White Rose Maths

Spring - Block 4

Weight & Volume

Overview

Small Steps

- Introduce weight and mass
- Measure mass
- Compare mass
- Introduce capacity and volume
- Measure capacity
- Compare capacity

NC Objectives

Measurement: Weight and Volume
Measure and begin to record mass/weight, capacity and volume.

Compare, describe and solve practical problems for mass/weight: [for example, heavy/light, heavier than, lighter than]; capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]

Introduce Weight & Mass

Notes and Guidance

Children are introduced to weight and mass for the first time. They may already have some understanding of heavy and light from their own experience of carrying objects.
Children should begin by holding objects and describing them using vocabulary such as heavy, light, heavier than, lighter than before using the scales to check.
The children may believe that larger objects are always heavier and this misconception should be explored.

Mathematical Talk

Hold two objects, which is heavier/lighter? How do you know? How can we prove this?

Are larger objects always heavier than smaller objects?

If the balance scale is down, what does that tell us?

If the balance scale is up, what does that tell us?

If the balance is level, what does that tell us?

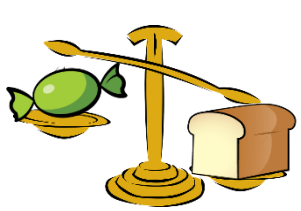
Which of these objects is heavier? How do you know? How will this be shown on the weighing scale?

Varied Fluency

- Choose two objects. Which is heavier? Which is lighter?
Can you be a human weighing scale?
Now use the weighing scale to check.

Which object is heavier? Which object is lighter?
The _____ is heavier/lighter than the _____ .

- Fill in the missing gaps to make the sentences correct.



The _____ is heavier than the _____.
The _____ is lighter than the _____.
The _____ is equal to the _____.

- Collect different objects from around your classroom. Use a balance scale to find the heaviest object.
Can you find 2 objects that are equal in mass?

Introduce Weight & Mass

Reasoning and Problem Solving

The class are seeing whether the balloon or apple will weigh more.

Eva

The balloon will be heavier because it is bigger than the apple.

The balance will be level because they are both red.

Whitney

Mo

The apple will go down because it is lighter.

The balloon will go up because it is lighter.

Teddy

Teddy is correct. However his explanation needs to be clearer. Children should practice using vocabulary such as heavier than and lighter than when comparing objects alongside talking about the movement of the scale.

Children should be encouraged to explain why the others are incorrect.

I'm thinking of an object. It is heavier than a pencil, but lighter than a dictionary.

What object could Jack be thinking of?
Prove it.
How many objects can you think of?

Children will use a balance scale to find objects that are heavier than a pencil, then check that their chosen objects are lighter than the dictionary.

Measure Mass

Notes and Guidance

Children begin by using a variety of non-standard units (e.g. cubes, bricks) to measure the mass of an object.
They see that when the scale is balanced, the number of non-standard units can be used to determine the mass.
E.g. One apple weighs ____ bricks.
Children may find that it is difficult to balance objects exactly using non-standard units. For example an object may be heavier than 3 bricks, but lighter than 4 bricks.

Mathematical Talk

When the scales are balanced, what does this mean?
How many _____ weigh the same as one _____?

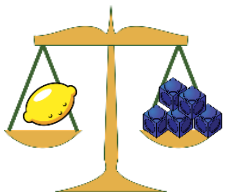
If I add one more cube to this side, what will happen?
How do you know? What if I take a cube away?

Which classroom objects are the best units to measure with?
Why?

Varied Fluency

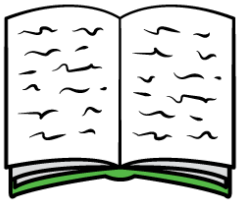
- Use the non-standard units to measure each item on your table.

The _____ weighs the same as _____ cubes.



- Weigh an object using cubes and then weigh the same object using different non-standard units.
Record your findings.
What do you notice?
Which non-standard unit was the best to use? Why
Which non-standard unit was not good to use? Why?

- Which non-standard units would be the best to measure the mass of a heavy book?

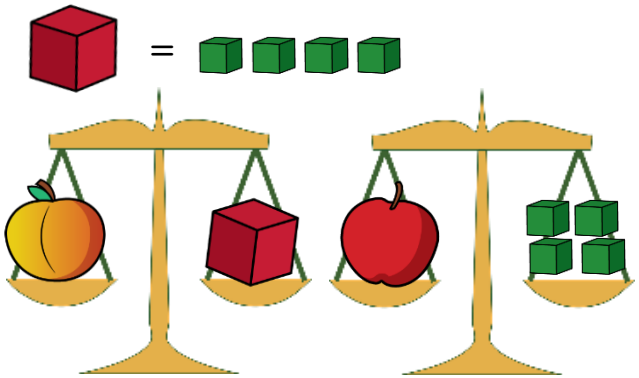


Counters
Wooden blocks
Pencils

Why?

