CHECKLIST FOR MATH SMALL GROUPS AND CENTERS

TEACHER TABLE: THIS IS YOUR MATH TEACHING POWER-SOURCE!
*HERE IS WHERE ALL OF THE INITIAL INVESTIGATION HAPPENS.

- ☐ **Do you have a manipulative?** - Kiddos must get their hands on the math! Decide on the focus for your small group investigation then gather a manipulative that creates an opportunity for your students to explore.

- ☐ **Are the kids the ones using the manipulatives?** It is very tempting to show the kids how "to do" math in the name of modeling; but it is much more empowering for them to discover how and why the math works.

- ☐ **Are the kids writing the math?** It is vital that your students are connecting the actions they make with the manipulatives to the written symbols of math.

- ☐ **Do you have an engaging activity, challenge or game?** Seal the discoveries they made in the investigation by letting them practice in a fun way. Make it active! (Plus, once they learn the game with you, you can then use it in an independent or partner station the following week.)

*The power behind small group investigation is the time your students have with YOU in a small group of 1 to 6 kids at a time. Centers are great, but small group math instruction is where they make the awesome gains and growth!

MATH STATIONS: (OR CENTERS, PODS, ROTATIONS... ETC.)

- ☐ **Can they do the chosen activity independently or with a partner?** This is not the time to learn new ideas. The last thing we want for our kiddos is for them to practice a new concept over and over the wrong way. *Goal = math thinking + self-check.*

- ☐ **Are there enough stations?** Your students should never run out of activities to do in their stations for the week.

- ☐ **Is your center system easily maintained?** Keep it as simple as possible. Kids don't need the concept of the centers to change much at all and you don't need extra work. Decide on your concept/activity types for your centers and keep it consistent and engaging. Kids just like learning and being active!

- ☐ **How about follow up?** You get to decide how you want to follow-up with the work done in centers. There are many options, just choose which is best for you and your students (Ex: student self-check, partner check, teacher check, etc.)

For more info on why teaching math in small groups is so beneficial, check out our blog post.
https://www.mathstackers.com/blog/why-teach-in-small-groups-for-math

© Math Stackers Inc.

Hip Hip Hooray, you get to inspire and grow kiddos from PreK to 5th!!! We know how important differentiation for hands-on exploration is, so we designed The Math Thinker Plus+ Learning System to meet the needs of all of your small groups. The Math Thinker Plus+ Learning System includes our Early Learning Book & Discovery Guide which sets up your small groups to investigate number reasoning from the value of a number all the way to adding fractions with different denominators. It is our ultimate goal to build amazing math thinkers with you!

What is included in each of the resources?
The Early Learning Book has 20 active games and activities for your kids to discover: counting, number recognition, 1-1 correspondence, comparing and ordering, measurement, patterns, subitizing, spatial reasoning, writing numbers, and categorizing!

The Discovery Guide is a complete hands-on teacher guide designed to equip your small group instruction for powerful exploration that incorporates all of the necessities included in our checklist above! It is full of leveled investigations to discover: addition and subtraction, multiplication and division, factors and multiples, equivalent fractions, comparing and ordering fractions, and adding fractions. Each of the 28 levels has an active challenge or game and a "What are they learning?" section explaining all of the deeper mathematics going on in that level.

In this free sample pack, we have included 3 investigations: "Build-A-Scene" from the Early Learning Book, "Addition Level 1" and "Multiplication Level 2" from the Discovery Guide, and also Paper Math Stackers for you to print. Much of the power of Math Stackers comes from the design and feel of the large foam math blocks. However, we want you to get a taste of all the math thinking that is included in The Math Thinker Plus+ Learning System. These activities were chosen specifically for you to try because it showcases the creativity and deep math reasoning that can be harnessed with Math Stackers blocks and can still be done with a slight modification using the 2D Paper Math Stackers.

In each of these investigations your kiddos will be the ones discovering how mathematics works by experimenting and proving or disproving their ideas. With this sample pack, your students will be able to explore: spatial reasoning, the properties of addition, and the properties of multiplication with factoring. Each of these concepts lays a strong foundation that sets your kiddos up for math success! The goal throughout the Early Learning Book and Discovery Guide is to build math thinking instead of memorizing every step to a solution and let me tell you, it is powerful!

Let us know if there is any information we can get your school to help you get Math Stackers for your students. Together we will #buildmaththinkers!

