

# Length – Multiple and Single Informal Units.

## Table of Contents

Teaching Plan Overview and Summary.....	<a href="#">page 2</a>
Identify length as a line in 1 dimension and measure length using multiple uniform informal units.....	<a href="#">page 3</a>
Explain the relationship between the size of the unit, and the number of units needed to measure a length.....	<a href="#">page 11</a>
Measure length using a single informal unit.....	<a href="#">page 13</a>

## Differentiate and Assess

Not every student will be ready to investigate this concept at this Level and so we will need to differentiate to ensure every student is learning at their leading edge. Select the Differentiate button on this screen.

## Integrate

Every mathematical concept is integrally related to other mathematical concepts. Teaching and learning related concepts simultaneously develops deep relational understanding. Select the Integrate button on this screen.

## Intervene

Some students may not yet be ready to investigate this concept at any Level, and so we will need to provide some intervention. Select the Intervention button on this screen.

# LENGTH – MULTIPLE AND SINGLE INFORMAL UNITS.

## EXPLICIT TEACHING PLAN OVERVIEW PAGE

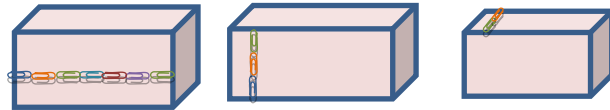
THIS PAGE IS A SUMMARY OF THE EXPLICIT TEACHING PLAN, INCLUDING STRATEGIC QUESTIONS, AND DESCRIBING THE SEQUENCE WHICH WILL OCCUR OVER MULTIPLE LESSONS.

RESOURCES: OBJECTS TO MEASURE THE LENGTH OF, CIRCLES, PINFORMAL LENGTH UNITS - APERCLIPS, SHORT STICKS, PENCIL, PAPER

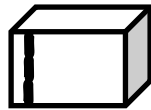
### WHAT COULD WE DO?

Children:

- Use paperclips to measure the length of a box from left to right, top to bottom, and front to back, for example



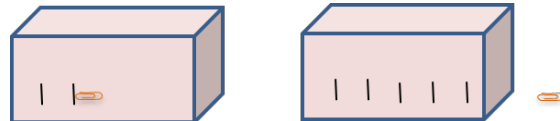
- Record the number of informal units used to measure, for example,



Length = 3 paperclips

- Describe the dimensions of the box as height, width and depth
- Use a length of string to measure the distance around a circle
- Identify that we need more short units than long units than short units, and fewer long units than short units, to measure the same length.

- Use a single paperclip to measure the length of a box by marking and moving, for example,



### WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?

Children

- ask one another questions about using multiple uniform informal units to measure length, for example;
  - Where could we measure length on this box?
  - Could we measure the length from the top to the bottom?
  - Could we measure the length from the left to the right?
  - What is the length of the box from left to right?
  - Is the length of the box from left to right 6 paperclips?
  - What is our unit of measurement?
- What are the 3 dimensions on this box?
- When we measure these different dimensions, what words do we use?
- If we wanted to measure the length of this circle, what parts would we measure?
- Do we need more paperclips than sticks because paperclips are shorter than sticks?
- Do we need fewer sticks than paperclips because sticks are longer than paperclips?
- How could we measure length on this box using a single paperclip?
- How could we mark and move?

# LENGTH – MULTIPLE AND SINGLE INFORMAL UNITS.

## EXPLICIT TEACHING PLAN

FULL EXPLICIT TEACHING PLAN, EMBEDDING DEEP RELATIONAL UNDERSTANDING, METALANGUAGE, AND QUESTIONS THAT MAY BE USED OVER MULTIPLE LESSONS.

### WHAT COULD WE DO?

Children think about, talk and listen to a friend about, then have the opportunity to share what they already know.

Display an object, for example, a box (a rectangular prism),

Children suggest where they could measure the length of the box.

Point to the surfaces, for example,

Point up and down, left to right and front to back.



