

Appropriate Tools for Learning Elementary Math: From Physical to Virtual with Sketchpad

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Learn how to engage students and extend understanding through the use of appropriate tools for learning elementary mathematic concepts. Starting with physical models and extending and expanding the understanding through virtual models made with The Geometer's Sketchpad, participants will experience how to make elementary math accessible to all students.

Activities and Common Core Focus

(Please note: All virtual activities are free to use and found at <http://sll.keypress.com/classpass/NCTM2012> or most can be found at www.keycurriculum.com/resources/sketchpad.)

(You must have Sketchpad to open the virtual activities. Download it for free at: <http://keycurriculum.com/gsp/downloads>.)

Grade 3:

- 3.OA.1. Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5×7 .*
- 3.OA.2. Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as $56 \div 8$*
- 3.MD.5. Recognize area as an attribute of plane figures and understand concepts of area measurement.
 - A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.
 - A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.
- 3.MD.6. Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).

Physical: Counters and Geoboards

Virtual: Sketchpad Activities 1) *Bugs in a Group* and 2) *Area on a Grid: Combining and Subdividing Shapes*

Grade 4:

- 4.NF.1. Explain why a fraction a/b is equivalent to a fraction $(n \times a)/(n \times b)$ by using visual fraction models, with attention to how the number and size of the parts differ even though the two fractions themselves are the same size. Use this principle to recognize and generate equivalent fractions.
- 4.G.3. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Physical: Fraction Circles, Rulers and Patty Paper

Virtual: Sketchpad Activities 1) *Comparing Fractions* and 2) *Crop and Reflect*

Grade 5:

- 5.G.1. Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x -axis and x -coordinate, y -axis and y -coordinate).
- 5.G.3. Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category. For example, all rectangles have four right angles and squares are rectangles, so all squares have four right angles.
- 5.G.4. Classify two-dimensional figures in a hierarchy based on properties.

Physical: Geoboards

Virtual: Sketchpad Activities 1) *Lulu: Introducing the Coordinate Grid* and 2) *Virtual Geoboard and Quadrilateral Pretenders*

Additional Virtual Activities (time allowing):**Grade 3/4:**

- 3.NBT.1. Use place value understanding to round whole numbers to the nearest 10 or 100.
- 4.NBT.3. Use place value understanding to round multi-digit whole numbers to any place.

Virtual: Sketchpad Activity: *Place-Value Counter: Get to the Target*

Grade 4:

- 4.OA.4. Find all factor pairs for a whole number in the range 1–100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1–100 is prime or composite.

Virtual: Sketchpad Activity: *Jump Along: Factor Families on the Number Line*

Grade 5:

- 5.NBT.3. Read, write, and compare decimals to thousandths.
 - Read and write decimals to thousandths using base-ten numerals, number names, and expanded form, e.g., $347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)$
 - Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.
- 5.NBT.4. Use place value understanding to round decimals to any place.

Virtual: Sketchpad Activity: *Zooming Decimals: Precision and Place Value*