

| <b>Grade 2</b>   |
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| (1) Within a well-balanced mathematics curriculum, the primary focal points are developing an understanding of the base-ten place value system, comparing and ordering whole numbers, applying addition and subtraction, and using measurement processes.  |
| (2) Throughout mathematics in Kindergarten-Grade 2, students build a foundation of basic understanding in number, operation, and quantitative reasoning; patterns, relationships, and algebraic thinking; geometry and spatial reasoning; measurement; and probability and statistics. Students use numbers in ordering, labeling, and expressing quantities and relationships to solve problems and translate informal language into mathematical language and symbols. Students use objects to create and identify patterns and use those patterns to express relationships, make predictions, and solve problems as they build an understanding of number, operation, shape, and space. Students progress from the informal to formal language to describe two- and three-dimensional geometric figures and likenesses in the physical world. Students begin to develop measurement concepts as they identify and compare attributes of objects and situations. Students collect, organize, and display data and use information from graphs to answer questions, make summary statements,, and make informal predictions based on their experiences. |
| (3) Throughout mathematics in K-2, students develop numerical fluency with conceptual understanding and computational accuracy. Students in Kindergarten through grade two use basic number sense to compose and decompose numbers in order to solve problems requiring precision, estimation, and reasonableness. By the end of Grade 2, students know basic addition and subtraction facts and are using them to work flexibly, efficiently and accurately with numbers during addition and subtraction computation.   |
| (4) Problem solving, language and communication, connections within and outside mathematics, and formal and informal reasoning underlie all content areas in mathematics. Throughout mathematics in Kindergarten-Grade 2, students use these processes together with technology and other mathematical tools such as manipulative materials to develop conceptual understanding and solve meaningful problems as they do mathematics.  |

**Grade 2**

**(2.1) Number, operation, and quantitative reasoning.** The student understands how place value is used to represent whole numbers.

2.1(A) use concrete models of hundreds, tens, and ones to represent a given whole number (up to 999) in various ways

- \* Example - represent the number 28 using 2 ten rods & 8 units; 1 ten rod & 18 units, and 28 units.
- \* Students should be able to make sets of hundreds and tens when provided any manipulative.

**Helpful manipulatives:**

- \* base 10 pieces
- \* linked unifix cubes
- \* variety of counters: beans, bears, buttons, etc.
- \* dimes and pennies

2.1 (B) use place value to read, write and describe the value of whole numbers to 999

- \* Use manipulatives to build the numbers such as 624 and then describe the value of each of the numbers. ex. 6 hundreds + 2 tens + 4 ones and write as  $(600 + 20 + 4)$ .
- \* Use place numbers to accurately find hundreds, tens, and ones.

**Note:**

Write using numerals, not words. Number words are **introduced** in the 3rd grade TEKS

2.1(C) use place value to compare and order whole numbers to 999 and record the comparisons using numbers and symbols ( $<$ ,  $=$ ,  $>$ )

- \* Use visual clues and concrete representations.
- \* Read  $4 < 6$ , 4 is less than 6 and  $6 > 4$ , read 6 is greater than 4.

**Note:**

This is the first time the students use the comparative symbols  $>$   $=$   $<$ .

**(2.2) Number, operation, and quantitative reasoning.** The student describes how fractions are used to name parts of whole objects or sets of objects.

2.2(A) Use concrete models to represent and name fractional parts of a whole object (with denominators of twelve or less)

- \* Example - using color tiles have students build a rectangle that is one half red and one half blue, build one that is one fourth red and three fourths blue.
- \* Use language such as one out of three or one third when referring to various representations.

**Note:**

In second grade students use "manufactured" concrete objects ex. fraction tiles, graham crackers scored into equal parts, color tiles to create fractional parts. In 3rd grade students will construct concrete models themselves, ex. taking a square and cutting it into 4 equal parts. Fraction symbols are introduced in 3rd grade according to the TEKS.

2.2 (B) Use concrete models to represent and name fractional parts of a set of objects (with denominators of twelve or less)

- \* Recognize fractions as part of a set, ex. given 12 tiles with 5 red and 7 blue, students should be able to describe the tile colors by their fractional parts - a set where 5 out of 12 parts are red.

