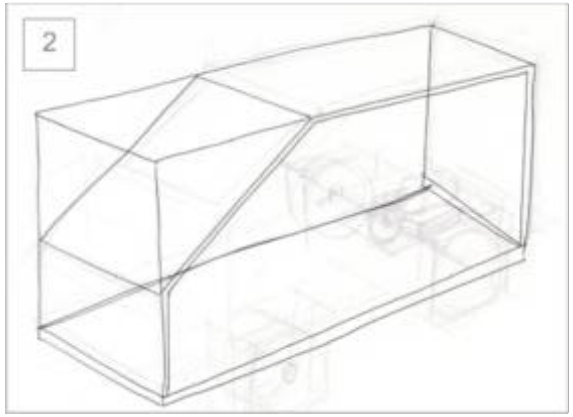
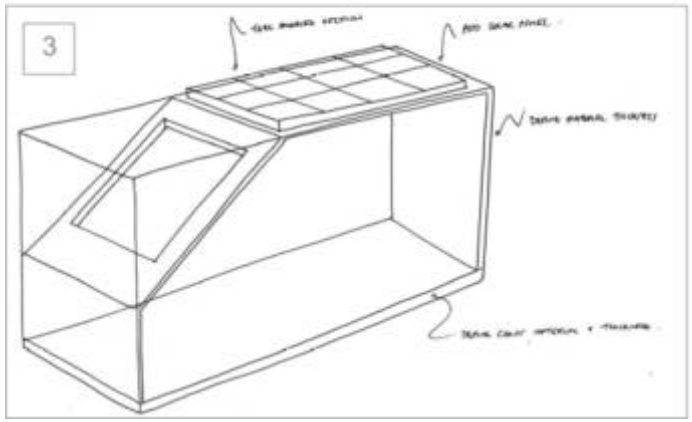
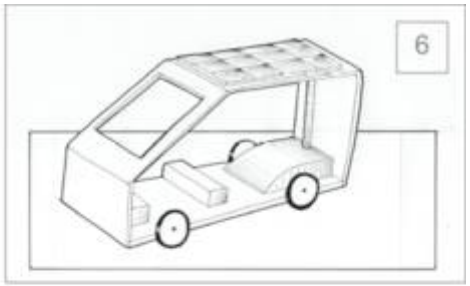
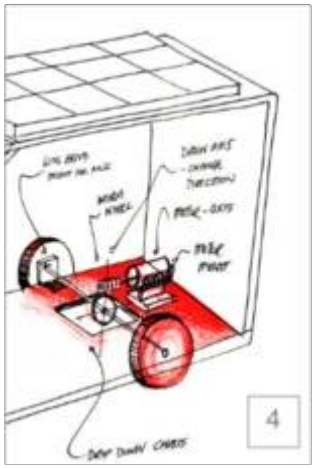


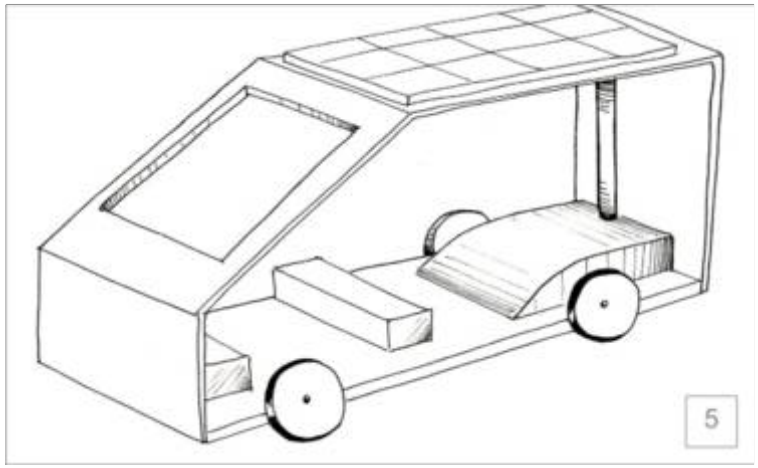


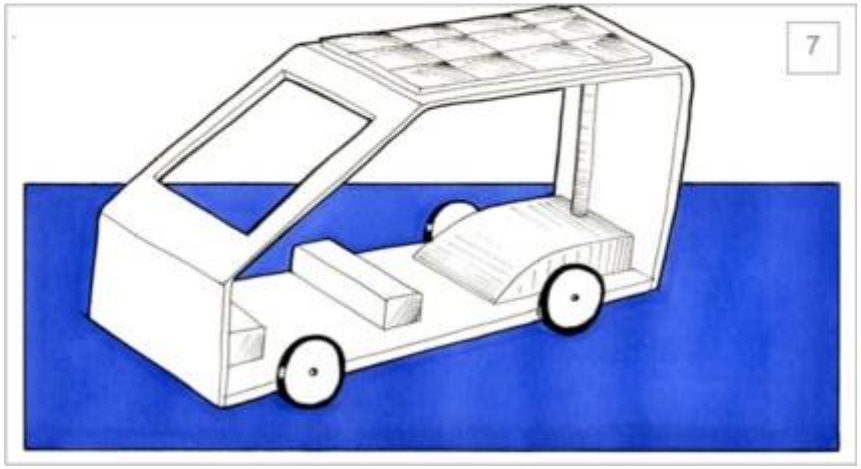


1. Create a light isometric crating frame, to establish the proportions of the design.
2. Subtract angled section. Add material thickness. Roughly sketch position of mechanical components.
3. Subtract cut out window. Add solar panel using contour lines.
4. Sketch mechanical components to ensure the design functions within the space provided
5. Add housing to conceal motor and mechanical workings. Add wheels and vertical tubing to housing wiring.
6. Use a background block to ground the sketch and to create definition
7. Use thick fine line pen, 0.7 around the outside of the vehicle. Apply colour to the inside of the block shape.









