1st Grade Math

Unit 1

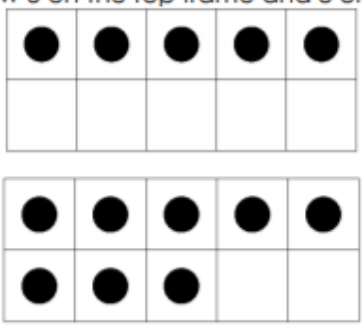
Building Number Patterns and Meanings

Models to Represent Addition & Subtraction

Double Ten-Frames

The example below shows 5 + 8 using double ten-frames.

Use counters to show 5 on the top frame and 8 on the bottom frame.



You can pull out the two fives to make a combination of a ten and then add three.

5 + 5 = 10
10 + 3 = 13

5 + 8 = 13

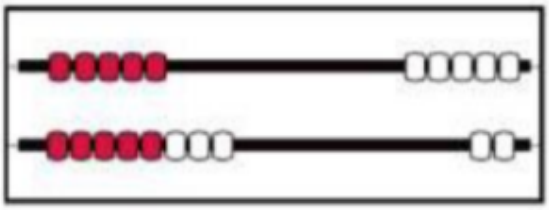
Rekenrek (Number Rack)

The example below shows 5 + 8 using a rekenrek.

The model is made of 2 strings of 10 beads. Each string is broken into a group of 5 red and 5 white beads. Beads start at the right hand side and are slid to the left when in use.

For 5 + 8, the first string shows 5 beads. The second string shows 8 beads. You can pull out the two fives to make a ten and then add three more. It's easy to see the two fives that make a ten because of the color.

5 + 5 = 10
10 + 3 = 13



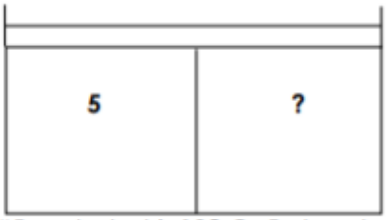
Part-Part Whole Mat (Bar or Tape Diagram)

The example below shows 13 - 5 using a Part-Part Whole Mat.

The Part-Part Whole Mat helps students see the relationship between addition and subtraction. It shows the whole being broken up into smaller parts. It helps them see that subtraction is the missing part.

For 13 - 5, the whole is 13. The part is 5 and one of the parts is missing.

13



Ask yourself, "5 and what is 13? Or 5 plus what is 13?"

5 and 8 is 13 so 13 - 5 is 8.

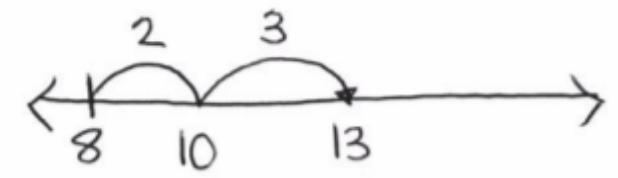
5 + **8** = 13

Open Number Line

The example below shows 5 + 8 using an Open Number Line.

The Open Number Line allows students to partition the number line as they see fit and use friendly numbers that are comfortable for them. It provides a way for students to develop strategies, keep track of the steps involved and communicate about their thinking with others.

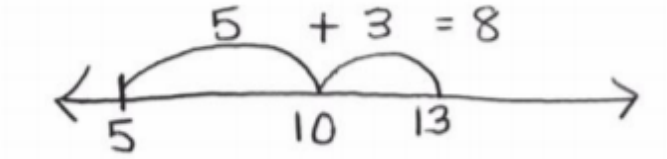
For 5 + 8, you need to draw a blank number line and place the larger addend on the left. Then make a jump of 5 to add 5 to 8. Since 5 can be decomposed into 2 and 3, you can make one small jump of 2 to land on 10 and then another jump of 3 to land on 13.



5 + 8 = 13

The example below shows 13 - 5 using an Open Number Line.

For 13 - 5, you need to draw a blank number line and place the smaller number on the left. Then make jumps leading to 13. You can make one jump of 5 to land on 10 and make a smaller jump of 3 to land on 13. Add the jumps together to get your answer.



