Measures Week - Multiplicative Reasoning Y5/6

This week is all about exploring the relationships between lengths of different body parts.

We come in all sorts of different shapes and sizes but when you start measuring and comparing, there are lots of similarities between parts of our bodies.

For example, if you know your height you can predict approximately how long your arm span is. If you know the distance all the way around your wrist you can predict approximately how long your neck is.

For this week you will need:

- Pencil and paper
- String, ribbon, wool, cotton etc. that can be cut into pieces
- Scissors

You will need to keep the pieces of string that you use to measure each body part. Label each clearly.

You may also need the help of an adult or friend to measure and cut the string during the week.

Notes for adults working with groups of children

During this week the children might need help with identifying the multiplicative relationship between different lengths of string. There are different ways to do this including:

- Use the shorter piece like a ruler, lying it alongside the longer piece starting at one end, marking the longer piece where the short piece ends and then moving the short piece and repeating from the mark made.
- Cut several pieces of string the same length as the shorter piece, lay them end to end next to the longer piece and count how many are needed to match the length.
- Fold the longer piece into equal parts so the length of each part equals the length of the shorter string.

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You will need to use this table each day:

Body parts	What and how to measure
Height	Distance from top of head to heel of foot. Stand against the wall with feet flat, or lie on the floor with feet flat against a wall.
Arm span	Distance from the tip of one middle finger to the tip of the other middle finger when stretching out arms as far as can be reached.
Thigh bone	Sit down and measure from hip joint to the tip of the knee.
Forearm	Distance from wrist to tip of elbow.
Head length	Distance from top of the head to bottom of the chin.
Foot length	Distance from tip of big toe to heel
Shoulder width	Distance form one shoulder to the other across the chest
Upper arm	Distance from arm pit to elbow
Hand	Distance from tip of middle finger to base of hand
Face	Distance from hair line to the tip of your chin
Head width	Distance around the face from ear to ear

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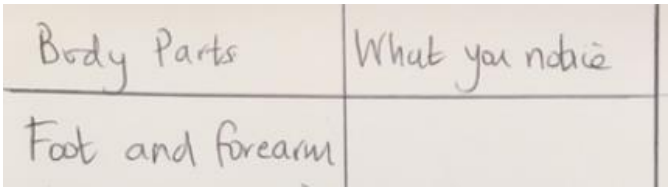
Day 1

How do you think your foot length compares to your forearm?

- Cut a piece of string/wool/ribbon to match the length of your foot.
- Next cut a piece to match the length of your forearm.
- What do you notice about the two lengths?
- For example, is your foot **approximately** twice as long as your forearm, about the same length or half as long?
- Start recording the things you notice in table like this one:



How do you think the distance around your wrist compares to the distance around your neck?

- Cut a piece of string to fit around your wrist.
- Cut a piece of string to fit around your neck.
- What do you notice about the lengths?
- Record in your table.

How do you think your height compares to the width of your shoulders?

- Cut a piece of string to match the width of your shoulders.
- Compare this with your height.
- What do you notice?
- Record in your table.

Find other people in your house and with string measure the length of their: feet, forearms, wrists, necks, width of shoulders and heights. Or you could phone some friends and ask them to do the activities and let you know their results.

- Record what you notice.

Notes for adults working with groups of children

- Model how to measure accurately using the string and how to record. Encourage children to notice the relationships between pairs of body parts. You might want to use a stem sentence to support their explanation. For example: The distance around the wrist is **approximately** half the distance around the neck. The distance around the neck is **approximately** twice the distance around the wrist.

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Day 2

How do you think your height compares to your arm span?

- Cut a piece of string to match your height.
- Cut a piece of string to match your arm span.
- What do you notice?
- Record in the table.

How do you think your height compares to the length of your thigh bone?

- Cut a piece of string to match the length of your thigh bone.
- Compare this with your height.
- What do you notice?
- Record in your table.

How do you think your height compares to the length of your upper arm?

- Cut a piece of string to match the length of your upper arm.
- Compare this with your height.
- What do you notice?
- Record in your table.

Find other people in your house and measure their heights, arm spans thigh bones and upper arms with string. Or you could phone some friends and ask them to do the activities and let you know their results.

- Record what you notice.

Notes for adults working with groups of children

- See Day 1 and introduction

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Day 3

How do you think the length of your face compares to the length of your hand?

- Cut a piece of string to match the length of your face.
- Cut a piece of string to match the length of your hand.
- What do you notice?
- Record in your table.

How do you think the length of your face compares to the length of your ear?

- Cut a piece of string to match the length of your ear.
- Compare this with the length of your face.
- What do you notice?
- Record in your table?

How do you think the width of your head compares to the width of your eye?

- Cut a piece of string to match the width of your eye (take the string well away from your eye when cutting).
- Cut a piece of string to match the width of your head.
- Record in your table.

Now explore some other relationships such as:

- The distance from your nose to the bottom of your chin compared to the length of your face.
- The distance from your hairline to your eyebrows compared to the length of your face.
- What you notice?

Find other people in your house and measure their faces, hands and ears etc. Or you could phone some friends and ask them to do the activities and let you know their results.

- Record what you notice.

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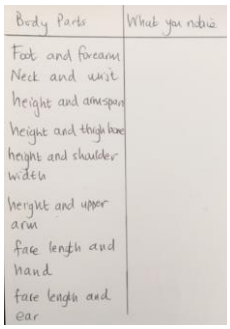

Day 4

- Look back at your recordings and gather together all the lengths of string.
- Did you notice that your height was about **approximately** four times the length of your thigh bone? We can also say the length of your thigh bone is **approximately** one quarter of your height.
- Use your pieces of string to explain why.
- Look at the statement below:
- **My** height is approximately four times the length of my thigh bone so the length of **my** thigh bone is approximately one quarter of my height.
- Create your own statements like this that describe the relationships between other pairs of body parts. You might like to use the ones below to help you:
    - My height is approximately ____ times the length of my shoulder width so the length of my shoulder width is approximately _____ of my height.
    - The distance around my neck is approximately ____times the distance around my wrist so the distance around my wrist is approximately ____ the distance around my neck.
    - My height is approximately ____ times the length of my upper arm so my upper arm length is approximately _____ of my height.
    - My face length is approximately ____ times the length of my ear so the length of my ear is approximately ____ of my face length.
    - My face length is approximately ____ times the distance from my hairline to my eyebrows so the distance from my hairline to my eyebrows is approximately ___ of my face length.
- What do you notice?
- You might like to explore relationships between other body parts such as eye width, nose length, finger lengths, distance around the head, lower leg etc.
- Record your findings in the same way

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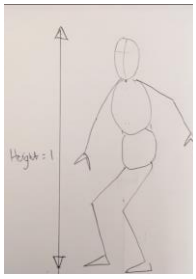
Day 5

This week you have been exploring the relationship between different parts of the body.

- Do you think the relationships you have noticed for your lengths are true for most people of your age? What about adults or babies?
- Using what you have noticed, make a hypothesis. For example: *I think that for most people their height is approximately three times the length of their feet.*
- You could go online and research to see if your hypothesis is true or test it out with more people in your house.
- The tallest man in history was Robert Wadlow who was approximately 2.72 metres tall. Based on the relationships you've discovered this week, can you estimate the length of other parts of his body? For example, what would you estimate his arm span and his shoulder width to be?
- Try drawing some stick figures on a sheet of paper, applying some of the relationships you have explored (for example the height to head relationship) in the figures? Which ones look most realistic to you?



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