Vehicle Drawing Task: Using crating and presentation techniques to develop a design idea.

TECHNOLOGY SUBJECTS SUPPORT SERVICE

1

2

3

1. Create a light isometric crating frame, to establish the proportions of the design.
2. Subtract angled section. Add material thickness. Roughly sketch position of mechanical components.
3. Subtract cut out window. Add solar panel using contour lines.
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5. Add housing to conceal motor and mechanical workings. Add wheels and vertical tubing to housing wiring.
6. Use a background block to ground the sketch and to create definition
7. Use thick fine line pen, 0.7 around the outside of the vehicle. Apply colour to the inside of the block shape.

6

4

5

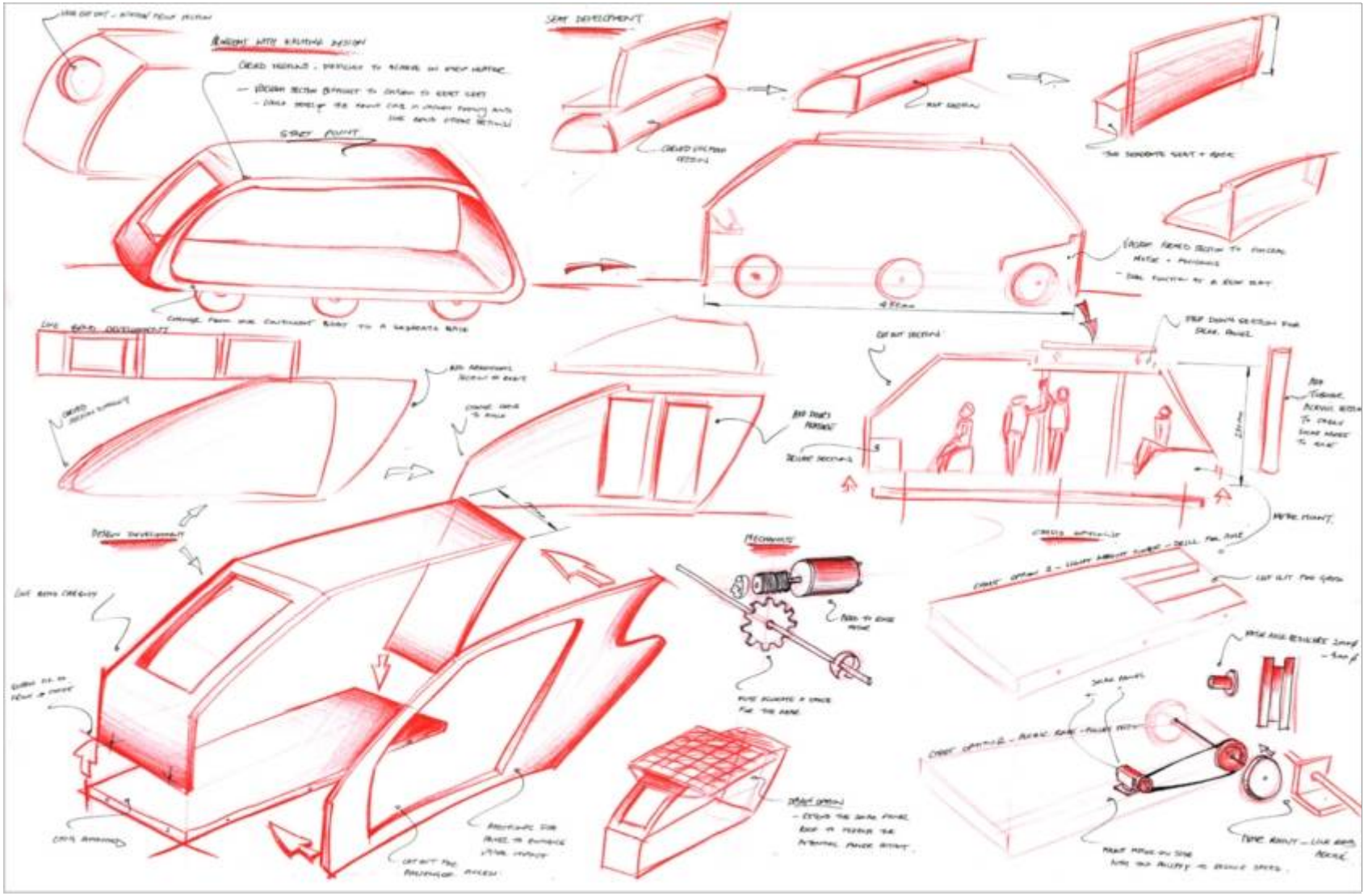
7

Communication and Graphic Media

Task: . *Guidelines for producing a concept development sheet.*

Using a combination of freehand sketches, annotation and technical illustration to communicate a concept's development.