Happy Math Stacking!

Kelly

Kelly Threadgill
President & Creator of Math Stackers

© Math Stackers Inc.

TO GET STARTED WITH MATH STACKERS: BUILD-A-SCENE (PREK & KINDERGARTEN)....

How many Paper Math Stackers will you need to print for this lesson?
One sheet, pre-cut for each kid.

To modify this activity for the Paper Math Stackers, we recommend giving each kiddo a large piece of construction paper. After you read the chosen story, allow their creativity to flow as they create a scene or picture that goes along with what was read by assembling and glueing the Paper Math Stackers.

What are they learning? Awesome mathematical spatial reasoning. Listen to your kiddos as they reason through which Paper Math Stacker they chose and why. Did they build a house and need to find two Math Stackers to equal a larger one (addition)? Did they line up consecutive whole numbers to make a set of stairs (ordering numbers)? See this video for an example. https://www.instagram.com/p/B2Rqz1HBfbH/

© Math Stackers Inc.

Build-A-Scene

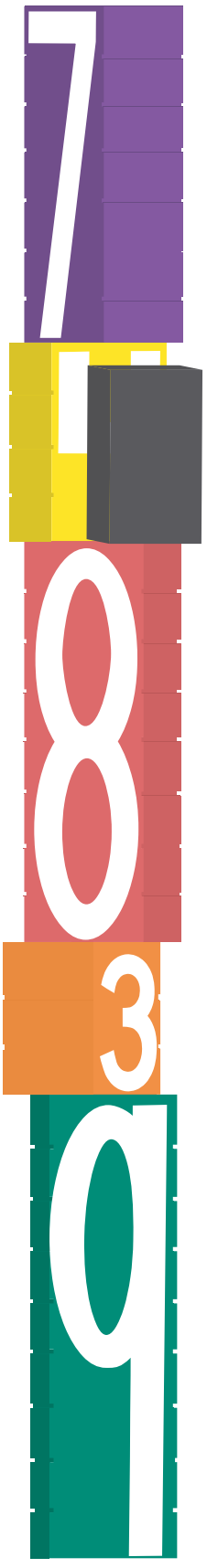
Focus: Creative play with spatial reasoning

Materials Needed:
A set of Math Stackers
A selected book to read to the kids

How To Play:

1. Read the kids the selected book.
2. Kids use Math Stackers to build a scene in the story. This can be anything that would fit into the stor .

   For example: If the kids were read “Jack and the Beanstalk”, then kids could build a beanstalk as high as possible and use one of the smaller blocks to show Jack climbing.



© Math Stackers Inc.

TO GET STARTED WITH MATH STACKERS: ADDITION LEVEL 1...

How many Paper Math Stackers will you need to print for this lesson?
One sheet for each kid. (You may only need up to five 1-blocks per child in addition to all of the other blocks on the sheet.)

To modify this activity, your students will lay the Paper Math Stackers flat on a surface to manipulate.

How to use the Discovery Guide?
The left side column has a picture index of how your students are manipulating their blocks in the investigation. (The way your students are stacking the blocks may, of course, vary; however, the images give you a great idea of the type of stacks your students will build.) The right side column is a flow of the questions and prompts you will offer your students. Remember, the kiddos are the ones manipulating the Math Stackers! After the hands-on investigation, the small group will participate in the “Math Stackers Speedy Structures” challenge.

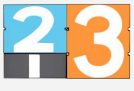
The great thing about the setup of the Discovery Guide is that within each section (Addition, Subtraction, Multiplication, Fractions, Adding Fractions) the levels get progressively more complex within that concept. For example, after fully exploring the addends pairs of 10 in Level 1 of Addition, you may move the students who are ready to Level 2 where they will explore decomposing the addend pairs to find three addends to make 10. If you have students who are not yet understanding the addend pairs of 10, then they continue to investigate and prove the concepts in Level 1 before moving on to Level 2. It is a great way to differentiate for all of your different kiddos!

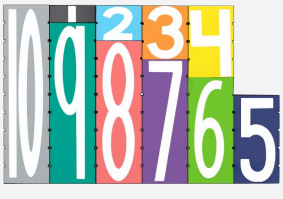
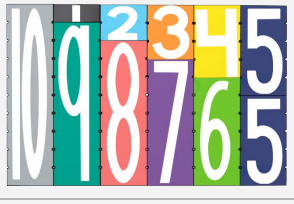
© Math Stackers Inc.

