ST Math

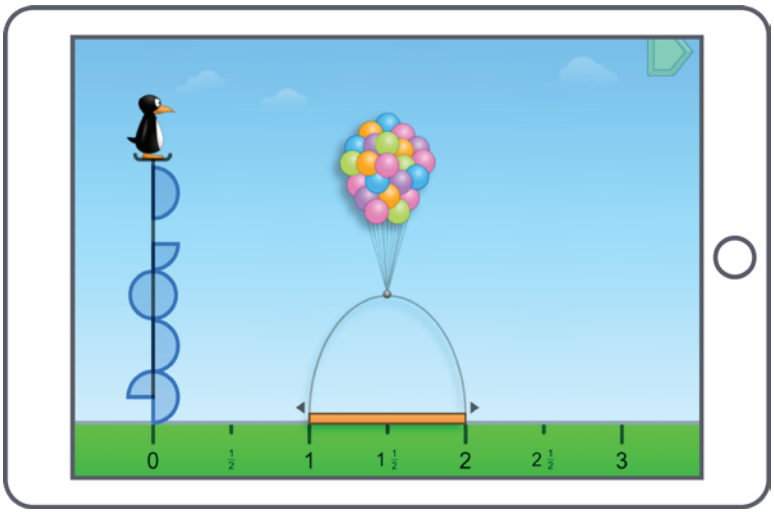
Teacher Guide to Supporting 4th Grade Students Learning From Home

MIND RESEARCH INSTITUTE

With the spread of Coronavirus, COVID-19, schools across the country are temporarily closing. At MIND Research Institute, our mission is to ensure that all students are mathematically equipped to solve the world's most challenging problems. That's why we stand ready to provide resources and no-cost access so the learning can keep on happening, even if school is temporarily closed.

This guide provides support and resources that teachers can use for remote learning. There's also a companion guide for parents. All resources in the parent guide are included here to support teachers as they plan their remote instruction. The three types of resources in this guide are outlined below.

ST Math Program: ST Math is a PreK-8 visual instructional program that leverages the brain's innate spatial-temporal reasoning ability to solve mathematical problems. Its unique, patented approach provides students with equitable access to learning through challenging puzzles, non-routine problem solving, and informative feedback. With ST Math, students build deep conceptual understanding, and schools see proven, repeatable results.



Hands-On Math Activities: These activities focus on specific math concepts within a grade level. Each activity is designed to engage students in learning that is hands-on and promotes understanding of the concept. These activities are meant to be done with a parent or guardian. It's a fun way for children and parents to do math at home. Each activity includes clear directions, vocabulary words, and questions parents can ask to support their children during the activity.

Number Sense Games: Number Sense is an area that is critical to mathematics learning. It includes mathematical concepts like counting, adding, subtraction, multiplication, division, fractions, place value, estimation, and many others. Included in this packet are activities that students can do at home with their families to build number sense and practice those critical skills in a fun and engaging way through gameplay.

Contents

Using These Resources

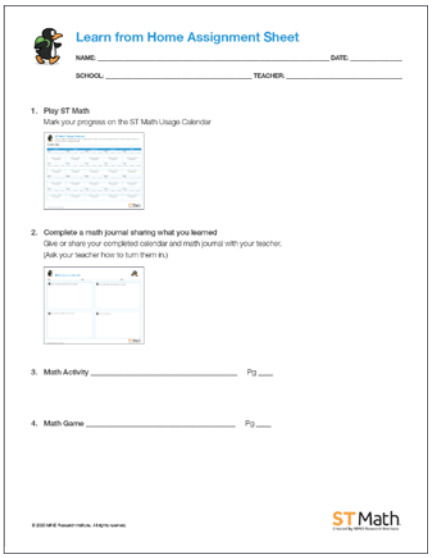
As you review this packet and prepare to use these resources to support you in planning your remote learning, here are some suggestions for you.

Provide your students with an assignment sheet.

- Download the assignment sheet from this packet and use it to communicate with your students the expectations for their work during the week.

Review the tips for parents.

- These are tips that are provided in the parent guide, but also are good reminders that you may want to include in your email communications.



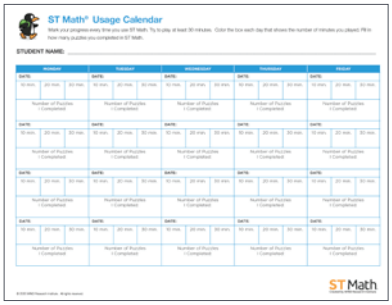
Visit stmath.com/coronavirus
for additional information and support.

Learn from Home Assignment Sheet

NAME: _____ **DATE:** _____

SCHOOL: _____ **TEACHER:** _____

1. **Play ST Math.**
   Mark your progress on the ST Math Usage Calendar.



2. **Complete a math journal sharing what you learned.**
   Give or share your completed calendar and math journal with your teacher.
   (Ask your teacher how to turn them in.)

3. **Math Activity** _____ Pg. ____

4. **Math Game** _____ Pg. ____

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ST Math

Resources to support, monitor, and assess student learning while they play ST Math.

Teacher Guidance:

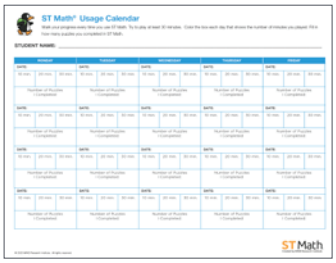
- Encourage students to work independently on ST Math and track their usage on the ST Math calendar. Recommended usage time is 20 to 30 minutes at least 3 times per week.
- Remind your student to use the Think Before You Click strategy to help them think through games. This will help support them when they are stuck on puzzles. For more information on this strategy, view the videos on our instructional resources Youtube playlist.
- Encourage parents to support the student's thinking by asking facilitating questions instead of telling or showing the student how to solve the puzzles. The parent guide includes a facilitating questions poster. For more information on how parents can facilitate student thinking as they work on ST Math puzzles, view the videos on our instructional resources Youtube playlist.
- Consider posting or emailing a link to the Think Before You Click and Facilitation videos for easy access for parents.
- Review the other resources on the site to determine what other things you might want to share to support the use of ST Math at home.

Below are tips to share with families working with their children at home:

- Work with your child to set goals and monitor their progress toward achieving their goals. This is a great opportunity to help your child see that they can achieve their goals.
- When your child is finished playing ST Math, have them complete a math journal to share what they have learned.
- If possible, take time to sit with your child and ask them to explain to you what they are learning with ST Math.
- A fun way to share learning together is to have your child "teach" a family member how to play one of the ST Math games. They can share the mathematics in the game.
- If your child gets stuck playing the ST Math puzzles, you can have them think through the questions on the Think Before You Click poster. If you are able, you can use the questions on the Facilitating Questions poster to help your child problem-solve through the ST Math games.

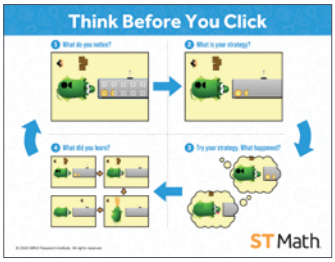
ST Math Resources in the Teacher Guide

The resources in the table below are provided in the Parent and Teacher Guides to support students as they learn at home.



ST Math Usage Calendar: As students play ST Math, have them track their progress on the calendar.

ST Math Journals: There are different Math Journals for students to communicate their learning. You may choose to use only one or to provide all of them for students to choose from. Students can turn these in via email or another virtual tool each week or you may choose to have them turned in when students return to school.



Think Before You Click Poster: This poster is a great resource for students to ask themselves questions as they work through ST Math puzzles. It will help students as they get stuck. Students may have to try different strategies and observe the feedback several times before they get the correct answer. For more information on this strategy, view the videos on our instructional resources Youtube playlist.

Facilitating Questions Poster: This poster is a great resource provided to parents to help support their student while they play ST Math at home. It is important to remind parents not to tell the student the answer, but to ask questions that help them think through the puzzles. For more information on this strategy, view the videos on our instructional resources Youtube playlist.

Additional Resources: Additional resources for teachers and parents can be found at https://www.stmath.com/coronavirus.

ST Math® Usage Calendar

Mark your progress every time you use ST Math. Try to play at least 30 minutes. Color the box each day that shows the number of minutes you played. Fill in how many puzzles you completed in ST Math.

STUDENT NAME: ______________________________

MONDAY			TUESDAY			WEDNESDAY			THURSDAY			FRIDAY		
DATE:			**DATE:**			**DATE:**			**DATE:**			**DATE:**		
10 min.	20 min.	30 min.	10 min.	20 min.	30 min.	10 min.	20 min.	30 min.	10 min.	20 min.	30 min.	10 min.	20 min.	30 min.
Number of Puzzles I Completed:			Number of Puzzles I Completed:			Number of Puzzles I Completed:			Number of Puzzles I Completed:			Number of Puzzles I Completed:		
DATE:			**DATE:**			**DATE:**			**DATE:**			**DATE:**		
10 min.	20 min.	30 min.	10 min.	20 min.	30 min.	10 min.	20 min.	30 min.	10 min.	20 min.	30 min.	10 min.	20 min.	30 min.
Number of Puzzles I Completed:			Number of Puzzles I Completed:			Number of Puzzles I Completed:			Number of Puzzles I Completed:			Number of Puzzles I Completed:		
DATE:			**DATE:**			**DATE:**			**DATE:**			**DATE:**		
10 min.	20 min.	30 min.	10 min.	20 min.	30 min.	10 min.	20 min.	30 min.	10 min.	20 min.	30 min.	10 min.	20 min.	30 min.
Number of Puzzles I Completed:			Number of Puzzles I Completed:			Number of Puzzles I Completed:			Number of Puzzles I Completed:			Number of Puzzles I Completed:		
DATE:			**DATE:**			**DATE:**			**DATE:**			**DATE:**		
10 min.	20 min.	30 min.	10 min.	20 min.	30 min.	10 min.	20 min.	30 min.	10 min.	20 min.	30 min.	10 min.	20 min.	30 min.
Number of Puzzles I Completed:			Number of Puzzles I Completed:			Number of Puzzles I Completed:			Number of Puzzles I Completed:			Number of Puzzles I Completed:		

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Math Journal with JiJi

NAME: _____ GAME: _____ DATE: _____

1 WRITE OR DRAW SOMETHING YOU LEARNED

2 TELL SOMETHING THAT WAS EASY OR HARD

3 TELL HOW THIS HELPS YOU WITH MATH

4 MATH VOCABULARY

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Math Journal with JiJi

Write or draw something you learned today. Write in one box each day.