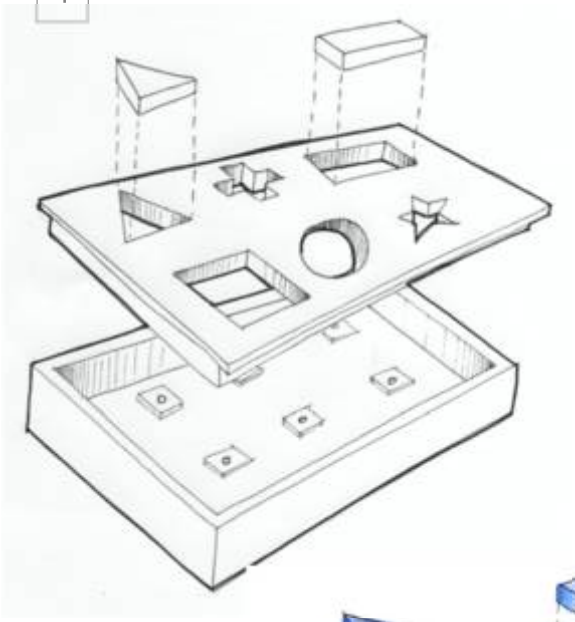
- Quick Tonal shading
- Minimal Colour scheme
- Arrows indicating progression
- Combination of ortho and iso views
- Descriptive Annotation
- Evaluation/ Constructive Criticism
- Connecting horizon lines
- Technical Sketching
- General Dimensions
- Add figures to interpret scale.
- Fill white space!

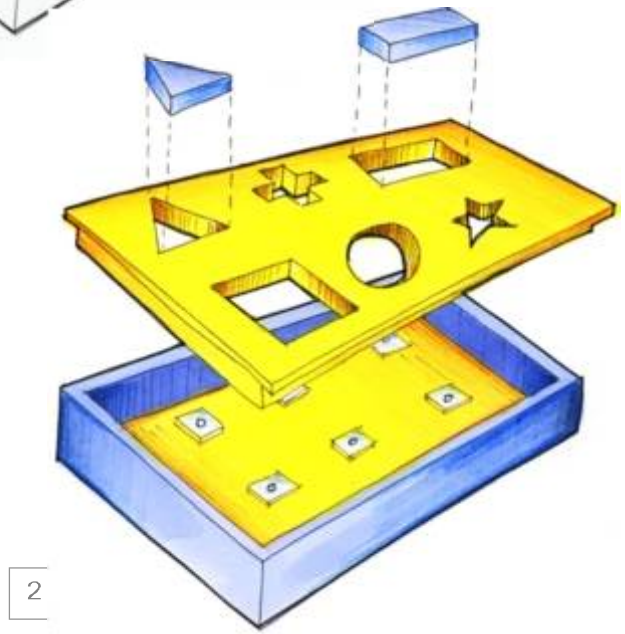


Task: Complete a page of concept designs and developments for a solar powered vehicle suitable for transporting ten passengers.

Task: *Exploded drawing task to communicate various components in a design idea.*

1





2

Communication and Graphic Media

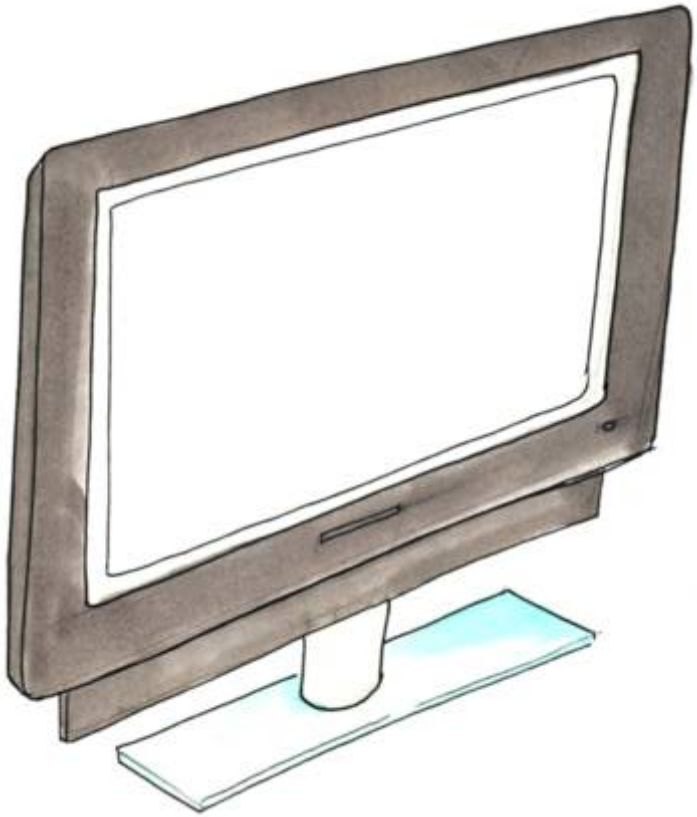
Task: TV Task - *Using rendering markers to present a design idea.*

1

Observe the object, notice shadows, highlights and changes in surface detail and materials.

