2nd Grade Unit 5 Overview and Standards

Use these links to access resources for this unit.

Before You Begin this Unit…	Unit at a Glance
This unit builds on the ideas about patterns and sequences from first grade. Students in first grade constructed, described and extended repeating patterns using connecting cubes and body movement patterns. They also identified the pattern unit (the part that repeats) and compared how repeating patterns can be alike and different. This idea of comparing situations in different contexts will continue in this unit, as students explain how different ratio situations can result in the same table (Investigation 1). Students in first grade also worked with patterns that have a constant increase. By this point in second grade, students should be familiar with counting by specific numbers (2's, 5's and 10's), as seen in Unit 3 (Stickers, Number Strings and Story Problems). For this unit, students do not need to know all counting sequences (counting by 3's, etc.) because they can engage in this work by counting or adding. Students also need to be familiar with situations in which they encounter equal groups (2 shoes in a pair, 5 fingers on a hand, etc.). In this unit, they will begin to think about how ratios can be expressed in many pairs of numbers (5 fingers on one hand, so there are 20 fingers on 4 hands). They will explore these ratio situations with cube buildings and pattern blocks; and record data in a table as they begin to notice how different situations can have the same relationship between quantities.	**Estimated Duration:** 12 days

Standards Addressed in the Unit

2.OA.2 Fluently add and subtract within 20 using mental strategies.[2] By end of Grade 2, know from memory all sums of two one-digit numbers.

2.OA.3 Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.

2.OA.4 Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

2.NBT.1 Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones; e.g., 706 equals 7 hundreds, 0 tens, and 6 ones.

2.NBT.2 Count within 1000; skip-count by 5s, 10s, and 100s.

2.NBT.3 Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.

2.NBT.5 Fluently add and subtract within 100 using strategies based on place value, properties of operations, and/or the relationship between addition and subtraction.

2.MD.7 Tell and write time from analog and digital clocks to the nearest five minutes, using a.m. and p.m.

2.MD.8 Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $and ¢ symbols appropriately.

2.G.1 Recognize and draw shapes having specified attributes, such as a given number of angles or a given number of equal faces.[1] Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.

2.G.2 Partition a rectangle into rows and columns of same-size squares and count to find the total number of them.

Link to CCSS Unpacking Document

2nd Grade Unit 5 Planning Differentiation

Students Who Struggle...

Behaviors	Resources	How to Use
Inaccurate when skip-counting	Fairies in the Fog- Counting by 2's	This interactive game would be best used after modeling what skip-counting looks like, perhaps with different colored cubes. Recording equations to show what is happening (2 more each time, etc.) also gives a good mental image for students. Then, students can use this site to practice skip-counting by 2, 5 and 10 on their own. The numbers for counting

	Fairies in the Fog- Counting by 5's Fairies in the Fog- Counting by 10's	by 2 and 5 are less than 100. The numbers for counting by 10 go slightly above 100, but are numbers on the decade (120, 130, 140 …).
Confused by the idea of floors and rooms	Colored Cubes	Have students make each floor of the building with cubes of one color (first floor blue, second floor red, etc.). This will help them see each floor as separate from the other floors, and allows them to then focus on the number of rooms on that floor.
Overwhelmed by the amount of data in the table	Frame the information using 2 sheets of paper	Isolate one row of the table at a time using two sheets of paper to "frame" that row. Model this technique so students can utilize it on their own.

Students Who Have Mastery...

Behaviors	Resources	How to Use
Easily determines the number of rooms in 10 floors for all activities	More Floors?	Have students determine the number of rooms for more floors (12, 13, 15, 20, etc.). Continue to have them explain the numbers in their tables, in terms of what is happening in the corresponding cube building.
Easily explains the relationship between two shapes when covering hexagons	How Many Triangles? Rhombuses?	Ask students to determine how many triangles or rhombuses would be needed to cover 15, 20, 25 hexagons and explain their thinking about the relationship between the two shapes.

2nd Grade Unit 5 Planning Each Investigation and Classroom Routines

Notes About Each Investigation

Investigation 1:

- Students create cube buildings with the same number of rooms on each floor.
- Students use the number of floors to determine the total number of rooms. To do so, they will use strategies such as skip-counting, and model their thinking with equations.
- Students use a table to represent the total number of rooms and how that changes as floors are added.
- Students study and compare 2 tables, considering how situations that look different can be represented by the same table.
- Students use partial information in a table to create a building that matches the ratio and helps them fill in missing information in a table. **Students do not need to complete all floor plans. It is most important for them to work carefully and thoroughly, checking to see that the tables and buildings match. **
- Students represent ratio relationships between pattern blocks of different shapes and use information in a table to locate "mystery shapes".

