Desirable features

High-quality performance is evidenced by:

- well-structured and sequenced explanations and enlightening illustrations that relate, accurately and in depth,
  - concepts in the mathematical sciences, to
  - the shapes and important associated attributes, of:
    - (i) something from nature; and
    - (ii) mechanical and non-mechanical man-made objects in various stages of their evolution.
- harnessing of concepts in the mathematical sciences to devise an original and credible adaptation shown to meet a new purpose or situation or an additional condition.

Acceptable performance (successful task completion) is evidenced by:

- demonstrated appreciation of how concepts in the mathematical sciences are useful in describing something from nature and man-made objects, and their attributes.
- an adaptation that meets a new purpose or situation or an additional condition.

YEARS 7–9

TASK #7 alternative

The Shape We're In

New Basics referents

Life pathways and social futures

- Developing initiative and enterprise

Multiliteracies and communications media

- Mastering literacy and numeracy

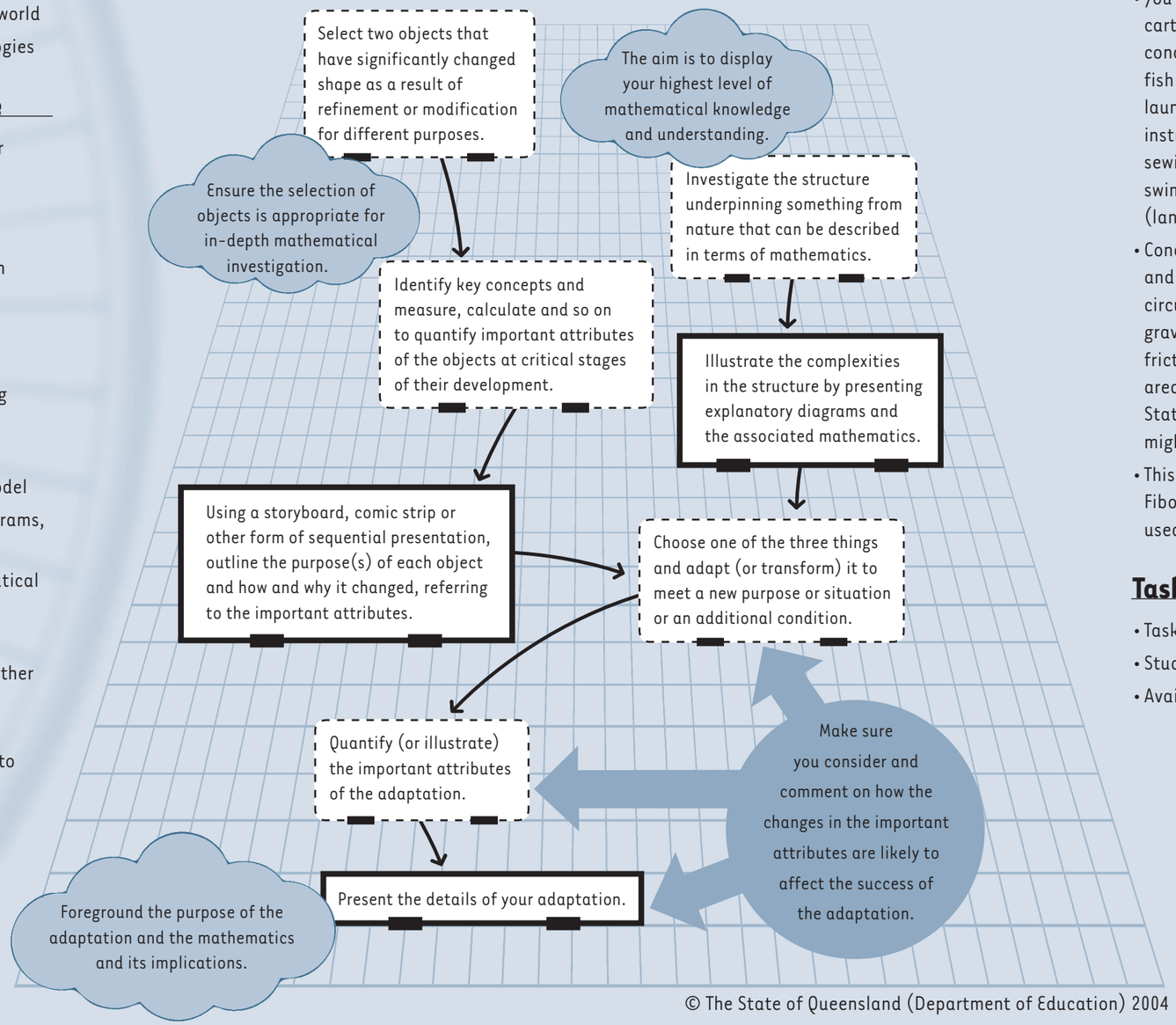
Environments and technologies

- Developing a scientific understanding of the world
- Working with design and engineering technologies

Targeted repertoires of practice

- Adapting something to meet a new purpose or situation or an additional condition
- Analysing physico-mathematical and mathematical relationships in different ways
- Comparing and contrasting ideas/information
- Estimating, measuring and calculating
- Identifying and dealing with shapes, their properties, and their constructions
- Identifying, creating, analysing and extending patterns
- Mensuration
- Predicting on the basis of a mathematical model
- Presenting complex ideas simply e.g. via diagrams, storyboards and comic strips
- Sequencing the steps that lead to a mathematical solution
- Substituting in formulae
- Translating information from one form to another to make it comprehensible
- Understanding general principles from mathematics and physics and applying them to specific situations
- Understanding how mathematics is used to describe and explain
- Using algebra to effect
- Using technology as appropriate in the representation of mathematics

Students will use concepts and skills in mathematical sciences — especially in such things as number, measurement, space, statics and dynamics — to investigate the structure of something from nature and changes in the shapes and properties of one mechanical and one non-mechanical type of man-made object. They will adapt one of these to meet an identified new purpose or situation or an additional condition, and discuss the implications of the adaptation and the mathematics involved.



Ideas, hints and comments

- Adaptations may reflect aesthetic, functional or social needs.
- The choice of the two man-made objects should require students to be exposed to and develop a variety of concepts.
- You might select amusement rides, bottles or cartons, buildings (ancient or modern), computers, concave mirrors, crockery or glassware, corkscrews, fish species, food containers, footwear, furniture, laundry equipment, mechanical clocks, musical instruments, planets, puzzles, radios, robots, sewing machines, sinks, skateboards, surfboards, swimming pools, telescopes, tools or vehicles (land, water and air).
- Concepts you might use include length, breadth and height, pattern and sequence, perimeter/circumference, distribution of mass and centre of gravity, equilibrium, ratio, moments and stability, friction, angle, elasticity and tension, surface area, volume, resistance, and mass and power. Statistical measures such as 'average' and 'range' might also prove useful.
- This might be an opportunity to investigate how Fibonacci numbers and/or the golden mean are used to explore nature or aesthetic relationships.

Task parameters

- Task intensity: medium–high
- Students may work individually or in groups.
- Available grades: 4