To render:

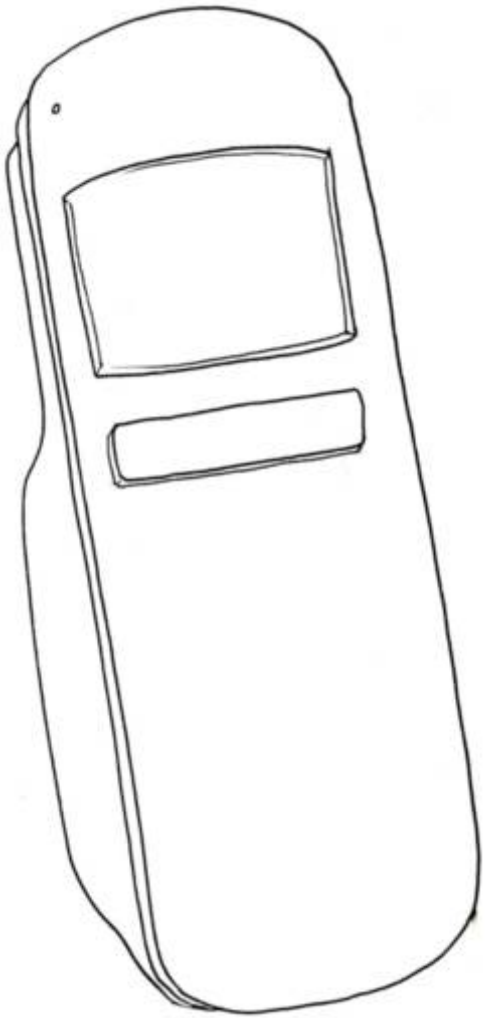
- Choose a light source direction
- Use cool grey 2 marker to block in dark areas
- When dry, reapply layering the marker to build up shadow areas
- Use aqua marker to block screen area. Leave streaks of white in the centre of the screen.
- Use colouing pencil to add texture and layer dark areas.
- Use white chalk pencil or tipex pen to emphasize highlighted details.



Task: *Phone Rendering Exercise – Choose light source, Decide shadows and Highlights, Layer colour.*

1

2



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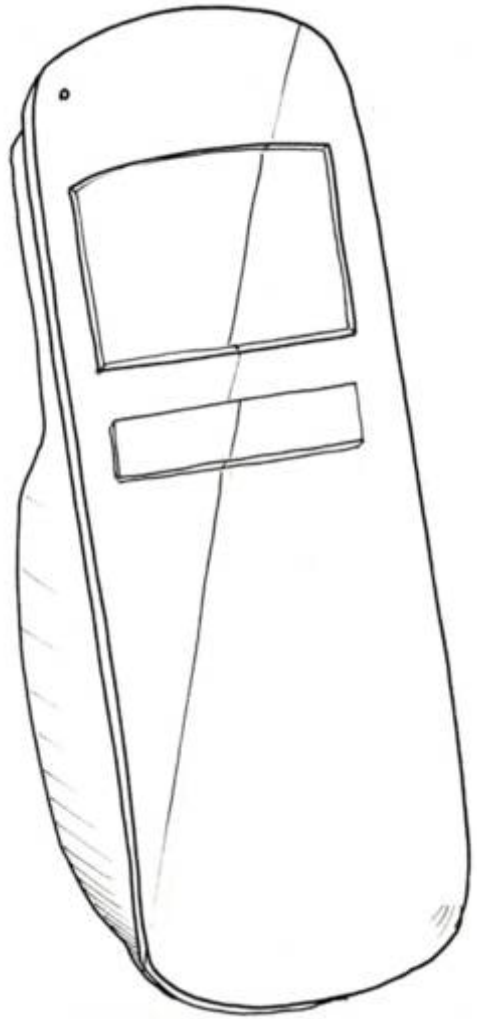
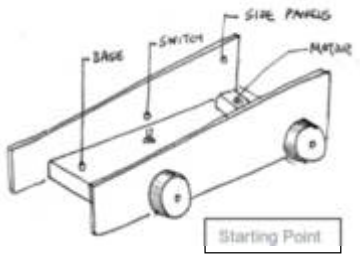


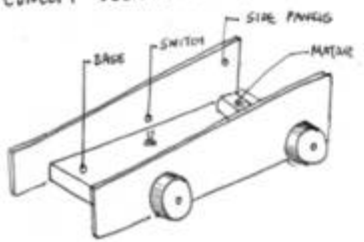
Concept Development Worksheet

Suggested areas to explore:

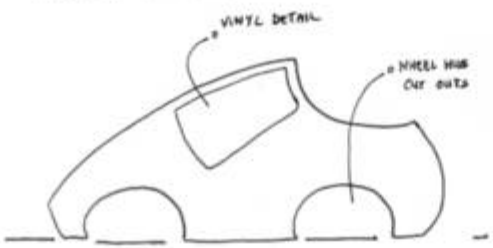
- *Possible mechanisms*
- *Electronics*
- *Frame and Structures*
- *Assembly and Manufacture*
- *Materials and Components*
- *Integrating electronics and access*
- *Aesthetics*
- *Design in context*