**Note:**

Only verbal descriptions ex. 1 out of 4 or one fourth are appropriate. Fraction symbols are **introduced** in 3rd grade according to the TEKS.

2.2 (C) use concrete models to determine if a fractional part of a whole is closer to 0,  $\frac{1}{2}$ , or 1

- \* Use the word one half not the symbol  $\frac{1}{2}$ .
- \* This is to be done by concrete models, never " $\frac{2}{5}$  is closer to 0,  $\frac{1}{2}$ , or 1" .
- \* Example - using circular fractional pieces - give 4 one fifths pieces to students and have them compare to the representation of 0 circle, one half circle and one whole circle.

**Helpful manipulatives:**

- \*color tiles
- \*overhead fractional parts

**Note:**

Avoid representations that are too close to  $\frac{1}{4}$  and  $\frac{3}{4}$ . Representations close to  $\frac{1}{4}$  and/or  $\frac{3}{4}$  are too subjective for 2nd grade students.

**(2.3) Number, operation and quantitative reasoning.** The student adds and subtracts whole numbers to solve problems. The student is expected to:

2.3(A) recall and apply basic addition and subtraction facts (to 18)

- \* Students develop strategies to work with the more difficult addition/subtraction facts to improve fluency rather than rely only on rote memory.
- \* "To 18", means to the sum of 18.
- \* Students work with doubles, near doubles and near tens.
- \* Recall fact families up to  $9+9=18$ .

**Note:**

Second grade is held accountable for "recalling" facts. The focus is on teaching strategies for recall and not just memorization of facts. Understanding strategies will improve math 'fluency' (speed).

2.3(B) model addition and subtraction of two digit numbers with objects, pictures, words, and numbers

- \* Students may use a variety of methods such as: solving two digit addition and subtraction incorporating place value as well as the traditional method

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|--|---|--|
| $\begin{array}{r} 25 \\ +37 \\ \hline 12 \\ \hline 50 \\ 62 \end{array}$ | $5 \text{ ones} + 7 \text{ ones} = 12 \text{ ones}$<br>$2 \text{ tens} + 3 \text{ tens} = 5 \text{ tens}$<br>$12 + 50 = 62$ | $20 + 5$<br>$\underline{30} + 7$<br>$50 + 12 = 62$ |
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**Note:**

During this grade the student is introduced to 2 digit +/- in the **concrete**, then connects it to the pictorial, and finally to the abstract. It is important to use base ten pieces then pictures of base ten pieces and finally bridge to the abstract numbers. It is also important to use a variety of manipulatives such as straws or buttons on a string, or hundreds chart. Drawing pictures and recording numerically what the pictures represent allows students to "bridge"/connect the concrete to the numerical/abstract.

2.3(C) select addition or subtraction to solve problems using two-digit numbers, whether or not regrouping is necessary

**Note:**

Two digit +/- is new to 2nd grade and the concept of regrouping is new to 2nd grade.

2.3(D) determine the value of a collection of coins up to one dollar

- \* Use real life and age appropriate examples and situations that are meaningful to students.
- \* Use concrete models with applications.
- \* Use dimes, pennies, nickels and quarters - half dollar pieces are seldom used.

**Note:**

This is the first time they have added coins.

2.3(E) describe how the cent symbol, dollar symbol and the decimal point are used to name the value of a collection of coins

- \* Use all representations - \$0.04 \$ .04 4¢.

**(2.4) Number, operation and quantitative reasoning.** The student models multiplication and division.

2.4(A) model, create, and describe multiplication situations in which equivalent sets of concrete objects are joined

- \* The most 2nd Grade students should model is  $10 \times 10$ . Students can model by looking at multiple sets of an object. Ex. show three sets/groups of 2 balls in each to model  $3 \times 2$ .
- \* Use a variety of concrete manipulatives ex. tiles, base ten blocks.

**Note:**

ALWAYS use manipulatives at this grade level.

Always use "multiplication situations" (story problems) never just  $3 \times 6 = \underline{\quad}$ .

