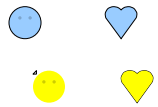
Big Ideas of Sets

Topic	Big Ideas	Examples
Sets & Sorting	•**Attributes can be used to sort collections into sets.**	•Color, size, shape, type of object, etc.
	•The same collection can be sorted in different ways.	•Red bears vs. blue bears; big bears vs. little bears
	•Sets can be compared and ordered.	•*There are more red bears than blue bears.* (compare); *small bears, medium bears, large bears* (order)

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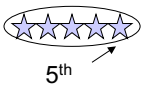
Big Ideas of Number Sense

Topic	Big Ideas	Examples
Uses of Number 	•Numbers are used many ways, some more mathematical than others.	• *Tommy has 5 books.* (cardinal) • *Ava is fifth in line today.* (ordinal) • Numbers on basketball jerseys, home addresses, telephone numbers (nominal) • *Let's meet at 5 pm on December 5.* (referential)
Numerosity  = 5	•**Quantity is an attribute of a set of objects** and we use numbers to name specific quantities. •The quantity of a small collection can be intuitively perceived without counting.	• 5 mice and 5 elephants are alike in quantity, though different in other ways. • Children just "see" three objects and know it's 3.

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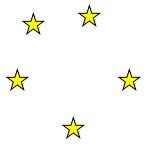
Big Ideas of Counting

Topic	Big Ideas	Examples
Quantity  "1,2,3,4,5…5!"	• Counting can be used to find out "how many" in a collection.	• *1, 2, 3, 4, 5, 6 … you used six blocks!*
Counting Rules 	• Counting has rules that apply to any collection.	• "One, four, two" doesn't give a correct answer. (*stable order*) • Children need strategies for keeping track, like touch-pointing or moving to another pile. (*one-to-one correspondence*) • Mixing up objects and counting again is a good exercise; the third object counted is not the only one that can "be" three (*order irrelevance*) • Being able to count is not the same as being able to answer "how many?" (*cardinality*)

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Big Ideas of Number Operations

Topic	Big Ideas	Examples
Changing Sets 	• Sets can be *changed* by adding items (joining) or by taking some away (separating).	• *You have 2 balls and I have 3 balls. How many balls do we have altogether?* • *You had 12 cards, and you gave your friend 5. How many do you have now?*
Comparing Sets 	• Sets can be *compared* using the attribute of numerosity, and *ordered* by more than, less than and equal to.	• *I have a handful of raisins; Chris has a bowl-ful. Chris has more!* • *I have 1 pear and 1 peach; you have 2 apples. We have the same number of fruits.* • *Avery has 3 dirty plates, and Tracy has 4 dirty bowls. Who has fewer dishes to wash?*
Number Composition 	• A quantity (whole) can be *decomposed* into equal or unequal parts; the parts can be *composed* to form the whole.	• *How many ways can you show 5 with fingers on both hands?*

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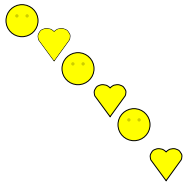
Big Ideas of Pattern

Topic	Big Ideas	Examples
Pattern & Regularity 	• Patterns are sequences (repeating or growing) governed by a rule; they exist both in the world and in mathematics. • Identifying the rule of a pattern brings predictability and allows us to make generalizations. • The same pattern can be found in many different forms.	• Dots on a ladybug; posts of a fence; adding 1 to any number gives you the next number • *After lunch comes recess; If we keep counting people's feet, it will always be 2 more.* • Big block, little block; big block, little block; big block, little block … OR snap, clap; snap, clap; snap, clap…

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Big Ideas of Measurement

Topic	Big Ideas	Examples
Attributes 	• Many different attributes can be measured, even when measuring a single object.	• A bucket has many measurable attributes, including height, weight, capacity, or circumference: *What kind of "big" is it?*
Comparison 	• All measurement involves a "fair" comparison.	• Weighing rocks on a pan balance (direct comparison); using a length of string to measure a table in one room and chairs in another (indirect comparison). • A "fair" comparison measures the same attribute. Units must be of equal size, with no gaps or overlaps.
Precision 	• Quantifying a measurement helps us describe and compare more precisely.	• Nonstandard units (such as blocks) and standard units (such as inches) allow for more precision than direct comparison. • There is always a more precise measurement possible – we never get it exactly "right," but it must be "good enough" for the task at hand.

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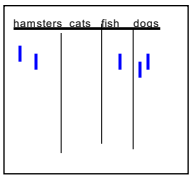
Big Ideas of Data Analysis

Topic	Big Ideas	Examples
Gathering Data 	• The purpose of collecting data is to answer questions when the answers are not immediately obvious.	• Children's own questions are most meaningful to them; often the need to gather data will come naturally in the course of discussion or from content areas such as science and social studies.
Organizing Data 	• Data must be represented in order to be interpreted, and how data are gathered and organized depends on the question.	• Age-appropriate data collection methods: sort real objects; organize pictures, counters, or name cards; make tallies; survey friends or family. • A tally chart can help with seeing clusters in the data; a bar graph provides an easy way to compare quantities across categories.
Describing Data 	• It is useful to compare parts of the data and to draw conclusions about the data as a whole.	• *There are more dogs than fish. But overall, hamsters are the most common pet.*

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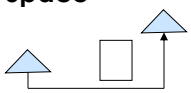
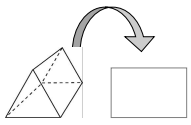
Big Ideas of Spatial Relationships

Topic	Big Ideas	Examples
Describing Space 	• Relationships between objects and places can be described with mathematical precision.	• Maps and models represent the 3-dimensional world. • *Joshua is in front of Ana, and he is behind Tameika.*
Visualizing Space 	• Our own experiences of space and two-dimensional representations of space reflect a specific point of view. • Spatial relationships can be visualized and manipulated mentally.	• A party hat looks triangular from the side, but when you lay it down, it can look like a circle. • An expert jigsaw-puzzle solver can picture a missing piece and does not rely on trial and error.

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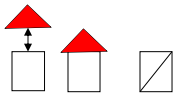
Big Ideas of Shape

Topic	Big Ideas	Examples
Defining & Analyzing Shapes 	**•Shapes can be defined and classified by their attributes.** •The flat faces of solid (three-dimensional) shapes are two-dimensional shapes. •Shapes can be combined and separated (composed and decomposed) to make new shapes.	•A rectangle must have two sets of parallel sides of equal length and four 90° angles; thus, a square is a special type of rectangle. •A baseball is a sphere and can be represented in a drawing as a circle. •Any rectangle can be divided into 2 triangles.

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Attribute: More than just a Big Idea of Sets

Number & Operations	○ What kind of thing are we counting? ○ What is the unit? What is the set? ○ Number is an attribute of a set. ○ Subitizing is seeing small sets.
Geometry	○ What kind of shape is it? ○ We use shape as an attribute to sort. ○ We define shapes by their attributes.
Measurement	○ What kind of big is it? ○ We use size as an attribute to sort. ○ Each type of measurement corresponds to a particular attribute.
Data Analysis	○ What kind of question are we trying to answer? ○ We collect & analyze data by classifying, sorting & making sets.

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