NAME: _____ **GAME:** _____ _

1

2

3

4

WRITE MATH WORDS YOU USED IN THIS GAME.

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Math Journal

My Reflections

NAME: _____ DATE: _____

OBJECTIVE PROGRESS	SYLLABUS PROGRESS	TIME SPENT	# OF PROBLEMS SOLVED

SOMETHING I LEARNED TODAY IS . . .

SOMETHING THAT WAS EASY / HARD FOR ME WAS...
(circle one)

ONE WAY THIS CONNECTS TO WHAT I LEARNED IN CLASS IS . . .

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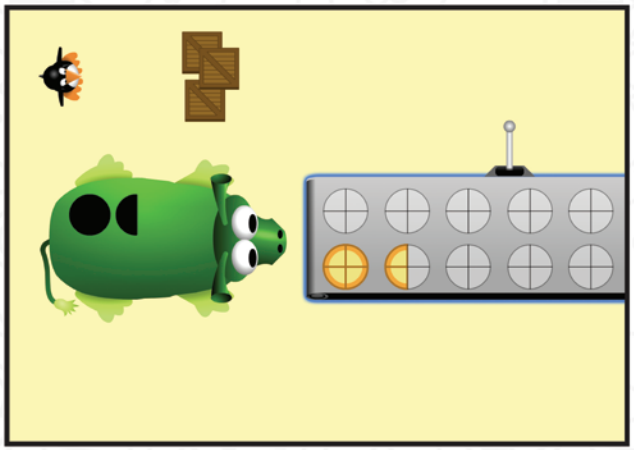
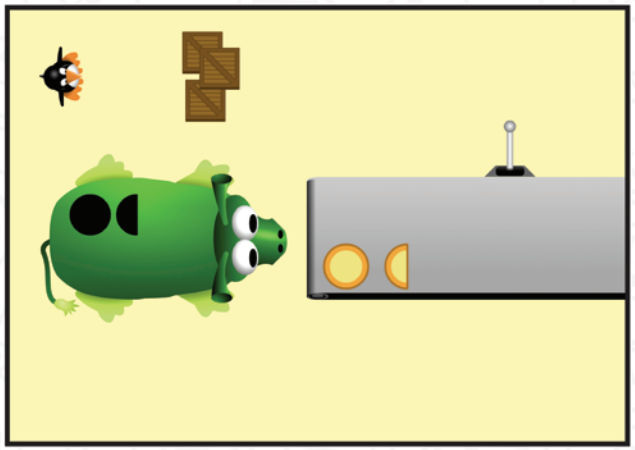
Think Before You Click

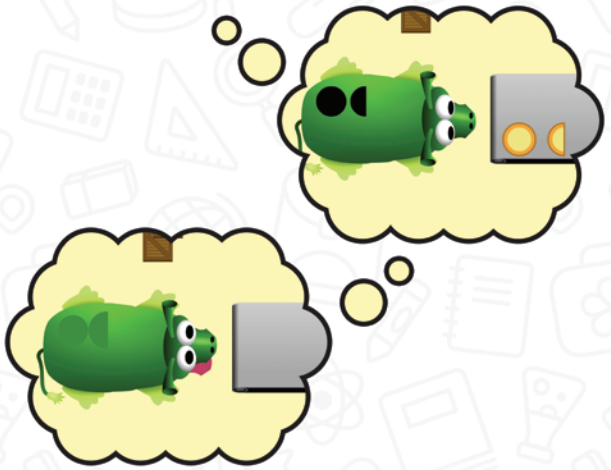
1 What do you notice?



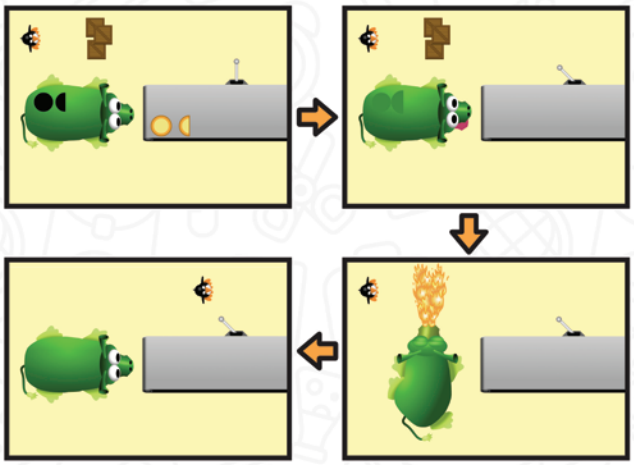
2 What is your strategy?



3 Try your strategy. What happened?



4 What did you learn?



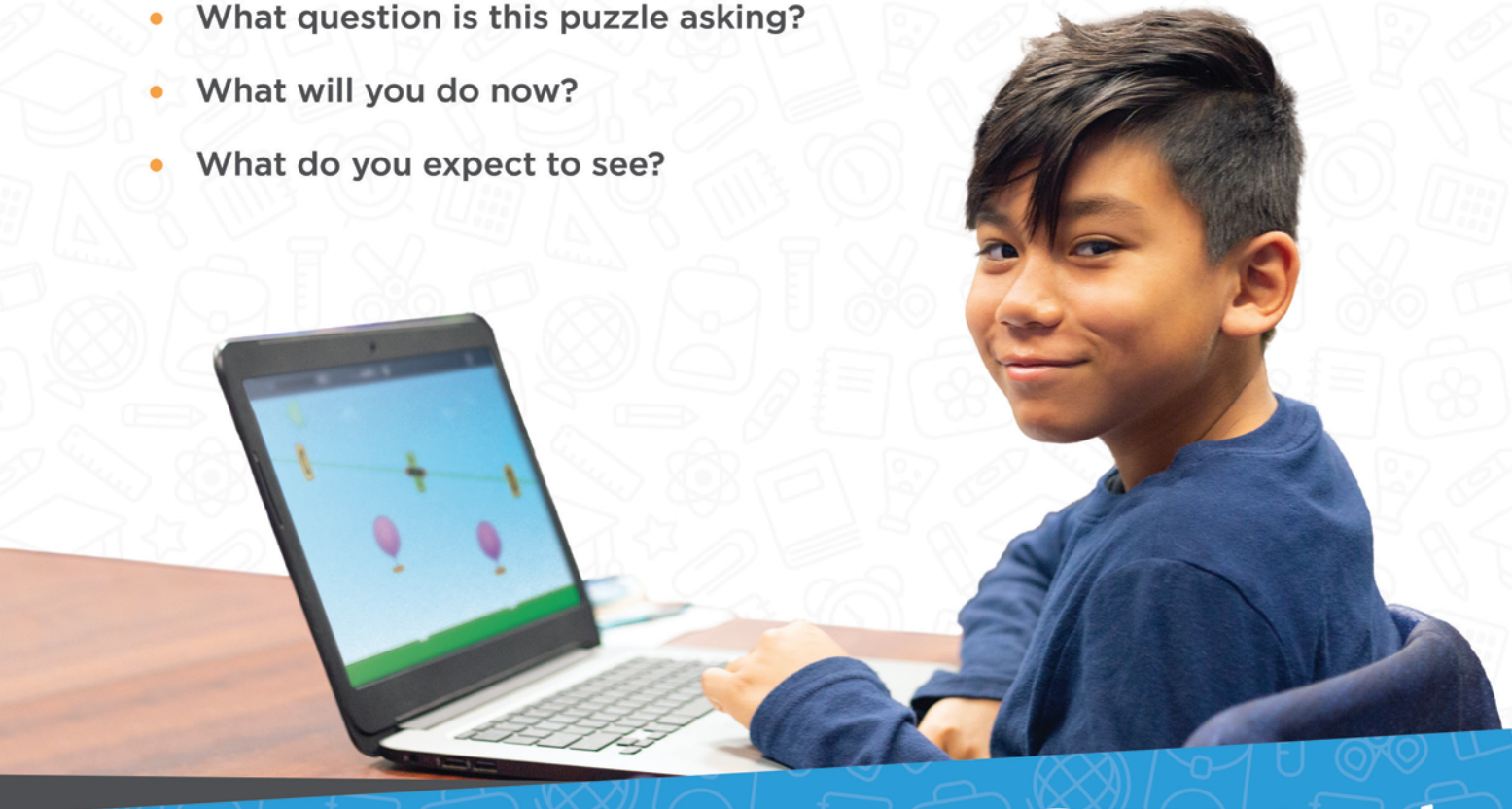
ST Math

Facilitating Questions

In ST Math®, the puzzles start off simple and then get more challenging as the student progresses. When they reach a challenging problem, they may ask for your help.

To help them, ask questions like:

- **What do you notice about the puzzle?**
- **What did you learn from the previous level that can help you here?**
- **What can you click?**
- **Describe what you see after you click. What did you learn?**
- **Describe the strategy that you are going to use.**
- **What can you do to get JiJi across the screen?**
- **What question is this puzzle asking?**
- **What will you do now?**
- **What do you expect to see?**



ST Math®
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Hands-On Math Activities

A collection of hands-on, grade-band activities focused on practicing and exploring math concepts. These activities correlate to our games.

Teacher Guidance:

- These activities focus on specific math concepts within a grade-level. Each of the hands-on math activities are correlated to an ST Math game. These games are great for you to use with your students in your one-on-one meetings, or in virtual lessons. The visual models in the games help students "see" the mathematics.
- As students do these activities with their families, you may want to have students write what they learned during the activity, or write their answers to the questions so you can assess their learning. Below are some tips that you can share with parents as they do these activities with their children.

Below are tips to share with families working with their children at home:

- These are great activities for you to do with your child. Family members can use the questions and ideas provided to promote math conversations.
- Once your child finishes the activity, have them write a 5-sentence summary or draw a picture of what they learned. They should also list any questions they have for their teacher.

Hands-On Math Activity Resources in the Teacher Guide

The resources in the table below are provided in the Parent and Teacher Guides to support students as they learn at home.

Math Activity Guide: This guide outlines activities, their related materials, and math concepts.

Math Activity Sheets: These activity sheets include directions, vocabulary words, sample questions, and extension ideas. The activities are designed so that students can complete with the teacher or at home with their families.

