



Math for Love  
Grade 3 Teacher's Guide



# Introduction

Welcome to the Math For Love Supplemental Curriculum! We are thrilled that you will be using this curriculum with your students. Like the lesson plans, we'll make this introduction quick, easy to read, and useful.

We are [Math For Love](#), an organization dedicated to transforming how math is taught and learned. Our passion is connecting students and teachers with opportunities to experience excellent mathematics, deepening everyone's skill and enjoyment in the process.

The Math For Love Supplemental Curriculum is built on our belief that *play* and *rigor* go hand in hand, and that the best of mathematics is accessible to students and teachers who are ready to work hard and have fun. You and your students will learn a lot of math over the next 80 lessons, and by the end we hope you'll see why we think math is one of the best parts of the day.

## The Big Picture

We built this curriculum with a few key principles in mind.

### **Principle 1.**

#### **Every student can participate in rigorous mathematical thinking.**

Rigorous mathematical thinkers want to understand *why*, not just get the answer. They make connections and seek underlying structure and coherence. They develop powerful tools to solve problems, including fact fluency and procedural efficiency. Rigorous mathematical thinkers ask questions, make conjectures and predictions, test out their ideas relentlessly, and expect to be surprised.

### **Principle 2.**

#### **Play is the engine of learning.**

Mathematicians engage in play constantly: exploring, wondering, noticing, and being led by curiosity. Play can transform math class from tedious to joyful, from shallow to deep, from mundane into fascinating. Students at play are more likely to persist, to build tenacity, to remember, and to learn. Play is the secret sauce that helps students come to love and succeed in mathematics.

### **Principle 3.**

#### **Without rigor, mathematical play is formless.**

#### **Without play, mathematical rigor is unsustainable.**

We need both, together, to get the most out of mathematics.

In this introduction, we'll discuss some specific teacher moves that can help encourage rigorous mathematical play.

But first, some details.

# The Details

The Math For Love Supplemental Curriculum is built to provide eighty days of 1-hour (or longer) classes, intended to complement a standard curriculum. It can be used for small groups, enrichment, remediation, after school programs, and summer programs. Every lesson is written to accommodate a wide range of student skill level, making it easy and enjoyable to differentiate and support each individual's learning. Our belief is that beautiful and interesting math problems — when designed to be appropriately accessible — should be offered to everyone, no matter where they are in their math journey.

Materials included with curriculum:

- Teacher Guide
- Student Workbooks
- Manipulative Kit
- Math Games

## The Lessons

Each lesson follows a standard format with four sections:

- Opener
- Main Activity
- Closer
- Choice Time

We sometimes provide a sketch of how a lesson might unfold, with prompts and questions to help you respond organically to what your students bring to the conversation. Any sample dialog is never meant to be a script, and precisely how the lesson goes will depend on you and your students.

We include guidelines for how long we expect each part of the day will take; however, times will vary depending on student engagement and your decisions.

When preparing for a lesson, review all sections of the lesson in advance. This will help you make decisions on how to group students, how to arrange materials, and what images to project. Even a little bit of preparation will help you be ready to emphasize what's important in the lesson and respond naturally to your students' ideas.

## Choice Time Days

Occasionally a full lesson - after the Opener - is devoted to Choice Time. These Choice Time Days are intended to give students a chance to dig deeper into any lessons, or relax with some extra time to play the games they already know. As with normal Choice Time, you can use the suggestions we provide, or substitute in other options.

See the sample lesson templates on the next pages for more details about the lesson plans.

**SAMPLE DAY**

Opener

Main Activity

Closer

Choice Time

## Overview

### Focus Standards

This is where we highlight the main standards we're focusing on for the day, particularly in the main activity. We usually highlight one practice standard and one content standard.

**Materials:** This section will mention everything you need for the day. The main activity will also include a materials list.

<b>Opener</b>	<b>We'll say what the opener is here</b>	10 – 15 minutes
<b>Main Activity</b>	<b>We'll say what the main activity is here</b>	20 – 30 minutes
<b>Closer</b>	<b>We'll summarize what's happening in the Closer here</b>	5 – 10 minutes
<b>Choice Time</b>	<ul style="list-style-type: none"> <li>We'll provide a short list of good options for Choice Time here.</li> <li>You're always welcome to choose different options!</li> </ul>	5 – 25 minutes

### Standards Connections

These are additional standards that are connected (or could connect) to today's lesson.

## Opener

The lessons cycle through a short collection of our favorite opening routines. The first time you see a particular Opener, there will typically be more detail included. Later, these writeups will become shorter and more succinct. Don't be surprised to see the Opener instructions look almost identical on different days - once you're confident with a given opener, it should take very little time to prep for using it with class.

Here are the main Openers we use in this grade, with a two-sentence description of how each one works.

### → Unit Chats

Project an image with multiple options for what to count.  
Prompt: "How Many?"

### → Number Talks

Share an expression to evaluate.  
Prompt: "How many ways can you find the answer?"

### → Counterexamples

Make a false claim or conjecture.  
Invite students to find an example that proves you wrong.

### → Choral Counting

Skip count with the class, then look for patterns.

### → Broken Calculators

Project a calculator with some broken keys, and a target number.  
Prompt: how many ways can you hit the target number using the broken calculator?

### → Teacher-led Games

For example, Bullseyes and Close Calls, Don't Break the Bank, Penny Nickel Dime.

## Tips for the Classroom

1. Look here for some specific ideas for increasing student interaction, adjusting challenge, and more.
2. If there's an image to project for an opener, it's typically on the next page.

## Prompts and Questions

- Look here for useful things to say to students to help them get started or push deeper in their thinking.

## SAMPLE DAY

## Opener

## Main Activity

## Closer

## Choice Time

## Main Activity

### Materials and Prep

Here's where we describe what students will need for the main activity (doesn't include choice time materials). You'll need to read the lesson to make some decisions about how to arrange the materials for the day. In general, keep this simple – offer containers of manipulatives rather than exact amounts.

### Motivating Question (OR How to Play)

To begin working or playing on their own, students should either have a question that frames the day's exploration— along with the knowledge and skill to begin thinking about it – or know the rules of the game they're about to play. We essentialize that question (or summarize those rules) here.

### Launch

This is how to introduce the motivating question and get students excited and curious to think about it, or to teach the game in a way students will understand and find irresistible. In the case of games, demonstrating with a student volunteer is almost always the most powerful way to communicate how the game is played.