Investigation 2:

- Students create and describe repeating patterns, using body movements and colored cubes.
- Students describe number sequences associated with color patterns, including even and odd. They use this information to determine what comes next in a particular position in the pattern. Students use what they know about a pattern to determine later elements in the pattern (i.e. On page 93, we see orange cubes count by 5's. So can we tell what the 80th element will be without building the whole thing?).
- Students construct and describe number sequences associated with ABC patterns (3, 6, 9…) (1, 4, 7…)
- Students describe number sequences associated with AABBC and ABCD repeating patterns.
- Students compare 2 ABCD patterns made with different colors.

Classroom Routines

Activity	Note	Standard
Today's Number	Students make Today's Number, using tens and ones and discuss place value patterns when combining tens and ones. They also use coins to make Today's Number, and solve problems about Today's Number with missing parts in all areas.	2.OA.2 2.NBT.1 2.NBT.2 2.NBT.3 2.NBT.5 2.MD.8

Quick Images	Students will compare images composed of tens and ones. They will also identify coins and their values and give the total for a set of coins. Students will also locate numbers on a number line and 100 chart. A particularly important part of this routine in this unit is using ratios relationships to determine the total number of shapes used to make a given number of hexagons.	2.NBT.1 2.MD.8 2.G.1
How Many Pockets?	Small groups of students will determine the total number of pockets they are wearing and represent that amount with cubes in groups of 10s and 1s. Students then find the total number of pockets in the class and compare it to the number of cubes.	2.OA.2 2.NBT.1
What Time is it?	Students review the number of minutes in a half hour, and practice setting and telling time to the hour, half hour and quarter hour.	2.MD.7

2nd Grade Unit 5 Teaching Standards for Math Practice

Standards for Mathematical Practice **(behaviors of mathematically proficient students)**		
Building the Language of Mathematics *Increasing accountable talk is the goal for ALL students in our district.* The following activities are provided to help ensure your students are engaging in mathematical conversations that address **SMP 3** (Construct Viable		***Words you should hear students use in mathematical conversations:*** array, row, column, equation, skip-counting, table, pattern, pattern unit

Arguments) and **SMP 6** (Attend to Precision)		
During Investigation 1, students find the number of rooms in a cube building with specific numbers of floors. During Session 1.1 students share their solutions for finding the number of rooms in 10 floors. Students look at each other's representations and discuss if they can see how many rooms are added for each floor, the number of floors, the number of rooms on the first floor, and the number of rooms total.	During Session 1.3, students are given a floor plan for different buildings. Some of the floor plans are different, but use the same number of blocks making the information recorded in the table exactly the same. Ask students to discuss why the two are the same even though the two floor plans are different (i.e. Building C and Building E).	During Investigation 2, students build cube trains using a pattern unit. Students use skip counting to find the color of cubes beyond what has been built using cubes. During Session 2.4, students build two different patterns using 4-cube units. **Have students discuss** why the numbers for the green cube in the first pattern match the numbers for the orange cube in the second pattern.

Building Mathematically Proficient Students

During this unit, focus student attention on Practices 4-Model with Mathematics, 7-Look for and Make Use of Structure, and 8-Look for and express regularity in repeated reasoning.

Unit 5, Investigation 1 focuses recording the relationship between the number of floors and the number of rooms in cube buildings. Students need to apply Practice 4-Model with Mathematics as they figure out the number of rooms in each floor. For example, in Session 1.2, the class discusses and records ways to figure out the total number of rooms. Expressions can be used to model the situation with floors and rooms (Building B 4th floor: 5 + 5 + 5 + 5). This poster (page 2) can be posted and discussed during these lessons. Share with students that expressions and equations are one way that mathematicians model real-life situations using symbols like using and expression to represent the number of rooms in our cube buildings.

Unit 5 also addresses Practice 7- Look for and make use of structure and Practice 8-Look for and express regularity in repeated reasoning. In Investigation 2 students use skip counting number sequences to think about which blocks will be a specific color. Students use the structure of the pattern unit to determine the color of upcoming elements in the sequence. For example, in Session 2.3, students record the number of every orange cube. The orange cubes are every 5th cube. Students should see that they can use a skip counting pattern to find the location of the orange cubes. Students experience several cube patterns with 3, 4, and 5 elements in each unit. This work might be extended to Practice 8 by having students record and use rules such as, "If there are 5 cubes in the pattern unit, then every 5th cube will always be the same color. If the 5th cube is green, then every cube that is located at a number we say when we count by 5's will be green. As you complete these sessions review Practice 7 using this poster (page 2) and introduce Practice 8 using the following poster (page 2).

