

Kindergarten

K.1. Core Content: Whole numbers

(Numbers, Operations)

Students begin to develop basic notions of numbers and use numbers to think about objects and the world around them. They practice counting objects in sets, and they think about how numbers are ordered by showing the numbers on the number line. As they put together and take apart simple numbers, students lay the groundwork for learning how to add and subtract. Understanding numbers is perhaps the most central idea in all of mathematics, and if students build and maintain a strong foundation of number sense and number skills, they will be able to succeed with increasingly sophisticated numerical knowledge and skills from year to year.

Performance Expectations

Students are expected to:

K.1.A Rote count by ones forward from 1 to 100 and backward from any number in the range of 10 to 1.

K.1.B Read aloud numerals from 0 to 31.

K.1.C Fluently compose and decompose numbers to 5.

K.1.D Order numerals from 1 to 10.

Explanatory Comments and Examples

Shown numeral cards in random order from 0 to 31, students respond with the correct name of the numerals. Students also demonstrate that they can distinguish 12 from 21 and 13 from 31—a common challenge for kindergartners.

The choice of 31 corresponds to the common use of calendar activities in kindergarten.

Students should be able to state that 5 is made up of 4 and 1, 3 and 2, 2 and 3, or 1 and 4. They should understand that if I have 3, I need 2 more to make 5, or that if I have 4, I need only 1 more to make 5. Students should also be able to recognize the number of missing objects without counting.

The words *compose* and *decompose* are used to describe actions that young students learn as they acquire knowledge of small numbers by putting them together and taking them apart. This understanding is a bridge between counting and knowing number combinations. It is how instant recognition of small numbers develops and leads naturally to later understanding of fact families.

Example:

- Here are 5 counters. I will hide some. If you see 2, how many am I hiding?

The student takes numeral cards (1 to 10) that have been shuffled and puts them in correct ascending order.

Performance Expectations

Students are expected to:

- K.1.E Count objects in a set of up to 20, and count out a specific number of up to 20 objects from a larger set.
- K.1.F Compare two sets of up to 10 objects each and say whether the number of objects in one set is equal to, greater than, or less than the number of objects in the other set.
- K.1.G Locate numbers from 1 to 31 on the number line.
- K.1.H Describe a number from 1 to 9 using 5 as a benchmark number.

Explanatory Comments and Examples

Students should be able to do this without having to start counting at 1.

Students should make observations such as “7 is 2 more than 5” or “4 is 1 less than 5.” This is helpful for mental math and lays the groundwork for using 10 as a benchmark number in later work with base-ten numbers and operations.

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K.2. Core Content: Patterns and operations

(Operations, Algebra)

Students learn what it means to add and subtract by joining and separating sets of objects. Working with patterns helps them strengthen this understanding of addition and subtraction and moves them toward the important development of algebraic thinking. Students study simple repetitive patterns in preparation for increasingly sophisticated patterns that can be represented with algebraic expressions in later grades.

Performance Expectations

Students are expected to:

K.2.A Copy, extend, describe, and create simple repetitive patterns.

K.2.B Translate a pattern among sounds, symbols, movements, and physical objects.

K.2.C Model addition by joining sets of objects that have 10 or fewer total objects when joined and model subtraction by separating a set of 10 or fewer objects.

Explanatory Comments and Examples

Students can complete these activities with specified patterns of the type AB, AAB, AABB, ABC, etc.

Examples:

- Make a type AB pattern of squares and circles with one square, one circle, one square, one circle, etc.
- Here is a type AAB pattern using colored cubes: red, red, blue, red, red, blue, red, red. What comes next?
- A shape is missing in the type AB pattern below. What is it?



Red, red, yellow, red, red, yellow could translate to *clap, clap, snap, clap, clap, snap*.

Students should be able to translate patterns among all of these representations. However, when they have demonstrated they can do this, they need not use all representations every time.

Seeing two sets of counters or other objects, the student determines the correct combined total. The student may count the total number of objects in the set or use some other strategy in order to arrive at the sum. The student establishes the total number of counters or objects in a set; then, after some have been removed, the student figures out how many are left.