In general, the Launch should be as thorough as necessary *and* as short as possible. The goal should always be to have the students spending as much time as possible doing the thinking during math class. Whenever you are speaking to the whole class, pose questions and look for opportunities to ask for student ideas, questions, and contributions.

### Work

As soon as they're ready, students go to work on their own or in pairs or small groups. This section will have some ideas of what to look for, the lesson flow, extensions, good hints, and (occasionally) solutions.

While students work, circulate in the room, offering help, prompts, hints, asking questions, making connections between ideas, and getting a sense of your students' strengths and where they could benefit from greater support.

### Tips for the Classroom

1. Look here for additional ideas on how to implement this activity.
2. We'll often include extensions or simplifications to help with differentiation.
3. Student workbook pages will typically be included on the page right after the Tips for the Classroom.

### Launch Key Points

- We try to include some key points for how to help the launch succeed in getting students excited to work.
- Points about the essential knowledge or skills might be here too.

### Prompts and Questions

- This section gives ideas for what you might say to students during the "Work" section of the lesson, when they're working on their own or in small groups.
- Sometimes a prompt, hint, or nudge to talk to someone else is all students need.

## SAMPLE DAY

## Opener

## Main Activity

## Closer

## Choice Time

## Closer

Gather the students together for a whole-class discussion when the Main Activity is done. This is where students reflect, consolidate their learning, and potentially try an extension or variation of the Main Activity. To make sure the engaged thinking continues during this part of the day, rather than just summing up what everyone should have learned, take the opportunity to pose questions, invite student comments, and use partner sharing to give everyone a chance to participate.

## Choice Time

Choice Time is when students get a chance to revisit games, puzzles, and other material they want to spend more time with. Getting to choose their activity helps with buy-in and self-regulation, and is a chance for students to reflect on what they want to think about more.

Choice Time works like this:

1. Present students with a short list of suggested activities.
2. Students choose the game, worksheet, challenge problem, block set, or other activity they'd like to pursue and commit to sticking with it for at least 5 - 10 minutes.
3. If time permits, students can try more than one activity.

The suggestions for Choice Time are only suggestions. If there is another activity from the curriculum that you think would be a better fit here, or if a student has a strong preference for something not on the suggested list, feel free to make a swap.

You may need to print some materials in advance to prepare for Choice Time. Since the final Choice options are up to you, we don't give a list of materials you'll need for them.

Here are some options that can be freely offered any Choice Time:

- Challenge Problems
- Free Block Play
- Multiplication by Heart (once students know how to play it)
- Prime Climb (once students know how to play it)
- Work on problems from an earlier lesson

## Prompts and Questions

- These prompts are for the Closer.
- They might be useful things to say to the class as a whole.
- They also might be helpful replies to anticipated student contributions to a closing discussion.



# Teacher Moves

Here are some useful ways to support your students during these lessons.

- **Model enthusiasm and curiosity.** Ask questions. Statements like “I wonder if...” and “I notice that...” go a long way. If students see you enjoying the work, they’ll be much more likely to enjoy it too.
- **Keep instructions and launches as brief as possible** (but as long as necessary) and look for places to invite student questions or ideas. As much and as often as possible, we want students to be spending classroom time doing mathematics and thinking mathematically.
- When launching games, **play a demo game with a volunteer** to help students learn the rules. When students play games against each other during work time, try these ways of grouping students:
  - Students play one against one and switch opponents often.
  - Students play in groups of three. Two play while one watches as a referee. When the game is over, the referee position rotates.
  - Students play two against two, and have to agree on moves with their teammate.
  - Students play collaboratively with a partner, and try to get the highest score they can, rather than beat an opponent.
- **Resist solving students’ problems for them.** While working on hard problems, it’s natural to feel stuck, or unsure of what to do next. Sometimes a key insight requires a lot of exploration first. Give students the time they need.
- **On the other hand, support students when they need it.** There’s no use in leaving students feeling dispirited or unsuccessful, and the goal is for students to be productive, even if stuck. We provide ideas for questions, prompts, and hints to keep students motivated and engaged. Even when students are playing or exploring, understand your job as looking for opportunities to help students develop greater efficiency, organization, and power in their methods.
- **Have a plan for how to respond to wrong ideas and answers.** One of the strongest ways to handle these moments is to turn them back to the students by treating the idea seriously and asking for counterexamples or supporting arguments. A very good phrase to keep in your back pocket is: “Convince me.”
- **Be willing to be the slowest person in the room.** This means asking for elaboration and clarification if you think there is even one student in the room who doesn’t understand an argument yet.
- **Care and respect.** Show students you care about them, respect their thoughts, and that it matters to you that they learn, and enjoy, mathematics.

# Materials

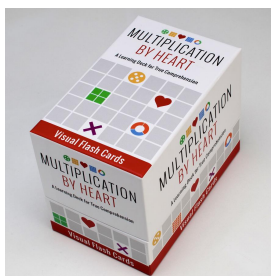
We provide just about everything you need to use this curriculum with a classroom of 25 (or more) students. The only extras you'll need are scratch paper, pencils, and crayons or colored pencils. You may occasionally need to make some additional photocopies for Choice Time, though students can often turn to earlier pages in their Student Workbook and find what they need. In addition to this Teacher's Guide and the student workbooks, manipulatives and games include:

**21st Century Pattern Blocks.** These blocks include 8 shapes, with enormous possibilities for exploring multiplication, division, fractions, ratios, geometry, and more. These are also great for students to explore with during Choice Time.



**Number Rods.** Another excellent tool for understanding arithmetic operations, fractions, measurement, and more. Rods go from 1 cm to 10 cm long, in the colors named to the left.

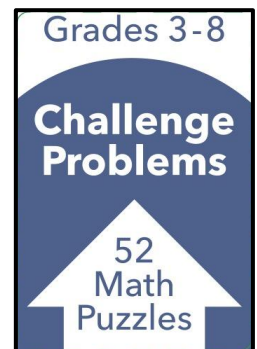
**Prime Climb.** One of the world's most popular mathematical board games. Includes a unique visual for prime factorizations of numbers that acts as a guide for multiplication and division. Always a good Choice Time option once students learn how to play. Video instructions available at [mathforlove.com/prime](http://mathforlove.com/prime).