CONCEPT DESIGN - STAGE 1

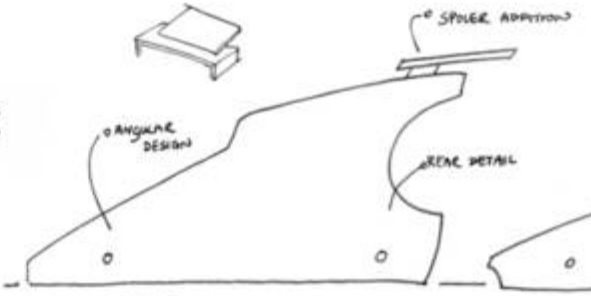


FRAME DEVELOPMENT



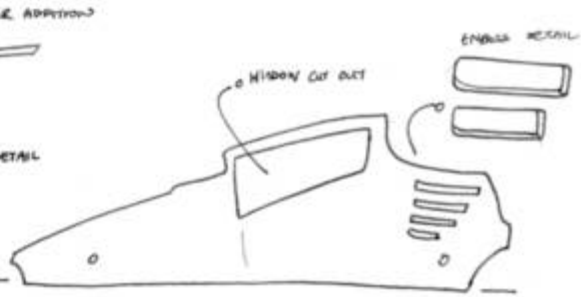
DESIGN IDEA 1.

- DIFFICULT TO FINISH INTERNAL CURVES
- ADDITION OF VINYL - ENHANCE STYLE
- WHEEL CUT OUT MAY INTERFERE WITH MOVEMENT.



DESIGN IDEA 2.

- OVERLY COMPLEX
- MINIMISE SPOILER - DECREASE FLUCTUATE
- REDUCE HEIGHT



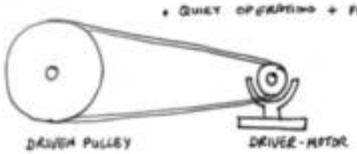
DESIGN IDEA 3.

- ADDITION OF WINDOW - ENHANCES
- USE COMPUTER TO CREATE ENGINE DETAIL
- INCREASE FRONT ANGLE AND CURVES

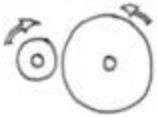
MECHANISMS

(1) PULLEY SYSTEM

- GROOVED WHEEL - REDUCE SLIP
- QUIET OPERATION + FLEXIBILITY

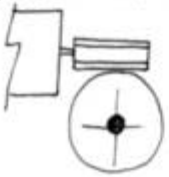


(2) GEAR ROTATION SYSTEM



- SIMPLE GEAR CHAIN
- LOSES WITH SPACE
- ACCURACY + FRICTION

(3) WORM + WORM WHEEL

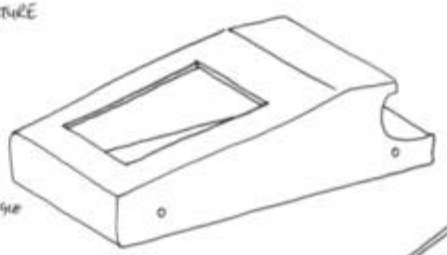


- TRANSFERS MOTION 90°
- HIGH GEAR RATIO
- BASE NEED TO BE MODIFIED

ASSEMBLY + FRAME MANUFACTURE

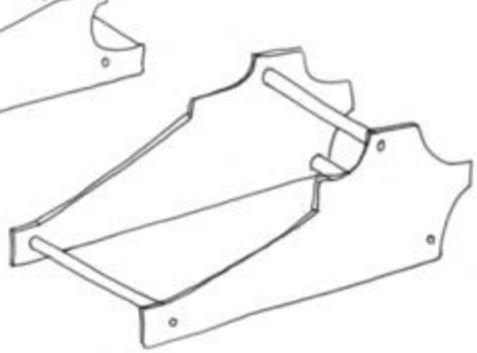
DAY 1 - VACUUM FORM INTERNAL

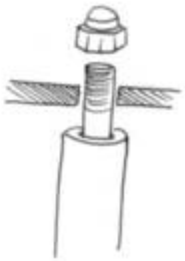
- WINDOW DETAIL TO SEE HOUSINGS + MOTOR
- DIFFICULT TO FINISH SIDES
- NEED TO INCLUDE DRAFT ANGLE



DAY 2 - SIDE PANEL - CAD CAM

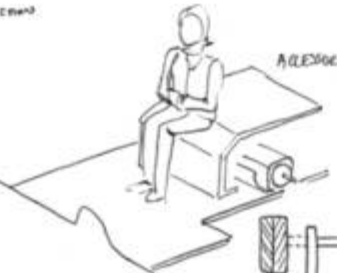
- LINE BEND + LIQUID CEMENT MOTOR MOUNT
- AXLE HOLDER - THREADED ROD + SHOULDERS + BOLT
- VISUAL DETAIL + HOUSINGS BOUGHT





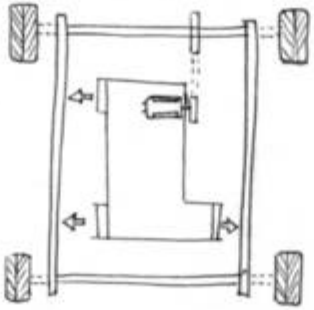
MOTOR MOUNTING OPTIONS

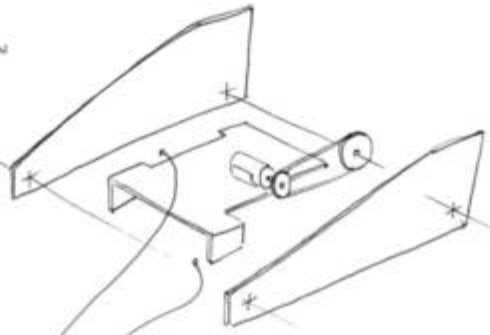
OPTION 1 - GEARING SYSTEM + LINE BEND AXLE SUPPORTS



