

## National 5 Design and Manufacture - Exploration

<p>What is exploration and how does it differ from refinement?</p>	<p>Exploration is the ability to investigate a range of alternatives to different aspects of a design. Exploration requires divergent thinking which is generally creative, risk taking and non-linear. Refinement however requires convergent thinking that focusses on the facts and finding the correct answer.</p>
<p>What does good exploration look like?</p>	<p>Good exploration:</p> <ul style="list-style-type: none"><li>◆ evolves the solution</li><li>◆ makes use of the specification to consider alternatives for a range of different aspects of the product</li><li>◆ show clear consideration of alternatives</li></ul> <p>In other words, there is evidence of</p> <ul style="list-style-type: none"><li>◆ several pathways and dead ends</li><li>◆ alternatives in the various layers of how something works, looks etc.</li><li>◆ experimenting with new ideas, consideration of alternatives for a range of points in the specification, important to evolving the proposal.</li><li>◆ sufficient alternatives to facilitate decision making</li></ul>
<p>Why do you need to explore if you have a good idea that you like?</p>	<p>Exploration assumes that the optimal solution is unknown. Exploring allows you to investigate alternatives and develop a better understanding about the product you are designing by evaluating alternatives that will better inform your decision making to evolve the idea into the best solution. With nothing to compare or test against- you are limiting your opportunity in other areas of the assignment, generally using graphics, modelling and application of knowledge (20 available marks). Remember to record all the bad ideas on paper too- don't filter them out in your head.</p>

**NOTE:** The following tasks are designed as skill builders. They should be used to introduce/develop a candidates skills in exploring and applying knowledge, prior to working on a design task.  
Candidates can complete the task in 2D or pictorial but will require some basic skills in graphics.  
The tasks can also be adapted to teach exploring using modelling.

**Task 1: Exploring visual aspects and pathways**

**Resources**

Visual for starting point (exploration task 1)  
1 x A3 sheet of paper each  
Pencils  
Something to split paper into 8 (ruler, scissors, trimmer)

**Task 2: Exploring by applying design knowledge**

**Resources**

Visual for starting point (exploration task 2)  
Specification for exploration task 2  
1 x A3 sheet of paper each  
Pencils  
Something to split paper into 8 (ruler, scissors, trimmer)

**Task 1: Exploring visual aspects and pathways**

Stage	Time(m)	instruction	Observation/comments
Preparing paper	2	Fold paper in half to A4 size, then again to A5 and finally to A6. Now open and cut/tare paper along the folds into 8 pieces.	
Sketching starting point	2	Quickly sketch the product on one of your pieces of paper	Sketches can be in 2D or pictorial. Difficulty to match candidate ability but starting point must allow scope for change and pace.

Exploring	20	<p>I am now going to give you instructions to help you explore your idea. You will only have 2 minutes to sketch the changed idea on another small piece of paper.</p> <ol style="list-style-type: none"> <li>1. Change the initial idea by using symmetry</li> <li>2. Now on your third piece of paper explore the idea by rotating something to make a change.</li> <li>3. On your 4<sup>th</sup> piece change the proportion of a part/ parts</li> <li>4. Now incorporate a curve/ curves</li> <li>5. On your 6<sup>th</sup> piece change the shape of a part/parts</li> <li>6. Now explore by adding or removing material or parts</li> <li>7. Finally, on your last piece change the angle of a part/ parts</li> </ol>	<p>Time per sketch should be adapted based on the candidates' graphic ability. Max 5 minutes per sketch.</p> <p>This task can also be used to teach how to explore using models.</p>
Reflecting and developing understanding	10	<p>Lay out your pieces showing your path of exploration.</p> <p>Ask candidates to consider the following:</p> <ul style="list-style-type: none"> <li>◆ <b>Are there clear changes/alternatives in your exploration?</b></li> <li>◆ <b>Have you used more than one pathway?</b></li> <li>◆ What decisions were you making when selecting a starting point?</li> <li>◆ Is the best idea the last? What idea is the best and why?</li> <li>◆ What further improvements could be made?</li> </ul>	<p>Ask the candidates to tape together and add arrows (pathway)</p> <p>Look for differences in approach and explain the different skills for linear <b>convergent thinking</b> and wide <b>divergent thinking</b>.</p> <p>Use the questions/answers to introduce:</p> <ul style="list-style-type: none"> <li>◆ application of design knowledge</li> <li>◆ superficial and meaningful exploration</li> </ul>

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**Task 2: Exploring by applying design knowledge**

Stage	Time(m)	Instruction	Observation/comments
Preparing paper	2	Fold paper in half to A4 size, then again to A5 and finally to A6. Now open and cut/tare paper along the folds into 8 pieces.	
Sketching starting point	4	<p>Quickly sketch the product on one of your pieces of paper</p> <p>Add the annotation which adds clarity and shows application of knowledge.</p>	<p>Sketches can be in 2D or pictorial. Difficulty to match candidate ability but starting point must allow scope for change and pace.</p> <p>Explain the difference between annotation that labels or adds info and application of knowledge.</p>
Exploring	30	<p>I am now going to give you instructions to help you explore your idea. You are looking to develop the best solution so can use any one of your previous sketches as a starting point. You must make use of the specification to apply design knowledge and annotations that add clarity <b>when developing this idea towards a proposal.</b></p> <p>You will only have 4 minutes to sketch each changed idea on another small piece of paper.</p> <ol style="list-style-type: none"> <li>1. Using 2 pieces of paper show me 2 alternatives for how/where this product could hold the items.</li> <li>2. Now show me two ways that a jungle theme could be incorporated into the solution</li> <li>3. Finally show me two ways that you could improve the practical skills required to manufacture the product</li> </ol>	<p>Time per sketch should be adapted based on the candidates' graphic ability. Max 5 minutes per sketch.</p> <p>(Prompt candidates when they need to move onto the next sketch). Also encourage annotation re other spec points (link between changes)</p> <p>To explore function, you could use prompts such as (in, on, hanging, under, over...)</p> <p>To explore theme, you could use prompts such as (creatures, plants, pattern, shape...)</p> <p>To explore practical skill required you could use prompts such as (forming, shaping, joining methods, split into parts.... Change material...change solid to frame etc...)</p>

Reflecting and developing understanding	10	<p>Lay out your pieces showing your path of exploration.</p> <p>Ask pupils to consider the following:</p> <ul style="list-style-type: none"> <li>◆ <b>Are there clear changes/alternatives in your exploration?</b></li> <li>◆ <b>Have you used more than one pathway?</b></li> <li>◆ <b>Did you use any of the methods from the previous task?</b></li> <li>◆ How well was your decision making based on the specification?</li> <li>◆ How well did you record your decision making?</li> <li>◆ How did your functional changes impact other aspects?</li> <li>◆ What further improvements could be made?</li> </ul>	<p>Ask candidates to tape together and add arrows (pathway)</p> <p>Look for differences in approach and explain the different skills for linear <b>convergent thinking</b> and wide <b>divergent thinking</b>.</p> <p>Use the questions/answers to discuss:</p> <ul style="list-style-type: none"> <li>◆ application of design knowledge</li> <li>◆ how one change impacts other aspects of the design</li> <li>◆ superficial and meaningful exploration</li> <li>◆ importance of recording your decisions</li> </ul>
Proposal	5	Use the final pieces of paper to sketch an amended solution and indicate any refinement activity that would need to take place.	