**Multiplication by Heart.** A visual flash card deck with three subdecks. Great in the classroom for small group fact practice and for simple fluency games. Ideas included in the lessons, and at [mathforlove.com/multiply](http://mathforlove.com/multiply).

**Challenge Problems Deck.** These extra puzzles and problems are great options for Choice Time. These generally get harder the higher the number.

Also included: **Square Tiles**, **6-sided and 10-sided Dice**, and **Polyominoes** (which include dominoes, triominoes, and tetrominoes).



## Other Stuff

- Email [errata@mathforlove.com](mailto:errata@mathforlove.com) if you notice an error that should be fixed.
- **Additional Material:** We'll gather corrections and additional material at [mathforlove.com/curriculum/grade3](https://mathforlove.com/curriculum/grade3).  
Password: M4LCurriculum
- Problem with access? Email [info@mathforlove.com](mailto:info@mathforlove.com).

## Thanks and Acknowledgements

These lesson plans were built from the lessons we developed over our years working with teachers and students of all ages. However, putting together this more ambitious curriculum required a team, and we were lucky to have an amazing one.

Our curriculum writers were Karen Gallagher, Mark Goldstein, Tara Hofmann, Becky Holden, and Chase Orton. Our editors were Hana Murray and Jen Moffett. We had help with images from Bella Christianne and Hana Murray. Hana Murray also created the cover using photos of 21st Century Pattern Blocks.

This team of writers and editors worked with incredible focus and skill to build the teacher's edition you're holding now — big thanks to all of them for their dedication and contributions to this project.

Some images for this book were made, with permission, using Mathigon Polypad ([polypad.amplify.com](https://polypad.amplify.com)) - thanks to the good folks there for building such a fantastic tool. Mathigon also partnered with us to create digital versions of the Multiplication by Heart and Addition by Heart cards included in the curriculum kits. If you'd like to use the digital versions, they are free to use at [fluency.amplify.com](https://fluency.amplify.com).

Finally, thanks to all the teachers, coaches, students, and staff who have used versions of our materials over the years, and welcomed us into their classrooms.

Daniel Finkel | Founder | Math for Love



Katherine Cook | Creative Director | Math for Love



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**DAY 1**

Opener

Main Activity

Closer

Choice Time

## Overview

### Focus Standards

MP6 Attend to precision.

3.OA.3 Use multiplication to solve problems.

**Materials:** 21st Century Pattern Blocks, scratch paper and pencil.

<b>Opener</b>	<b>Bullseyes and Close Calls</b>	10 – 15 minutes
<b>Main Activity</b>	<b>Forty Faces</b>	20 – 30 minutes
<b>Closer</b>	<b>Strategies for calculating values of faces</b>	5 – 10 minutes
<b>Choice Time</b>	<ul style="list-style-type: none"> <li>● Forty Faces</li> <li>● Block Free Play</li> <li>● Bullseyes and Close Calls</li> <li>● Challenge Problems</li> </ul>	5 – 25 minutes

### Standards Connections

MP1 | MP6 | MP7 | 3.OA.8 | 3.NBT.2



## DAY 1

## Opener

## Main Activity

## Closer

## Choice Time

## Bullseyes and Close Calls

Secretly choose a number with no repeated digits and write it down where no one can see it. (Play with 2-digit numbers for the first game.)

Students attempt to guess the number. After each guess, give feedback using a combination of “Close Call” and “Bullseye”, or possibly “Nothing”.

Note: you might need to say “2 Close Calls” or “1 Bullseye and 2 Close Calls” some other combination. DON'T say “first digit Close Call, second digit Bullseye.” Your responses apply to the entire numbers, not individual digits. That's what makes the logic interesting.

As soon as the rules are mostly clear, begin to play the game. Any confusion about the rules will get worked out during play itself.

### Example Game

Your secret number is 487.

Guess	Feedback
139	Nothing
820	Close Call
468	1 Close Call, 1 Bullseye
568	Close Call
482	2 Bullseyes

### Tips for the Classroom

- Note that students DON'T get a Bullseye or Close Call for each digit. The clue applies to the entire 2- or 3-digit number.
- Write the guesses and the responses somewhere that everyone can see it.
- Keep track of digits. The skill in the game is about using the feedback from the guesses to make educated future guesses. For example, after guessing 139 and finding that none of those digits are in the number, cross off the 1, 3, and 9 from the list of possible digits.
- Pause the game occasionally to ask students what they know for sure. Are there any digits that they are sure are not in the number? Any digits they know are in the number? How do they know?

Outcome of Guess	Feedback
Correct digit in the wrong place	“Close Call”
Correct digit in the correct place	“Bullseye”
No correct digits	“Nothing”

### Prompts and Questions

- What numbers can I cross off after that guess?
- Is there anything you know after that guess? Any number that is or isn't in our mystery number?
- Why are you so sure the number doesn't have a 5?

## DAY 1

## Opener

## Main Activity

## Closer

## Choice Time

## Forty Faces

## Materials and Prep

21st Century Pattern Blocks, scratch paper and pencil.

## Motivating Question

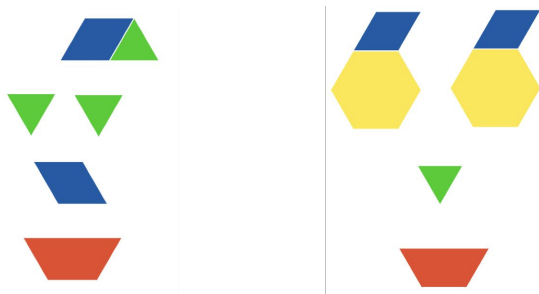
How can you make a face with an area equal to exactly forty green triangles?

## Launch

Project the images below, or build them where everyone can see.

Briefly discuss how these faces are made by putting together the equivalent of 10 or 20 triangles worth of area.

For the second face, for example, there are 2 hexagons, 2 rhombuses, one trapezoid, and one triangle. In terms of triangle area, the total “value” would be 12 (in hexagons) + 3 (in trapezoids) + 4 (in rhombuses) + 1 (in triangles) = 12 + 3 + 4 + 1 = 20 triangles worth of area. Once students understand how to count the “value” of the face, challenge them to create their own faces from pattern blocks that have value (i.e., area) 30 and 40.



## Work

Circulate the room as students construct their faces. Encourage them to check their neighbors' work to make sure the faces everyone builds are actually worth 30 and 40.