ACCESSORY - INTERCHANGE LINE DEVELOPMENT SEAT + MOTOR COVERING

OPTION 2 - PULLEY SYSTEM

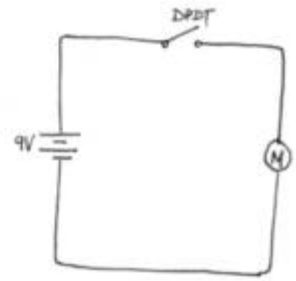




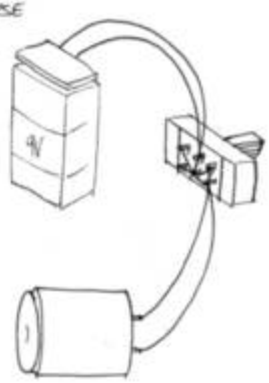
LINE BEND + LIQUID CEMENT

CUT OUT TO FEED ELECTRONICS

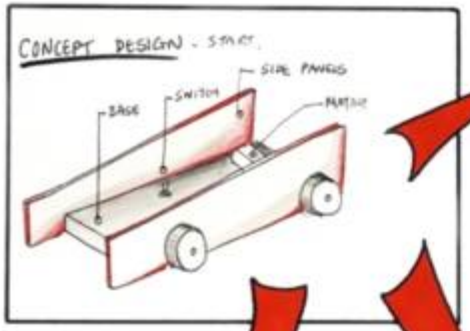
ELECTRONICS - FORWARD/REVERSE



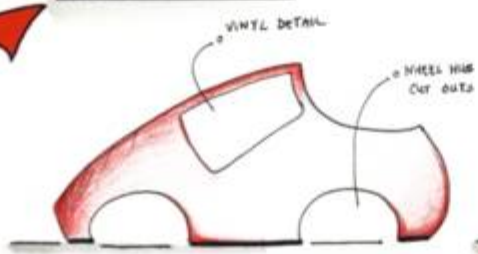
- MAINTAINING WIRING
- USE CUTOUT ON MOTOR MOUNT TO CONCEAL WIRING.



CONCEPT DESIGN - STAGE 1

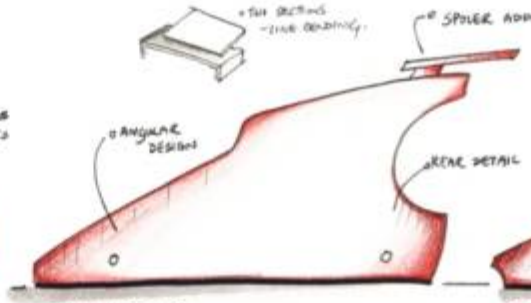


FRAME DEVELOPMENT



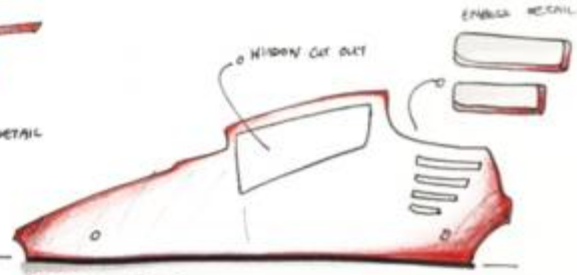
DESIGN IDEA 1.

- DIFFICULT TO FINISH INTERNAL CURVES
- ADDITION OF VINYL - ENHANCE STYLE
- WHEEL CUT OUTS MAY INTERFERE WITH MOVEMENT.



DESIGN IDEA 2.

- OVERALL SIMPLER
- MINIMISE SPOILER - DECREASE FLUCTUATIONS
- CENTRE MOUNT

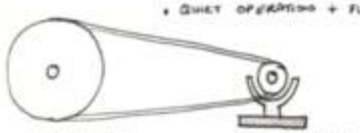


DESIGN IDEA 3.

- ADDITION OF WINDOW - ENHANCES
- USE CAMBER TO CREATE ENGINE METAL
- INCREASE REAR ANGLE AND CURVES

MECHANISMS

① PULLEY SYSTEM
- GROOVED WHEEL - REDUCE SLIP
- QUIET OPERATIONS + FLEXIBILITY



② GEAR RATIO SYSTEM

- SIMPLE GEAR CHAIN
- ITCHING WITH SPACE
- ACCURACY + FRICTION

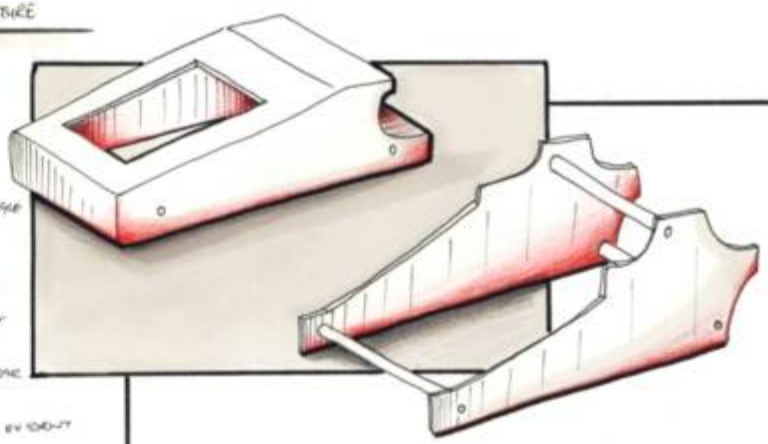
③ WORM + WORM WHEEL

- TRAVELS MOTION 90°
- HIGH GEAR RATIO
- LARGE AREA TO BE MAINTAINED

ASSEMBLY + FRAME MANUFACTURE

OPT 1 - VACUUM FORM MATERIAL
- WINDOW DETAIL TO SEE MECHANICS + MOTOR
- DIFFICULT TO PUSH SIDES
- NEED TO INCLUDE DRAFT ANGLE

