

# MASS – TONNES, NET, GROSS.

## INVESTIGATIONS OVERVIEW PAGE

THIS PAGE IS A SUMMARY OF THE INVESTIGATIONS THAT STUDENTS MAY ENGAGE IN TO DEEPEN THEIR RELATIONAL UNDERSTANDING. INVESTIGATIONS WITH INSTRUCTIONS TO STUDENTS FOLLOW ON SUBSEQUENT PAGES.

- Children record a metric measurement chart for mass and explain it to a friend. *Reflection: How is metric measurement based on multiplicative place value?*
- In pairs, children have a landscape brochure and select items to buy that are sold in kilograms or tonnes. They decide on a mass to buy and record the mass in kilograms, in tonnes and kilograms, in a fraction of a tonne and in tonnes and a fraction of a tonne. *Reflection: How can we convert mass between kilograms and tonnes?*
- In pairs, children research the mass of large animals, for example, elephants, whales, dinosaurs. They record their mass in kilograms, in tonnes and kilograms, in a fraction of a tonne and in tonnes and a fraction of a tonne. *Reflection: How can we convert mass between kilograms and tonnes?*
- In pairs, children have food packages with their net mass labelled. They weigh the package and record gross mass. They work out, then measure the mass of the contents and packaging. They discuss the mass that the packaging adds to the mass of the item. *Reflection: What is net and gross mass?*
- In pairs, children research Imperial units of measurement to measure mass, as well as their histories and current usage. (Google and YouTube are great). They discuss how these units were not created by multiplying and dividing by the same number repeatedly, and so are less easy to convert between. *Reflection: What is the Imperial measurement system for mass?*
- In pairs, children select a mass of 100 kilograms, 200 kilograms, 300 kilograms, 400 kilograms, 500 kilograms, 600 kilograms, 700 kilograms, 800 kilograms or 900 kilograms. They record the mass as a number of kilo. They use their understanding that there are 1000 kilograms in a tonne, that a kilogram is  $\frac{1}{1000}$  tonne and of the relationship between the numerator and denominator in equivalent fractions, to record the mass as  $\frac{1}{10}$ ,  $\frac{2}{10}$ ,  $\frac{3}{10}$ ,  $\frac{4}{10}$ ,  $\frac{5}{10}$ ,  $\frac{6}{10}$ ,  $\frac{7}{10}$ ,  $\frac{8}{10}$ ,  $\frac{9}{10}$  of a tonne. *Reflection: How can we measure and convert mass in kilograms and tonnes?*
- In pairs, children have a landscape brochure and select items to buy that are sold in kilograms or tonnes. They decide on a mass to buy and record the mass in kilograms, in tonnes and kilograms, in a fraction of a tonne and in tonnes and a fraction of a tonne. They calculate the cost of the purchase. *Reflection: How can we convert mass between kilograms and tonnes?*
- In pairs, children research the mass of vehicles. They record their mass in kilograms, in tonnes and kilograms, in a fraction of a tonne and in tonnes and a fraction of a tonne. *Reflection: How can we convert mass between kilograms and tonnes?*
- In pairs, children measure their own mass (or the mass of a volunteer child). They research the mass of a vehicle / animal. They work out the number of children

needed to match the mass of the animal / vehicle. [Reflection: How can we convert mass between kilograms and tonnes?](#)

- In pairs, children research the maximum individual passenger baggage allowance on an airplane. They work out the total mass of the baggage if every passenger carried their maximum allowance. [Reflection: How can we convert mass between kilograms and tonnes?](#)
- In pairs, children have food packages with their net mass labelled, containing individual pieces of the food, for example, chocolates or biscuits. They weigh the package and record gross mass. They work out, then measure the mass of the packaging. They discuss any packaging that adds noticeable mass to the item. They then work out the mass of one piece of the food by dividing the net mass by the number of pieces. [Reflection: What is net and gross mass?](#)

# Pebbles



Cowra White 10mm  
\$199.00 per 1 Tonnes



Cowra White 20mm  
\$199.00 per 1 Tonne



Cowra White 40mm  
\$199.00 per 1 Tonne



Cowra Gold 14mm  
\$199.00 per 1 Tonne



Nepean River Pebble 10mm  
\$99.00 per 1 Tonne



Nepean River Pebble 20mm  
\$99.00 per 1 Tonne



Nepean River Pebble 40mm  
\$99.00 per 1 Tonne



Lucky Stone 40 - 150mm  
\$129.00 per 1 Tonne

# Mass – Tonnes, Net, Gross.

Record a metric measurement chart for measuring mass, starting with a gram, continually multiplying and dividing by 10 until you have a tonne.