## Tips for the Classroom

1. Encourage students to use pencil and paper to track the arithmetic. It gets challenging to find the total accurately once faces get larger.
2. Challenge: Can you make a 100 face?
3. The new shapes of 21st Century Pattern Blocks create an additional challenge: what are those blocks worth? Figuring out the answer requires some subtle arguments. This will come up in the Closer, and in future lessons.



## Launch Key Points

- Each pattern block can be built from triangles.
- Clarify for students that the term “area” refers to the number of triangles.
- Use scratch paper to keep track of quantities.

## Prompts and Questions

- How much more area do you need to add to get to 30?
- Show me how you found the area.
- Let's count how much the hexagons are worth.
- The trapezoids came to 18 area? Let's write that down.
- Do you think the two of you could make a face with an area of 75?

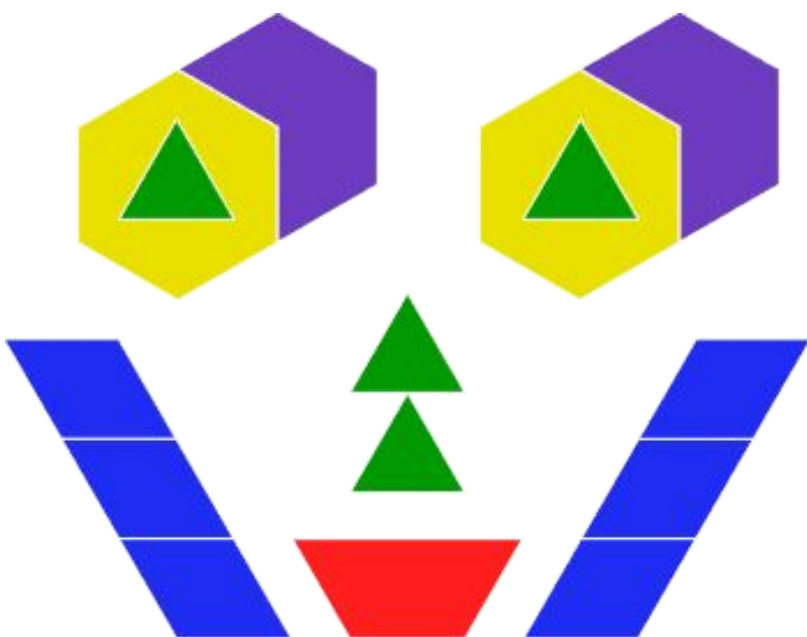
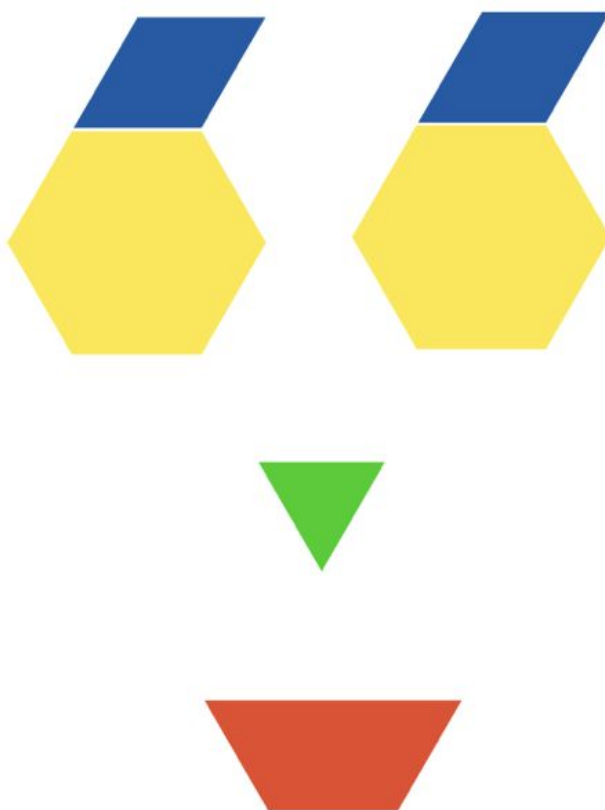
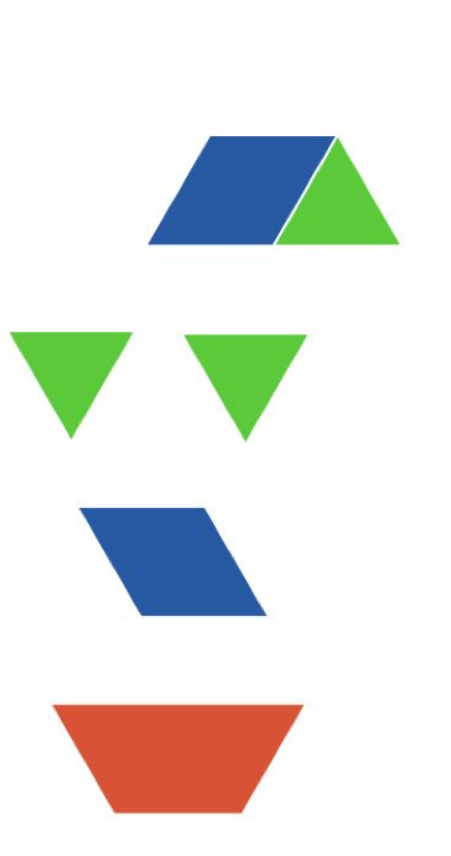
DAY 1

Opener

Main Activity

Closer

Choice Time



## DAY 1

## Opener

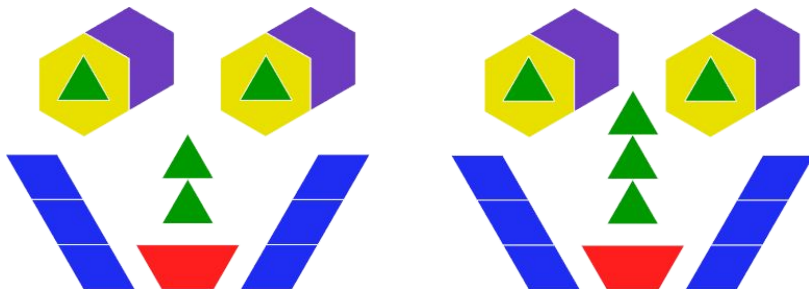
## Main Activity

## Closer

## Choice Time

## Closer

Share a face that almost has area forty. Find its area/value with students, emphasizing the possibility of skip-counting or multiplying to find the value of specific blocks.