Addition Level 1

Focus

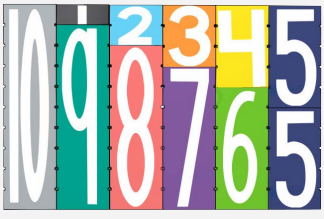
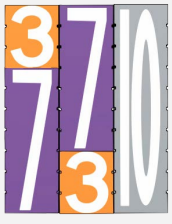
To explore and experiment with addend pairs to find sums of 10.

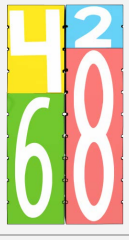
Introduction to Addition	
	a. Allow students to play with Math Stackers and discover how their values are linked with their heights.
	b. Align Math Stackers from 1-10.
	c. Stack the 2-block on top of the 1-block so students can observe how the 1-and 2-blocks are equivalent to the height of the 3-block.
	d. Present the 5-block and allow students to explore how to create an equivalent stack using Math Stackers.
	e. Once they demonstrate this, link the equation that describes the relationship. In this case, $3 + 2 = 5$ and $1 + 4 = 5$.
	f. Use this opportunity to introduce the concepts of addends and sums. The numbers added are **addends**, and the result, or answer, is the **sum**.

Finding Addend Pairs	
	a. Ask your students to create all of the addend pairs of 10 using Math Stackers 1-10.
	b. Have them explain how they know the addend pairs equal 10. They should also explain what additional Math Stacker is needed to complete the task.
	c. Students discuss each stack and write the corresponding equation for each addend pair.

© Math Stackers Inc.

Additive Identity Property	
	a. Discuss the single 10-block and its equation $10 + 0 = 10$.
	b. Explain or review the **additive identity property**: adding zero to any number does not change its value.

Commutative Property of Addition	
	a. Disassemble all stacks so students may continue to explore. Have students take turns stacking pairs of addends that equal the sum of 10.
	b. Have them observe that the pairs can be stacked in any order and it does not change the outcome; the addend pairs still equal 10.
	c. Explain or review the **commutative property of addition**: changing the order of addends does not change the sum.

Relationship Between Pairs of Addends	
	a. Have students select two different pairs of addends that equal the sum of 10.
	b. Discuss how the two stacks are equivalent.
	c. Guide students to conclude that an **equation** can be a statement of two equivalent expressions and is not limited to only an expression equaling a solution.
	d. Have students write and explain the equation for their pair of stacks. For example, $6 + 4 = 8 + 2$.

© Math Stackers Inc.

Completed Chart for Level

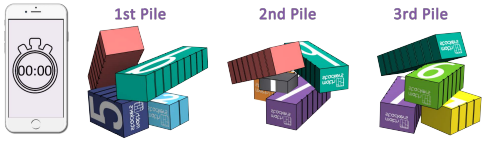
Addend Pairs of 10	
$5 + 5 = 10$ $6 + 4 = 10$ $7 + 3 = 10$ $8 + 2 = 10$ $9 + 1 = 10$ $10 + 0 = 10$	Commutative Property of Addition $7 + 3 = 3 + 7$ Other Equations $6 + 4 = 8 + 2$ $9 + 1 = 5 + 5$

Math Stackers Speedy Structures!

Materials needed:

- One timing device per team
- 3-pile-setups of Math Stackers per team (Each team chooses one of the options listed below):

	Option 1	Option 2
1st pile	9, 4, 6, 7, 1	6, 7, 4, 8, 2
2nd pile	7, 2, 5, 3, 8	3, 1, 6, 7, 9
3rd pile	5, 7, 8, 5, 3	4, 5, 7, 6, 5



Goal:

Students race against themselves to build the 3 structures (one structure per pile) as quickly as possible. On their second turn, they try to beat their first time.