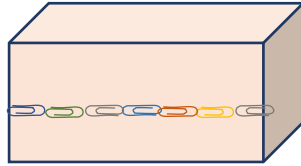
Display some paperclips, for example,



### WHAT LANGUAGE COULD WE USE TO EXPLAIN AND ASK QUESTIONS?

- ▶ Today brings an investigation about length.
- ▶ What do you know about length?
- ▶ Talk about length with a friend.
- ▶ Is anyone ready to share what they are thinking about length?
  
- ▶ Do you think that we could measure length on this box?
- ▶ Where could we measure length?
- ▶ Could we measure the length of a surface?
- ▶ Could we measure the length up and down?
- ▶ Could we measure the length from left to the right?
- ▶ Could we measure the length from front to back?
- ▶ When we measure length, how many dimensions are we measuring?
- ▶ Are we measuring 1 dimension when we measure length?
- ▶ How could we use these paperclips as a unit to measure a length on the box?
- ▶ Will our unit of measurement be paperclips?

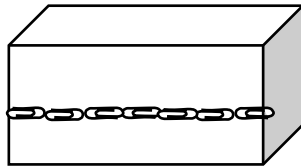
Place the paperclips in a row on a surface of the box from left to right, for example,



Record, for example, 6 and a bit paperclips

*Children who are not yet ready to identify if the fraction is a half, name and record the length as 6 and a bit paperclips.*

Record, for example, 6 and a half paperclips



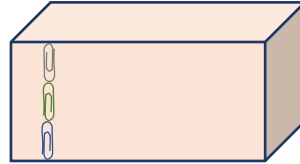
Record, for example,

Length = 6 and a bit paperclips  
Length = 6 and a half paperclips

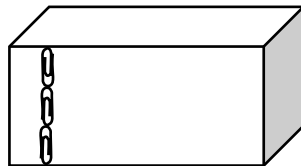
OR

- ▶ Could we place the paperclips in a row on a surface of the box?
- ▶ Let's place the paperclips in a row from left to right.
- ▶ Did we place the paperclips in a row?
- ▶ Do we have any gaps?
- ▶ Do we have any overlaps?
- ▶ How could we work out the length of the box?
- ▶ Could we count the paper clips?
- ▶ How many paperclips?
- ▶ Are there 6 full paperclips, and a bit of another paperclip?
- ▶ What fraction is the bit of the paperclip?
- ▶ Is the bit about a half?
- ▶ Are there 6 full paperclips, and about half of another paperclip?
- ▶ What is our unit of measurement?
- ▶ Is our unit of measurement, paperclips?
- ▶ Could we record the box and the paperclips?
  
- ▶ Could we record the length?

Place the paperclips in a row on a surface of the box from top to bottom, for example,



Record, for example,



Length = 3 paperclips

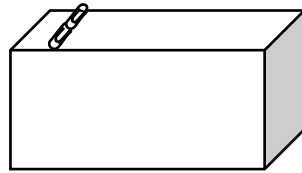
- ▶ Where else could we use these paperclips as a unit to measure a length on the box?
- ▶ Will our unit of measurement be paperclips?
- ▶ Could we place the paperclips in a row on a surface of the box?
- ▶ Let's place the paperclips in a row up and down.
- ▶ Did we place the paperclips in a row?
- ▶ Do we have any gaps?
- ▶ Do we have any overlaps?
- ▶ How could we work out the length of the box?
- ▶ Could we count the paper clips?
- ▶ How many paperclips?
- ▶ Are there 3 full paperclips?
- ▶ What is our unit of measurement?
- ▶ Is our unit of measurement, paperclips?
- ▶ Could we record the box and the paperclips?
- ▶ Could we record the length?

- ▶ Where else could we use these paperclips as a unit to measure a length on the

Place the paperclips in a row on a surface of the box from top to bottom, for example,



Record, for example,



Length = 2 paperclips

box?