The first image, for example, has value 39. Add a green triangle to make the value 40. Once everyone agrees on the area of the figure, take student suggestions for how it could be adjusted to come to forty exactly.

A question that should come up is what the value of the blocks that can't be built from green triangles are actually worth. These include the pink triangle, the gray dart (concave quadrilateral), and the teal kite. Ask students if they have any ideas what the value of these blocks might be. Don't solve this problem for them yet - it'll be the topic of an upcoming lesson in its own right.

## Choice Time

Today's Choice Time Options

- Forty Faces
- Block free play
- Bullseyes and Close Calls
- Challenge Problems

Prepare students for Choice Time by explaining that they will choose from some pre-selected options. Tell students that once they choose an activity, they should spend at least 10 minutes on it before trying something else.

Show the Challenge Problem Deck and explain that it will always be among the Choice Time options. Students can simply take a challenge problem card and try to solve it, on their own or with a partner. Be sure to provide scratch paper and pencils to support student work.

Block free play is also an option. This is an opportunity for students to build with Pattern Blocks or other manipulatives.

## Prompts and Questions

- What is the exact value of this face?
- How could this face be adjusted to equal exactly forty?

**DAY 2**

Opener

Main Activity

Closer

Choice Time

## Overview

### Focus Standards

MP6 Attend to precision.

3.NBT.2 With accuracy and efficiency, add within 1000.

**Materials:** Dice, pencil and paper, Pig game boards (optional).

<b>Opener</b>	<b>Unit Chats</b>	10 – 15 minutes
<b>Main Activity</b>	<b>Pig</b>	20 – 30 minutes
<b>Closer</b>	<b>Pig Strategy Discussion</b>	5 – 10 minutes
<b>Choice Time</b>	<ul style="list-style-type: none"> <li>● Pig</li> <li>● Bullseyes and Close Calls</li> <li>● Pattern Block Free Play</li> <li>● Challenge Problems</li> </ul>	5 – 25 minutes

### Standards Connections

MP1 | MP3 | 3.OA.1

## DAY 2

## Opener

## Main Activity

## Closer

## Choice Time

## Unit Chats

This simple-to-launch exploration emphasizes not just how many, but also the unit involved. With a variety of images to use, unit chats are productive, fun, differentiated, and delightful.

Project a Unit Chat image. It will include a variety of objects to count.

Prompt the students to look at the image and answer the question “**how many**.” The question is ambiguous on purpose. Let students know that there are many correct ways to answer the question, depending on what they choose to count.

Students take a minute or two to look at the image and chat with a partner about what they see. Circulate to talk to groups and hear how people are approaching the image. Be prepared with prompts for those who are having trouble getting started.

Once each group has some ideas to share, transition to a whole-class discussion. Groups can share what they counted, and how they know their count is correct. Clarify their ideas as necessary, and make notes on the image, or write equations or other notes on another surface.

Do 1 - 2 unit chats, as time permits.

Some possible student answers for today's image include:

- I see two dice colors.
- I see two different types of dice.
- 8 (total number of dice)
- 24 (total number of dots on the dice)
- 8 threes (adding the numbers on all dice)

## Tips for the Classroom

1. You can emphasize how students counted, or shift the conversation to what they counted, depending on what will be the most engaging and enlightening.
2. Each unit chat image usually gives you 5 - 10 minutes of conversation. **Don't try to get every possible observation out of an image** - if the conversation starts to flag, just move on to the second image.
3. When there's a suggestion of a pattern building between image 1 and image 2, there may be a possibility for an interesting observation from students concerning what might come next. You might pose this question too, as a possible extension.



## Prompts and Questions

- How did you see that?
- How did you count that?
- Does anyone else think they can explain what Therese is saying?
- Did anyone count something different?
- Did anyone count the same thing but with a different strategy?

**DAY 2****Opener**

Main Activity

Closer

Choice Time

Image 1



Image 2



## DAY 2

## Opener

## Main Activity

## Closer

## Choice Time

# Pig

## Materials and Prep

One 6-sided die per group, a copy of the Pig Score Sheet for each group, pencils.

## How to Play

Pig is a game for 2 to 6 players. Players take turns rolling a die as many times as they like. If a roll is a 2, 3, 4, 5, or 6, the player adds that many points to their score for the turn. After a roll, a player may choose to end their turn at any time and “bank” their points. If a player rolls a 1, they lose all their unbanked points and their turn is over. The first player with 50 points or more in their bank wins.

## Launch

Invite a volunteer to play a demonstration game. Make sure you take lots of risks, and let the students advise you on whether they think you should keep rolling by giving a thumbs up/down. Demonstrate using the Pig score sheet to show where to keep track of each roll and when to move them to the bank (or cross them out, if a 1 is rolled).

Play until it feels like most students are clear on the rules - usually 3 - 4 turns for you and your volunteer.

## Work

Students play Pig in pairs. Consider having both students in a pair keep score for both players.

## Tips for the Classroom

1. Remind students that they will lose games and win games, and each loss can be a chance to re-examine how they are playing. It's hard to lose all your points, but it will happen to everyone!
2. Beginner Game: The first player to score 50 or more points wins. Advanced Game: The first player to score 100 or more points wins.
3. Whoever isn't rolling is in charge of writing. That way, every student has something to do every turn.

## Launch Key Points

- Take risks and ask students to give a thumbs up/down on whether you should stop rolling.
- Demonstrate how to use the score sheet, where to keep track of rolls, and when to bank.
- It can be useful to roll recklessly until you get a 1 for one of your turns, to show losing all the points for that turn.

## Prompts and Questions

- How long are you waiting before you stop rolling?
- Do you have a strategy?
- Before you roll again, tell me how many points you already have for this turn.
- What's the best way to add those numbers up?



# Day 2

Pig

Rolls

Rolls

Bank

Bank

**DAY 2****Opener****Main Activity****Closer****Choice Time**

## Closer

Gather the whole class together for a discussion of Pig. Ask students if they are using any strategies as they play. For example, a student might always roll 3 times, then bank, or roll till they have 10 points, then bank.