Grade 4

Game	Materials Needed	Concepts	ST Math Game Connection
Follow the Rule	• Notecards • Pencil • Paper	Numbers or shapes can form a pattern according to a specific rule.	**Fourth Grade Objective:** Patterns in Number and Shapes **Game:** Helicopter Table
Fraction Match	• Notecards • Pencil • Paper	Fractions greater than 1 can be written as a mixed number.	**Fourth Grade Objective:** Mixed Numbers **Game:** Match Fraction LI
Make It Equal	• Toothpicks, straws or other straight household objects • Paper • Pencil	You can compare fractions with the same or different denominators as long as the fractions refer to the same whole.	**Fourth Grade Objective:** Fractions- Equivalence and Ordering **Game:** Equivalent Fractions
What's Your Angle?	• Straight household items such as toothpicks, straws, chopsticks, pencils • Notecards or sticky notes	Angles can be named and classified according to their measurement in degrees.	**Fourth Grade Objective:** Angles and Triangles **Game:** Which Angle?
Fraction Fun	• Two sheets of copy paper or construction paper • Scissors • Markers	Fractions with the same denominator can be added or subtracted using visual models.	**Fourth Grade Objective:** Adding and Subtracting Fractions **Game:** Scale Fraction Addition and Subtraction
Shape Detective	• Toothpicks • Notecard or piece of paper	Shapes can be named and classified based on attributes such as types of angles and the presence or absence of parallel and/or perpendicular sides.	**Fourth Grade Objective:** Advanced Shapes **Game:** Shape Types
How Many Legs?	• Creature Cards • Number cubes (dice) • Paper • Pencil	Problems can have multiple steps and multiple operations. Parentheses can help to make the order of operations clear.	**Fourth Grade Objective:** Multiple Operations **Game:** Leg Drape Boots
Coin Trade	• Pennies • Nickels • Dimes • Quarters • Pencil • Paper	In a measurement system, a larger unit can be traded for a smaller unit.	**Fourth Grade Objective:** Measurement and Conversions **Game:** Buy Item

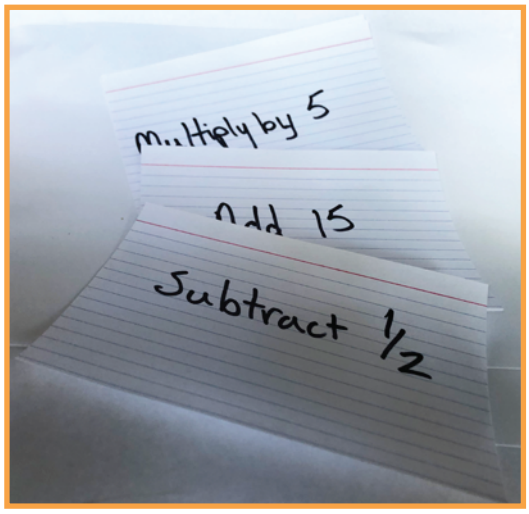
Follow the Rule

Activity for 4th Grade Students

This game focuses on helping children see that numbers or shapes can form a pattern. That pattern can follow a given rule (e.g., “add 5” or “x 2”). Your child should be able to recognize the rule a pattern follows and generate a pattern that follows a given rule.

Directions:

- Write the following rules on notecards and place the notecards upside down.
  - Add 15
  - Subtract 2
  - Multiply by 5
  - Add 1/2
  - Multiply by 10
  - Subtract 1/2
- Decide who will be Player 1 and who will be Player 2. Player 1 should choose a starting number between 10 and 100. Player 2 should draw a notecard and follow the rule starting at the number chosen by Player 1.
- Player 1 starts at the number Player 2 ended on and follows the same rule. Continue until Player 1 and 2 have followed the rule 2 times each.
- Switch roles and repeat.



Math Words to Use:	Materials	Sample Questions to Ask:
Pattern **Rule**	• Pencil • Paper • Notecards	• How can you prove your pattern follows the given rule? • What are the next two numbers in this pattern? • What if this pattern started with the number __?

Ideas to extend Learning:

- Explore shape patterns with your child. Ask them to make shape patterns that follow rules that use geometry vocabulary (e.g., “make an ABC pattern using only quadrilaterals” or “make a growing pattern with shapes with increasing number of sides”).
- Look closer at one of the repeated patterns. Ask your child to tell you what kind of numbers they see in the pattern (even or odd). Discuss why this is true and if this is still true if they start the pattern with a different number (e.g., Rule is add 2 and start at 5; 7, 9, 11, 13. Then Start at 18; 20, 22, 24,26).
- Use one of the rules on the notecard to create an input/output table. Challenge students to apply the rule to bigger and bigger starting numbers.

Example:

Input	Output
4	40
12	120
15	150
29	290

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Fraction Match

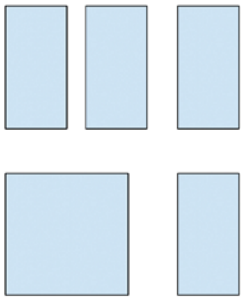
Activity for 4th Grade Students

This game focuses on helping children to understand that a fraction can be written as a mixed number (e.g., 10/8 is equivalent to 1 2/8 or 1 1/4). Your child should understand that the fraction and corresponding mixed number are equivalent.

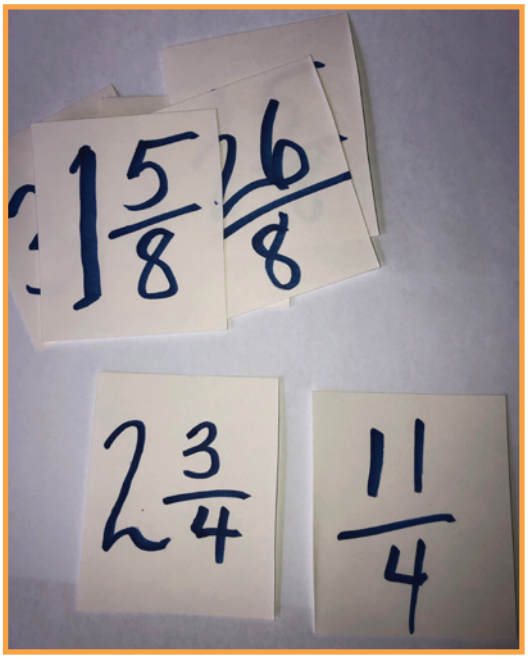
Directions:

- Gather notecards, paper, and a pencil.
- Create the set of notecards shown to the right with one number per card.
- Mix up the notecards. Have your child match the fraction with the equivalent mixed number.
- Have your child draw a visual model of each mixed number and equivalent fraction pair.

Example:



$2\frac{3}{4}$	$\frac{11}{4}$
$1\frac{5}{8}$	$\frac{13}{8}$
$5\frac{1}{2}$	$\frac{11}{2}$
$8\frac{3}{4}$	$\frac{35}{4}$
$3\frac{2}{8}$	$\frac{26}{8}$



Math Words to Use:	Materials	Sample Questions to Ask:
Fraction **Mixed number** **Equivalent** **Numerator** **Denominator**	• Notecards • Pencil • Paper	• How can you prove these are equivalent? • Why is the numerator bigger than the denominator? • What fraction with this denominator would equal 1? • How many more halves/fourths/eighths would we need to have another whole number?

Ideas to Extend Learning:

- Have your child randomly choose two of the notecards. Ask them to add (or subtract) the two numbers. Ask them to express their answer as a mixed number.
- Make a list of real world situations where the answer to a question might be a mixed number (e.g., "How much pizza is left after a big party?" Or "How many rooms in the building have been painted today?").
- Draw different visual models of mixed numbers. Ask your child to write the matching mixed number and equivalent fraction.

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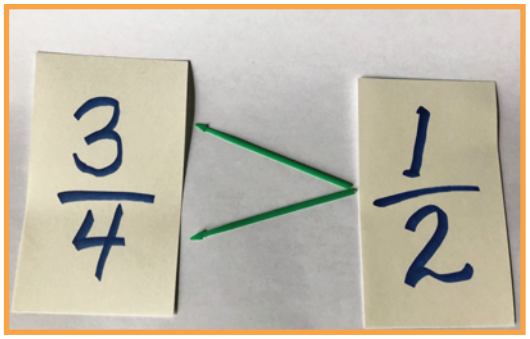
Make It Equal

Activity for 4th Grade Students

This game focuses on equivalent fractions. Your child should understand that as long as fractions refer to the same whole we can compare them. Fractions do not have to have the same denominator in order to determine how they compare, but your child might find that creating common denominators makes comparing two fractions easier.

Directions:

- Gather two toothpicks (or straws or any straight household object), paper and a pencil.
- On the paper, write two fractions for your child to compare. Leave a fairly big space between the fractions and room underneath each fraction.
- Have your child draw a visual model underneath each fraction and decide which fraction is greater. Have them use their two toothpicks to create a greater than, less than, or equal sign (>, <, =).
- Work together to prove the answer by finding a common denominator.



Math Words to Use:	Materials	Sample Questions to Ask:
Equivalent fractions **Numerator** **Denominator** **Greater than** **Less than** **Equal to**	• Toothpicks, straws or other straight household objects • Paper • Pencil	• Why is this fraction greater than/less than this fraction? • What does your visual model show? • Can you think of an equivalent fraction for this fraction? • How could we find a common denominator?

Ideas to Extend Learning:

- Look at all of the fractions you used in the game. Ask your child to choose three fractions and place them in order from least to greatest. Repeat with other fractions.
- Choose one of the fractions from the game. Ask your child to generate a list of equivalent fractions.
- Help your child to memorize multiplication facts up to 9 x 9. This will make finding common denominators much easier.

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What's Your Angle?

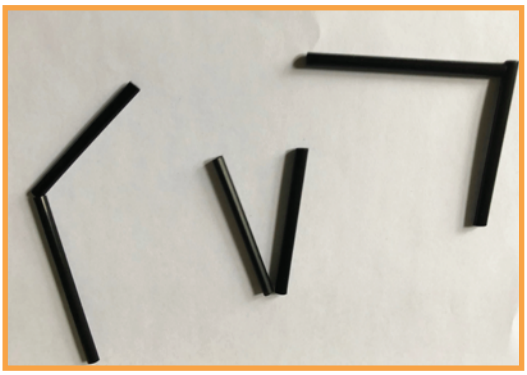
Activity for 4th Grade Students

This game focuses on helping children to identify different types of angles. Your child should understand that an angle is formed when two rays or line segments share an endpoint - called a vertex. The measurement of the amount of rotation (or turning) around the vertex is called an angle. Angles can be measured and then classified based on this measurement.

Directions:

- Gather straight objects such as toothpicks, straws, chopsticks, pencils, etc.
- On notecards or sticky notes, write the following labels: straight, right, acute, obtuse.
- Use two toothpicks (or other straight objects) to make examples of the angles from the table below. Have your child label each angle with the correct name and explain their answer.
- Give your child the straight objects, hold up one of the labels and have them create an angle that would match the label and explain why.

