

Find Your Hero Rating

Purpose:

The purpose of this activity is to engage students in a practical investigation that leads to comparing fractions and/or decimals quantitatively.

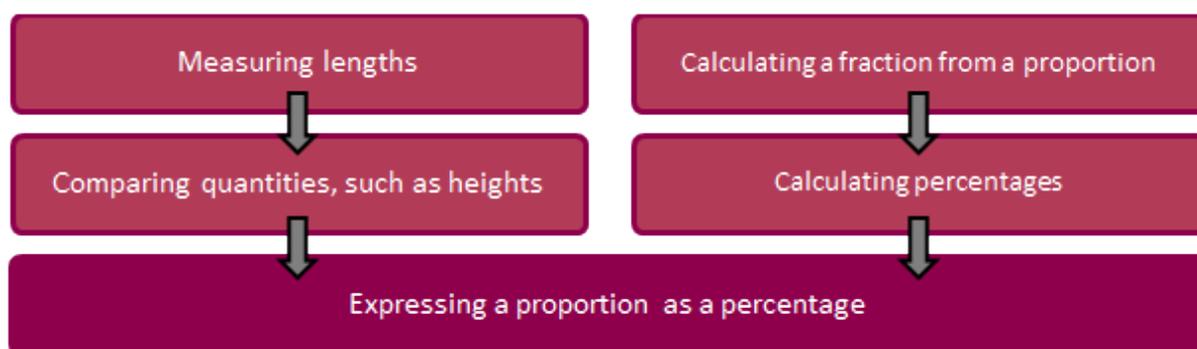
Achievement Objectives:

NA4-4: Apply simple linear proportions, including ordering fractions.

NA4-6: Know the relative size and place value structure of positive and negative integers and decimals to three places.

Description of mathematics:

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



Measuring lengths

Measure your foot length and your height.

Calculating a fraction from a proportion

Jane's feet are 21 cm long and she is 147 cm tall. Express the length of her feet as a fraction of her height.

Calculating percentages

If Al gained 36 out of a possible 60 marks in a test, what percentage score did he achieve?

Comparing quantities, such as heights

Bill is 165 cm tall and Bob is 140 cm. How much taller is Bill than Bob?

Expressing a proportion as a percentage

Bill is 165 cm tall and Bob is 140 cm. What percentage of Bill's height is Bob?

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:

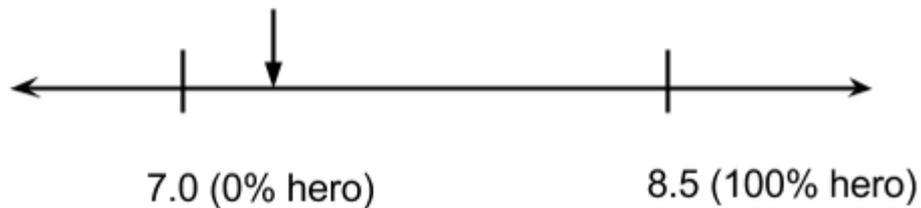
In images of Greek gods and heroes, their full height tends to be $8\frac{1}{2}$ lots of their head height.

The average year 7 or 8 student has a height to head height ratio of 7.

Measure your full height and head height (in the same units), to find your height to head height ratio.

Use this ratio, and the example below, to say how much of a hero you are.

eg A ratio of 7.3 gives a hero rating of +20%



The arithmetic approach

The student is able to use numerical techniques to solve a problem comparing or fractions quantitatively.

Prompts from the teacher could be:

1. What will you measure your head and height with?
2. Measure your head and height.
3. Find, as a fraction or decimal, the ratio of your height to head height.
4. We have been told that a 20% hero has a ratio of 7.3 and that a 100% hero has a ratio of 8.5. Where does your ratio fit? Explore!

Head 20cm Height 155cm

Ratio $\frac{155}{20} \times \frac{5}{5} = \frac{775}{100} \div \frac{100}{100} = 7.75$

$8.5 - 7 = 1.5$ (100%)

$7.3 - 7 = 0.3$ (20%)

$7.75 - 7 = 0.75$ (50%)

So 0.15 means 10%
0.015 means 1%

$\frac{15}{30} \quad \frac{15}{60} \quad \frac{15}{75}$

I am 50% heroic

Rule $\square - 7 = \text{Hero Rating decimal stage (HRDS)}$

$\text{HRDS} \div 0.15 \times 10 = \text{Hero Rating \%}$

T: Talk me through this rule.

S: If you get your ratio and put it in the box you get your hero rating as a decimal.

T: So how do you get it as a percentage?

S: See how many 0.15s fit in and that's how many lots of 10% it is. Or you can divide by 0.015 and that's the percentage.

T: And what if the ratio is less than 7?

S: Then you'll be negative. Not everyone can be a superhero!

The conceptual approach

The student is able to use original techniques to solve a problem comparing decimals or fractions.

Prompts from the teacher could be:

1. Find, as a fraction or decimal, the ratio of your height to head height.
2. We have been told that a 20% hero has a ratio of 7.3 and that a 100% hero has a ratio of 8.5. Where does your ratio fit? Explore!

Unit = hand spans
head = 1
height = 8 and a thumb = $8\frac{1}{3}$

Use of non-standard unit, will yield the same result for a ratio as cm or m would



hero 100 mm = 100%
20% = 20 mm
85% (85 mm)

Use of proportion of length as calculating tool

I am ~~85%~~ 85% hero!

T: Tell me about this numberline.
S: I've made it 10 cm from 7 to 8 $\frac{1}{2}$, so that 100mm = 100%. Then I folded it into thirds to measure out where 7 $\frac{1}{2}$ and 8 go.
T: And to mark on 8 $\frac{1}{3}$?
S: Well, 7.3 is about 7 $\frac{1}{2}$, and that's 2cm after the 7, so 8 $\frac{1}{3}$ will be about 2cm after the 8.