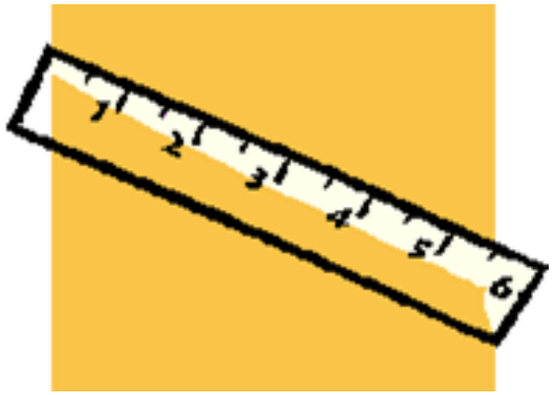
November 30, 2016



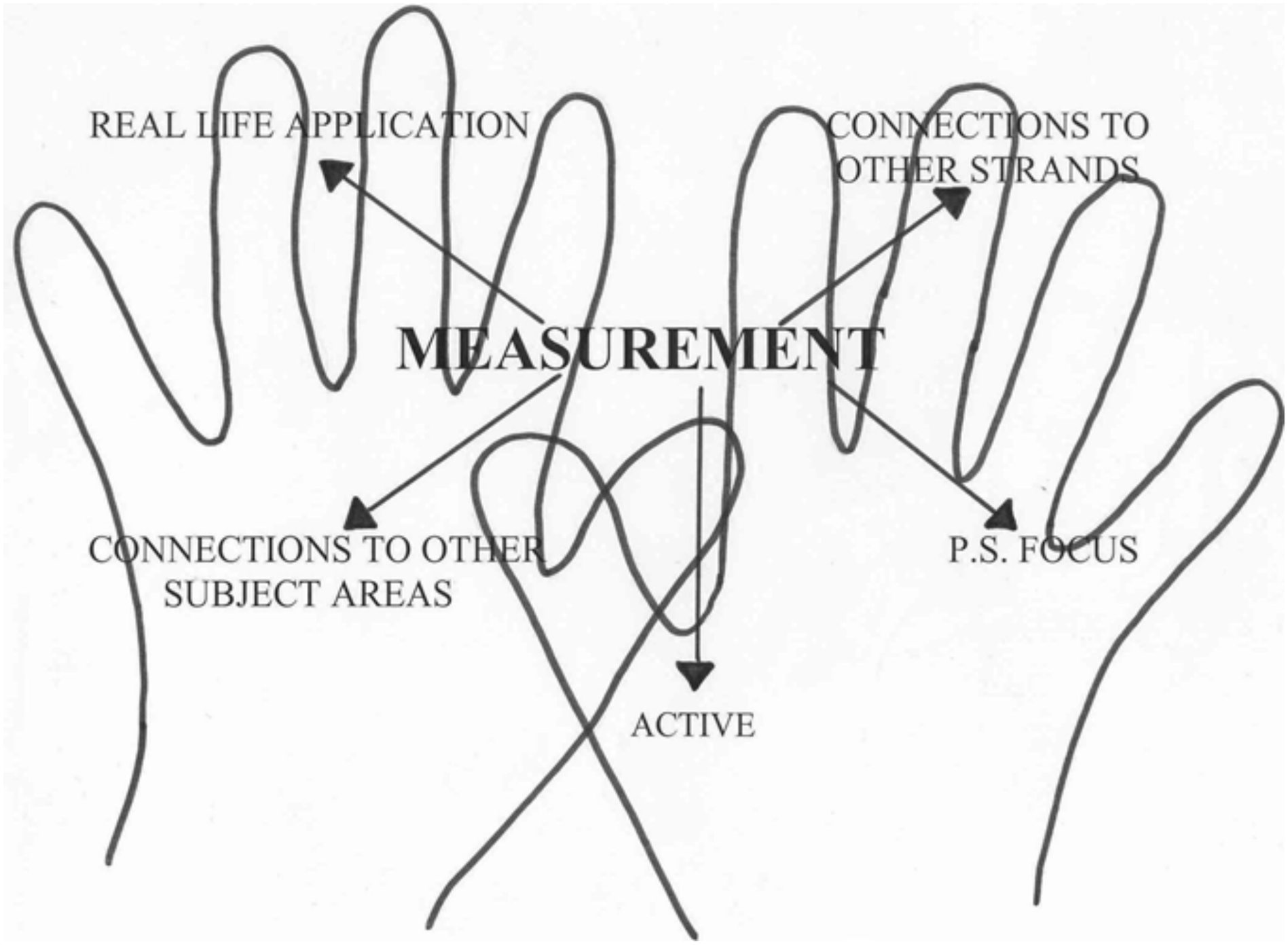
Measurement

J. Graham

Measurement

Attributes/Units/Measurement sense
&
Measurement Relationships

BIG Ideas


REAL LIFE APPLICATION
CONNECTIONS TO OTHER STRANDS
MEASUREMENT
CONNECTIONS TO OTHER SUBJECT AREAS
P.S. FOCUS
ACTIVE

ATTRIBUTES OF MEASUREMENT

LENGTH

CAPACITY

MASS

AREA

VOLUME

ANGLES

TEMPERATURE

TIME

MONEY

Attribute: Weight
Units: objects that stretch the spring in the scale

How many units will pull the spring as far as the bucket will?