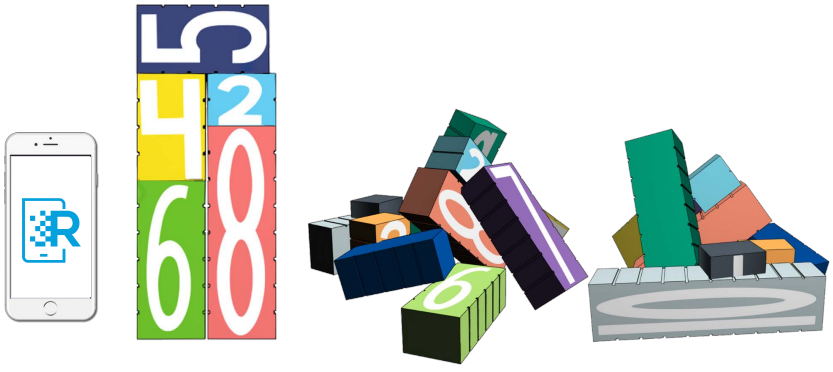
How to play:

1. Students are divided into teams of 2.
2. Each team is designated 3 piles (either of option 1 or option 2).
3. One student times while the other student races to find pairs of addends that equal the sum of 10 within each of the 3 piles as quickly as possible.
4. With the remaining block in each pile, students complete their structure and show equivalence by placing it across the top of the two stacks.

© Math Stackers Inc.

5. After the first student completes all three piles, they scramble the Math Stackers in each pile so the challenge is ready for the second student.

6. Both students in each pair will complete the challenge twice with the objective of beating their first time.



What are they learning?

- Students focus on addend pairs of 10.
- By learning how to apply the properties of addition and manipulate the decomposed addends of 10, students will strengthen their number sense across all mathematics operations.
- Students will also begin to develop their understanding of equivalent as “same value.” This development is extended to the understanding of an equation as a statement of two equivalent expressions $(6 + 4 = 8 + 2)$ (an expression being numbers, symbols and operations grouped together to show the value of something).
- This idea of equivalence is further applied to prove the **commutative property of addition**: $a + b = b + a$, the order of the addends does not affect the sum.
- The **additive identity property** of addition may also be addressed to explain $0 + a = a$ or $a + 0 = a$.

© Math Stackers Inc.

TO GET STARTED WITH MATH STACKERS: MULTIPLICATION LEVEL 2...

How many Paper Math Stackers will you need to print for this lesson?
Both sheets (A & B) for each kid.

To modify this activity, your students will lay the Paper Math Stackers flat on a surface to manipulate.

How to use the Discovery Guide?
The left side column has a picture index of how your students are manipulating their blocks in the investigation. (The way your students are stacking the blocks may, of course, vary; however, the images give you a great idea of the type of stacks your students will build.) The right side column is a flow of the questions and prompts you will offer your students. Remember, the kiddos are the ones manipulating the Math Stackers! After the hands-on investigation, the small group will participate in the “Math Stackers Fast Factors” challenge.

The great thing about the setup of the Discovery Guide is that within each section (Addition, Subtraction, Multiplication, Fractions, Adding Fractions) the levels get progressively more complex within that concept. For example, after fully exploring factors in Level 2 of Multiplication*, you may move the students who are ready for more to Level 3 where they will discover prime and composite numbers using what they learned about factoring. If you have students who are not yet understanding factors, then they continue to investigate and prove the concepts in Level 2 before moving on to Level 3. It is a great way to differentiate for all of your different kiddos!

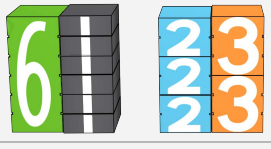
*(Typically, we recommend starting with Level 1 in each section of the Discovery Guide and moving on from there. The reason we did not start you with Multiplication Level 1 is because in that level, we investigate multiples by building a huge 3D graph with Math Stackers blocks and it just isn’t possible to get the power of this investigation with our 2D paper version.)

© Math Stackers Inc.

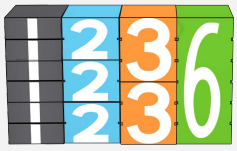
Multiplication Level 2

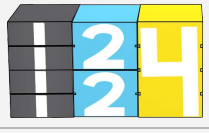
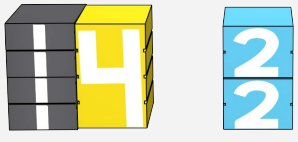
Focus

To discover factors of whole values and experiment with the commutative property of multiplication.