OPT 2 - SIDE PANEL - CAD CAM
- LINE BEND + LIQUID CEMENT MOTOR MOUNT
- AXLE DIVIDER - TRIANGLED EDGE + SHRINK FILM + BOLTS
- VISUAL DETAIL + MECHANICS EVIDENT

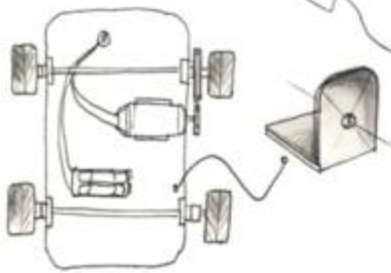


OPTION 2 - ASSEMBLY

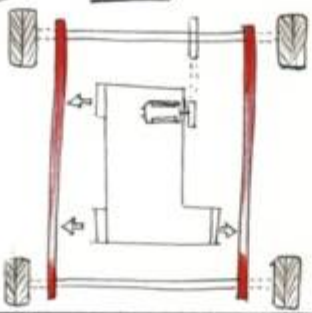
MOTOR MOUNTING OPTIONS

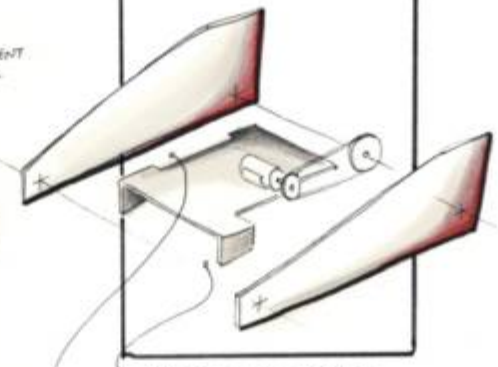
ACCESSORY - INTERIOR LINE DEVELOPMENT SEAT + MOTOR COVERING

OPTION 1 - GEARING SYSTEM + LINE BEND AXLE SUPPORTS



OPTION 2 - PULLEY SYSTEM

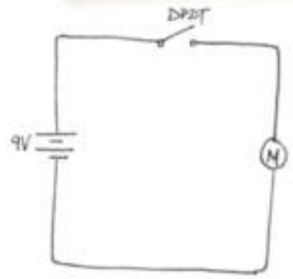




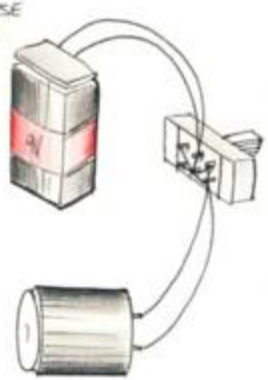
LINE BEND + LIQUID CEMENT

CUT OUT TO FEED ELECTRONICS

ELECTRONICS - FORWARD/REVERSE

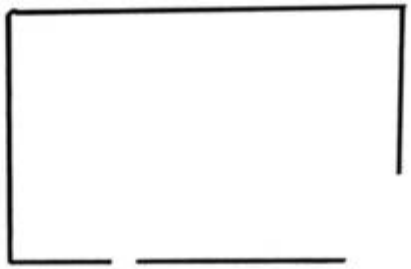


- MAINTAINING WIRINGS
- USE CIRCUIT ON MOTOR MOUNT TO CONCEAL WIRING.