Examples:

- Get 4 counting chips. Now get 3 counting chips. How many counting chips are there altogether?
- Get 8 counting chips. Take 2 away. How many are left?

Performance Expectations

Students are expected to:

K.2.D Describe a situation that involves the actions of joining (addition) or separating (subtraction) using words, pictures, objects, or numbers.

Explanatory Comments and Examples

Students can be asked to tell an addition story or a subtraction story.

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K.3. Core Content: *Objects and their locations*

(Geometry/Measurement)

Students develop basic ideas related to geometry as they name simple two- and three-dimensional figures and find these shapes around them. They expand their understanding of space and location by describing where people and objects are. Students sort and match shapes as they begin to develop classification skills that serve them well in both mathematics and reading—matching numbers to sets, shapes to names, patterns to rules, letters to sounds, and so on.

Performance Expectations

Students are expected to:

- K.3.A Identify, name, and describe circles, triangles, rectangles, squares (as special rectangles), cubes, and spheres.
- K.3.B Sort shapes using a sorting rule and explain the sorting rule.
- K.3.C Describe the location of one object relative to another object using words such as *in*, *out*, *over*, *under*, *above*, *below*, *between*, *next to*, *behind*, and *in front of*.

Explanatory Comments and Examples

Students should be encouraged to talk about the characteristics (e.g., round, four-cornered) of the various shapes and to identify these shapes in a variety of contexts regardless of their location, size, and orientation. Having students identify these shapes on the playground, in the classroom, and on clothing develops their ability to generalize the characteristics of each shape.

Students could sort shapes according to attributes such as the shape, size, or the number of sides, and explain the sorting rule. Given a selection of shapes, students may be asked to sort them into two piles and then describe the sorting rule. After sorting, a student could say, “I put all the round ones here and all the others there.”

Examples:

- Put this pencil under the paper.
- I am between José and Katy.

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K.4. Additional Key Content

(Geometry/Measurement)

Students informally develop early measurement concepts. This is an important precursor to Core Content on measurement in later grades, when students measure objects with tools. Solving measurement problems connects directly to the student's world and is a basic component of learning mathematics.

Performance Expectations

Students are expected to:

K.4.A Make direct comparisons using measurable attributes such as length, weight, and capacity.

Explanatory Comments and Examples

Students should use language such as *longer than, shorter than, taller than, heavier than, lighter than, holds more than, or holds less than.*

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K.5. Core Processes: Reasoning, problem solving, and communication

Students begin to build the understanding that doing mathematics involves solving problems and discussing how they solved them. Problems at this level emphasize counting and activities that lead to emerging ideas about addition and subtraction. Students begin to develop their mathematical communication skills as they participate in mathematical discussions involving questions like “How did you get that?” and “Why is that true?”

Performance Expectations

Students are expected to:

- K.5.A Identify the question(s) asked in a problem.
- K.5.B Identify the given information that can be used to solve a problem.
- K.5.C Recognize when additional information is required to solve a problem.
- K.5.D Select from a variety of problem-solving strategies and use one or more strategies to solve a problem.
- K.5.E Answer the question(s) asked in a problem.
- K.5.F Describe how a problem was solved.
- K.5.G Determine whether a solution to a problem is reasonable.

Explanatory Comments and Examples

Descriptions of solution processes and explanations can include numbers, words (including mathematical language), pictures, or physical objects. Students should be able to use all of these representations as needed. For a particular solution, students should be able to explain or show their work using at least one of these representations and verify that their answer is reasonable.

Examples:

- Grandma went to visit her two grandchildren and discovered that the gloves they were each wearing had holes in every finger, even the thumbs. She will fix their gloves. How many glove fingers (including thumbs) need to be fixed?
- Students are given drinking straws or coffee stirrers cut to a variety of different lengths: 6”, 5”, 4”, 3”, and 2”. They are to figure out which sets of three lengths, when joined at their ends, will form triangles and which sets of three will not.