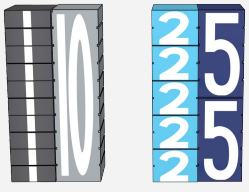
Finding Factors of Products	
	a. Place a 6-block in the center. Students discuss which multiple of 6 is represented by the block then state its corresponding equation: $1 \times 6 = 6$.
	b. Students discuss if they could make stacks of repeated identical blocks that are equivalent to the 6-block's height.
	c. In pairs, students build all of the different ways to make equivalent stacks using one type of block in each stack.
	d. Discuss that the stacks they created and the 6-block show the factors of 6. Factors are the whole numbers that are multiplied to get a specific multiple or product.
Finding Factors Factors of 6 $6 \times 1 = 6$ $3 \times 2 = 6$ $2 \times 3 = 6$ $1 \times 6 = 6$	e. Students analyze each stack and write the corresponding equation on the chart.
	f. Guide students, through questioning, to observe that 1×6 and 6×1 involve the same factors and 3×2 and 2×3 are using the same factors.
	g. Students make the connection between their observations and the **commutative property of addition**.
	h. Students conclude that the **commutative property** also applies to **multiplication**: the order in which the factors are multiplied does not matter, $a \times b = b \times a$.

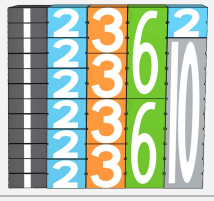
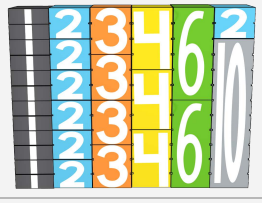
© Math Stackers Inc.

Practice Building Factor Walls for the Product 6	
	a. Using the factor stacks created above, sort the stacks from the smallest block to the largest block to create a Math Stackers factor wall.
	b. Guide them to create an ordered factor list of 6 from the model. The factor list will be in the following order: 1-blocks, 2-blocks, 3-blocks, and 6-block.
Finding Factors **Factors of 6** $6 \times 1 = 6$ $3 \times 2 = 6$ $2 \times 3 = 6$ $1 \times 6 = 6$ $1, 2, 3, 6$	c. Write the factor list for 6 on the chart: 1, 2, 3, 6.

Practice Building Factor Walls for the Product 4	
	a. Each student builds a factor wall of 4.
	b. In pairs, students discuss the equations for each stack and write them on the chart. They extend their discussion to include all of the different factors of 4.
	c. Re-discuss the **commutative property of multiplication** and how it is represented in the model.
	d. Guide students, through questioning, to observe that 4 has an odd quantity of factors: 1, 2, 4. Students theorize that 2×2 does not have a commutative pair because it is the same factor multiplied by itself. Discuss this finding and connect to the discovery that 4 is a square number.
	e. Write the factor list for 4 on the chart: 1, 2, 4.

© Math Stackers Inc.

Practice Building Factor Walls for the Product 10	
	a. Students build two factor walls of 10.
	b. Students experiment with the stacks to check if all factors have been identified. If any stacks remain or there are no stacks that use the same factors, there is a possibility it's commutative stack is missing. However, if the factors are the same in its equation (ex: $2\times2=4$), then the whole value is a square number and there will not be a stack with which to pair it.
	c. Students write the corresponding equations and the organized factor list on the chart.

Counterexample	
	a. Teacher builds the incomplete factor wall of 12 as seen in the picture provided. Ask students to analyze the factor wall.
	b. Students prove or disprove if the wall shows all factors of 12 and explain their reasoning. Students correct the factor wall of 12.
	c. Students write the corresponding equations and organized factor list on the chart.

Completed Chart for Level

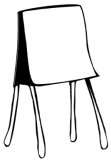
Finding Factors			
Factors of 6 $6\times1=6$ $3\times2=6$ $2\times3=6$ $1\times6=6$ $1, 2, 3, 6$	**Factors of 4** $4\times1=4$ $2\times2=4$ $1\times4=4$ $1, 2, 4$	**Factors of 10** $10\times1=10$ $5\times2=10$ $2\times5=10$ $1\times10=10$ $1, 2, 5, 10$	**Factors of 12** $12\times1=12$ $6\times2=12$ $4\times3=12$ $3\times4=12$ $2\times6=12$ $1\times12=12$ $1, 2, 3, 4, 6, 12$

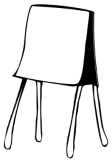
© Math Stackers Inc.

Math Stackers Fast Factors!

Materials needed:

- A pile of Math Stackers in between each team's area so that both teams can access the blocks.
- A writing surface for teacher to write the multiples for each round.
- A writing surface for each of the two teams positioned about 3 yards from the building area.