- ▶ Will our unit of measurement be paperclips?
- ▶ Could we place the paperclips in a row on a surface of the box?
- ▶ Let's place the paperclips in a row front to back.
- ▶ Did we place the paperclips in a row?
- ▶ Do we have any gaps?
- ▶ Do we have any overlaps?
- ▶ How could we work out the length of the box?
- ▶ Could we count the paper clips?
- ▶ How many paperclips?
- ▶ Are there 2 full paperclips?
- ▶ What is our unit of measurement?
- ▶ Is our unit of measurement, paperclips?
- ▶ Could we record the box and the paperclips?
- ▶ Could we record the length?

- ▶ Did we measure the length of the box in 3 directions?

Record, for example, dimension

Record, for example, up and down.

Record, for example, left to right.

Record, for example, front to back.

Record, for example, length up and down = height.

Record, for example, length left to right = width.

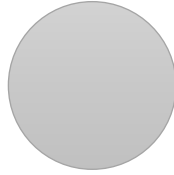
Record, for example, length front to back = depth.

- ▶ Is each direction a dimension?
- ▶ What are the 3 dimensions on this box?
- ▶ Is 1 dimension up and down?
- ▶ Is 1 of the dimensions left to right?
- ▶ Is 1 of the dimensions front to back?
  
- ▶ When we measure these different dimensions, what words do we use?
- ▶ Can we describe length as height when it goes up and down?
- ▶ Can we describe length as length when it is front to back or left to right?
- ▶ Can we describe length as the distance from the top to the bottom, or the front to the back, or the left to the front?

- ▶ Do you think that we could measure length on this circle?

Display a shape, for example, a circle.

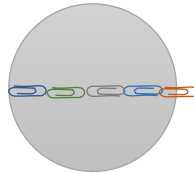
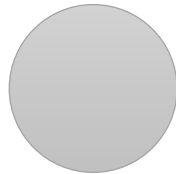
Children suggest where they could measure length on the circle.



Point up and down between the top and bottom sides of the shape.

Point side to side between the right and left sides of the shape.

Display some paperclips and a paper circle, for example,

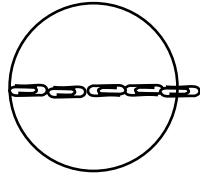


Place the paperclips in a row on the surface of the box from left to right, for example,

- ▶ Where could we measure length on this circle?
- ▶ Could we measure the length of this surface?
- ▶ How could we measure the length of this surface?
- ▶ Could we measure the length from the front to back?
  
- ▶ Could we measure the length from the left to the right?
  
  
- ▶ How could we use these paperclips as a unit to measure the length of the circle?
- ▶ Could we place the paperclips in a row on the surface of the circle?
  
- ▶ Let's place the paperclips in a row from left to right.
- ▶ Did we place the paperclips in a row?
- ▶ Do we have any gaps?
- ▶ Do we have any overlaps?
- ▶ How could we work out the length of the circle?
- ▶ Could we count the paper clips?
- ▶ How many paperclips?
- ▶ Are there 4 full paperclips, and a bit of another paperclip?
  
- ▶ What fraction is the bit of the paperclip?
- ▶ Is the bit about a half?
- ▶ Are there 4 full paperclips, and about half of another paperclip?
- ▶ What is our unit of measurement?
  
- ▶ Is our unit of measurement, paperclips?

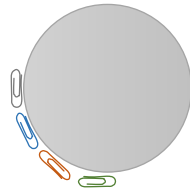


Record, for example,

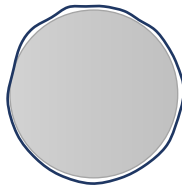


Length = 4 and a bit paperclips OR  
Length = 4 and a half paperclips

Place the paperclips around the circle, for example,



Curve the string around the curved line, for example,



Straighten out the string and measure it with the paperclips, for example,



► Could we record the circle and the paperclips?

► What if we wanted to measure the length of the curved line around the circle?

► Let's place the paperclips in a row along the curved line.

► Can we place the paperclips in a row along a curved line?

► Why not?