You may find that some students play a riskier game than others. If time permits, consider selecting a student who plays a risky game (roll 10 times before banking) and one who plays a conservative game (bank after one roll) and have them play against each other in a demonstration game. You can take a vote ahead of time about which strategy is more likely to win.

There is an opportunity here to discuss the difference between a good strategy and a single loss—luck plays a big role here!

## Choice Time

- Pig
- Bullseyes and Close Calls
- Pattern Block Free Play
- Challenge Problems

## Prompts and Questions

- What's your favorite winning strategy so far?
- Do you prefer to be more risky or more cautious? Which seems like it works better in the long run?
- Do you have a rule for when you stop rolling and bank your points?

**DAY 3**

Opener

Main Activity

Closer

Choice Time

## Overview

### Focus Standards

MP6 Attend to precision.

3.MD.7 Find the area of a rectangle by tiling it.

**Materials:** Square tiles, graph paper, pencil.

<b>Opener</b>	<b>Unit Chats</b>	10 – 15 minutes
<b>Main Activity</b>	<b>Square Building</b>	20 – 30 minutes
<b>Closer</b>	<b>Patterns in Square Building</b>	5 – 10 minutes
<b>Choice Time</b>	<ul style="list-style-type: none"> <li>● Pig</li> <li>● Bullseyes and Close Calls</li> <li>● Challenge Problems</li> </ul>	5 – 25 minutes

### Standards Connections

MP1 | MP6 | MP6 | MP7 | MP8 | 3.OA.9 | 3.MD.6 | 3.MD.7 | 4.OA.1

## DAY 3

## Opener

## Main Activity

## Closer

## Choice Time

## Unit Chats

Project the first Unit Chat image.  
Ask students “**How many?**”

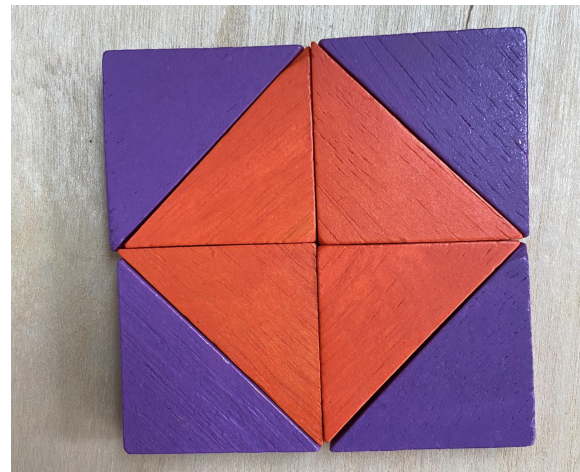
Give them a minute to think privately. Then invite students to share their answers with their partner.

After they've had enough time, discuss 3 - 4 student answers with the class.

Some possible student answers:

- I see two colors.
- I see different shapes - triangles and squares.
- 8 (total number of small triangles)
- 4 (total number of orange/ small triangles)
- Various numbers of squares/triangles of different size.

Repeat with the second Unit Chat image, if time allows.



### Prompts and Questions

- How did you see that?
- How did you count that?
- Does anyone else think they can explain what Therese is saying?
- Did anyone count something different?
- Did anyone count the same thing but with a different strategy?

DAY 3

Opener

Main Activity

Closer

Choice Time

Image 1

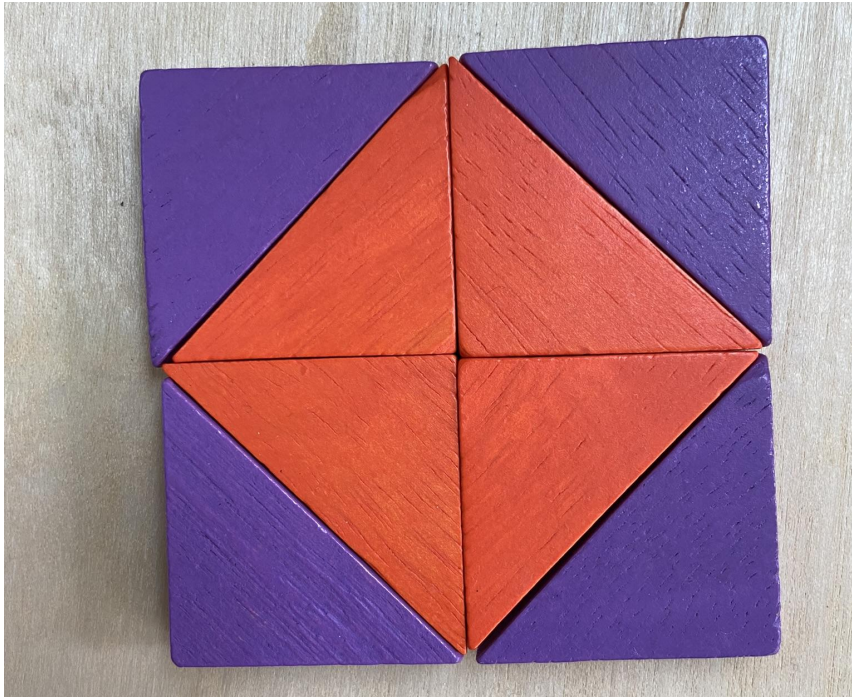
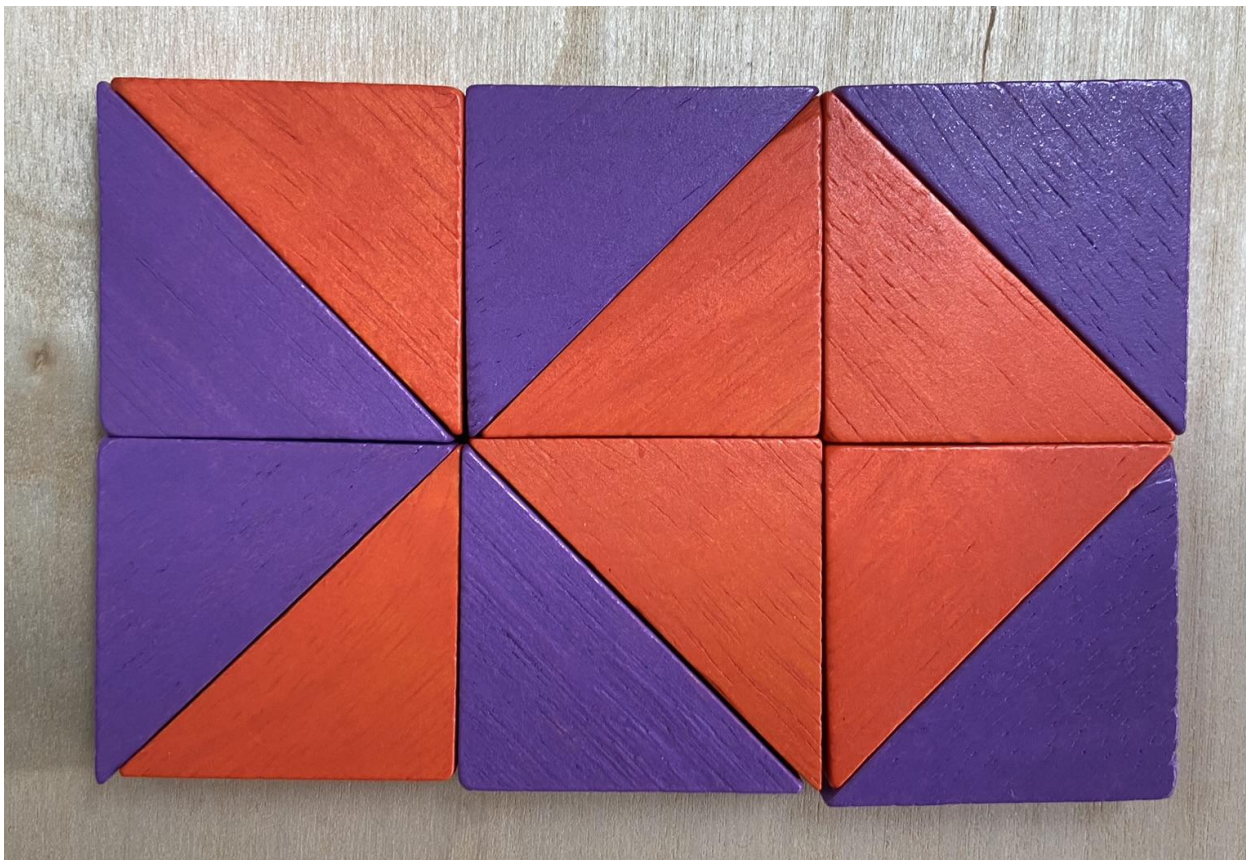