Attribute: Volume/Capacity
Units: cubes, balls, cups of water

How many units will fill the bucket?

Attribute: Length
Units: rods, toothpicks, straws, string

How many units are as tall as the bucket?
How much string is needed to go around the bucket?

Attribute: Area
Units: index cards, squares of paper, tiles

How many cards will cover the surface of the bucket?

A General Plan of Instruction

A basic understanding of measurement suggests how to help children develop a conceptual knowledge of measuring.

Conceptual Knowledge to Develop	Type of Activity to Use
1. Understand the attribute being measured.	1. Make comparisons based on the attribute.
2. Understand how filling, covering, matching, or making other comparisons of an attribute with units produces what is called a measure.	2. Use physical models of measuring units to fill, cover, match, or make the desired comparison of the attribute with the unit.
3. Understand the way measuring instruments work.	3. Make measuring instruments and use them along with actual unit models to compare how each works.

Van de Walle, John A. (2001). Elementary and middle school mathematics: Teaching developmentally. New York: Addison Wesley Longman, Inc.

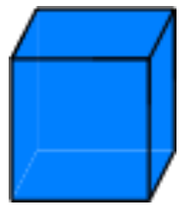
STAGES IN THE DEVELOPMENT OF MEASUREMENT

COMPARISON

a. Direct - contrast/comparison
b. Seriation - order by size, mass, area etc.
c. Indirect (length only)

NON-STANDARD

a. Quantification
b. Constant Unit



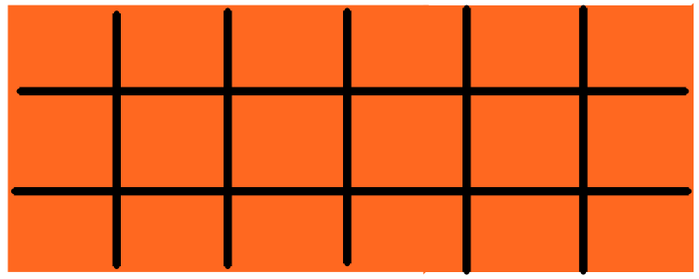
STANDARD – SI Units

Area Measurement

Area of a Rectangle = # of spares in each row

X

# of rows



In this rectangle, there are six squares in the first row, so there must be six rows in every row. There are three rows. The ares is 6 x 3 = 18 square units.

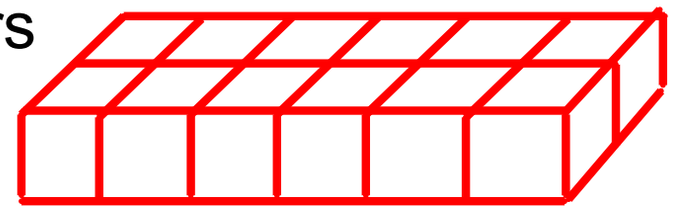
When we have a figure for which there is no area formula, we arrange the shape to get a figure for which we have an area formula.

