KINDERGARTEN MATH #3

UNITS & FRACTIONS

Units & Fractions addresses ways to represent quantities, which cannot be represented by whole numbers.

This is the third of the seven levels of the troubleshooting guide for KINDERGARTEN MATH. See *Summary* for details on all seven levels.

These lessons are designed for kindergarten, but they may be applied to anybody to fill earlier blanks in understanding.

Start with the Diagnostic. If the diagnostic fails, then do the Lesson & Exercise.

Follow these guidelines.

(a) *When helping, make sure you have the attention of the student.*

(b) *If you lose the attention, then go back to the point in the lesson where the student was attentive. Then come forward checking student's understanding.*

(c) *Always approach any situation in an affectionate and relaxed manner.*

(d) *Always encourage the student to ask questions.*

(e) *Carefully listen to what the student has to say, and let the student know that you have heard him (or her).*

(f) *Answer all questions matching the interest and understanding of the student.*

(g) *Always talk to the student at his (or her) level. Use only those terms and words that the student can easily understand.*

(h) *When teaching a new concept, ask the student to think examples of his own. Allow enough time even days to let that happen.*

(i) *Get the student involved and thinking with mathematical principles.*

(j) *In the final analysis, make sure that the student can apply mathematics with confidence.*

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DIAGNOSTICS & LESSONS

☺ Diagnostic K3.1   Describe UNIT and FRACTION

To pass, the student should be able to tell apart a fraction from a unit.

> "Show a UNIT of something."
> "Show a FRACTION of something."

If the diagnostic fails, then do the Lesson & Exercise.

Lesson & Exercise

In this lesson the student learns about units and fractions.

(a) Introduce the lesson.

> "In this lesson we are going to learn about units and fractions."

(b) Make several cookies out of modeling clay and place them on the table.

> "Here are some cookies. We count them as 1, 2, 3 and so on."
> "Each cookie is a unit, because a UNIT is anything we count one at a time."
> "The basic meaning of UNIT is *'one.'* It means a single whole thing."

(c) Pick up a cookie and show it to the student.

> "This cookie is a UNIT – a single whole thing."

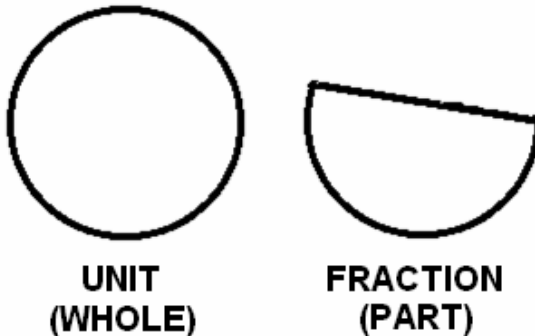(d) Show some more examples of UNIT to the student.

> "Here are some markers. Each marker is a unit."
> "Here are some books. Each book is a unit."
> "When you count cats, each cat is a unit."

(e) Have the student give you some examples of UNIT.

(f) Break a piece from a cookie and place it next to a whole cookie.

UNIT
(WHOLE)

FRACTION
(PART)

> "This is a broken piece of cookie. It is less than a whole cookie."
> "This broken piece is a FRACTION; whereas, a whole cookie is a UNIT."
> "The word FRACTION means *'a broken piece.'*"

(g) Show a notebook with several sheets of paper it.

"Here we have several sheets of paper, which we may count as 1, 2, 3, and so on."

(h) Tear a piece from one of the sheets.

"This torn piece of a sheet is a FRACTION; whereas, a whole sheet is a UNIT."

(i) Show some more examples of FRACTION.

"When you drop a plate on the floor, it breaks into fractions."
"You may fill a whole glass, or just a fraction of it."
"A fraction of a class may be boys, and another fraction may be girls."

(j) Make different things out of modeling clay, such as, a plate, an apple, a pencil, etc. Have the student show fractions of these things.

(k) Have the student ask you to show some fractions of things.

(l) Continue with this lesson until the student can comfortably tell apart a fraction from a unit.

(m) Repeat the diagnostic test.

☺ Diagnostic K3.2   Show the fraction HALF

To pass, the student should be able to demonstrate one half of a whole correctly and with confidence.

> "Show one HALF of a cookie."

If the diagnostic fails, then do the Lesson & Exercise.

Lesson & Exercise

In this lesson the student learns to represent one half of a whole thing.

(a) Introduce the lesson.

> "In this lesson we are going to learn about the fraction called a HALF."

(b) Make a cookie out of modeling clay.
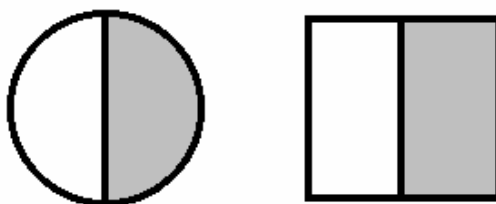
> "Here is a whole cookie – a unit."

(c) Cut that cookie into two equal parts.

> "Now we have cut the cookie in two equal pieces."

(d) Point to one of the pieces.