13 - 5 = 8

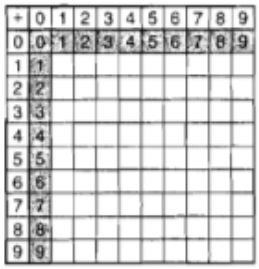
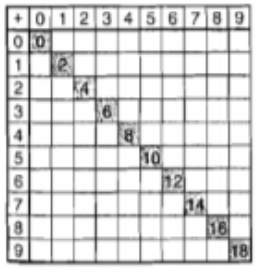
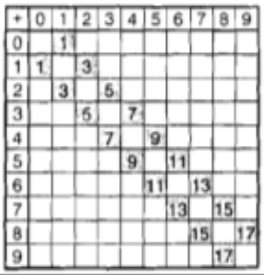
1st Grade Math
Unit 1
Building Number Patterns and Meanings

Structures for Addition & Subtraction Story Problems			
Problem Types	**Result Unknown**	**Change Unknown**	**Start Unknown**
Add To (Join)	Two bunnies sat on the grass. Three more bunnies hopped there. How many bunnies are on the grass now? 2 + 3 = ?	Two bunnies were sitting on the grass. Some more bunnies hopped there. Then there were five bunnies. How many bunnies hopped over to the first two? 2 + ? = 5	Some bunnies were sitting on the grass. Three more bunnies hopped there. Then there were five bunnies. How many bunnies were on the grass before? ? + 3 = 5
Take From (Separate)	Five apples were on the table. I ate two apples. How many apples are on the table now? 5 - 2 = ?	Five apples were on the table. I ate some apples. Then there were three apples. How many apples did I eat? 5 - ? = 3	Some apples were on the table. I ate two apples. Then there were three apples. How many apples were on the table before? ? - 2 = 3
Put Together/Take Apart (Part-Part-Whole)	**Total Unknown**	**Addend Unknown**	**Both Addends Unknown**
	Three red apples and two green apples are on the table. How many apples are on the table? 3 + 2 = ?	Five apples are on the table. Three are red and the rest are green. How many apples are green? 3 + ? = 5 or 5 - 3 ?	Grandma has five flowers. How many can she put in her red vase and how many in her blue vase? 5 = 0 + 5; 5 = 5 + 0 5 = 1 + 4; 5 = 4 + 1 5 = 2 + 3; 5 = 3 + 2
Compare	**Difference Unknown**	**Bigger Unknown**	**Smaller Unknown**
	("How many more?" version): Lucy has two apples. Julie has five apples. How many more apples does Julie have than Lucy?	(Version with "more"): Julie has three more apples than Lucy. Lucy has two apples. How many apples does Julie have?	(Version with "more"): Julie has 3 ore apples than Lucy. Julie has five apples. How many apples does Lucy have? 5 - 3 = ? or ? + 3 = 5
	("How many fewer?" version): Lucy has two apples. Julie has five apples. How many fewer apples does Lucy have than Julie?	(Version with "fewer"): Lucy has 3 fewer apples than Julie. Lucy has two apples. How many apples does Julie have? 2 + 3 = ? or 3 + 2 = ?	(Version with "fewer"): Lucy has three fewer apples than Julie. Julie has five apples. How many apples does Lucy have?

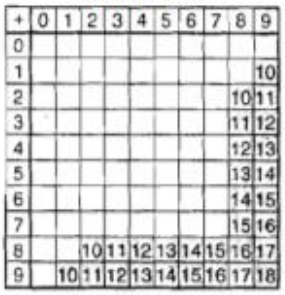
1st Grade Math

Unit 2

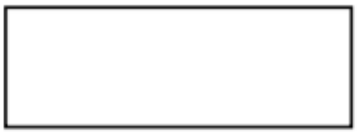
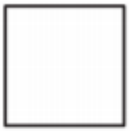
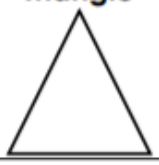
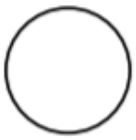
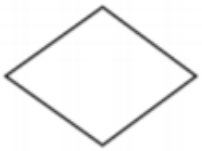
Addition and Subtraction Fact Strategies

