

# DEVELOPING MATHEMATICAL INQUIRY COMMUNITIES

Level 2 (Year 3, Year 4)  
Copy Masters,  
Measurement: Mass, volume,  
and capacity

**Task 1**

Timo is making himself a treasure box. He is wondering which box has the largest volume. Use the cubes to find the volume of the different boxes.

**Task 1 – Independent Tasks**

What box has the most volume?

What box has the least volume?

Which boxes have the same volume?

Represent how you found the volume for each box and label which one has the most volume, the least volume, and same volume.

**Task 2**

Look at the net of the box and estimate how many cubes you will need to fill the box.

Check your estimate by making the box and filling it with  $1 \text{ cm}^3$  cubes.

Draw a representation which shows the volume of the box.

**Task 2 - Independent Tasks**

Use the 24 cubes to design some box shaped buildings.

Draw a representation of your design and write the volume for each one.

**Task 3**

What is the volume of the classroom using the unit measure of cubic metres?

Draw a representation to use to explain and justify your solution.

### **Task 3 - Independent Tasks**

Estimate the volume of the space using cubic metres. Record your estimate using  $\text{m}^3$  and draw a 3D representation to justify this.

Choose 5 spaces around your home and community and write the place. Estimate the volume of the space using cubic metres. Record your estimate using  $\text{m}^3$  and draw a 3D representation to justify this.

**Task 4**

Matiu and Linea have a carton of juice the same size. Matiu measures the volume of the carton of juice using cubic centimetres. Linea measures the capacity of her carton using water and millilitres. They compare their results and are surprised.

With your carton use the two units of measure to find out what surprised them.

Make sure you explain and justify your answer using representations.

## **Task 4 - Independent Tasks**

Use the measuring container to find out the capacity of the containers.

Record the measurement in mL and record your findings on a numberline using a scale of 50 mL.

**Task 5**

Find the containers that have the same capacity but are a different shape.

Prove that they have the same or almost the same capacity.

Make sure that you explain and justify your reasoning using a range of representations including a number-line.

## **Task 5 - Independent Tasks**

Tasi is making juice for a party. He would like to know how much liquid each container will hold.

Predict the millilitres and litres for each container.

Test your prediction with the measuring jug. Use a number line to represent the measurement.

**Task 6**

Find the mass of each bag of objects.

Record the mass in grams and represent this on a number-line.

Find the difference in grams between for the bags of objects and put them in order from most massive to least massive.

**Task 6 - Independent Tasks**

Find the difference in mass between each pair of measures. Represent your solution on an empty number-line.

19 grams and 67 grams

75 grams and 26 grams

183 grams and 57 grams

43 grams and 118 grams

312 grams and 99 grams

708 grams and 409 grams

1 kilogram and 446 grams

**Task 7**

Find three things which would have a total mass of one kilogram.

Draw a number line to represent the mass measure of each item and show how altogether their estimated mass is one kilogram.

Now use the scales to check the mass of each object against your estimation.

Draw another number line to represent the mass measure of each item from the scale and show the individual and combined mass.

How close to one kilogram was your estimation?

**Task 7 - Independent Tasks**

Choose a group of objects that you predict will have a total mass of:

50g

175g

1 and a  $\frac{1}{2}$  kg

1kg and 350g

1kg and 990g

2kg

Use the scales to check the mass of the group. Draw a number line and represent the mass measure of each item in the group and show the total mass.

How close were you to the total mass you were trying to make?

## **Task 8**

In most competitive ball games, the rules are that balls should have the same mass.

Select three balls used in the same competitive sport. Estimate and record the mass for each ball. Use the scales to find out the mass of each ball in the set and record this in grams and kilograms.

Was the mass of each ball exactly the same? If there was a difference between the mass of the balls, what was it?

What about other balls which are not used competitively? Do they have the same mass? Check using the same process.