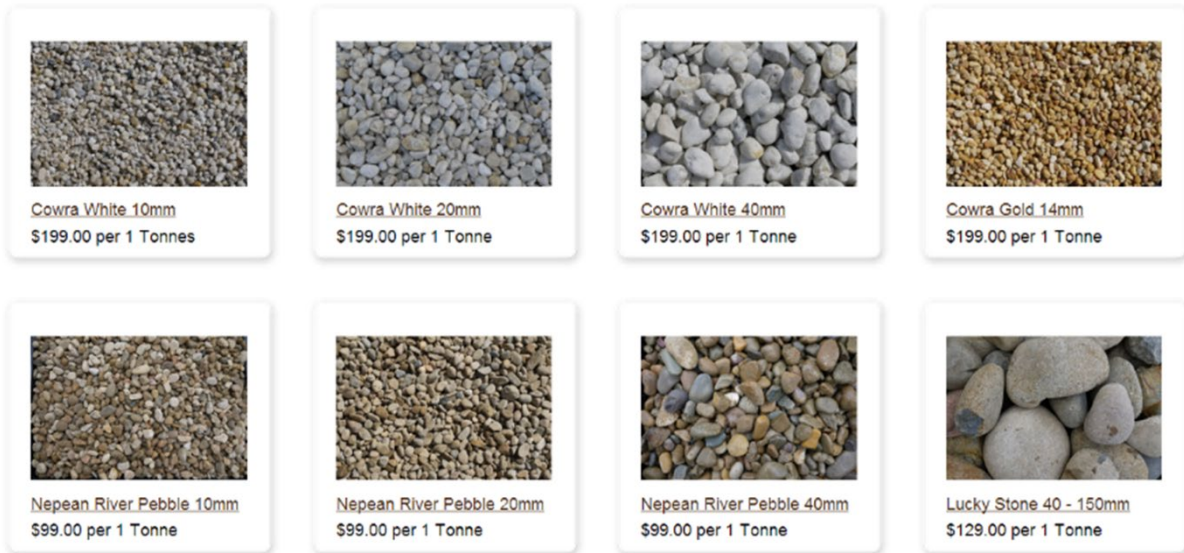
Explain it to a friend.

Reflection: How is metric measurement based on multiplicative place value?

# Mass – Tonnes, Net, Gross.

Have a landscape brochure, for example,

## Pebbles



Select items to buy that are sold in kilograms or tonnes.

Decide on a mass to buy, (for example, 1 and a half tonnes of Nepean River Pebble 10mm).

Record the mass in

- kilograms, (for example, 1500 kilograms)
- tonnes and kilograms, (for example, 1 tonne and 500 kilograms)
- a fraction of a tonne or tonnes and a fraction of a tonne (for example,  $1\frac{1}{2}$  tonnes).

Reflection: How can we convert mass between kilograms and tonnes?

# Mass – Tonnes, Net, Gross.

Research the mass of large animals, for example, elephants, whales, dinosaurs.

Record the mass in

- kilograms, (for example, 1500 kilograms)
- tonnes and kilograms, (for example, 1 tonne and 500 kilograms)
- a fraction of a tonne or tonnes and a fraction of a tonne (for example,  $1\frac{1}{2}$  tonnes).

Reflection: How can we convert mass between kilograms and tonnes?

# Mass – Tonnes, Net, Gross.

Have food packages with their net mass labelled.

Measure the mass of the package and contents and record the gross mass.

Either

- empty out the contents and measure the mass of the contents  
then work out the mass of the package  
then measure the mass of the package
- empty out the contents and measure the mass of the package  
then work out the mass of the contents  
then measure the mass of the contents

Record the mass of the package and contents as gross mass.

Record the mass of the contents as net mass.

Reflection: What is net and gross mass?

# Mass – Tonnes, Net, Gross.

Research Imperial units of measurement to measure mass,

- their histories
- current usage. (Google and YouTube are great).

Discuss how these units were not created by multiplying and dividing by the same number repeatedly, and so are less easy to convert between.

Reflection: What is the Imperial measurement system for mass?



# Mass – Tonnes, Net, Gross.

Select a mass of 100 kilograms, 200 kilograms, 300 kilograms, 400 kilograms, 500 kilograms, 600 kilograms, 700 kilograms, 800 kilograms or 900 kilograms.

Record the mass of the object as a number of kilograms.

