

Objectives

Students apply skill-level appropriate techniques and tools to determine the real size of objects using standard and nonstandard units of measure.

Students apply mathematics and problem-solving skills to create scale drawings of objects.

Multiple Intelligences

- Bodily-kinesthetic
- Interpersonal
- Logical-mathematical
- Spatial

What Does It Mean?

Cubit: principal unit of measurement in ancient Egypt, equal to 52.4 cm

Petroglyph: drawing or carving on rock created by prehistoric people

Pictograph: artwork that shows people, places, and/or things in pictures, signs, or symbols

National Standards

Visual Arts Standard #1

Understands and applies media, techniques, and processes

Mathematics Standards

Measurement

Understand measurable attributes of objects and the units, systems, and processes of measurement

Connections

Recognize and apply mathematics in contexts outside of mathematics

Background Information

The Ancient Egyptians incorporated a measurement system into all fundamental areas of their lives, including commerce, building, and art.

Using body parts with which to measure, the Egyptian measurement system included units such as the *cubit* (the length of a man's arm from elbow to tip of middle finger), *palm* (cross-wise width of hand), and *span* (the length of outstretched upper limbs).

Graphic artists use the human head as the basic unit of measurement for drawing the entire body in proportion. The height of the head from the chin to the top of the head is the "ruler" by which vertical lines in a human form are measured. Fine artists often consider that most people are 7.5 head lengths tall.

One way archaeologists record prehistoric petroglyphs and pictographs is to carefully create a string grid over the petroglyphs or artifacts and then do a scaled-down sketch on paper of what they see in each square.

Resources

Math Curse by Jon Scieszka & Lane Smith
Humorous look at numbers in everyday life, including measurement, time, arithmetic, and problem-solving. All ages.

Picasso's One-Liners by Pablo Picasso
A collection of Picasso's one-liners, drawings created in one movement, without lifting drawing tool from paper. All ages.

The Painter by Peter Catalanotto
A celebration of creativity in life and art. Cover illustration shows a father tracing his child's body on large paper. Simple text and vivid watercolor illustrations appeal to young children.

Concept List

Use this list to explore new vocabulary, create idea webs, or brainstorm related subjects.

- Nonstandard units of measure
Paper clips Index cards
- Terms
Height Length Width
- Units of measure – Length
Metric U.S. Customary Egyptian
Centimeter Foot Cubit
Kilometer Inch Palm
Meter Mile Span
Millimeter Yard
- Scale
Models Drawings Archaeology
Cars Book illustrations Digs
Globes Maps Petroglyphs
Trains Scientific illustrations Pictographs



Artwork by students from Spring Garden Elementary School, Bethlehem, Pennsylvania.
Teacher: Pat Check



Artwork by students from St. Theresa School, Hellertown, Pennsylvania.

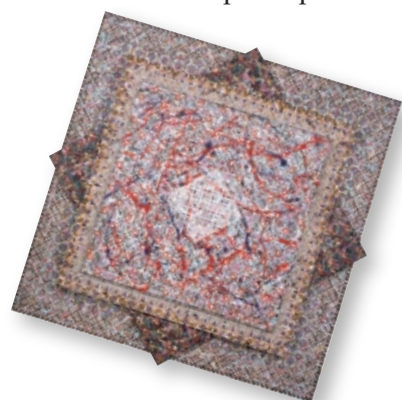
Artwork by students from Spring Garden Elementary School, Bethlehem, Pennsylvania.
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Measure Twice, Create Once

	K-2	3-4	5-6
Suggested Preparation and Discussion	<p>Introduce use of hands and fingers as units of measure. Demonstrate how to determine the length of a marker by counting fingertips set side by side along the barrel. Show how to measure the length of a desk by counting palms set side by side.</p> <p>Invite children to measure other objects and compare results. What do they notice? Why might two different children using the same body part to measure the same object obtain different results?</p>	<p>Who has measured objects using ancient Egyptian units of measure? Talk about the Egyptian standards for length—the cubit, palm, and span—and how long each might be. Use a yardstick or ruler to measure body parts and shoe sizes, for example. Compare findings among students to see the variations. Talk about how that could be a challenge when building furniture or sewing clothes.</p> <p>Brainstorm and list different measurement units suitable for the grade level and children’s skills including U.S. Customary, metric, and historic measures. Which units measure length and which measure area?</p>	
Crayola® Supplies	<ul style="list-style-type: none"> Construction Paper™ Crayons Erasable Colored Pencils Markers 	<ul style="list-style-type: none"> Paint Brushes Tempera Paint 	
Other Materials	<ul style="list-style-type: none"> Construction paper Rulers 	<ul style="list-style-type: none"> Craft paper on a roll Paper plates Paper towels Recycled newspapers Water containers Yardsticks 	
Set-up/Tips		<ul style="list-style-type: none"> Cover painting surface with recycled newspaper. Mix paint colors on paper plates. 	