2nd Grade Unit 5 Assessing Student Understanding

Resource:	Teaching Suggestion:
Task 17a,b	These tasks assess student understanding of arrays. You might connect these tasks to the work of this unit by relating the stars in Task 17a to rooms and by asking student to create a "cube building" with 8 cubes for Task 17b. These are extra assessment tasks that could be used after Session 1.2
Tasks 1, 2, 4	These tasks assess student understanding of arrays. These are extra assessment tasks that could be used after Session 1.2
Task 16a,b	These tasks assess student understanding of even and odd. You might connect this task to the work of this unit by having students build AB patterns and determining whether the 12th and 15th elements are even or odd. These assessment tasks could be used after Session 2.2.
Tasks 3 and 5	These tasks can be used to assess student understanding of even and odd. You might relate to the work of this unit by having students build a pattern with even and odd numbers of cubes for Task 3. Have students explain how they know their pattern is even or odd. These assessment tasks could be used after Session 2.2.

Exit Tickets

Investigation 1	1.1 Present students with a building with 5 floors. Each floor has 4 rooms. Ask, "How many rooms? How did you figure it out?" 1.2 Use Student Activity Book pages 3 – 4 1.3 Use Student Activity Book pages 5 – 6 1.4 Assessment Checklist: Understanding Tables (M7, One-on-one) 1.5 Use Student Activity Book page 27 1.6 Use Student Activity Book page 34

Investigation 2	2.1 Use Student Activity Book page 38. 2.2 Use Student Activity Book pages 40-41 2.3 Use Student Activity Book page 46 2.4 Use Student Activity Book pages 47-49 2.5 End of Unit Assessment

2nd Grade Unit 5 Digital Resources

Interactive Student Resources		
Resource	**Suggestion for Use:**	**What standard(s) are addressed?**
Pattern Blocks	Students can model their actions with pattern blocks with this interactive site. This would be great to use with Covering Hexagons and Mystery Shapes.	2.G.1 SMP7
Base Blocks	Students can create Today's Number and other number representations by modeling with tens and ones.	2.NBT.1

Digital Resources for Teachers		
Resource	**Suggestion for Use:**	**What standard(s) are addressed?**
Patterns	Show this video (up to 1:31) at the beginning of the unit to remind students of the foundations of patterns, and help them connect to what they already know about them.	2.NBT.2
How do Number Patterns Work?	This video has a short story, and the idea of how number patterns work is part of the solution to the problem in this story. This video is best used when the teacher stops after the narrator asks a questions, so that students may share their thinking aloud before seeing the explanation.	2.NBT.2

Printable Resources for Teachers		
Resource	**Suggestion for Use:**	**What standard(s) are addressed?**
Building Arrays More Building Arrays	Use these task cards as an additional resource for building arrays and assigning equations to match. You can align this to your lessons by referring to the rows and columns as “floors” and “rooms”.	2.OA.4
Arrays Concentration Use Performance Task 1	Students play concentration connecting arrays to matching expressions.	2.OA.4
Doubles Path	This game helps students reinforce their doubles facts. These facts will be used regularly when recording ratio relationships in tables in this unit.	2.OA.2

Teacher to Teacher Files	
Smart Board/Promethean Files	**Teacher Made Work**
Unit 5 Session 1.1 and 1.2	Functions and Relationships PPT

2nd Grade Unit 5 Professional Learning for Teachers

Professional Learning Activities	Things to Discuss with Your Team
Before you begin this unit, read Investigations Unit 5, Teacher Notes: “Using and Interpreting Tables”, page 107-108.	Discuss with your team: -How will students use tables in this unit? -What information will students need to gain from reading the tables in this unit? -How can teachers guide student to seeing the relationship between the quantities and the ratios?
Before Lesson 1.2, read Investigations Unit 5, Dialogue Boxes: “It’s the Same Thing as Up There on the Table”, pages 122-123.	Discuss with your team: -How can teachers help students focus on the number pattern and not forget how the numbers tell a story about the building changing as floors are added? -What questions can teachers ask to keep students continually moving back and forth between the table and the situation it represents? -In what ways might students articulate their thinking about the ratios?
Before Lesson 1.5, read Investigations Unit 5, Teacher Notes: “Students’ Difficulties with Mystery Shapes”, page 111-112.	Discuss with your team: -How is this activity helping students see and understand ratio relationships? -What difficulties might students have when approaching this table and activity? -How will students represent their thinking about the ratios and relationships?