Straight angle	Exactly 180°
Right angle	Exactly 90°
Acute angle	Greater than 0° but less than 90°
Obtuse angle	Greater than 90° but less than 180°



Math Words to Use:	Materials	Sample Questions to Ask:
Angle **Straight** **Right** **Acute** **Obtuse** **degrees**	• Straight household items such as toothpicks, straws, chopsticks, pencils • Notecards or sticky notes	• How do you know these two lines form an angle? • How can you show that this angle is greater than/less than a right angle? • Do all acute/obtuse angles have the same measurement? Why or why not? • Do all right angles have the same measurement? Why or why not?

Ideas to Extend Learning:

- Give your child pencil and paper. Hold up the different angle label cards and ask them to draw an angle that matches the label. Ask your child to draw more than one acute angle or obtuse angle.
- Draw and label a right angle. Divide the angle into two parts and label the measurement of one of the parts in degrees (If you do not have a protractor to measure the angle, make an estimate of the size of the angle). Label the other part with a question mark. Ask your child to use what they know about the right angle to find the measurement of the unknown angle.
- Explore the angles in common shapes and objects. Can your child identify straight, right, acute and obtuse angles in everyday objects?

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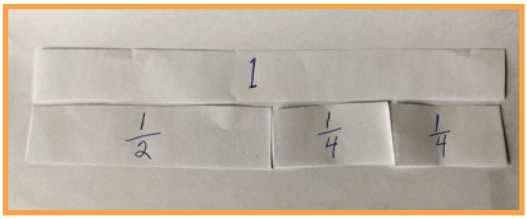
Fraction Fun

Activity for 4th Grade Students

This game focuses on helping children to understand how to add and subtract fractional parts that come from the same whole. Your child should understand that if a whole is broken into 4 equal parts, for example each part could be named ¼. These parts can be added or subtracted.

Directions:

- Gather two sheets of paper, scissors, and two markers.
- Work together with your child to make two sets of fraction strips.
- Cut each piece of paper into 4 equal strips. One strip will be the whole. The other 3 strips will be folded to make halves, fourths, and eighths (as shown below).
- Work together to label each piece. Focus on naming the pieces based on the number of equal parts the whole has been cut into. (e.g., The larger rectangle has been cut into 2 equal pieces. The denominator will be 2. This piece is 1 of those pieces so the numerator will be 1. This piece is ½.)



1 whole							
$\frac{1}{2}$				$\frac{1}{2}$			
$\frac{1}{4}$		$\frac{1}{4}$		$\frac{1}{4}$		$\frac{1}{4}$	
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

- Pose the following addition and subtraction problems to your child. Have them model their work using the fraction strips.

$\frac{1}{8}+\frac{2}{8}+\frac{1}{8}$	$\frac{2}{4}+\frac{1}{4}$	$\frac{4}{8}-\frac{1}{8}$
$\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$	$\frac{3}{4}-\frac{2}{4}$	$\frac{1}{4}+\frac{2}{4}+\frac{1}{4}$
$\frac{2}{4}+\frac{1}{2}$	$\frac{10}{8}-\frac{1}{8}$	$\frac{1}{8}+\frac{2}{4}+\frac{4}{4}$

Math Words to Use:	Materials	Sample Questions to Ask:
Fraction **Equal parts** **Numerator** **Denominator**	• Two sheets of copy paper or construction paper • Scissors • Markers	• What does the numerator represent? • What does the denominator represent? • How many equal parts have you made? • How do you know we have more than 1 whole? • Why doesn't the denominator change when we add the fractional parts?

Ideas to Extend Learning:

- Choose two different fraction pieces (e.g., 1/4 and 1/2). Talk with your child about which piece is bigger and why. Choose other pieces to compare.
- Ask your child to find equivalent fractions (pieces that are equal to each other). For example, what are other ways to represent 1/2using the pieces you have?
- Look at the addition problems where the parts equaled more than one. Help your child to represent this answer as a mixed number (e.g., 3/2 is the same as 11/2).
- Using only the fraction pieces you have made (in one set), find all of the ways you can make exactly one whole. Write the addition expression that represents each way.

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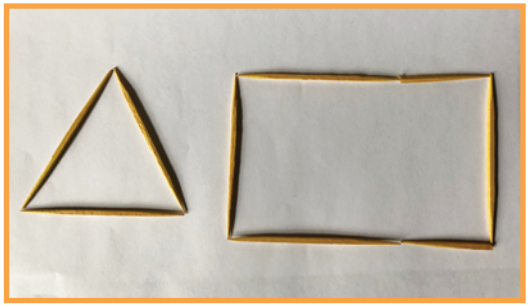
Shape Detective

Activity for 4th Grade Students

This game focuses on helping children to use geometry vocabulary to name and classify shapes. Your child should understand that shapes can be named and classified based on attributes such as the number of sides, types of angles, and whether or not the shape has parallel or perpendicular lines, etc.

Directions:

- Give your child toothpicks (or other straight items) and ask them to make the different shapes from the list below.
- After your child makes each shape, have them talk about its attributes. Ask questions about the number of sides, types of angles (right, acute, obtuse), and whether or not the shape has parallel or perpendicular sides.
- Use the corner of a notecard or piece of paper as a "right angle checker" for each shape.
- Repeat with all of the shapes in the list. Help your child to use correct geometry vocabulary as they describe the shapes.
- Shapes to make: *square, rectangle, rhombus, pentagon, hexagon, octagon, right triangle*



Math Words to Use:	Materials	Sample Questions to Ask:
Right angle **Acute angle** **Obtuse angle** **Parallel** **Perpendicular** **Pentagon** **Hexagon** **Octagon**	• Toothpicks • Notecard or piece of paper	• What is the name of this shape? • What type(s) of angles does this shape have? How do you know? • Does this shape have parallel sides? How do you know? • Does this shape have perpendicular sides? How do you know? • Do all squares have parallel sides? All hexagons?

Ideas to Extend Learning:

- Look for parallel and perpendicular lines in your home. Which objects have both types of lines? Use the right angle checker (if possible) to identify perpendicular lines.
- Look for acute, obtuse, and right angles in your home. Use the right angle checker (if possible) to identify right angles.
- Find objects in your home that have a line of symmetry (a line that would make two matching parts if the object was folded across that line). Discuss the attributes of the object that make it possible to have a line(s) of symmetry.

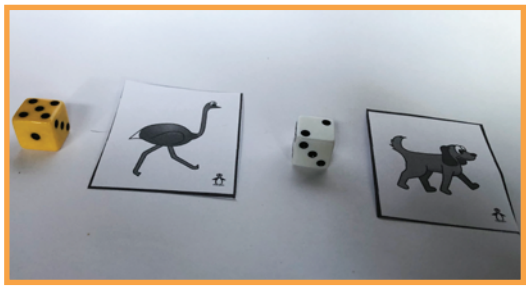
How Many Legs?

Activity for 4th Grade Students

This game focuses on helping children to perform more than one operation in a single problem. Your child does not yet have to know the order of operations, so parentheses can help to clarify which operation is completed first in a multi-step problem.

Directions:

- Gather paper, a pencil, number cubes (dice) and the ST Math Creatures Board.
- Have your child choose 2 creatures. Have them roll a number cube and place it next to one of the creature cards. Have them roll the other number cube and place it next to the other creature card.
- Ask your child to represent the total number of creature legs with an equation. Remind them that parentheses can help to make the order of operations easier to see. Work together to solve the problem. (e.g., If your child chooses a Robot and a Dog and rolls a 5 for Robot and a 6 for Dog, their equation would read (5 x 3) + (6 x 4). Your child would solve 5 x 3 = 15 and then 6 x 4 = 24 and add the two answers together (15 + 24) to get an answer of 39.)
- Repeat with other creatures on the board.



Math Words to Use:	Materials	Sample Questions to Ask:
Parentheses **Operation** **Multi-step problem**	• ST Math Creatures Board • Number cubes (dice) • Paper • Pencil	• How could we represent the total number of (creature 1) legs? • How could we represent the total number of (creature 2) legs? • How do we find out the total number of legs all together? • What do the parentheses tell us to do in this equation?

Ideas to Extend Learning:

- Pose multi-step word problems with remainders for your child to solve. The word problems could involve the same operation or two different operations. For example, “JiJi has one basket with 16 shoes and one basket with 39 shoes. JiJi gives the shoes to Ant and Ant’s friends. How many ants can wear the shoes? Explain.”
- Explain to your child that a variable is a letter or symbol that represents an unknown. Use a variable in each equation you write to represent the total number of creature legs.
- Challenge your child by using more than two Creature Cards.
- Challenge your child by changing the number cubes from 1 - 6 to 7 - 12 (add 6 to the number rolled).

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Coin Trade

Activity for 4th Grade Students

This game focuses on helping children to understand that in a measurement system a larger unit can be traded for a smaller unit. Your child should understand U.S. coin values and how a larger value coin can be traded for multiple coins with a smaller value.

Directions:

- Gather paper, a pencil, and a collection of coins: pennies, nickels, dimes and quarters.
- Pose the "You Have, You Need" situations listed below to your child. Ask them to represent the same amount using a different type of coin. As your child works, ask them to think out loud so you can hear their strategy (e.g., "I have 3 dimes and I need to trade them for nickels. I know that one dime is 10¢ so if each nickel is 5¢, it takes 2 nickels to equal 1 dime. I need 3 groups of 2 nickels so 6 nickels is the same as 3 dimes.")

You have 2 quarters	You need dimes
You have 8 dimes	You need pennies
You have 4 quarters	You need nickels
You have 5 quarters	You need dimes
You have 15 nickels	You need quarters

Math Words to Use:	Materials	Sample Questions to Ask:
Value **Convert** **Equal**	• Pennies • Nickels • Dimes • Quarters • Pencil • Paper	• What is the value of this coin? • How can you prove these two coin sets are equal? • When might you need to trade one type of coin for another? • Can you represent __¢ in dimes and then nickels and then pennies?

Ideas to Extend Learning:

- Add dollar bills into the exchange. Ask your child to convert the dollar into different coin types.
- Pose multi-step word problems with money for your child to solve. For example, "You buy an eraser for 30¢ and a pen for 45¢. You pay with a dollar bill. The cashier gives you your change in nickels. How many nickels did you get back as change?"
- Challenge your student to compare the money system with other measurement systems. How are the coin values similar to centimeters, meters, and kilometers, for example? Why do we sometimes use bigger (or smaller) units of measurement?