► Are paperclips straight and the line is curved?

► How could we measure the length of a curved line?

► Would we need to measure the length of a curved line with something that is curved?

► Could we curve some string around the curved line, then straighten out the string and measure it with the paperclips? Let's investigate!

► Let's curve some string around the curved line.

► Now let's straighten out the string and measure it with the paperclips.

► Do we have any gaps? Do we have any overlaps?

► How could we work out the distance around the circle?

► Could we count the paper clips?

Record, for example, Distance around the circle = 15 and a bit paperclips OR  
Distance around the circle = 15 and a half paperclips.

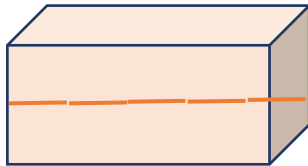
- ▶ How many paperclips?
- ▶ Are there 15 full paperclips, and a bit of another paperclip?
- ▶ What fraction is the bit of the paperclip?
- ▶ Is the bit about a half?
- ▶ Are there 15 full paperclips, and about half of another paperclip?
- ▶ What is our unit of measurement?
- ▶ Is our unit of measurement, paperclips?

Display short craft sticks and paperclips, for example,

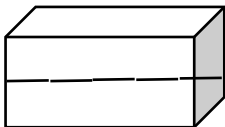


Display the same box that children measured the length of using paperclips.

Line up the sticks along the length of the box right to left with no gaps and overlaps, for example,

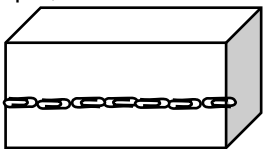


Record, for example,

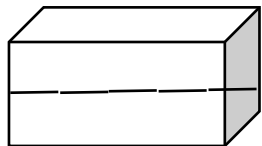


Length = 4 and a half sticks

Display the length of the box in paperclips and the length of the box in sticks, for example,



Length = 7 and a half paperclips



Length = 4 and a half sticks

Compare the length of the paperclip and the length of the stick using direct comparison, for example,



► How could we measure the length from left to right using sticks?

► Could we line up the sticks along the length with no gaps and overlaps?

► What is the length of the box from left to right?

► Could we say we have 4 and a half stick lengths?

► How could we record this?

► Could we record the box with the stick length marks on it?

► Could we record the length as 4 and a half sticks?

► We measured the length of the box using paperclips as a unit of measurement and using sticks as our unit of measurement.

► How many paperclips did we need?

► Did we need 7 and a half paperclips?

► How many sticks did we need?

► Did we need 4 and half sticks?

► Why did we need more paperclips than sticks?

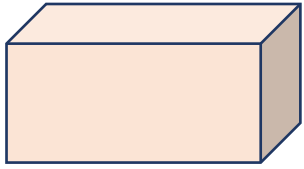
► Are paperclips shorter than sticks?

► Are sticks longer than paperclips?

► Do we need more paperclips because paperclips are shorter than sticks?

- ▶ Do we need less (fewer) sticks because sticks are longer than paperclips?
- ▶ So if we have short units of measurement, will we need more?
- ▶ If we have long units of measurement, will we need less (fewer) of them?

Display an object, for example, a box (a rectangular prism),



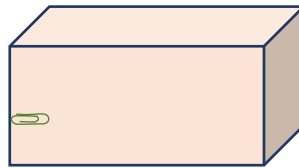
Display some paperclips, for example,



Display only one paperclip, for example,

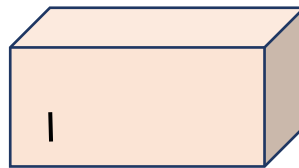


Place the paperclip at the beginning of the face that you want to measure, for example,

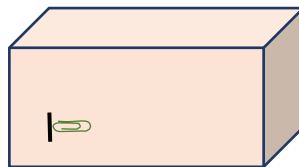


Children suggest how they could use one paperclip to measure a length longer than 1 paperclip.

