Across Lake Taupo

Purpose:

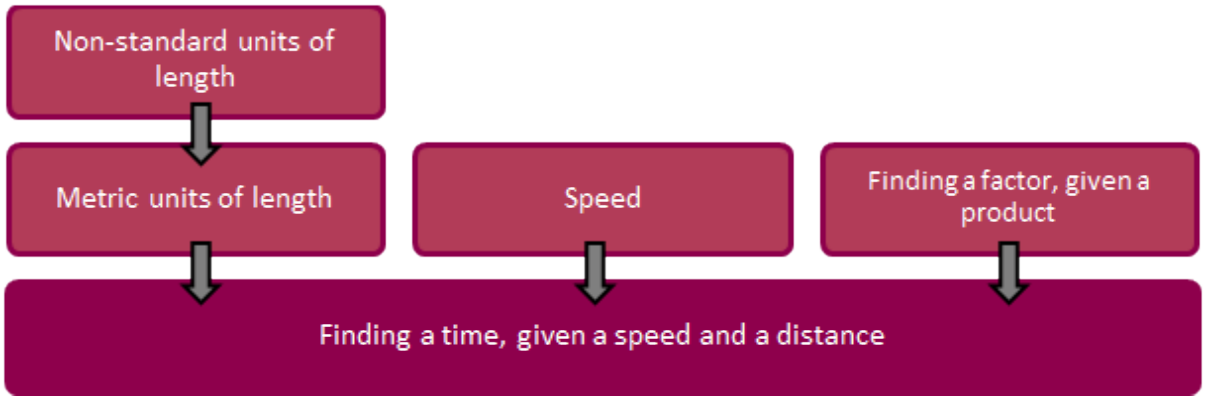
The purpose of this activity is to engage students in using multiplicative and/or additive strategies to solve a measurement problem.

Achievement Objectives:

NA3-1: Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages.
GM3-1: Use linear scales and whole numbers of metric units for length, area, volume and capacity, weight (mass), angle, temperature, and time.

Description of mathematics:

The background knowledge and skills that should be established before and/or during this activity are outlined in the diagram below:



Non-standard units of length
A student measures her height with a 30 cm long ruler. She finds that she is four and a half rulers high. How tall is she in cm?

Metric units of length
A student is told that they are 1.45 m tall. How tall is this in cm?

Speed
If it takes 3 hours to drive 210 km, what was the average speed of the journey?

Finding a factor, given a product
A class of 28 is split into small groups. How big can those groups be?

Finding a time, given a speed and a distance
A car, travelling at an average speed of 70 km/h is in a journey of 210 km. How long will the journey take?

This activity may be carried out with step by step guidance, or by allowing the student to follow their own method of solution. The approach should be chosen in sympathy with students' skills and depth of understanding.

Activity:

A long distance swimmer takes 80 strokes to swim 100 metres. He wants to swim across Lake Taupo, a distance of 4 200 metres.