Addition Strategies		
Strategy	**Example**	**Explanation**
Counting On (One-/Two-More-Than) 	6 + 1 2 + 6	• Count on from six. • As students count on from the larger addend instead of counting all, they are ready to practice this strategy. • Helping students see the connection between counting on and adding two will help students move from counting strategies to reasoning strategies.
Zero 	7 + 0 0 + 4	• Seven plus zero is still seven. • Some children may overgeneralize the idea that addition answers are always bigger than the addend. This strategy is a good time to address this misconception. • Create a story problem for one of the equations and use counters and a part-part whole mat to model the situation. • Post zero facts and ask, "How are the equations alike?"
Using 5 as an Anchor	7 + 6	• Students look for fives in the numbers of the problems. • For example, in 7 + 6, a child may think of 7 as 5 + 2 and 6 as 5 + 1. The child would add 5 + 5 and then the extra 2 from the 7 and the extra 1 from the 6, adding up to 13.
Doubles 	7 + 7	• These ten facts (0 + 0 through 9 + 9) are fairly easy to learn and serve as anchors for many other facts. • Use picture cards for doubles. • Use story problems that focus on pairs of like addends.
Near-Doubles 	4 + 5	• Double the smaller number and add one or double the larger number and subtract one. • Compensate addends to double the middle number. (6 + 4 = 5 + 5) • If no one uses near doubles strategy, then write the corresponding doubles for some of the facts and ask how these facts could help.
Combinations of Ten	6 + 4	• Most important! • Use story problems with two numbers that make 10 or that ask how many are needed to make 10. • Make a ten on a ten-frame: Place 6 counters on a ten-frame and ask, "How many more to make 10?"

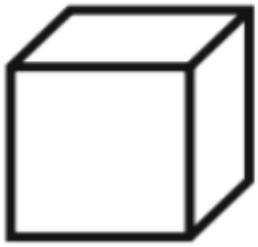
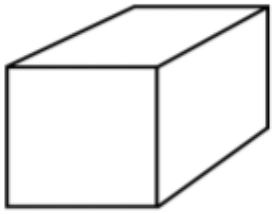
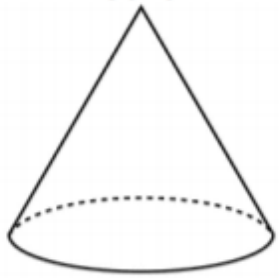
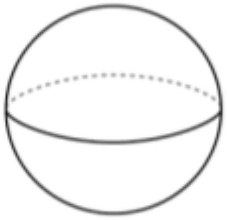
1st Grade Math
Unit 2
Addition and Subtraction Fact Strategies

Make Ten  	8 + 6 (Think 8 + 2 + 4) 9 + 2 (Think 9 + 1 + 1)	• It's used for facts that have sums greater than 10. • Students use their known facts that equal 10 and then add the rest of number onto 10. • For example, students solving 8 + 6 might start with the larger number and see that 8 is 2 away from 10; therefore, they take 2 from the 6 to get 10 and then add on the remaining 4 to get 14.
Subtraction Strategies		
Subtraction as Think-Addition	14 - 7	• Helpful to begin with facts that have totals of 10 or less. • It's essential addition facts are mastered first. • Think addition using doubles: See 14 - 7 and think 7 + 7 is 14 so 14 - 7 = 7. • Use story problems that promote think-addition. Those that sound like addition but have a missing addend.
Decompose a Number Leading to 10	14 - 9	• Students use combinations of ten to help subtract quickly. • For example, in 14 - 9, 9 can be decomposed into 4 and 5. You can take 4 away from 14 to get 10 and then take 5 away from 10 to get 5. 14 - **4** = 10 10 - **5** = 5
Take From 10	16 - 8	• It works for all subtraction problems in which the starting value (minuend) is more than 10. • For example, take the problem 16 - 8. Students take the minuend apart into 10 + 6. Subtracting from the 10 (because they know this fact), so 10 - 8 is 2. Then they add 6 back on to get 8. 16 - 8 = (10 + 6) - 8 10 - 8 = 2 2 + 6 = 8 So 16 - 8 = 8