2.4(B) model , create, and describe division situations in which a set of concrete objects is separated into equivalent sets

- \* 2nd Grade students will use manipulatives to model situations requiring separation and should only model situations up to  $18 \div 9$
- \* Use a variety of concrete manipulatives ex. tiles, base ten blocks

**Note:**

ALWAYS use manipulatives at this grade level.

**(2.5) Patterns, relationships, and algebraic thinking.** The student uses patterns in numbers and operations. The student is expected to:

2.5(A) find patterns in numbers such as in a 100s chart

\* Students discover and communicate what happens when +/- 10, describe patterns (including what stays the same and what changes) in columns and rows.

2.5(B) use patterns in place value to compare and order whole number through 999

\* This is under the patterns strand; requires patterns to teach this.

\* Students compare numbers when keeping the 100s value the same and change the ones or 10s ex. 287 283; or 287 237

\* Keep the ones value the same and change the 10s or the 100s ex. 334 534

\* What is a number that comes between .... ex. 334 and 529?

\* Use concrete models such as base ten blocks, unifix cubes to demonstrate the pattern.

2.5(C) use patterns and relationships to develop strategies to remember basic addition and subtraction facts, determine patterns in related addition and subtraction number sentences (including fact families) such as  $8+9=17$ ,  $9+8=17$ ,  $17-8=9$ ,  $17-9=8$ .

\* Students work with doubles, near doubles and near tens.

\* Students use counting on and back.

**(2.6) Patterns, relationships, and algebraic thinking.** The student uses patterns to describe relationships and make predictions.

2.6(A) generate a list of paired numbers based on a real-life situation such as number of tricycles related to the number of wheels

2.6(B) identify patterns in a list of related number pairs based on a real-life situation and extend the list

\* Example - give students a graph that includes teddy bears that have 2 ears. Two teddy bears would have 4 ears, etc. Students create a list of number pairs, describe the pattern and extend by creating the next row.

**Note:**

This is the first time students extend patterns using numbers.

2.6(C) identify, describe and extend repeating and additive patterns to make predictions and solve problems

\* Example - repeating and growing patterns using pictures of bugs, animals, or other real objects, geometric shapes, numbers or beads

\* Repeated addition of the same number produces a growing pattern - ex. counting legs in bugs, one bug 6 legs, two bugs  $6 + 6 = 12$  legs etc.

**(2.7) Geometry and spatial reasoning.** The student uses attributes to identify two- and three-dimensional geometric figures. The student compares and contrasts two- and three-dimensional geometric figures, or both.

2.7(A) describe attributes (the number of vertices, faces, edges, sides) of two- and three-dimensional geometric figures, such as circles, polygons, spheres, cones, cylinders, prisms and pyramids, etc.

\* Identify the number of vertices on two and three dimensional figures.

\* Use formal language including: vertices, faces, edges, bases and sides.

\* Two-dimensional - circle, oval, polygon, triangle, square, rectangle, rhombus, quadrilateral, pentagon, trapezoid, parallelogram, hexagon, octagon. (Two dimensional attributes are sides and vertices).

\* Three-dimensional - cylinder, sphere, cone, triangular prism, cube, rectangular prism, triangular pyramid, rectangular pyramid, square pyramid. (Three-dimensional attributes are faces, vertices, edges, and bases).

\* Include definition that a square is a special rectangle.

2.7(B) use attributes to describe how 2 two-dimensional and 2 three-dimensional geometric figures are alike or different

\* Example - examine a cone and square pyramid - both have one top vertex and one base; the pyramid has a square base and the cone has a circular base.

\* Discuss similarities and differences using formal language.

2.7(C) cut two-dimensional geometric figures apart and identify the new geometric figures formed

\* Example - cut rectangles on the diagonal and create 2 triangles, cut polygons into triangles, cut trapezoid to create rectangle and two triangles. etc.

**(2.8) Geometry and spatial reasoning.** The student recognizes that a line can be used to represent a set of numbers and its properties.

2.8 use whole numbers to locate and name points on a number line.

\* Use numbers from 0 to 99. The number line should be straight with arrows on both ends, equally spaced divisions with whole numbers written at some of the division marks.

**Note:**

This is the first time a number line is introduced in the TEKS.