Make a mark on the box where the paperclip ends, for example,



Move the paperclip so that the beginning of the paperclip is on the mark, for example,



► We've measured the length of a box using lots of units of measurement by lining them up with no gaps or overlaps.

► **But what if we didn't have lots of units of measurement!**

► **What if we only had 1 unit of measurement?**

► How could we use just one unit of measurement to measure the length of this object? Let's investigate!

► If we wanted to measure the length of a box, what parts would we measure?

► Could we measure the length from the left to right or up and down or front to back?

► How could we measure the length from left to right using just one paperclip?

► Let's start by placing the paperclip at the beginning of the length that we want to measure.

► Is the paperclip shorter than the length of the box?

► Is the box longer than 1 paperclip?

► What could we do now that we have placed our one paperclip on the length that we're measuring?

► Where does the paperclip end?

► How could we show where the paperclip measurement ends?

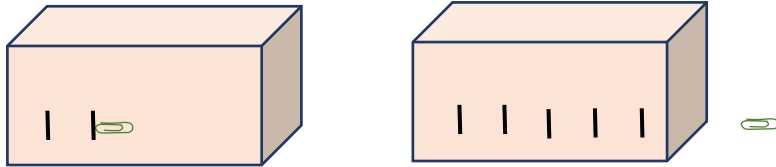
► Could we put a small mark there?

► Now that we have a mark where the paperclip ends, let's move the paperclip.

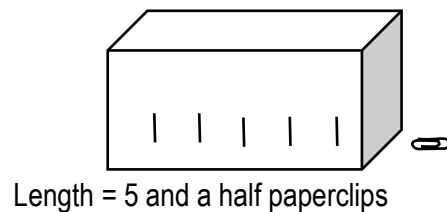
► Where will we move the paperclip to now?

► Could we move the paperclip, so that beginning of the paperclip is on the mark that we made?

Continue marking and moving the paperclip along the length of the box from left to right until it reaches the end of the box, for example,

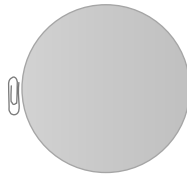


Record, for example,

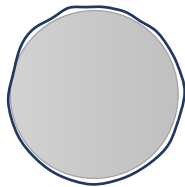


- ▶ What could we do now?
- ▶ Could we make a mark where the paperclip ends again?
- ▶ Could we move the paperclip, so that beginning of the paperclip is on the mark that we made?
- ▶ Could we keep marking and moving till we reach the end of the length of the box?
  
- ▶ Did we mark and move leaving no gaps and overlaps?
  
- ▶ What is the length of the box from left to right?
  
- ▶ Could we count how many spaces the paperclips left?
- ▶ Let's count the spaces, 1 2 3 4 5.
- ▶ Are there 5 paperclip lengths?
- ▶ Is there a small part left over?
- ▶ Is the small part about half as long as a paperclip?
- ▶ Could we say we have 5 and a half spaces?
- ▶ Could we say we have 5 and a half paperclip lengths?
- ▶ How could we record this?
- ▶ Could we record the box with the paperclip length marks on it?
- ▶ Could we record the length as 5 and a half paperclips?

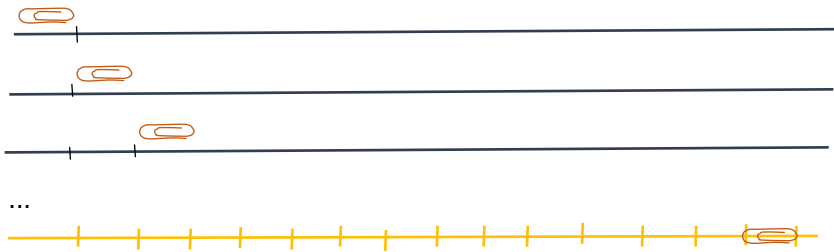
Move the paperclip around the circle, for example,