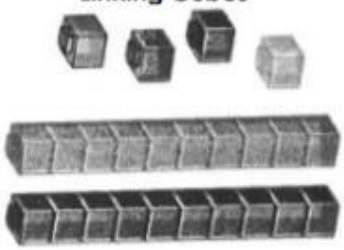
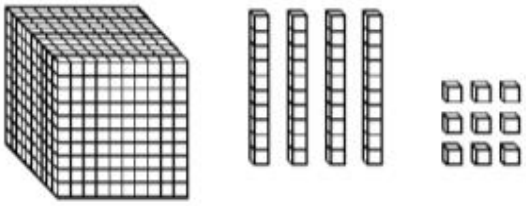
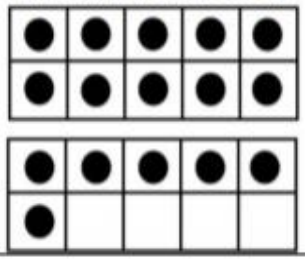
1st Grade Math
Unit 3
Geometry

Attributes of Two-Dimensional Shapes	
Rectangle 	• 2-dimensional • 4 sides • 4 square corners • Closed shape • Made up of straight lines • Opposite sides are the same size
Square 	• 2-dimensional • 4 sides • 4 square corners • Closed shape • Made up of straight lines • All sides are the same size
Triangle 	• 2-dimensional • 3 sides • 3 corners • Closed shape • Made up of straight lines
Hexagon 	• 2-dimensional • 6 sides • 6 corners • Closed shape • Made up of straight lines
Circle 	• 2-dimensional • No sides • No corners • Closed shape • Curved line
Rhombus 	• 2-dimensional • 4 sides • 4 corners • Closed shape • Made up of straight lines • All sides are the same size
Trapezoid 	• 2-dimensional • 4 sides • 4 corners • Closed shape • Made up of straight lines • Has one pair of sides that never meet

1st Grade Math
Unit 3
Geometry

Attributes of Three-Dimensional Shapes	
Cube 	• 3-dimensional • Slides • Stacks • 6 flat surfaces • 8 vertices • 12 edges • Flat surfaces are squares
Rectangular Prism 	• 3-dimensional • Slides • Stacks • 6 flat surfaces • 8 vertices • 12 edges • Flat surfaces are squares and rectangles
Cone 	• 3-dimensional • Slides • Rolls • 1 flat surface • 1 vertex • 0 edges • Flat surface is a circle • Curved surface
Cylinder 	• 3-dimensional • Slides • Rolls • Stacks • 2 flat surfaces • 0 vertices • 0 edges • Flat surfaces are circles • Curved surface
Sphere 	• 3-dimensional • Rolls • 0 flat surfaces • 0 vertices • 0 edges • Curved surface

1st Grade Math
Unit 4
Place Value Understanding

Groupable Base-Ten Models	
Model	**Explanation**
Counters and Cups 	• Ten single counters or beans are placed in a portion cup. • To make hundreds, put ten cups in a larger tub.
Bundles of Sticks (wooden craft sticks or coffee stirrers) 	• If bundles are intact, these are a pregrouped model. • To make a hundred, put ten bundles into a larger bunch held together with a rubber band.
Linking Cubes 	• Ten single cubes form a bar of 10. • To make a hundred, put ten bars on cardboard backing.
Pregrouped Base-Ten Models	
Model	**Explanation**
Base-Ten Blocks 	• Wooden or plastic units, longs, flats, and blocks
Little Ten-Frame Cards 	• Good for illustrating how far to the next multiple of ten. • Ones are not loose but are organized in a ten-frame. • No model for a 100.

1st Grade Math
Unit 5
Using Place Value to Add and Subtract

Math Strategies for Addition

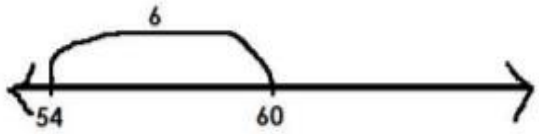
Open Number Line (Adding Up)

The example below shows 54 + 8 using the open number line.

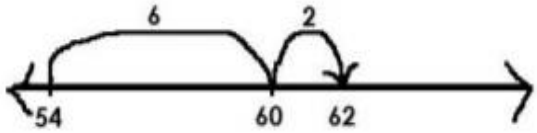
First, you need to draw a blank number line to record your jumps.
Then you need to plot the bigger addend, 54, on the left.

To add 8 to 54, you can decompose 8 into 6 + 2.

Next, add parts of 8 to 54 by making jumps.
For example, you can make a jump of 6 to land on 60.



Next you can make a jump of 2 to get to 62.



So, 54 + 8 = 62.