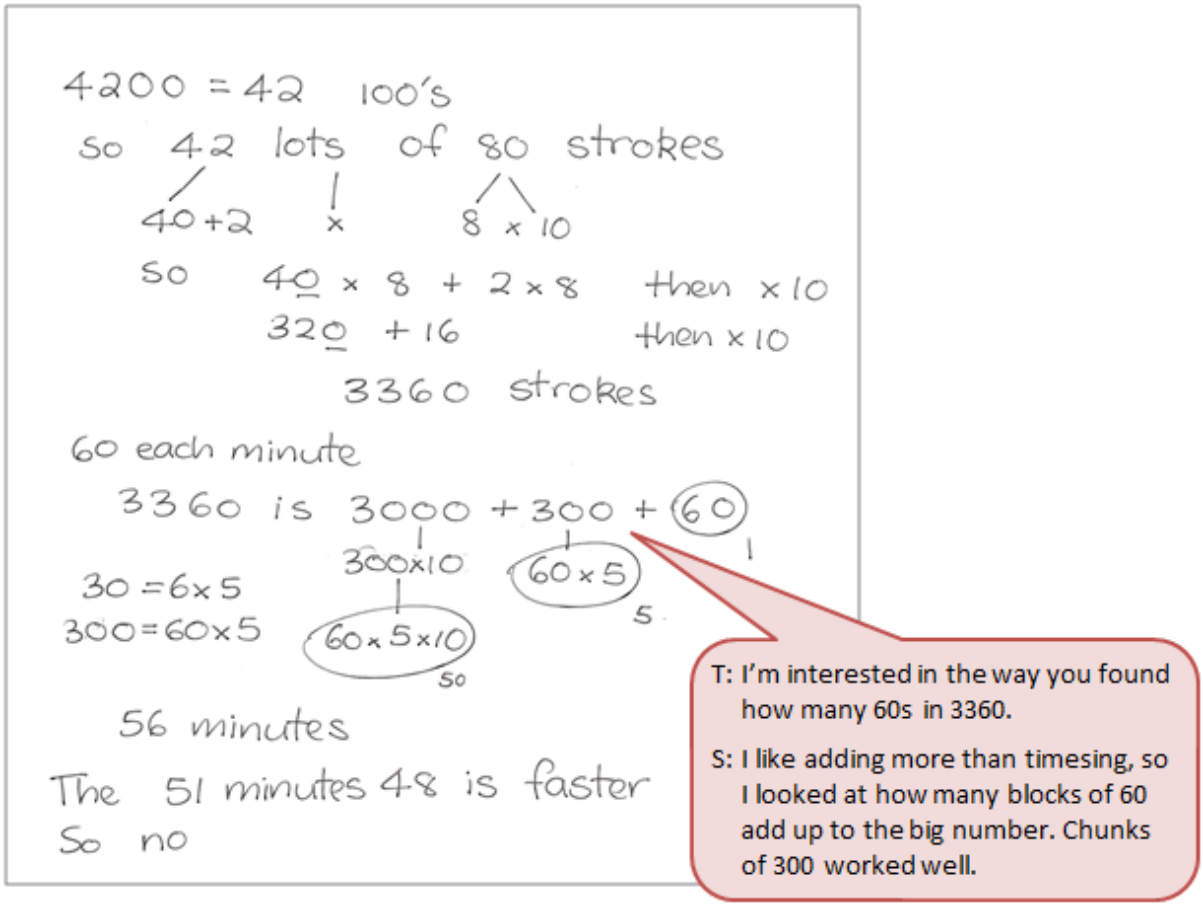
1. How many strokes will it take for him to swim across the lake?
2. If he can swim at a rate of 60 strokes per minute, how many minutes could he swim across the lake in?
3. Can he expect to beat the 2015 champion swimmer who crossed the lake in a time of 51 minutes and 48 seconds?

The procedural approach

The student is able to solve the measurement problem in a series of multiplicative and/or additive steps.

Prompts from the teacher could be:

1. How many lots of 100 metres are in the 4200 metres across the lake?
2. Your answer to (1) is the same as saying how many lots of 80 **strokes** he is swimming. Use this number to work out how many **strokes** it will take him to get across.
3. Every 60 strokes takes a minute, so how many lots of 60 are there in your answer to (2)?
4. How long (in minutes) will it take him to swim those 4200?
5. Can he expect to beat the 2015 champion swimmer who crossed the lake in a time of 51 minutes and 48 seconds?



The conceptual approach

The student is able to solve the measurement problem by breaking it into a series of multiplicative and/or additive steps.

Prompts from the teacher could be:

1. How many strokes will it take for him to swim across the lake?
2. If he can swim at a rate of 60 strokes per minute, how many minutes could he swim across the lake in?
3. Can he expect to beat the 2015 champion swimmer who crossed the lake in a time of 51 minutes and 48 seconds?