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Virtual Math Talk with the Teacher

Teacher Resource

- Math talks are great ways to have students explore math concepts. Use the ST Math Creature Board to explore number concepts with your students. Challenge your students to use pictures to solve the problem and then write it symbolically.
- Use the ST Math Creatures Board to pose questions to your students online. The table below has some examples.
- The ST Math Creature Board is also a great resource to use to play the Creature Target Game. This is a great game where you can give your students target numbers and then have them submit their responses. The responses can be discussed in one on one meetings, during office hours, and through online instruction.
- Both the Creature Problem Solving and the Creature Target Game are great opportunities to talk about Number Pairs/ Make Ten, Addition Concepts, Skip Counting, Additive/Multiplicative Reasoning, Multiplication Concepts, Factors, Multiples, etc.).

Creature Problem Solving

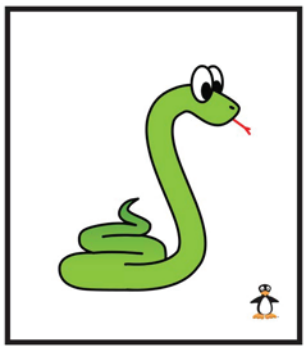
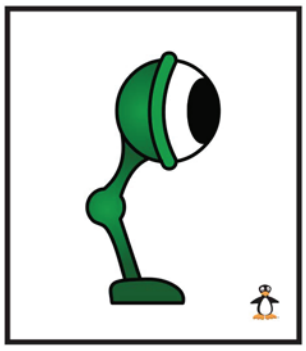
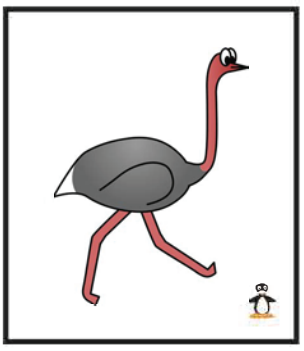
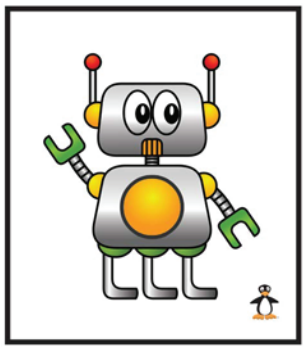
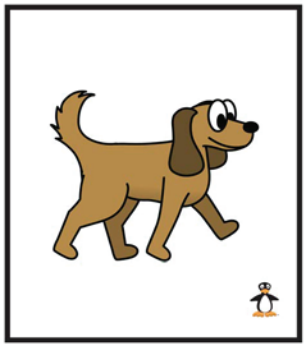
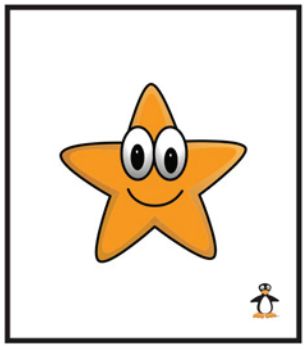
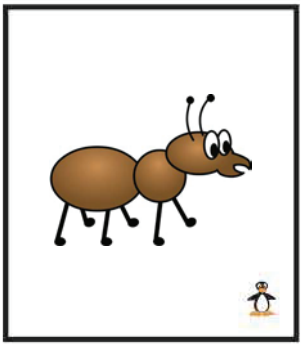
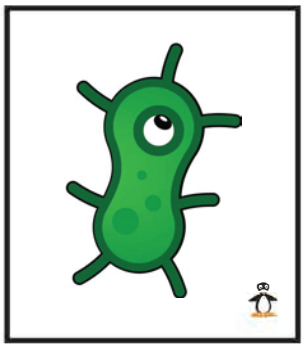
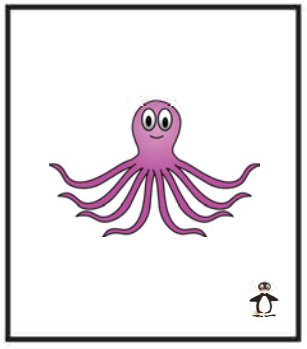
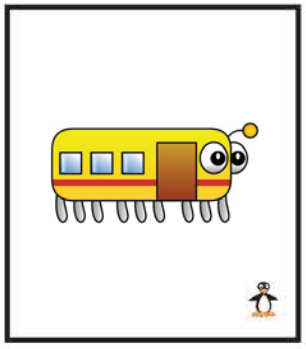
Using the creatures on the board, children can solve problems about the number of shoes each creature can wear. (NOTE: the snake has no feet so it represents 0.)

PreK-Grade 2 Ideas	Grades 3-5 Ideas
Find one creature that can wear 6 shoes. Prove that you are correct. Can you find two creatures that together can wear 6 shoes?	JiJi wanted to practice skip counting. JiJi looked at the creatures on the playground and used one of the creature's legs to skip count to 24. Which creature's legs could JiJi have used?
Angela had 10 shoes. She put them on two of the creatures. Which creatures could she put them on?	I have some creatures. Together they wear 12 shoes. If I only have 1 type of creature, which creature do I have and how many?
Paul had some shoes. He put them on robots and ants with exactly enough. How many shoes could he have?	There are 36 shoes and one type of creature. How many of those creatures do I need? Find three different ways.

Creature Target Number game

- Show the ST Math Creature Board.
  The challenge is to see how many shoes each creature can wear.
  Snake = 0, Eyeball = 1, Ostrich = 2, Robot = 3, Dog = 4, Starfish = 5, Ant = 6, Amoeba = 7, Octopus = 8, Bus = 9, Lobster = 10
- Give a target number. Have students identify the creatures who can wear the same number of shoes as the target number.
- Students may use any combination of creatures.
  Example: Give a target number of 10. Children may choose one dog and one ant (4 + 6) or one octopus and one ostrich (8+2).
- Students may use any operation to make a target number.
- Give a target number of 18. Students may choose three ants (3x6) or four starts minus an ostrich (4 x 5) - 2.
- If you are not able to be online with all your students at the same time, pose a few questions and have them send their responses to you.

ST Math Creature Board


Thinking Space

Target Number

ST Math
Created by MIND Research Institute

Number Sense Games

Hands-on games and math stories designed to support students in building number sense.

Teacher Guidance:

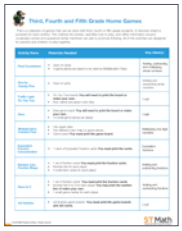
- These games are for students to play with their families at home. The games are focused on number sense.
- You may want to go through the games and assign specific games for students to work on at home.
- At the conclusion of game play, you may want your students to write a short summary of their experience.

Below are tips to share with families working with their children at home:

- Play the Number Sense games with your children. This is a great opportunity to strengthen their math skills and have fun at the same time.
- Some of the games in the packet include game boards. All of the game boards can easily be made by your child instead of printing them out.
- Use the ST Math Creature Board to play the game Creature Target Number. The directions to play the game are included in your packet.
- Once your child gets a sense of how to play Creature Target Number. Challenge them to create their own problems for you.

Number Sense Activity Resources in the Parent Guide

The resources in the table below are provided in the Parent and Teacher Guides to support students as they learn at home.



Grade-Band Game Activity Guide: This guide outlines games, their related materials, and math concepts.

Game Directions: Step-by-step directions on how to play the games. These games are focused on building number sense.

ST Math Creature Board: A creature board highlighting some of the characters from the ST Math games. This board can be used to explore math concepts. Included with this resource are directions for playing the target number game.

Third, Fourth, and Fifth Grade Games to Play at Home

This is a collection of games that can be done with third, fourth or fifth-grade students. A direction sheet is provided for each activity. This outlines the activity, specifies how to play, and offers information around vocabulary words and questions family members can ask to promote thinking. All of the activities are designed for parents and children to play together.

Activity Name	Materials Needed	Key Idea(s)
Final Countdown	• Deck of Cards • 3 game pieces per player to be used as Multiplication Chips	Adding, subtracting and multiplying whole numbers
Five for Twenty-Five	• Deck of cards	Adding and subtracting whole numbers
Traffic Light Tic-Tac-Toe	• Tic-Tac-Toe boards. **You will need to print the board or make your own.** • Red, yellow and green color tiles	Logic
Dara	• Dara game board. **You will need to print the board or make your own.** • 12 small game pieces per player	Logic
Multiplication Connect Four	• Two paper clips • Two different color chips or game pieces • Game board. **You must print the game board.**	Multiplying one-digit numbers
Equivalent Fraction Concentration	• 1 deck of Equivalent Fraction cards. **You must print the cards.**	Equivalent fractions
Number Line Fraction Bingo	• 1 set of fraction cards. **You must print the fraction cards.** • Number line for each player • 4 centimeter cubes for each player	Adding and subtracting fractions
Race to 2	• 1 set of fraction cards. **You must print the fraction cards.** • Number line 0 to 2 for each player. **You may print the number line of make your own.** • 1 small game marker for each player	Adding and subtracting fractions
JiJi Sudoku	• JiJi Sudoku game boards. **You must print the game boards and JiJi cards.**	Logic

Final Countdown

For 2 to 4 players

Supplies:

- Deck of cards
- 3 game pieces per player to be used as *Multiplication Chips*

How to Play:

1. Shuffle the cards.
2. Deal out 4 cards per player.
3. Place the remaining cards in the middle face down.
4. Player One places a card from their hand face up in the center and subtracts the value from 100. (For example, Player One plays a 7 and says 93.) They take the top face-down card to replace the card they played.
5. Player Two places a card from their hand face up on top of the first card, subtracts the value of their card from the new number, and takes a card from the face-down pile. (For example, Player Two plays a 10 and says 83.)
6. As play continues, each player adds a card to the pile and states the new difference.
7. After playing their card, each player picks the top face down card from the center deck to replace the card they played.

Multiplication Chips:

- Each player gets 3 *Multiplication Chips* which they can play when it's their turn. The chips change the value of a card.
- The player can use a chip to multiply their played card by 3 or 5. For example, a 6 card played with a hip means the player can subtract 18 or 30.

Aces — 1
Jacks — Double the previous card played
Queens — Wild Card (can be played as any other card in the deck)
Kings — 0
All others — Face value (2 to 10)

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Five for Twenty-Five

For 2 - 4 Players

Supplies:

- Deck of cards

Ace = 1
2-10 = face value
Jack = 11
Queen = 12
King = 13

The Object of the Game:

Have a hand of five cards that total 25 using addition and subtraction.

How to Play:

1. Deal each player five cards.
2. The remaining cards are placed in the center of the group with one card turned up beside the deck.
3. Players take turns picking up and discarding one card. They may take the face-up card or the top card in the stack and discard one of their cards to the face-up stack.
4. When a player has a hand totaling 25 using all five cards, they will call out "25." That player wins if they can successfully show how they made 25.