This is a very flexible strategy. Different amounts of jumps can be made depending on what you know.
Try making the least amount of jumps to solve the problem efficiently.

Compensation

The example below shows 43 + 8 using Compensation.

Compensation is a short cut used to add mentally.
When adding, the change made to one addend is the opposite of the change made to the other addend.

For, 43 + 8, you can add 7 to 43 to get a friendly number of 50. Then you have to subtract 7 from 8.
Now, it's easy to add 50 and 1 mentally to get 51.

$$\begin{array}{r} 43 + 8 \\ \underline{+\ 7 - 7} \\ 50 + 1 = 51 \end{array}$$

1st Grade Math

Unit 5

Using Place Value to Add and Subtract

Adding Up in Chunks

The example below shows 54 + 8 using Adding Up in Chunks

First, decompose one of the addends to its place value. 8 will be decomposed into 6 + 2.

54 + (6 + 2)

Then, add the chunks or parts of 8 to 54.

54 + **6** = 60
60 + **2** = 62

So, 54 + 8 = 62.

This is a very flexible strategy, because the addend can be decomposed into different amounts of chunks depending on what you know.

Breaking into its Place Value (Partial Sums)

The example below shows 54 + 8 using Partial Sums.

First, you need to decompose the two digit addend into its place value.

(50 + 4) + 8

Then, you add the numbers in each place value together. It doesn't matter which place value you add first.

4 + 8 = 12
50 + 0 = 50

Next, you add the partial sums together.

12 + 50 = 62

So, 54 + 8 = 62.

Making a Ten

The example below shows 54 + 8 using Making a Ten.

First, look at the smaller addend and think, "8 plus what number gives me 10?"

Since 2 more make a 10, decompose 54 into 52 + 2.

54 + 8
52 + 2

Then, add 52 and 10 to get 62.

54 + 8
52 + 2

52 + 10 = 62

So, 54 + 8 = 62.

1st Grade Math
Unit 5
Using Place Value to Add and Subtract

Math Strategies for Subtraction

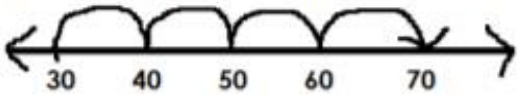
Open Number Line (Adding Up)

The example below shows 70 − 30 using the open number line.

First, you need to draw a blank number line to record your jumps. Then you need to plot the smaller number, 30, on the left.

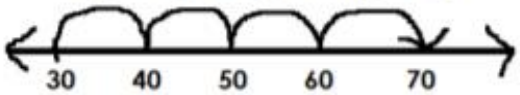
To subtract 30 from 70, you need to count up to get to 70.
You can do that by making jumps of 10s, 1s or other friendly numbers.

For example, you can make 4 jumps of 10 to land on 70.



Now you need to add the jumps together to get your answer.

10 + 10 + 10 + 10 = 40



10 + 10 + 10 + 10 = 40

So, 70 − 30 = 40.

This is a very flexible strategy. Different amounts of jumps can be made depending on what you know. Try making the least amount of jumps to solve the problem efficiently.

1st Grade Math
Unit 6
Measurement

Concept	Description	Example
Partitioning	The mental activity of slicing up the length of an object into the same-sized units	
Unit Iteration	The ability to think of a small block as part of the length of the object being measured and to place the smaller block repeatedly along the length of the larger object	
Transitivity	The understanding that: • if the length of object 1 is equal to the length of object 2 and object 2 is the same length as object 3, then object 1 is the same length as object 3 • if the length of object 1 is greater than the length of object 2 and object 2 is longer than object 3, then object 1 is longer than object 3 • if the length of object 1 is less than the length of object 2 and object 2 is shorter than object 3, then object 1 is shorter than object 3	For example, to compare the length of a bookshelf in one room with the length of a desk in another room, you might cut a string that is the same length as the bookshelf. You can then compare the piece of string with the desk. If the string is the same length as the desk, then you know that the desk is the same length as the bookshelf.
Conservation	The understanding that as an object is moved, its length does not change	  The length of the pencil does not change.
Accumulation of Distance	To understand measuring the distance from the beginning of the first iteration to the end of the last	 This distance from one end of the pencil to the other end is 4.
Relation to Number	Measuring is related to number in that measuring is simply a case of counting