> "This piece is a fraction called HALF."
> "Whenever we divide a unit into two equal parts, each part is called a HALF."

ONE HALF IS 1 OF 2 EQUAL PARTS OF A UNIT

(e) Make a square shape out of modeling clay.

> "Here is a square cookie – also a unit."

(f) Cut that square into two equal parts.

> "Now we have cut the square cookie into two equal halves."

(n) Have the student make different things out of clay, such as, ball, pencil, cake, etc. , and cut it into two halves.

(o) Have the student do the following.
   1. Fold a sheet of paper to show HALF of that sheet.
   2. Draw a circle, and color HALF of it.
   3. Draw a rectangle, and color HALF of it.

Note that half of a rectangle may be colored in more than one way.

(p) Have the student ask you to show HALF of some things.

(q) Continue with this lesson until the student can comfortably tell what HALF is.

(r) Repeat the diagnostic test.

☺ Diagnostic K3.3   Show the fraction FOURTH

To pass, the student should be able to use concrete materials to represent one fourth of a whole.

> "Show one FOURTH of a cookie."

If the diagnostic fails, then do the Lesson & Exercise.

Lesson & Exercise

In this lesson the student learns to represent one fourth of a whole thing.

(a) Introduce the lesson.

> "In this lesson we are going to learn about the fraction called a FOURTH."

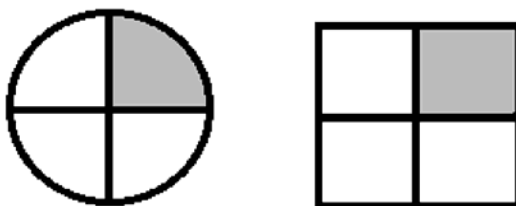(b) Make a cookie out of modeling clay.

> "Here is a whole cookie – a unit."

(c) Cut that cookie into four equal parts.

> "Now we have cut the cookie in four equal pieces."

(d) Point to one of the pieces.

> "This piece is a fraction called a FOURTH."
> "Whenever we divide a unit into four equal parts, each part is called a FOURTH."

ONE FOURTH IS 1 OUT OF 4 EQUAL PARTS OF A UNIT

(e) Make a square shape out of modeling clay.

> "Here is a square cookie – also a unit."

(f) Cut that square into four equal parts.

> "Now we have cut the square cookie into four equal fourths."

(g) Have the student make different things out of clay, such as, ball, pencil, cake, etc. , and cut it into four equal pieces creating "fourths."

(h) Have the student do the following.
   1. Fold a sheet of paper to show HALF of that sheet.
   2. Draw a circle, and color HALF of it.
   3. Draw a rectangle, and color HALF of it.

(i) Have the student ask you to show HALF of some things.

(j) Continue with this lesson until the student can comfortably tell what HALF is.

(k) Repeat the diagnostic test.

SUMMARY

This is the third of the seven levels of the Troubleshooting Guide for KINDERGARTEN MATH. The Troubleshooting Guide for Kindergarten introduces the concept of UNIT, and explores ways to measure length, weight, capacity and time. It further develops the concept of counting into the concepts of addition and subtraction.

The Kindergarten troubleshooting guide is divided into the following levels:

(1) ORIENTATION & SPATIAL SENSE

Orientation and Spatial Sense forms the foundation of the subject of GEOMETRY. It introduces the elements of space and how they relate to us.

(2) NUMBERS & PLACE VALUES

Numbers and Place Values form the foundation of the subject of ARITHMETIC. It introduces a system of whole numbers to represent quantities in a simple manner.

(3) UNITS & FRACTIONS

Units & Fractions addresses ways to represent quantities, which cannot be represented by whole numbers.

(4) COUNTING & MEASUREMENTS

Counting & Measurements provides ways to determine the various magnitudes. It helps to bring familiarization with the use of numbers.

(5) NUMBERS & OPERATIONS

Numbers & Operations introduces the basic operations with numbers and how such operations may be executed with skill.

(6) PATTERNS & RELATIONAL SENSE

Patterns and Relational Sense forms the foundation of the subject of ALGEBRA. It is a study of patterns underlying numbers, and quantitative relationships.

(7) DATA ANALYSIS & PROBABILITY

Data Analysis & Probability shows how to display quantitative comparisons graphically. It introduces the estimation of likelihood.

Though these lessons are designed for the kindergarten level, these diagnostic actions may be used for students at higher grades to help discover and resolve missing basics.

GLOSSARY

[For additional words refer to the glossary at the end of earlier levels.]

Fourth   A **Fourth** is a fraction obtained by dividing a unit into four equal parts.

Half   A **half** is a fraction obtained by dividing a unit into two equal parts.

Fraction   A **fraction** is a quantity smaller than a unit. The word FRACTION comes from a Latin word *"fractere"* which means, "a broken piece."

Unit   A **unit** is what we count one at a time. When we count one cookie at a time then each cookie is a unit. When we count a box of 10 cookies at a time then each box is a unit. The word UNIT comes from a Latin word *"unitus"* which means "one."