Measure Mass

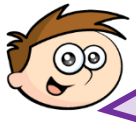
Reasoning and Problem Solving



Amir says,

The apple is heavier than the peach, because it weighs 4 cubes.

Teddy says,



The apple and the peach weigh the same.

Who do you agree with?
Explain why.

Possible answer:
I agree with Teddy, because 1 brick weighs the same as 4 cubes so the apple and the peach weigh the same.

How many cubes does the teddy bear weigh?
Explain how you know.

The teddy bear weighs 5 cubes. I can take 1 cube off of each side of the scale and it will still balance.

Compare Mass

Notes and Guidance

Children continue to use non-standard units to weigh objects and now focus on comparing the mass of two objects. They use balance scales to compare two objects and use the language of 'heavier', 'lighter' and 'equal to'.
Once children are confident using this language they can use <, > and = to compare mass.

Mathematical Talk

How many cubes weigh the same as _____?

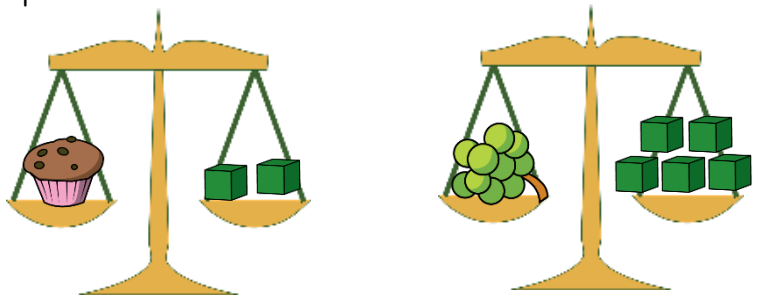
Which object is heavier? Which object is lighter?

Can we order the objects from heaviest to largest?

Explain why it is important to use the same non-standard unit if we want to compare the mass of two objects.

Varied Fluency

- Complete the sentences below.

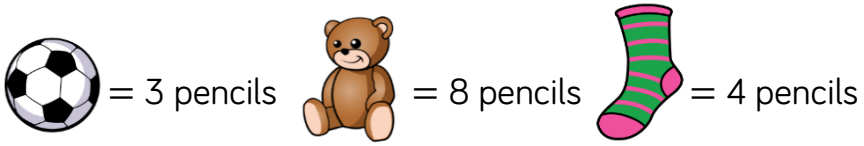


The cupcake weighs _____ cubes.

The grapes weigh _____ cubes.

The cupcake is _____ than the grapes. *(heavier/lighter)*

- Can you order the objects from heaviest to lightest?

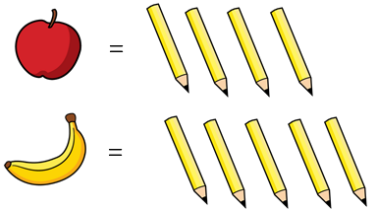


Ball Teddy Bear Sock

- Using cubes, find the mass of 4 objects.
Order them from lightest to heaviest.

Compare Mass

Reasoning and Problem Solving



Complete the sentences below:

The _____ is heavier than the _____ .

The _____ is lighter than the _____.

The _____ weighs ____ pencils.

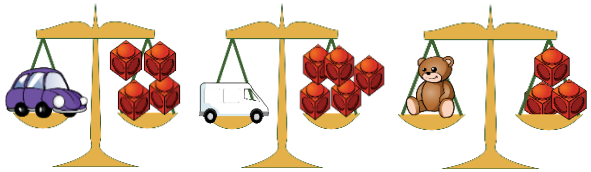
The banana is heavier than the apple.

Children may also notice

The banana weighs one more pencil than the apple.

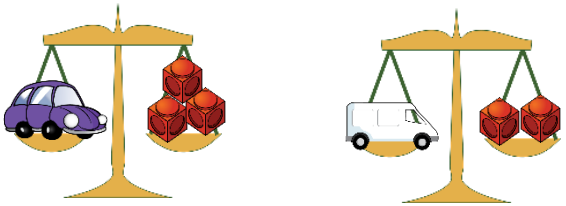
Can you match the clue to the images?