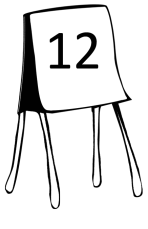


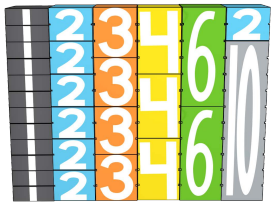
Goal:

Teams race to build Math Stackers factor walls and find the equations and factor list for given whole values. The team with the most points after three rounds, wins!

How to play:

1. Teacher selects the multiples to use for each round (8, 9, 16 as a suggestion).
2. Teacher calls out and writes the whole number for the first round on the chart (8, for example).
3. The teams must work together to create the Math Stackers factor wall for that value.
4. After their wall is complete, they will race to their team's writing surface and write all of the corresponding equations and the factor list for the given whole value.
5. Repeat steps 2-4 for all three rounds.
6. The team that correctly completes the list of equations and factor list first is awarded a bonus point. Each team will then be awarded a point for each correct solution.
7. The team with the most points at the end of round three is the winner.





© Math Stackers Inc.

What are they learning?

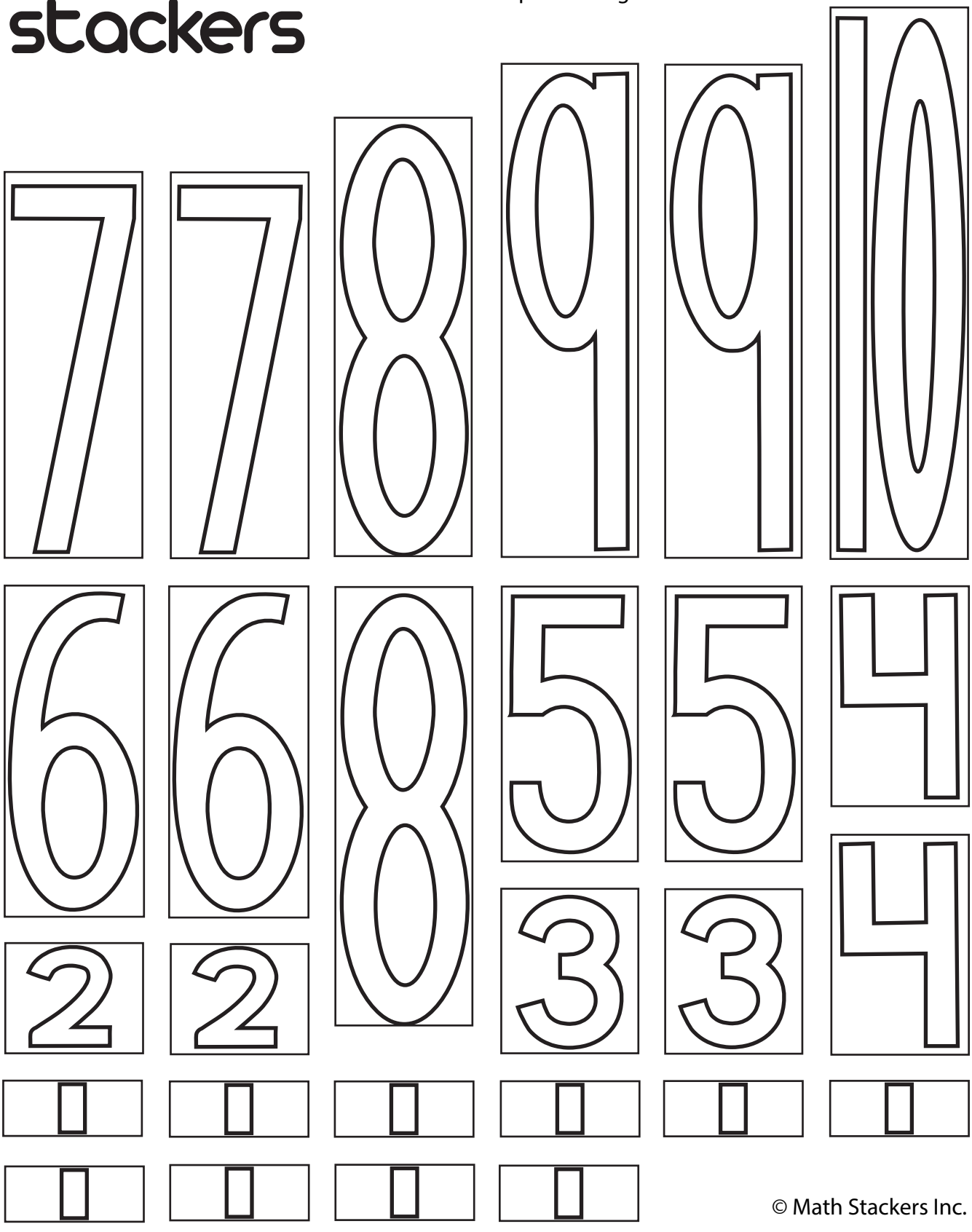
- Students begin to develop their understanding of factoring and the **commutative property of multiplication**.
- The **commutative property of multiplication** states that the order in which factors are multiplied does not affect or change the product, such as: $a \times b = b \times a$.
- Students also begin to naturally see the link between multiplication and division as they factor.
- This level lays a foundation for algebraic thinking, which includes factoring quadratic equations later in their mathematics learning.