Traffic Lights Tic-Tac-Toe

©adapted from nrich.

For 2 Players

Supplies:

- Tic-Tac-Toe boards
- Red, yellow, and green color tiles

How to Play:

1. Players take turns placing or replacing a tile on the Tic-Tac-Toe board.
2. Only a red tile can be placed in an empty space (cell).
3. A yellow tile replaces a red tile.
4. A green tile replaces a yellow tile. Nothing replaces a green tile.
5. Players can make any possible play in any cell.
6. The winner is the player who places a tile to make 3 same color tiles in a row (across, up and down, or diagonally).

Traffic Lights Tic-Tac-Toe Game Board

Dara

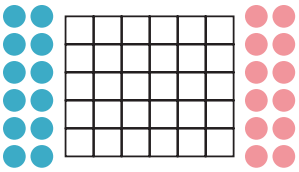
For 2 players

The Object of the Game:

- Be the first to capture 10 of your opponent's game pieces

Supplies:

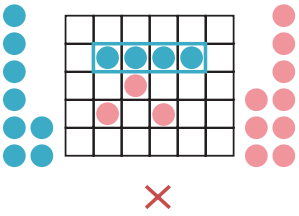
- Dara game board
- 12 small game pieces per player



How to Play:

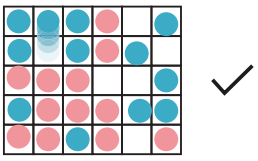
Phase 1: Place Pieces

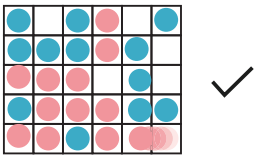
1. Players take turns placing their game pieces on empty squares.
2. Avoid placing more than three pieces in a horizontal or vertical row. Having more than 3 pieces of the same color in a row is not allowed at any time.

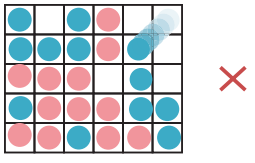


Phase 2: Move and Capture Pieces

3. Once all the pieces have been placed on the board, players take turns moving one of their pieces one space horizontally or vertically, but NOT diagonally.
4. If a player cannot move, their turn is skipped.
5. To capture, a player makes a new horizontal or vertical row of 3 of their pieces.
6. When a new row is made, that player can remove any one of the opponent's pieces from the game.
7. Only one piece can be captured per move, even if multiple rows of 3 are created with one move.
8. Each row of three pieces can be reformed only once by moving one piece out and back in to capture another piece.







Dara

Multiplication Connect Four

For 2 Players

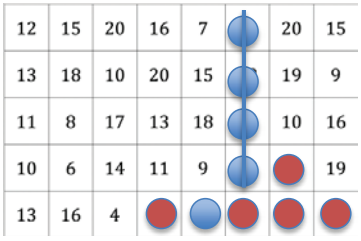
Supplies:

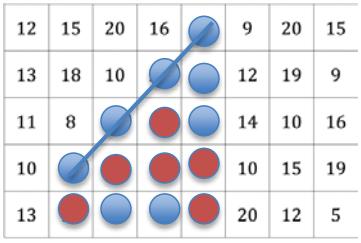
- Two paper clips
- Two different color chips or game pieces

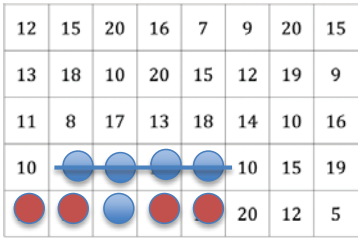
How to Play:

1. Player One places a paper clip on a number on the bottom strip.
2. Player Two places a paper clip on a number on the bottom strip, multiplies the two numbers, and places their piece on that number (product) on the board.
3. Player One moves one paper clip, multiplies the two numbers, and places their piece on that number (product) on the board.
4. Play continues until one player has 4 of their pieces in a row, on the board, without any of the opponent's markers in between their four markers (across, up and down, or diagonal).
5. The first player with four pieces in a row wins.

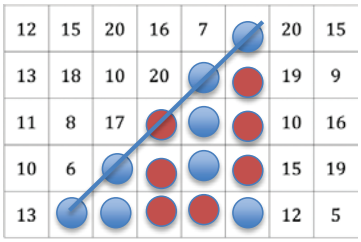
Examples

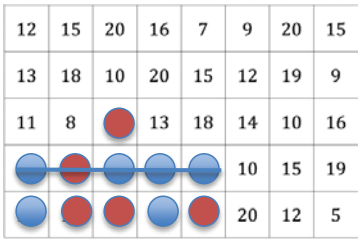


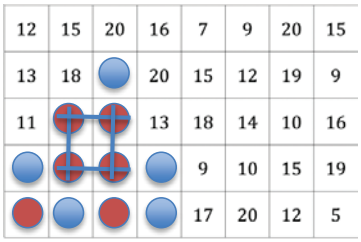




Non-Examples







adapted from Marilyn Burn's Pathways

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Multiplication Connect Four

81	15	64	16	7	9	30	36
28	56	36	21	54	12	40	4
24	1	27	45	18	14	72	35
49	6	24	2	63	10	54	48
3	63	56	8	42	25	32	5

1	2	3	4	5	6	7	8	9

Equivalent Fraction Concentration

For 2 - 4 Players

Supplies:

- 1 deck of Equivalent Fractions cards

How to Play:

1. Shuffle the cards and place them face down in an array.
2. Players take turns flipping two cards face up.
3. If the numbers on the cards are equivalent, the player keeps those cards.
4. If the numbers are not equivalent, the cards are turned face down.
5. The player plays until they do not have an equivalent match.
6. Play continues until all cards are removed.
7. The winner is the player with the most cards.

Equivalent Fraction Concentration

$\frac{1}{2}$	$\frac{2}{2}$	$\frac{1}{3}$	$\frac{2}{3}$
$\frac{3}{3}$	$\frac{1}{4}$	$\frac{2}{4}$	$\frac{3}{4}$
$\frac{4}{4}$	$\frac{1}{6}$	$\frac{2}{6}$	$\frac{3}{6}$
$\frac{4}{6}$	$\frac{5}{6}$	$\frac{6}{6}$	$\frac{2}{8}$
$\frac{4}{8}$	$\frac{6}{8}$	$\frac{8}{8}$	$\frac{2}{12}$

Equivalent Fraction Concentration

$\frac{3}{12}$	$\frac{4}{12}$	$\frac{6}{12}$	$\frac{8}{12}$
$\frac{9}{12}$	$\frac{10}{12}$	$\frac{1}{5}$	$\frac{2}{5}$
$\frac{3}{5}$	$\frac{4}{5}$	$\frac{5}{5}$	$\frac{2}{10}$
$\frac{4}{10}$	$\frac{5}{10}$	$\frac{6}{10}$	$\frac{8}{10}$
$\frac{3}{9}$	$\frac{6}{9}$	$\frac{4}{16}$	$\frac{12}{16}$

Number Line Fraction Bingo

For 2 to 4 Players

Supplies:

- 1 set of fraction cards, cut apart
- Number line for each player
- 4 centimeter cubes for each player

How to Play:

1. Shuffle cards and place face down in the center.
2. Each player places their centimeter cubes on various numbers on their number line. (They can place more than one cube on the same number.)
3. Players take turns flipping over two fraction cards at a time. Each player can decide to add or subtract the numbers on the cards. If their sum or difference is a number that they have a cube on, they get to remove the cube. If they have more than one cube on a number they can only remove one of the cubes.
4. When a player has removed all of their cubes, they say, “Bingo!” and win the game.

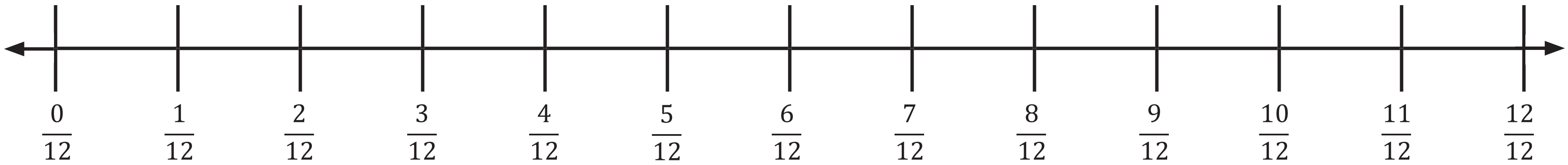
Cut out cards

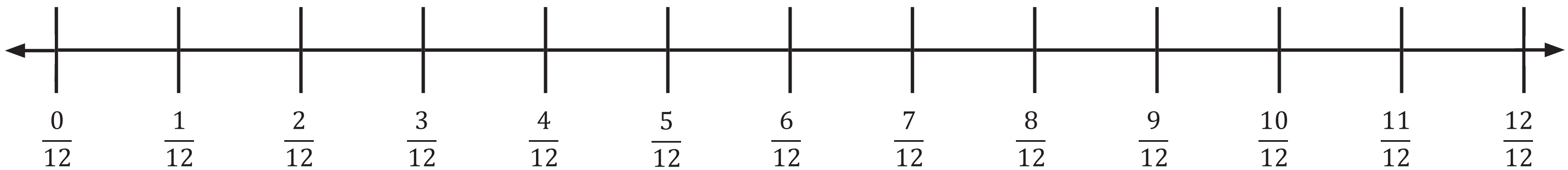
Number Line Fraction BINGO

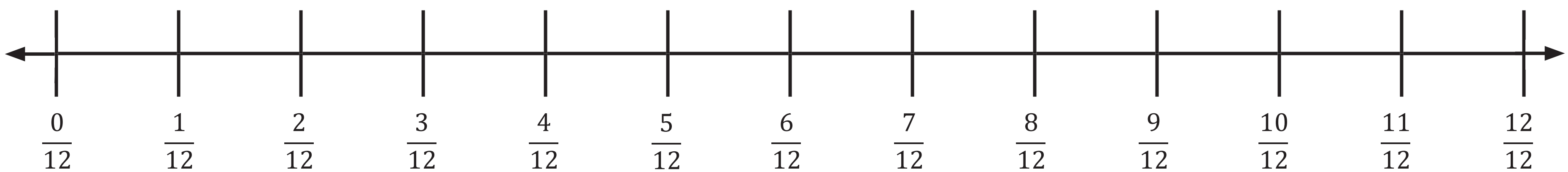
$\frac{1}{2}$	$\frac{2}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{3}{3}$
$\frac{1}{4}$	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{4}{4}$	$\frac{1}{6}$
$\frac{2}{6}$	$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$	$\frac{6}{6}$
$\frac{1}{12}$	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$
$\frac{6}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$
$\frac{11}{12}$	$\frac{12}{12}$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{12}$