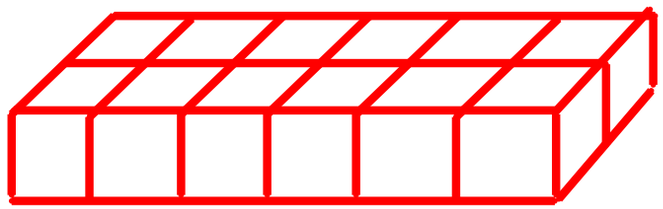
Volume Measurement

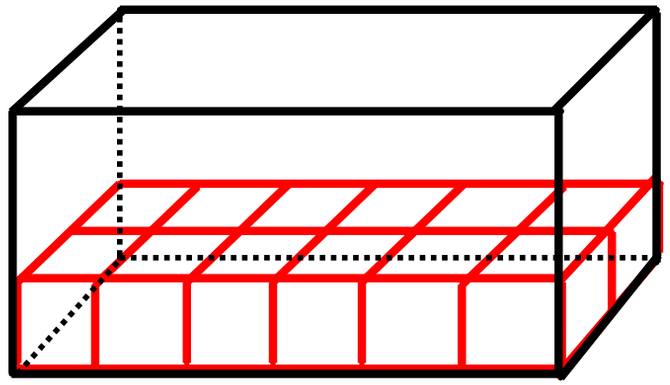
Volume = # of cubes in the first layer

X

# of layers





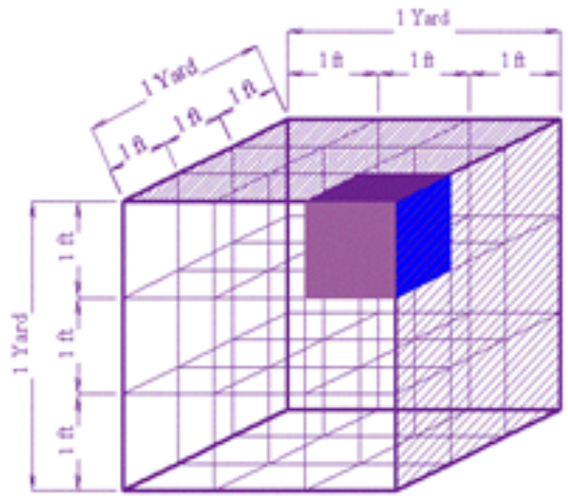


When we have a shape for which we do not have a volume formula, we arrange the volume into a shape for which we for have a formula.

Estimation & Measurement

"Measurement Sense"

Strategies:
Referents
Chunking
Unitizing



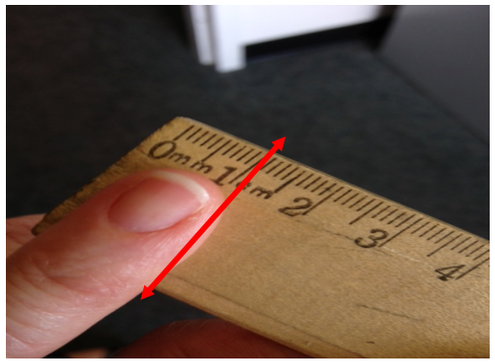
Real life Application

Referents

About how long is...

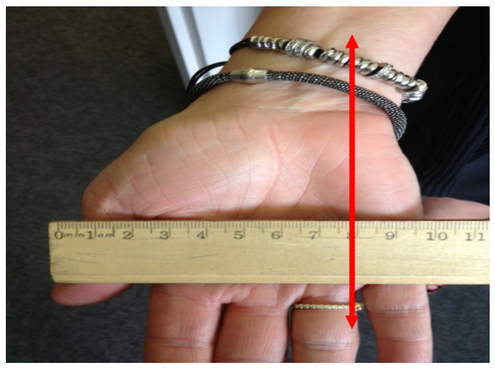
1 cm?

About the width of your ....



10 cm?

About the width of your ....



100 cm or 1 m?

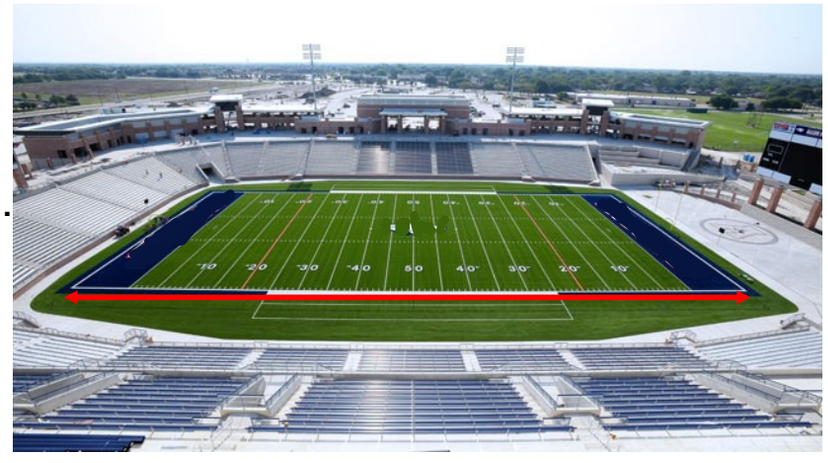
About the height of a ...

1000 cm or 10 m?

About the height of a ...

10,000 cm or 100 m?

About the length of a ...



Your turn:

Name another "thing" that is about as long as

1 cm_____ 10 cm_____ 10,000 cm or 100 m _____

100 cm or 1 m_____ 1000 cm or 10 m_____

How Many Jelly Beans

This jar is full of jelly beans

Estimate about how many jelly beans are in the jar _____

This cup holds about 25 jelly beans.

Four cups of jelly beans have been poured into the jar.

About how many jelly beans do you think are in the jar now? _____

One cup of jelly beans has been poured in the jar.

Now estimate about how many jelly beans are in the jar_____

How to Teach Measurement

- Measure frequently and often using real problems when ever possible
- Actively “DO” and experiment rather than passively observe
- Emphasize the important ideas of measurement that transfer or work across measurement systems
- Include estimation in the development of measurement