Image 2



## DAY 3

## Opener

## Main Activity

## Closer

## Choice Time

# Square Building

## Materials and Prep

Square tiles, graph paper, pencil.

## Motivating Question

How many squares tiles does it take to build a square?

How many “next largest” squares can we build with square tiles?

## Launch

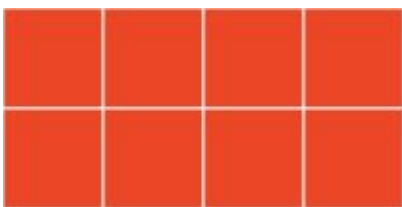
To launch the lesson, show a pile of square tiles and ask the students if they can build a square out of these square tiles. Invite them to build and share their ideas about this question.

Show how to build a square using just one tile. Next, ask the students how many tiles would be needed to build the next largest square. Have students think about it and share with the person next to them. Many students will probably say that 4 square tiles will work to build a square. Put four tiles together to form a square.

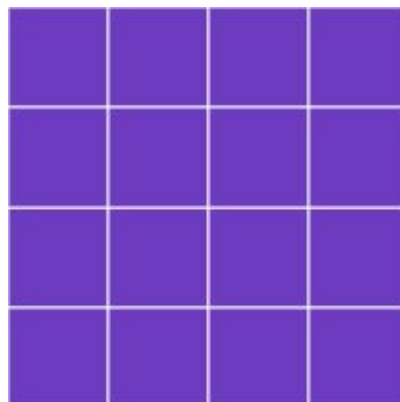


Ask the students how many tiles would be needed to build the next largest square. Have students imagine it, then share with the person next to them. Some possible answers shared by students may include 8, 12, 16, and 9 squares.

Explore the idea of using 8 squares. Build the 2 by 4 rectangle. The students will notice that it is a rectangle, not a square. Ask the students if anyone can explain why this is not a square. What needs to be true about squares?



A student may suggest that all the sides have to be the same length. Looking at the rectangle the students notice that the vertical side is 2 edges long, and the horizontal side is 4 edges long. Different side lengths means it is a rectangle, not a square.



## Launch Key Points

- Make square tiles available for students to actively build through the Launch.
- Clarify the attributes of a square during Launch by building a rectangle beside a square.
- Make sure students know how to check if they've built a square by looking at side length.
- Maintain a spirit of curiosity throughout this lesson.

## DAY 3

## Opener

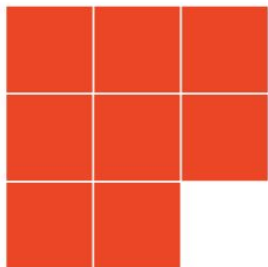
## Main Activity

## Closer

## Choice Time

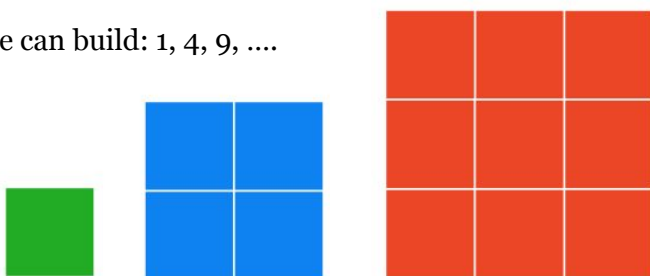
**Launch (continued)**

Think aloud about moving the squares around so that the tiles make a 3 by 3 square missing a corner. Students will see that it needs one more tile.



At this point note that this looks like a pattern starting, and write it down where the students can see it.

Squares we can build: 1, 4, 9, ....



Explain to students that their job today will be to see how many “next largest” squares they can build with square tiles. Remind them to make sure that their squares are actually squares! All the sides need to be the same length. Encourage them to record how many square tiles it takes to make their “next largest” squares.

**Work**

Give students 15-20 minutes to build squares of different sizes and write down the number of tiles it takes to build their squares. Make graph paper available to draw out the squares.