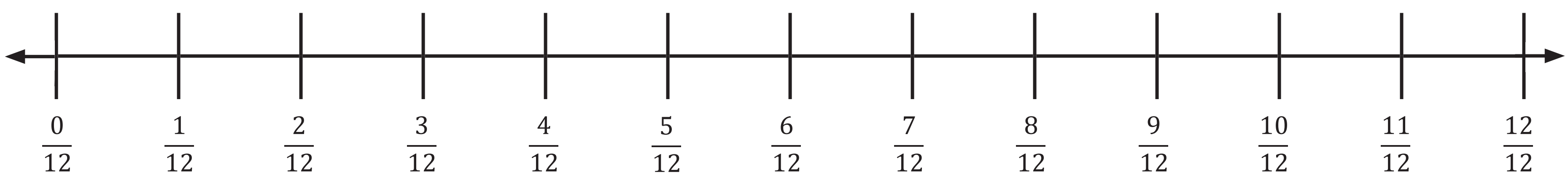
Number Line Fraction BINGO

Cut out number lines









Race to 2

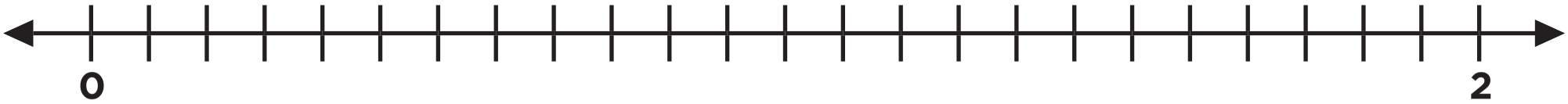
For 2 - 4 Players

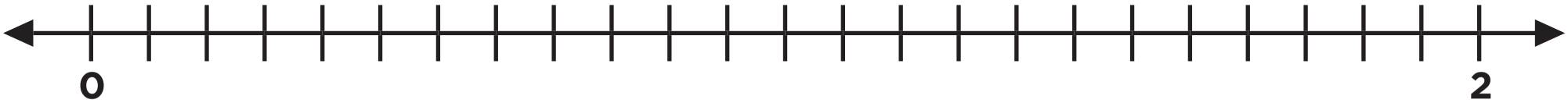
Supplies:

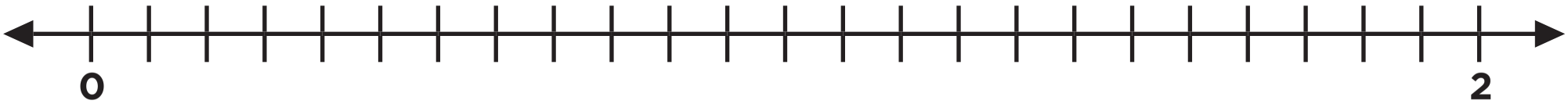
- 1 set of fraction cards
- Number line 0 to 2 for each player
- 1 small game marker for each player

How to Play:

1. Shuffle cards and place face down in the center.
2. Each player places their marker on 0
3. Player One flips over one fraction card and moves that value to the right on the number line.
4. Play continues with each player in turn selecting a card and moving that value to the right on their number line.
5. If the selected number results in a number greater than 2, the player subtracts the value and moves to the left of their position on the number line.
6. The winner is the first player to land on 2.







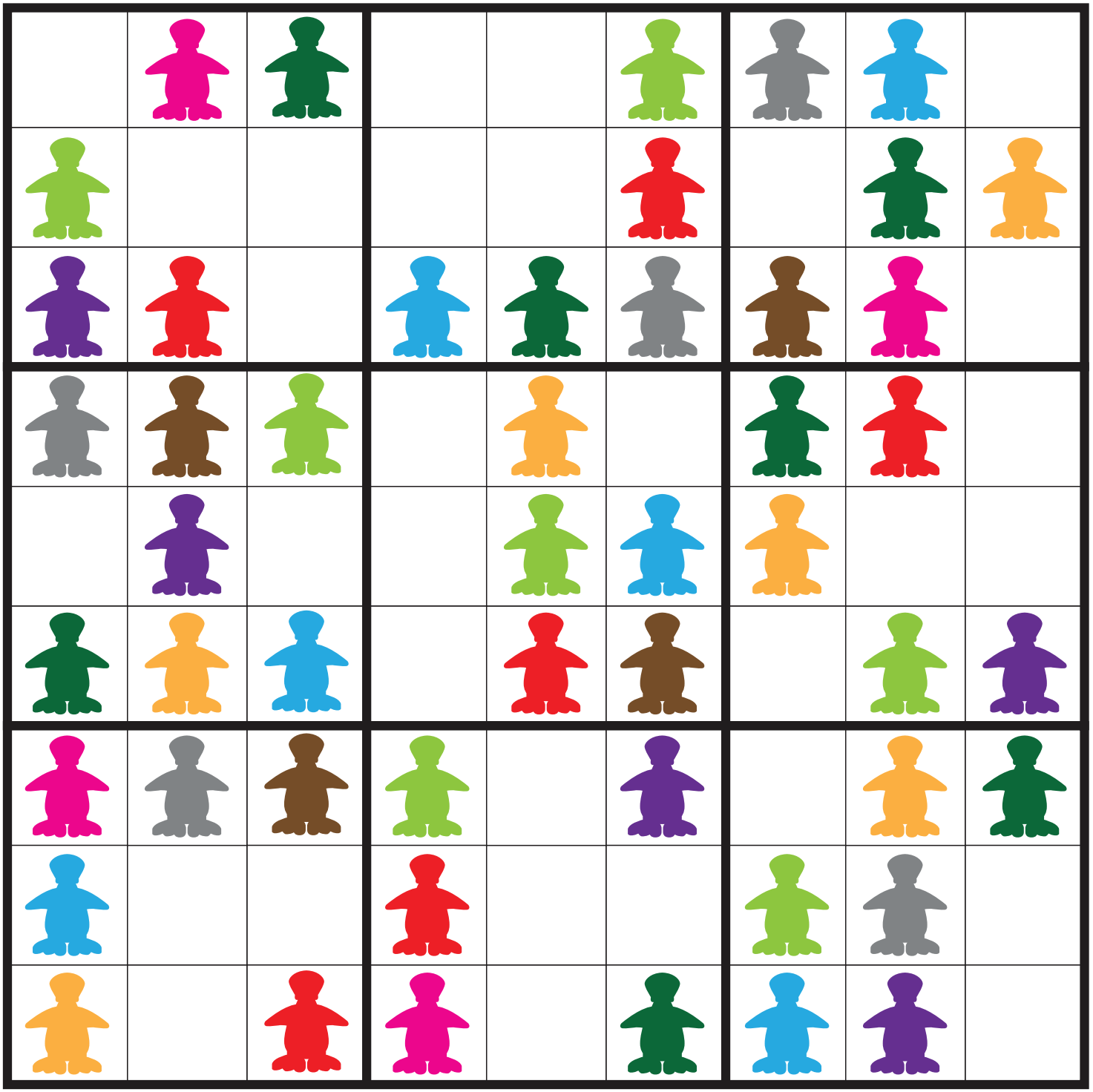
Race to 2

Cut cards apart.

$\frac{1}{2}$	$\frac{2}{2}$	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{3}{3}$
$\frac{1}{4}$	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{4}{4}$	$\frac{1}{6}$
$\frac{2}{6}$	$\frac{3}{6}$	$\frac{4}{6}$	$\frac{5}{6}$	$\frac{6}{6}$
$\frac{1}{12}$	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$
$\frac{6}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$
$\frac{11}{12}$	$\frac{12}{12}$	**Lose Your Turn**	**Draw Another Card**	**Draw Another Card**

JiJi Sudoku

Difficulty Level: Medium



ST Math
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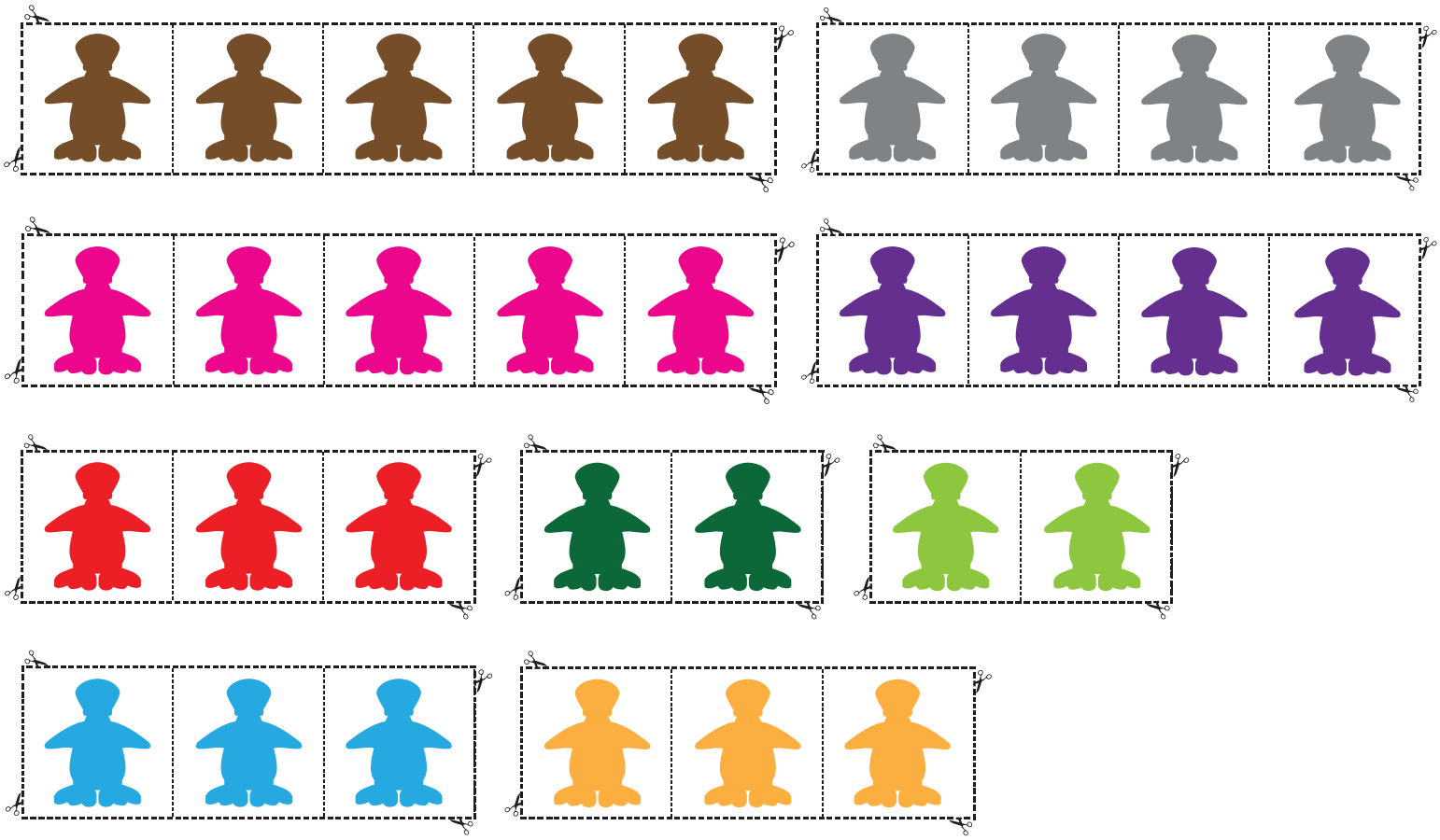