**(2.9) Measurement** The student directly compares the attributes of length, area, weight/mass, and capacity, and uses comparative language, to solve problems and answer questions. The student selects and uses nonstandard units to describe length, area, capacity, and weight/mass. The student recognizes and uses models that approximate standard units (from both SI, also known as metric, and customary systems) of length, weight/mass, capacity and time.

2.9(A) identify concrete models that approximate standard units of length and use them to measure length

\* Non-standard units should be close to the size of standard units.

\* Examples - use 1 inch color tiles, centimeter cubes, link cubes, etc.

**Note:**

Rulers are not appropriate at this grade level. They are introduced in the 3rd grade TEKS.

2.9(B) select a non-standard unit of measure, such as square tiles to determine the area of a two-dimensional surface

\* Non-standard units should be close to the size of standard units.

**Note:**

This is the first time students "count" (give a numerical value) for area.

2.9(C) select a non-standard unit of measure, such as a bathroom cup or a jar, to determine the capacity of a given container

\* This is the first time students "count" (give a numerical value) for capacity.

2.9(D) select a non-standard unit of measure, such as beans or marbles, to determine the weight/mass of a given object

\*Teacher information - the difference between weight and mass is a 4th grade TEKS.  
Weight is effect of gravity and is given in standard units, and measured with a scale.  
Mass is given in metric units and is found using a balance.

**Note:**

Do not use the term "weight" when using a balance. Scales measure weight and balances measure mass.

**(2.10) Measurement** The student uses standard tools to estimate and measure time and temperature (in degrees Fahrenheit).

2.10(A) read a thermometer to gather data

**Note:**

This is the first time the thermometer is introduced. Include reading to nearest 2 degrees or when each division on the thermometer equals two degrees.

2.10(B) read and write times shown on an analog and digital clock using five-minute increments

**Note:**

This is the first time students are held accountable for "writing" times shown on a clock.  
Analog clocks have "faces"

2.10(C) describe activities that take approximately one second, one minute, and one hour

**(2.11) Probability and statistics.** The student organizes data to make it useful for interpreting information. The student is expected to:

2.11(A) construct picture graphs and bar-type graphs

**Note:**

On a picture graph each picture represents one piece of data. **Third grade** introduces **pictographs** where one object/picture may represent more than one piece of data. A **pictograph** includes a key to explain the value of each symbol.

2.11(B) draw conclusions and answer questions based on picture graphs and bar-type graphs

\*On a **picture** graph each picture represent one piece of data.

2.11( C) use data to describe events as more likely or less likely such as drawing a certain color crayon from a bag of seven red crayons and three green crayons

\*Use concrete manipulatives and hands on experiences with probability.

\* Use manipulatives such as - spinners, items in a bag, and flipping coins.

\* Include situations that would be impossible - 4 red squares and 2 blue squares in a bag - impossible to draw a circle. If only red squares, it is certain that you will draw a red square.

**(2.12) Underlying processes and mathematical tools.** The student applies Grade 2 mathematics to solve problems connected to everyday experiences and activities in and outside of school. The student is expected to:

2.12(A) identify mathematics in everyday situations

2.12(B) solve problems with guidance, that incorporates the process of understanding the problem, making a plan, carrying out the plan, and evaluating the solution for reasonableness

\* Use manipulatives to represent problem situations.

\* Encourage different ways to solve a problem.

\* Have students verbalize observations.

2.12(C) select or develop an appropriate problem-solving plan or strategy including drawing a picture, looking for a pattern, systematic guessing and checking or acting it out in order to solve a problem.

\* Encourage different ways to solve a problem.

2.12(D) use tools such as real objects, manipulatives, and technology to solve problems

**(2.13) Underlying processes and mathematical tools.** The student communicates about Grade 2 mathematics using informal language. The student is expected to:

2.13(A) explain and record observations using objects, words, pictures, numbers, and technology

2.13(B) relate everyday language to mathematical language and symbols

**(2.14) Underlying processes and mathematical tools.**

2.14 The student uses logical reasoning. The student is expected to justify his or her thinking using objects, words, pictures, numbers, and technology.

\* Ask: "How do you know that is the answer? If someone said they didn't think it was right, how could you convince them?"