- My object weighs more than the car.
- My object is less than 5 cubes.
- My object is not the heaviest or the lightest.



- Van
- Teddy/Car
- Car

Look at the balance scales below.



Which statements are true?

- The car is heavier than the van.
- The van is heavier than the car.
- The car is lighter than the van.
- The van is lighter than the car.
- The car and van weigh the same amount.

Can you make a problem like this for your partner?

T
F
F
T
F

Introduce Capacity and Volume

Notes and Guidance

Children are introduced to volume and capacity for the first time.

They explore the concept in a practical way, using a variety of containers.

They compare the volume in a container by describing whether it is full, nearly full, empty or nearly empty.

Mathematical Talk

Look at my bottle, is it full? Is it empty?

Compare my two bottles, which has more liquid in? Which has less?

How can we show the container is nearly full or nearly empty?

How can we measure the capacity of this container?

Varied Fluency

- Provide a range of different containers for children to explore practically using water or sand.

  Show me full containers.
  Show me empty containers.
  Show me almost full.
  Show me almost empty.

- Use the words 'more' or 'less' to compare the containers.

A has _____ than B.

A B

A has _____ than B.

A B

- Put these in order from empty to full.

A B C D

empty full

Introduce Capacity and Volume

Reasoning and Problem Solving

Always, Sometimes, Never?

The tallest container holds the most liquid.

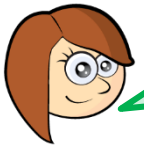
Sometimes.

Identical containers can have a different capacity.

Never - If the containers are identical they will have the same capacity but they can have different volumes of liquid in.

Show me.

Rosie, Teddy and Amir are describing their glasses of water.



My glass has more water than Teddy's.

Rosie

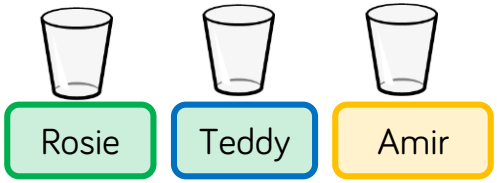
My glass is nearly full.

Teddy

My glass has less water than Rosie's.

Amir

Can you fill in how much water could be in each of the children's glasses?



Various representations for Rosie's and Amir's as long as they show that Amir's is less than Rosie's and Rosie's is more than nearly full.

Measure Capacity

Notes and Guidance

Children measure the capacity of different containers using non-standard units of measure. They understand that the unit of measure must stay the same, for example the same cup, the same spoon etc.

They understand to measure accurately, they must make each container or non-standard measure full.

Mathematical Talk

How can we measure how much liquid will fill my container?

What could I use?

How many bowls of liquid fill the bottle?

How many cups of liquid fill the bottle?

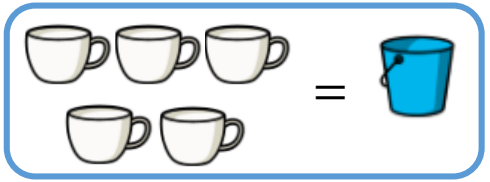
How is this different? How is this the same?

Varied Fluency

- Work practically using a variety of containers.
  Investigate how many small containers it takes to fill the larger containers.

  The capacity of the _____ is _____ pots.

- It takes 5  to fill 1 



How many  will it take to fill 2 buckets?

What about three buckets?

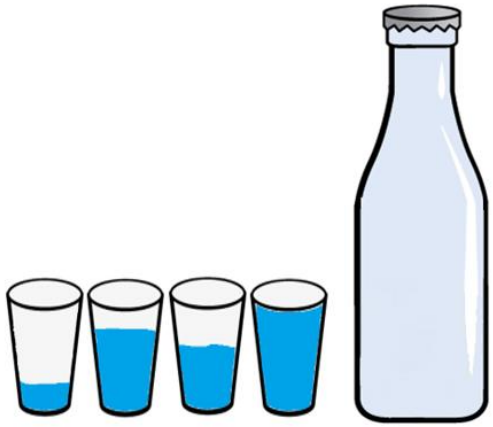
Four buckets?

What do you notice?
Can you continue the pattern?

Measure Capacity

Reasoning and Problem Solving

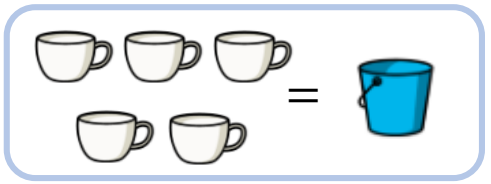
Whitney pours her cups into the bottle and they fill it exactly.