FINAL DEVELOPED DESIGN

ASSEMBLY



MATERIALS + COMPONENTS

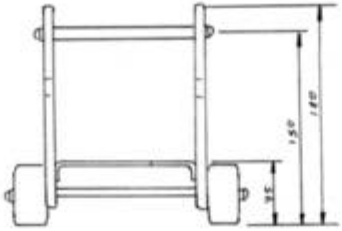
ORTHOGRAPHIC DRAWING

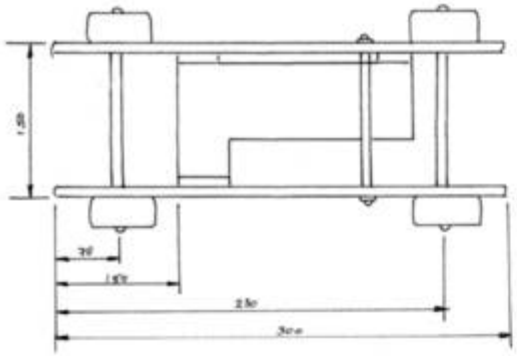
MECHANISM - PULLEY DOVE

HOUSING DEVELOPMENT - SUPPORT ELECTRONICS + MECHANISMS

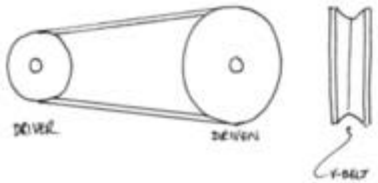
FINAL DEVELOPED DESIGN

ORTHOGRAPHIC DRAWING

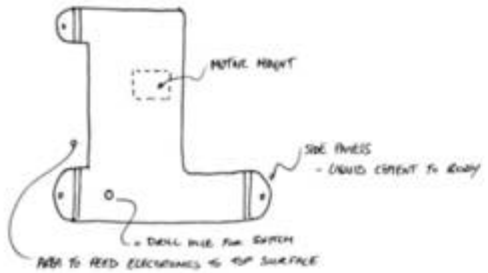




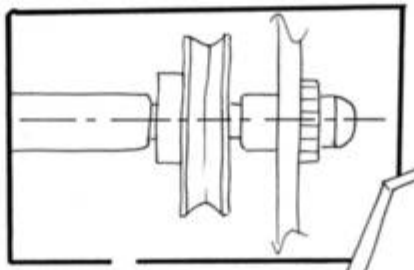
MECHANISM - PULLEY DRIVE - 2:1 RATIO



HOUSING DEVELOPMENT - SUPPORT ELECTRONICS + MECHANISMS



ASSEMBLY

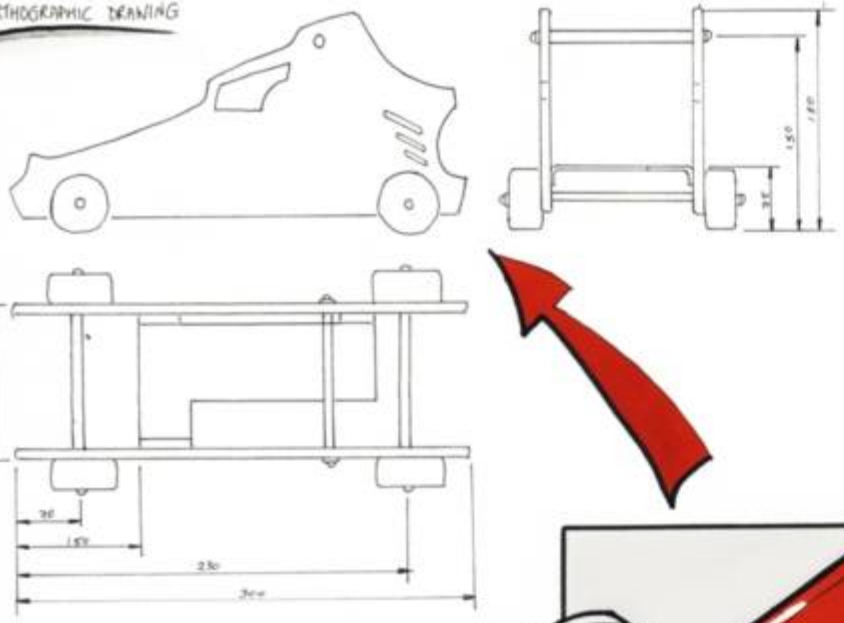


MATERIALS + COMPONENTS

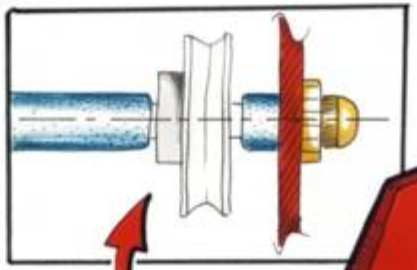
- SIDE PANELS - 300 x 180 x 5mm ACRYLIC
- MOTOR HOUSING - 110 x 140 x 5mm ACRYLIC
- ELECTRONICS - TOGGLE SWITCH - DPDT, MOTOR, BATTERY HOLDER + CLIP, 9V BATTERY
- COMPONENTS - PULLEY SYSTEM, V-BELT, 4 x NO. BEARD FLAT + BOLT, SHRINK WRAP

FINAL DEVELOPED DESIGN

ORTHOGRAPHIC DRAWING



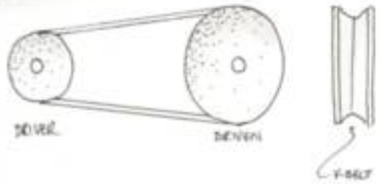
ASSEMBLY



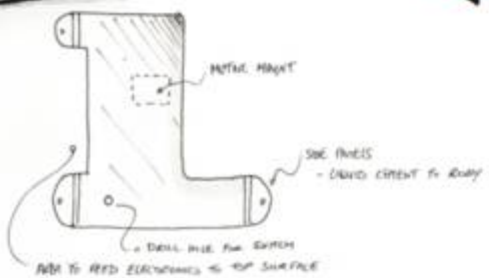
MATERIALS & COMPONENTS

- SIDE PANELS – 300 x 150 x 5MM ACRYLIC
- MOTOR HOUSING – 110 x 140 x 5MM ACRYLIC
- ELECTRONICS – TOGGLE SWITCH – DPDT, MOTOR, BATTERY HOLDER + CLIP, 9V BATTERY
- COMPONENTS – PULLEY SYSTEM, V-BELT, 4 x NO. BEMS NUT + BOLT, CHASSIS WHEEL

MECHANISM – PULLEY DRIVE – 2:1 RATIO



HOUSING DEVELOPMENT – SUPPORT ELECTRONICS + MECHANISMS



3D REPRESENTATION