JiJi Sudoku

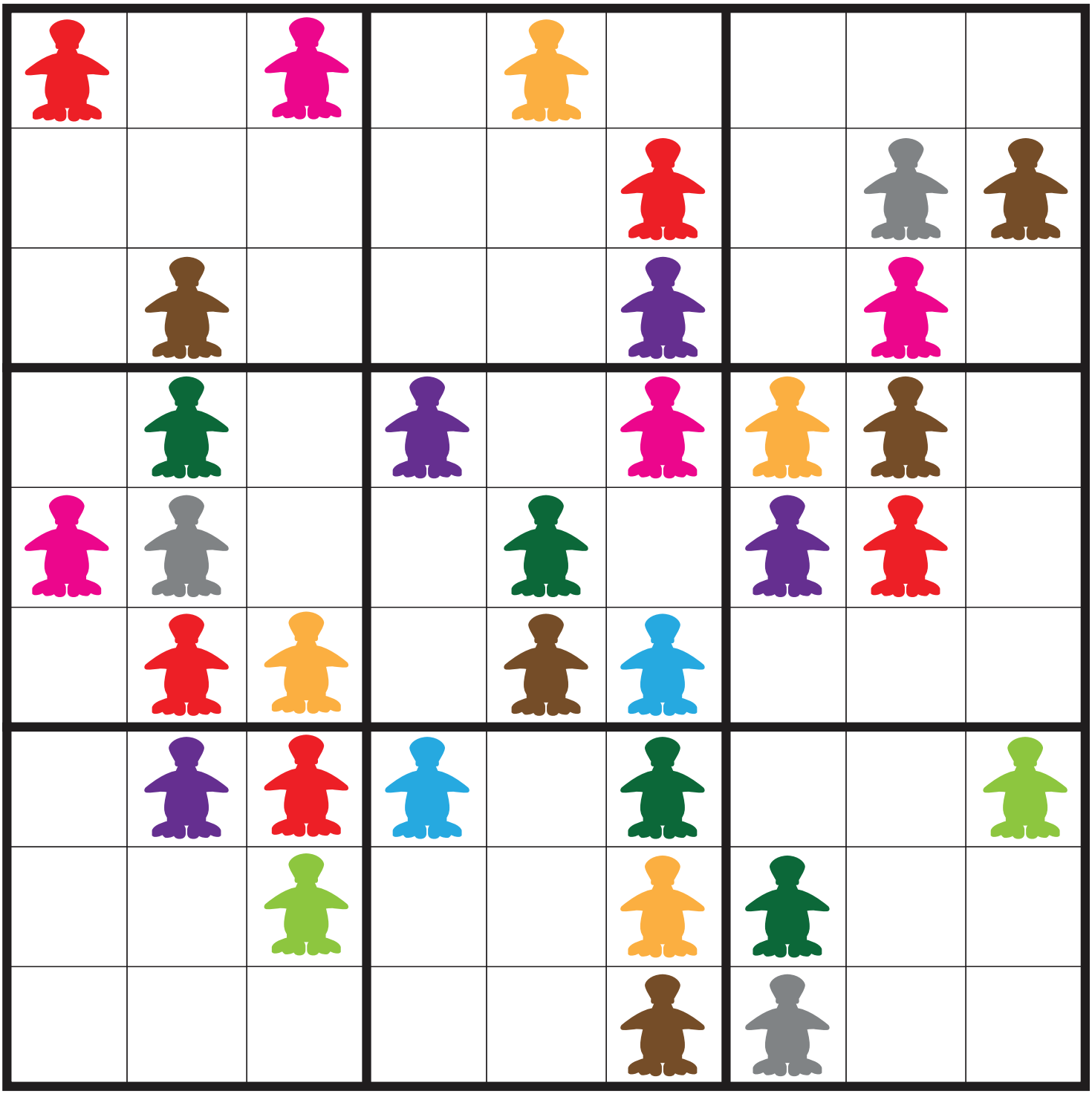
Difficulty Level: Medium

Puzzle pieces

ST Math
Created by MIND Research Institute

JiJi Sudoku

Difficulty Level: Challenge



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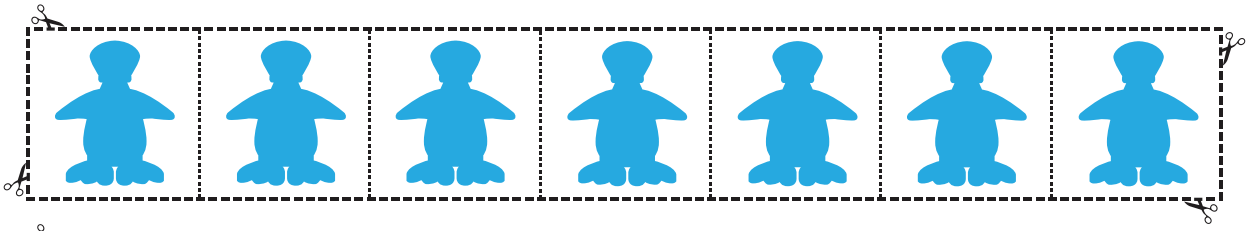

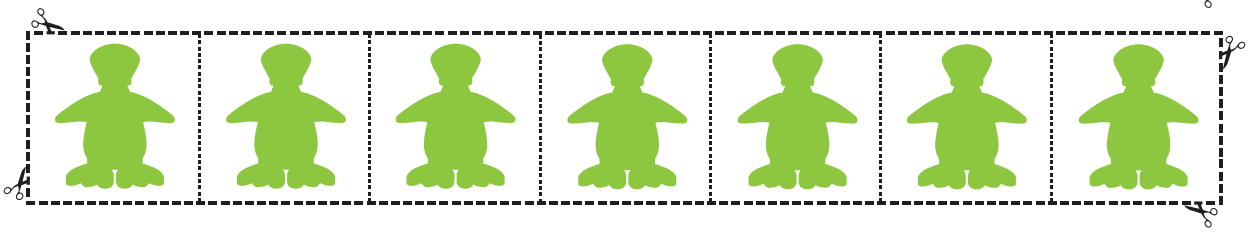

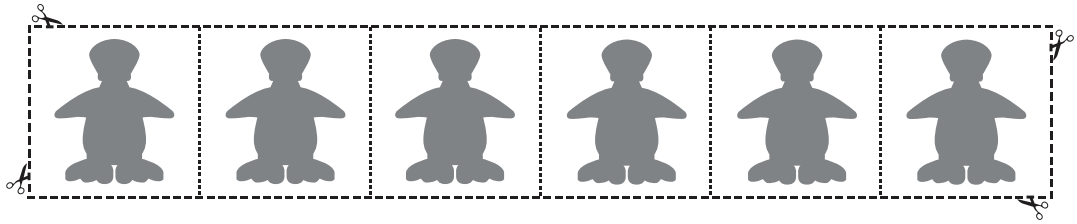

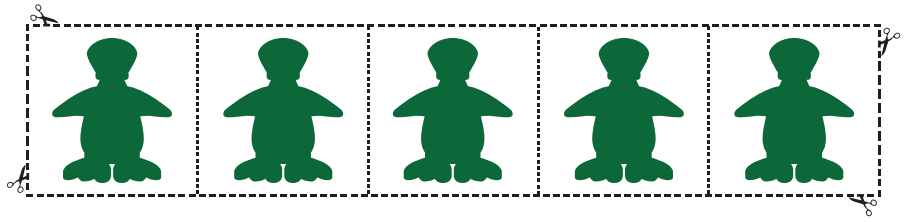

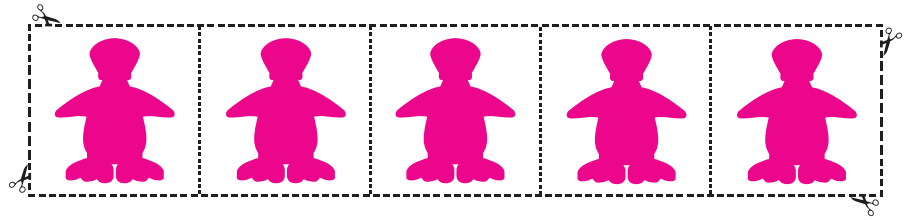

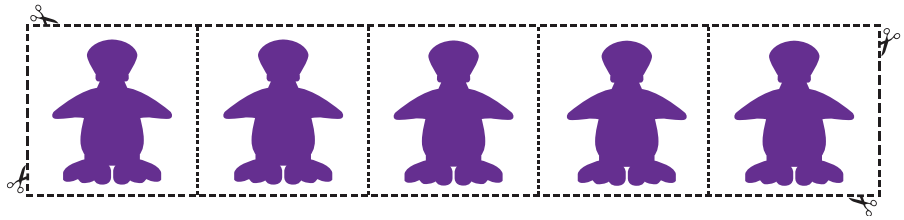

	9	3	1		5	6	4	
7								5
5		1	2		9	3		7
2								3
	3	6	9		7	5	2	
9								1
3		2	4		8	1		9
6								4
	4	7	3		2	8	5	

Easy

5					2		8	
								6
		7	1			5	3	
	3		7				5	9
		2		4		8		
7	5				9		1	
	9	8			4	3		
1								
	2		8					5

Medium

6	4			1	8			3
	2			5				
				7		1		
						6		7
	8		2		7		9	
5		9						
		7		8				
				2			3	
2			6	3			7	4

Medium

3				8				6
	1				6		2	
		4	7			5		
	4			1		9		
6			2		4			1
		3		6			5	
		8			3	6		
	2		4				1	
5				2				7

Hard