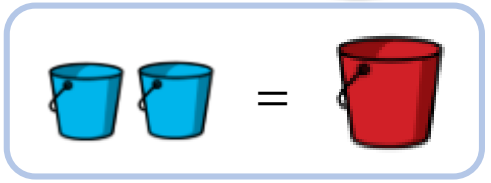
She says the bottle has a capacity of four cups. Do you agree?

Whitney is wrong. She has not filled the cups to the top so her measuring is inaccurate.

It takes 5  to fill 1 



It takes 2  to fill 1 



How many  will fill one  ?

What else can you find out?

10 cups will fill one red bucket.

The children may also find that it will take 20 cups to fill 2 red buckets etc.

Compare Capacity

Notes and Guidance

Children compare the capacity of different containers using non-standard units of measure.

They use 'more', 'less' and 'equal to' to compare as well as the symbols <, > and =.

Mathematical Talk

Which container has the largest/smallest capacity?
Can we order them from largest to smallest?

Which container do you think will hold more?
How can we check?

What can we use to measure the capacity of these containers?

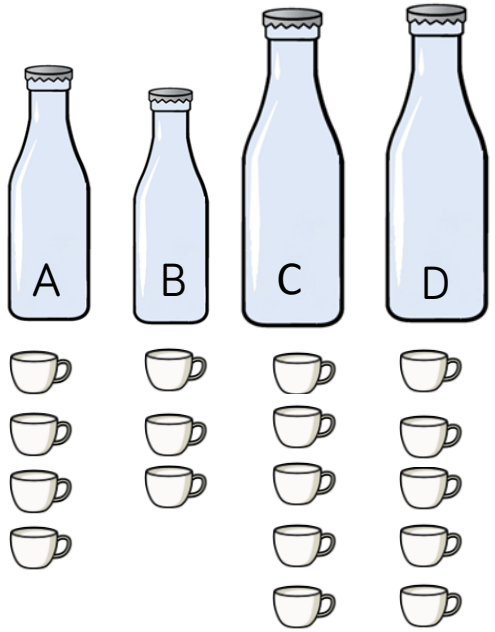
Can we show A has more than B but less than C?

Varied Fluency

- Take three different containers.
  Fill each container with liquid or rice using the same unit of measure e.g. A small cup.

  Order the containers from largest to smallest capacity.

- Complete the boxes to compare the capacity of the bottles:



□ > □

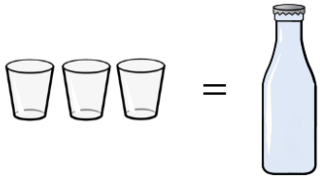
□ < □

□ = □

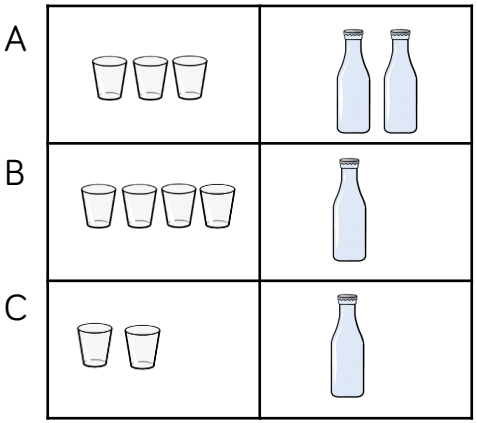
Compare Capacity

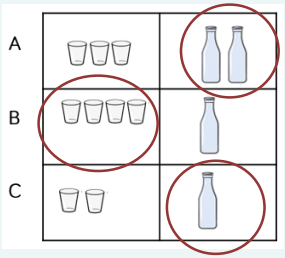
Reasoning and Problem Solving

If

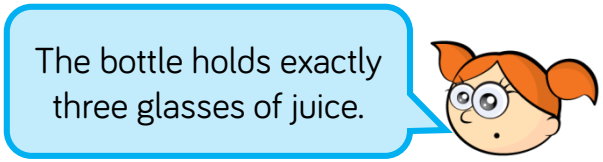


Circle whether the glasses or bottles hold more in each row:





Alex has a bottle of juice. She pours three glasses of juice.



Do you agree? Explain why.

I disagree. Alex has filled three glasses exactly but there is still juice left so she could have filled more than 3

Choose three containers. Investigate how you could compare the capacity of each one.

Children choose three containers and choose a unit of measure to compare the containers' capacities.