© Math Stackers Inc.

math stackers

SHEET A

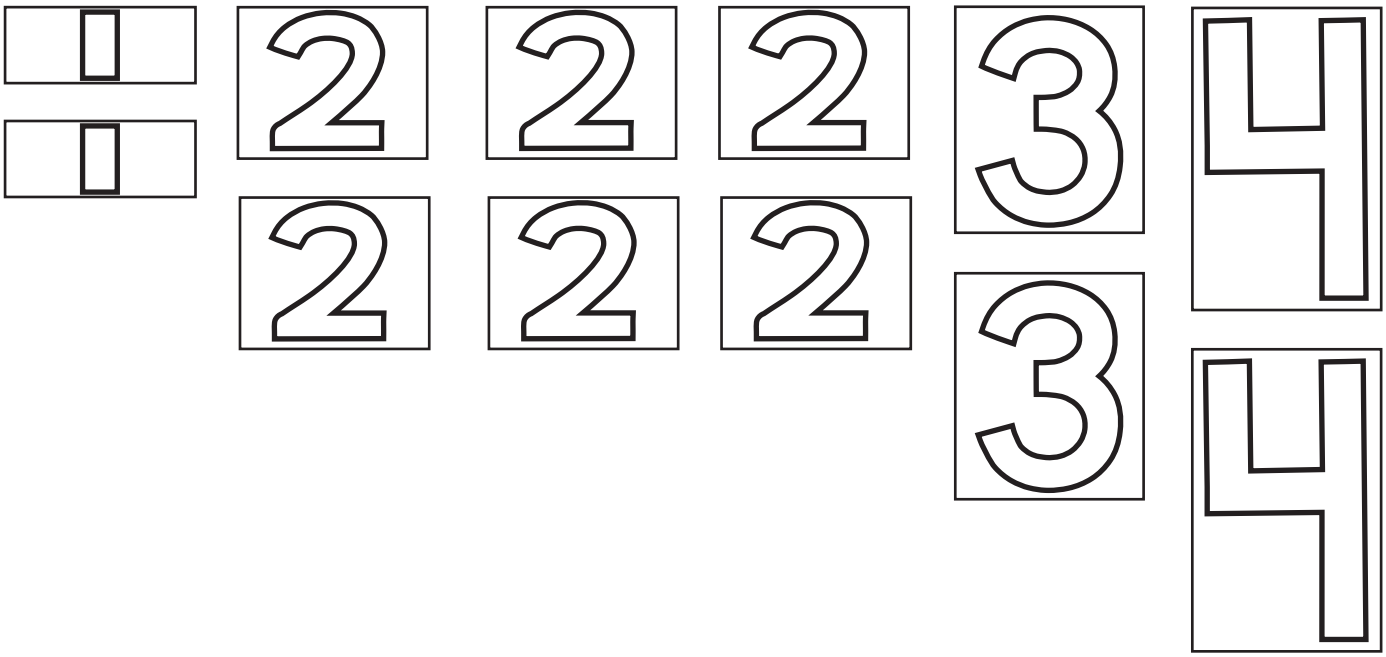
Cut out the Paper Math Stackers and use with your sample investigation.



© Math Stackers Inc.

math stackers

SHEET B



© Math Stackers Inc.

math stackers

SHEET A

Cut out the Paper Math Stackers and use with your sample investigation.

© Math Stackers Inc.

math stackers

SHEET B

© Math Stackers Inc.