## **Task 8 - Independent Tasks**

Choose a group of objects that you predict will have a total mass of:

75g

300g

2 ½ kg

1kg and 150g

1kg and 770g

2kg and 2500g

Use the scales to check the mass of the group. Draw a number line and represent the mass measure of each item in the group and show the total mass.

How close were you to the total mass you were trying to make?

## **Task 9**

The yoghurt container label shows a mass of 125g, but the container is empty.

How can you measure whether the mass would be 125g when it is full?

Be ready to explain and justify how a unit of measure could prove that the mass of the full container would be 125g.

Test your solution and unit of measure with other empty containers of different sizes and justify whether their mass when full is correctly recorded.

## **Task 9 - Independent Tasks**

Use the scales to measure the mass of different objects and record as follows:

Object	Mass in grams	Mass in kilograms
--------	---------------	-------------------

When you have recorded the mass of five objects, order the objects from most massive to least massive.

Record how much more mass you would need to make each object have the same mass as the object you labelled the most massive.

**Task 10**

Fill in the missing values:

$$1000\text{mL} = \underline{\quad} \text{l}$$

$$1500\text{mL} = \underline{\quad} \text{l and } \underline{\quad} \text{mL}$$

$$1340\text{mL} = \underline{\quad} \text{l and } \underline{\quad} \text{mL}$$

$$1750\text{mL} = \underline{\quad} \text{l and } \underline{\quad} \text{mL}$$

$$2\text{l} = \underline{\quad} \text{mL}$$

$$1000\text{g} = \underline{\quad} \text{kg}$$

$$1250\text{g} = \underline{\quad} \text{kg and } \underline{\quad} \text{g}$$

$$1500\text{g} = \underline{\quad} \text{kg and } \underline{\quad} \text{g}$$

$$2000\text{g} = \underline{\quad} \text{kg}$$

**Task 10 - Independent Tasks**

Find the missing values:

$$2\,000\text{mL} = \underline{\hspace{2cm}}\text{l}$$

$$500\text{mL} = 200\text{mL and } \underline{\hspace{2cm}}\text{mL}$$

$$1\,200\text{mL} = \underline{\hspace{1cm}}\text{l and } \underline{\hspace{1cm}}\text{mL}$$

$$1\,300\text{l} = \underline{\hspace{2cm}}\text{l and } \underline{\hspace{2cm}}\text{mL}$$

$$2\text{l} = \underline{\hspace{2cm}}\text{mL}$$

$$1050\text{g} = \underline{\hspace{2cm}}\text{kg and } \underline{\hspace{2cm}}\text{g}$$

$$2100\text{g} = \underline{\hspace{1cm}}\text{kg and } \underline{\hspace{1cm}}\text{g}$$

**Task 11**

Maia and her sister Quantum have each picked a bucket of strawberries. The strawberries in Quantum's bucket are bigger than Maia's and she says that her bucket is more massive than Maia. They both measure the mass of their buckets.

Maia's box is 1kg and 373g and Quantum's box is 1kg and 294g.

Which box is more massive?

How many grams would you need to add to make the boxes the same mass?

Represent your solution using a number-line.

**Task 11 - Independent Tasks**

What is the difference in mass between these measures?

1kg and 8 grams

1kg and 18 grams

1kg and 998 grams

1kg and 509 grams

1kg and 999 grams

2kg and 19 grams

2kg and 99 grams

3kg and 999 grams

4kg and 999 grams

**Task 12**

Jeremiah has a box of chocolates. The label on the box says that the net weight of the box is 245g.

Someone has eaten some of the chocolates and when Jeremiah measures the mass of the box, it is now 177g.

What mass of the chocolates was eaten?

## **Task 12 - Independent Tasks**

Select one or more of the following assessment tasks (attached at the end of the document) as the independent activity:

M8: Box of potatoes (mass and volume).

M3C: Find objects which have a mass that is more than one kilogram but less than two kilograms.

M20B: Find the volume of a box