Deconstruction and Design (Scientific Studies)

One of the science inquiry skills for which students need to provide evidence is being able to deconstruct a problem to determine the most appropriate method for investigation. This is a problem for which the outcome is uncertain.

The first part of a deconstruction involves breaking down a problem into manageable parts in order to find a solution.

This leads to consideration of the factors that may affect the solution to the problem and how they may affect the solution.

When deciding on a specific factor to investigate or the particular design for a prototype, students justify their proposed method to be used to test the factor or to justify the shape/structure/materials for a prototype. This may require some research or initial trialling to provide the evidence for the justification.

The flow diagram on page **2** illustrates the steps in a deconstruction.

Frequently Asked Questions

What is the best way to present evidence of the deconstruction?

* There is no specified format. Tables and flow diagrams provide a concise way to provide this kind of information.

What could be included in the evidence of deconstruction?

* Students should list some factors that could be investigated, how they could measure changes in these variables, other factors can be controlled or not controlled, why they have selected their independent variable and some justification for the various steps in their procedure. Students could describe expected results. The justification may be in the form of text box annotations or text of a different colour.

Can a deconstruction or design be completed as a group activity?

* In Scientific Studies, students working on the Collaborative Inquiry Task will work as a group on the deconstruction. They record individually, in a personal journal, their initial thinking, ideas, and their individual deconstruction of the problem.
* In a Science Inquiry Skills Task, students may deconstruct a problem individually or as a group, but each student will need to present their own evidence.

# **DECONSTRUCTING A PROBLEM AND DESIGNING PRACTICAL INVESTIGATIONS**

Investigate the smaller parts (e.g. variables or factors) and consider their impact and importance to the problem or solution.

Design: aim, hypothesis/ investigable question, independent and dependent variables, factors controlled/uncontrolled, method, results table etc.

Prototype: sketches, shape, size, materials, tools, cost, modelling, etc.

Suggest how to investigate one prioritised component and consider potential solutions that may be found by this investigation. [Scientific Method]

Suggest which factors are most significant when considering the design for a prototype. [Engineering]

How will the other factors be controlled or are there factors that may not be able to be controlled?

Determine if the problem is solved: what would be observed and what would be measured?

Deconstruction leads to design of an appropriate method.

Partial Deconstruction

Prioritise the components - how is each one related to the problem? Which component(s) are likely to enable a solution(s) to be found? Can they be investigated/tested?

Conduct Investigation / test prototype, collect results and complete task.

Note: Teacher determines the problem. This provides opportunity for students to investigate a hypothesis or an investigable question for which the outcome is uncertain.

**1**1

Which component will influence the outcome the most?

Refine ideas.

Which components will have an impact on the solution?

Specify and simplify the problem

Breakdown into smaller parts (components)

Brainstorming

**3**

What is the problem?

The Problem

**2**