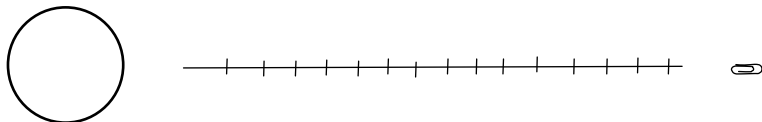
Curve the string around the curved line, for example,



Straighten out the string and measure it with the paperclip by marking and moving, for example,



Record, for example,



Distance = 15 and a half paperclips

- ▶ How could we measure the distance around a circle using just one paperclip?
- ▶ How could we measure the length of a curved line?
- ▶ Would we need to measure the length of a curved line with something that is curved?
- ▶ Could we curve some string around the curved line, then straighten out the string and measure it with the paperclip? Let's investigate!
- ▶ Let's curve some string around the curved line.

- ▶ Now let's straighten out the string and measure it with the paperclip.
- ▶ How could we measure the length of the string with 1 paperclip?
- ▶ Could we mark and move the paperclip till we reach the end of the length of the string?

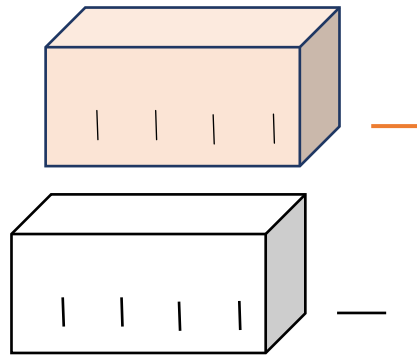
- ▶ Did we mark and move leaving no gaps and overlaps?
- ▶ What is the length of the string?
- ▶ Could we say we have 15 and a half paperclip lengths?
- ▶ What is the distance around the circle?
- ▶ Is the distance around the circle 15 and a half paperclips?
- ▶ How could we record this?
- ▶ Could we record the circle and the string?
- ▶ Could we record the distance as 15 and a half paperclips?

Display 1 short craft stick and 1 paperclip, for example,



Display the same box that children measured the length of using paperclips.

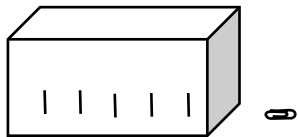
Mark and move the craft stick paperclip along the length of the box from left to right until it reaches the end of the box, for example,



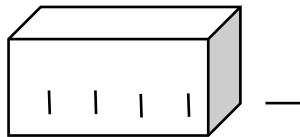
Record, for example,

Length = 5 and a half stick

Display the length of the box in paperclips and the length of the box in sticks, for example,



Length = 5 and a half paperclips



Length = 4 and a half sticks

Compare the length of the paperclip and the length of the stick using direct

- ▶ We've investigated measuring length using lots of units, and we've investigated measuring using just 1 unit.
- ▶ We've measured using paperclips.
- ▶ Today, let's measure length using short craft sticks.
  
- ▶ How could we measure the length from left to right using just one stick?
- ▶ Could we mark and move the stick till we reach the end of the length of the box?
- ▶ Did we mark and move leaving no gaps and overlaps?
- ▶ What is the length of the box from left to right?
- ▶ Could we say we have 4 and a half stick lengths?
- ▶ How could we record this?
- ▶ Could we record the box with the stick length marks on it?
- ▶ Could we record the length as 4 and a half sticks?
  
- ▶ We measured the length of the box using paperclips as a unit of measurement and using sticks as our unit of measurement.
- ▶ How many paperclips did we need?
- ▶ Did we need 5 and a half paperclips?
- ▶ How many sticks did we need?
- ▶ Did we need 4 and half sticks?
- ▶ Why did we need more paperclips than sticks?



comparison, for example,



- ▶ Are paperclips shorter than sticks?
- ▶ Are sticks longer than paperclips?
- ▶ Do we need more paperclips because paperclips are shorter than sticks?
- ▶ Do we need less (fewer) sticks because sticks are longer than paperclips?
- ▶ So if we have short units of measurement, will we need more?
- ▶ If we have long units of measurement, will we need less (fewer) of them?