**ACTIVITY: Cubits, spans and digits**

**Activity idea**

In this activity, students investigate the use of body parts such as the arm and fingers as a basis for developing a length measuring system.

By the end of this activity, students should be able to:

* use arm and finger parts to develop a length measuring system
* recognise the need to standardise a length measurement system
* understand that every measurement consists of two parts – a number and a unit
* recognise that there is a degree of uncertainty with every measurement taken.

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**Introduction/background**

Rudimentary measures became essential in primitive human societies for building dwellings, making clothing, bartering for food and exchanging raw materials. Early humans used body parts and natural surroundings to provide suitable measuring instruments. Early Babylonian and Egyptian records show that length was first measured with the forearm (cubit), hand (palm and span) and the finger (digit).

As trade and commerce expanded, it became necessary to standardise measurement systems, not only within a given country but also between countries.

In this activity, students measure the length and width dimensions of the classroom table they sit at using the length measures of cubit, span and digit:

* Cubit – the length of the forearm from the elbow to the tip of the middle finger.
* Span – the length of the outstretched hand from the tip of the thumb to the tip of the little finger.
* Digit – the width of the middle fingertip.

**What you need**

* Copies of the article [Measurement systems](https://www.sciencelearn.org.nz/resources/1855-measurement-systems)
* Metre rule
* 30 cm ruler
* Classroom tables
* Roll of newsprint
* Scissors
* Sticky tape
* Marker pens

**What to do**

1. As a class, read the article [Measurement systems](https://www.sciencelearn.org.nz/resources/1855-measurement-systems) and discuss.
2. Explain that students will be using personal measures to measure the length and width dimensions of the classroom table they sit at:
* Cubit – the length of the forearm from the elbow to the tip of the middle finger.
* Span – the length of the outstretched hand from the tip of the thumb to the tip of the little finger.
* Digit – the width of the middle fingertip.
1. Have each student use their own personal measures to calculate the number of digits in a span and the number of spans in a cubit and compare this with the Egyptian Royal Cubit: 28 digits = 2 large spans = 1 Royal Cubit = 52.3 cm.
2. Have each student measure the length and width of the classroom table they sit at using their own personal cubit, span and digit measures and record the results.
3. Have each student measure the table using a metre rule or a 30 cm ruler (standard measure) and record the results.
4. Working in pairs, have students compare the results and note any differences.
5. Have pairs join up to work in groups of four and decide upon a group name. Compare the four sets of measurements. Note any similarities and differences.
6. Have each group select a set of cubit, span and digit measurements from one person within the group that could act as the group’s standards and note the group’s name as well as the agreed length and width of the classroom table in cubits, spans and digits.
7. Using these measures, make two ‘tablecloths’ of newsprint that would fit the exact area of the table top – one using cubits, spans and digits, the other using standard measures. Be as accurate as possible. Clearly label the tablecloths with the group’s name as well as the length and width dimensions.
8. Pin up the tablecloths on the classroom walls keeping the cubits, spans and digits ones separate from the standard measure ones.

**Discussion questions**

* How did the tablecloths measured using the body part method compare with one another? Are there differences in size and why?
* How did the tablecloths measured using the metre rule and 30 cm ruler compare? Are there differences in size and why?
* Which system of measure would allow for better ‘trade’ between the groups?
* Why is it necessary to have a length measurement system that is based on an accepted standard?