Process: Session 1 20-30 min.	<p>Measure and draw a grid</p> <ol style="list-style-type: none"> Children measure and cut construction paper in half (4.5 x 6 inches). Lay one piece flat, vertically. Place ruler along the left edge of the paper and mark off inches starting at the top. Do the same on the right side. Use a ruler to connect the marks, making rows across the paper. Create 1-inch wide columns in a similar manner. Number squares consecutively from left to right across the rows, starting on the top row. <p>Trace a hand</p> <ol style="list-style-type: none"> Children place an open hand or simple shapes on a grid and trace around them with crayon, or draw a simple figure using simple shapes on the paper. 	<p>Measure and draw a grid</p> <ol style="list-style-type: none"> Children divide into small groups of three to five. Cut craft paper large enough to contain a life-size contour drawing of one student in the group. Students measure and mark 3- or 4-inch square grids, depending on their skills, of columns and rows of squares on craft paper. Number the squares from left to right across each row. Observe multiplication and other patterns in numbered cells at the ends of each row. <p>Trace a body model</p> <ol style="list-style-type: none"> Each group chooses a model from the team to lie on the grid in an unusual position. Team members trace around the model.
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Beside the Still Waters
1984-2003
Artist: Kendall Shaw
Acrylic and mirrors on canvas
60" x 60"
Collection of the artist.



Sun Ship
1982
Artist: Kendall Shaw
Acrylic and mirrors on canvas
4 panels, total 101" x 101"
Collection of the artist.

	K-2	3-4	5-6
Process: Session 2 30-40 min.	<p>Measure and draw larger, personal grids</p> <ol style="list-style-type: none"> Create a grid of 2-inch squares on a full sheet of construction paper. Follow steps from Session 1, mark papers every 2 inches. Number squares in this larger grid to match the smaller grid. <p>Enlarge a hand</p> <ol style="list-style-type: none"> Demonstrate how to copy the lines and curves that appear in the squares of the smaller grid into the corresponding squares of the larger grid. 	<p>Measure and draw smaller, personal grids</p> <ol style="list-style-type: none"> Using 12- x 18-inch construction paper, students each create an evenly spaced grid with the same number of rows, columns, and cells as on the team grid. Lightly number each cell to match the larger grid. <p>Reduce and redraw</p> <ol style="list-style-type: none"> Show students how to draw the lines and curves that appear in the larger squares of the team grid on the corresponding smaller squares of their personal grids to create a reduced version of the figure outlined on the large craft paper. 	
Process: Session 3 30-40 min.	<p>Add color and patterned designs to smaller grids</p> <ol style="list-style-type: none"> Students fill all the shapes in their smaller grids with crayon color to enrich and personalize them. 		
Process: Session 4 30-40 min.	<p>Paint large hand design</p> <ol style="list-style-type: none"> Fill larger hand grids with colors and patterns. 	<p>Paint team grid</p> <ol style="list-style-type: none"> Fill the group grid with paint colors. Plan use of negative space to highlight the outline if desired. 	
Assessment	<ul style="list-style-type: none"> Assess student grids for precise measurements. Observe the drawing process. Did students use problem-solving strategies to redraw and scale figures? Students exchange drawings to check how well smaller drawings match larger drawings. Ask students to reflect on this lesson and write a DREAM statement to summarize the most important things they learned. 		
Extensions	<p>Practice measuring desktops or other classroom items using a variety of units of measure such as crayons, paper clips, or yarn. Make and grid scale drawings of the desktops to represent the various units of measure.</p> <p>Simplify the grid-making part of this lesson for young students or those with special needs by providing cardboard “rulers” marked off in inches.</p>	<p>Show children sports play books created by coaches. How is scale used to create play books? How do the drawings of various plays show problem-solving strategies?</p> <p>Create scale drawings of favorite sports fields. The On the Court Lesson Plan found on Crayola.com offers a fun way to bring math, science, art, and sports together in a big way.</p>	<p>Research how archaeologists use scale plans to show the locations of discoveries and details of structures. See Pyramids in Paint on Crayola.com for an exploration of the Great Pyramids.</p> <p>Challenge students with strong mathematical aptitude to explore architectural blueprints (of the school if possible) and explain the scale notations and other symbols to classmates. Use problem-solving skills to determine the real sizes of the rooms and building.</p>

To demonstrate how mural artists use grids, each child selects a photograph of a simple object or photograph depending on children’s abilities. Superimpose a grid over the picture. On mural paper create a larger, proportionate grid. Create a drawing of the object using skills learned during this lesson.