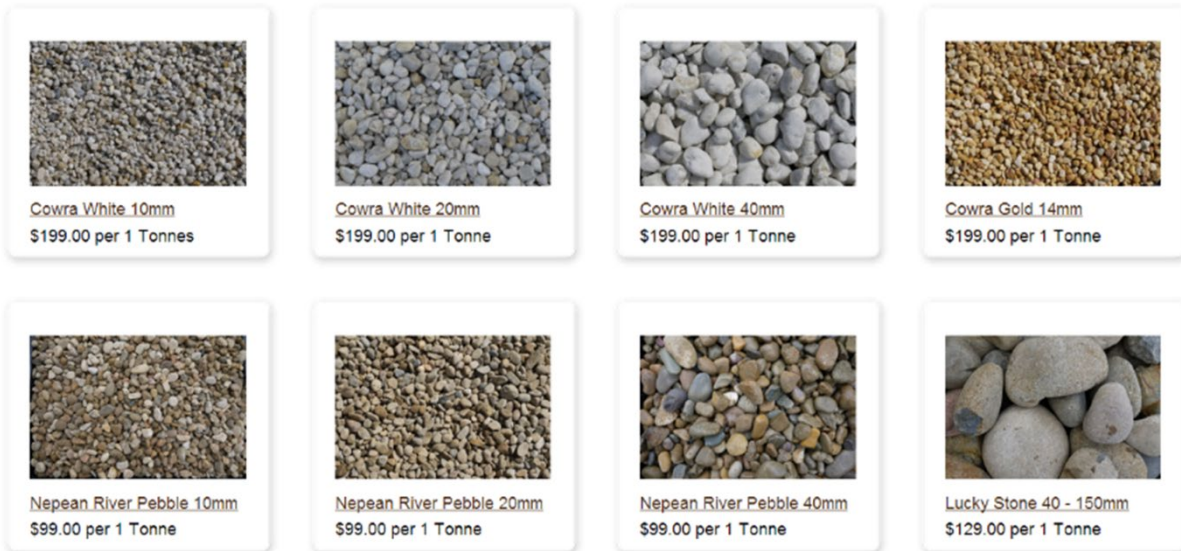
Use your understanding that there are 1000 kilograms in a tonne, that a kilogram is  $\frac{1}{1000}$  tonne and of the relationship between the numerator and denominator in equivalent fractions, to record the mass as a fraction of a tonne, for example,  $\frac{1}{10}$ ,  $\frac{2}{10}$ ,  $\frac{3}{10}$ ,  $\frac{4}{10}$ ,  $\frac{5}{10}$ ,  $\frac{6}{10}$ ,  $\frac{7}{10}$ ,  $\frac{8}{10}$ ,  $\frac{9}{10}$  of a tonne.

Reflection: How can we measure and convert mass in kilograms and tonnes?

# Mass – Tonnes, Net, Gross.

Have a landscape brochure, for example,

## Pebbles



Select items to buy that are sold in kilograms or tonnes.

Decide on a mass to buy, (for example, 1 and a half tonnes of Nepean River Pebble 10mm OR 800 kilograms of Nepean River Pebble 10mm and 500 kilograms of Nepean River Pebble 20mm.)

Record the mass in

- kilograms, (for example, 1500 kilograms OR 800 kilograms + 500 kilograms = 1300 kilograms)
- tonnes and kilograms, (for example, 1 tonne and 500 kilograms OR 1 tonne and 300 kilograms)
- a fraction of a tonne or tonnes and a fraction of a tonne (for example,  $1\frac{1}{2}$  tonnes OR  $1\frac{3}{10}$  tonnes).

Use the price on the brochure to calculate the cost of the purchase (for example, \$99 OR  $1\frac{3}{10}$  of

$$\$99 = \$99 + \frac{3}{10} \text{ of } \$99.$$

$$\frac{1}{10} \text{ of } \$99 = \$9.90 \text{ so } \frac{3}{10} \text{ of } \$9.90 = \$29.70.$$

$$\$99 + \$29.70 = \$128.70)$$

Reflection: How can we convert mass between kilograms and tonnes?

# Mass – Tonnes, Net, Gross.

Research the mass of vehicles.

Record the mass in

- kilograms, (for example, 1500 kilograms)
- tonnes and kilograms, (for example, 1 tonne and 500 kilograms)
- a fraction of a tonne or tonnes and a fraction of a tonne (for example,  $1\frac{1}{2}$  tonnes).

Reflection: How can we convert mass between kilograms and tonnes?

# Mass – Tonnes, Net, Gross.

Measure your own mass, or the mass of a volunteer child.

Research the mass of a vehicle / animal.

Work out the number of children needed to match the mass of the animal / vehicle.

Reflection: How can we convert mass between kilograms and tonnes?

# Mass – Tonnes, Net, Gross.

Research the maximum individual passenger baggage allowance on an airplane.

Work out the total mass of the baggage if every passenger carried their maximum allowance.

Reflection: How can we convert mass between kilograms and tonnes?

# Mass – Tonnes, Net, Gross.

Have food packages with their net mass labelled, containing individual pieces of the food, for example, chocolates or biscuits.



Measure the mass of the package and contents (for example, 250 grams).

Record the mass of the package and contents as gross mass.

Identify the mass of the contents from the label on the package (for example, 150 grams).

Record the mass of the contents as net mass.

Work out, then measure the mass of the packaging (for example,  $250 - 150 = 100$  grams).

Did the packaging add a lot of mass to the contents, or a small mass to the contents?

Work out the mass of one piece of the food by dividing the net mass by the number of pieces (for example,  $150 \text{ grams} = 15 \text{ chocolates}$ , so  $10 \text{ grams} = 1 \text{ chocolate}$ ).

**Reflection: What is net and gross mass?**