**Tips for the Classroom.**

1. It's worth mentioning to your students that these numbers, which represent the number of little squares it takes to make a bigger square, are called square numbers. Nifty name, and sensible too.
2. It's great if students start finding patterns that help them predict what the larger square numbers will be. If students can use the patterns on the chart to predict which numbers they might expect to come next, then they can try to build those missing squares as well.

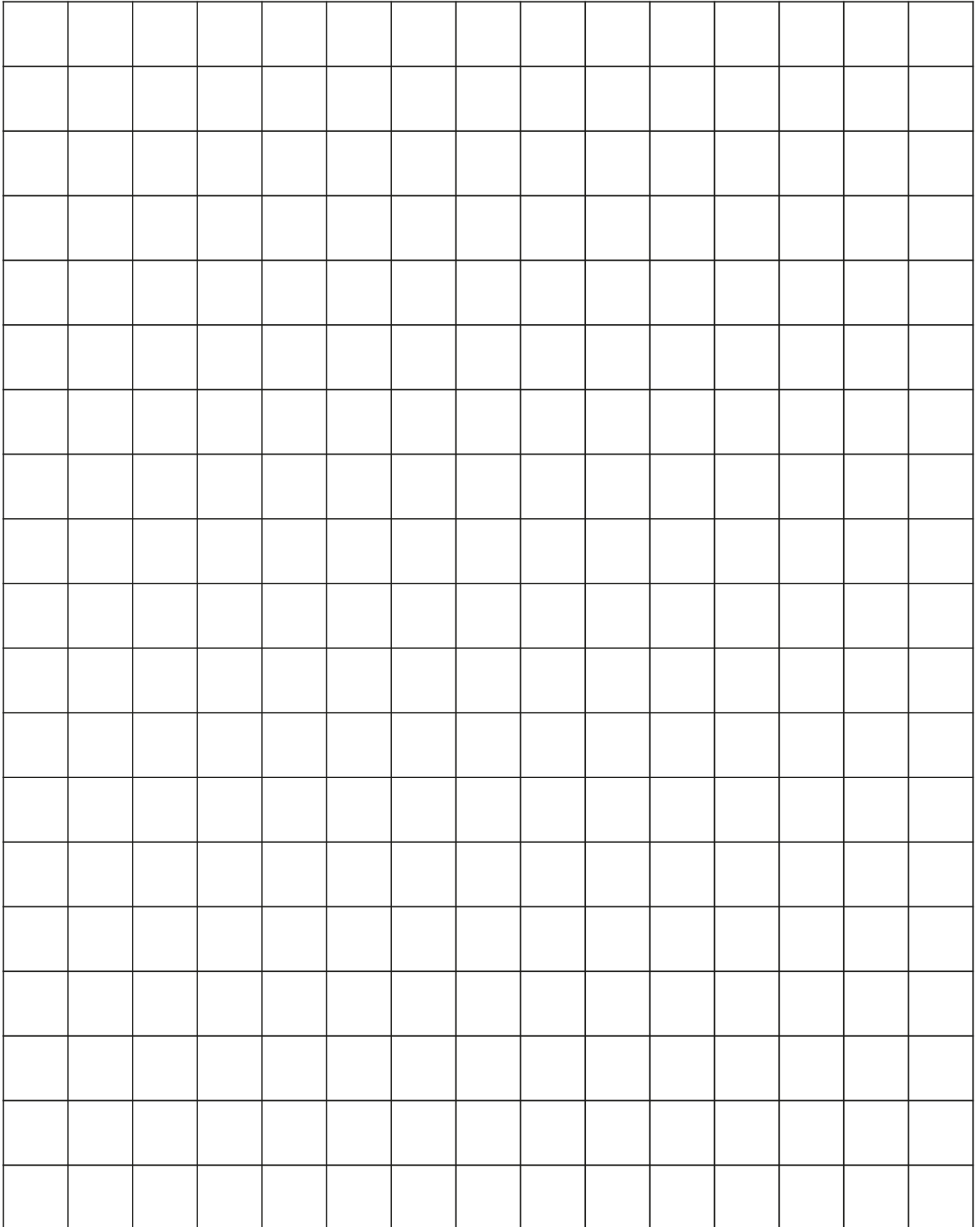
**Prompts and Questions**

- How do you know that's a square?
- What makes a square a square?
- How do you know that this is the next largest square? (Did you use the last square as a starting point?)
- How did you count the tiles? (one by one, or some other way?)
- How do you know that you didn't make a mistake in your counting?
- Do you all agree that this is the correct count?

# Day 3




# Day 3



## DAY 3

## Opener

## Main Activity

## Closer

## Choice Time

## Closer

Ask students to leave their built squares on their desks for a Gallery Walk. Have them walk around the room and look at the squares their classmates built.

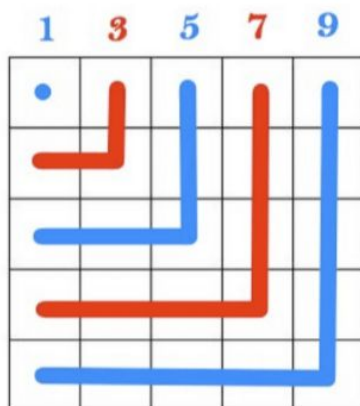
After the Gallery Walk, bring the class together and have the students share the number of square tiles it took to build their squares. The numbers should look like this: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, ...

Discuss patterns, and have students share patterns they found. However, if students haven't yet found one of the patterns below, don't worry about bringing them up.

Some patterns students may have found include:

- Looking at the pattern of odds and evens (odd, even, odd, even, etc.)
- Noticing that the numbers are  $1 \times 1$ ,  $2 \times 2$ ,  $3 \times 3$ ,  $4 \times 4$ , etc.
- Noticing how much each number in the pattern increases by. For square numbers, the pattern is  $+1$ ,  $+3$ ,  $+5$ ,  $+7$ .

Adding L-shapes gives this pattern quite nicely. It's a nifty way to see how to build up to the next square.



Take note of some of your students' "noticings" and "wonderings" for future Square Building experiences.

## Choice Time

- Pig
- Bullseyes and Close Calls
- Challenge Problems

### Prompts and Questions

- What patterns did you notice?
- What is interesting about this pattern?
- Does the pattern help predict the next largest square's number of tiles?

**DAY 4**

Opener

Main Activity

Closer

Choice Time

## Overview

### Focus Standards

MP1 Make sense of problems and persevere in solving them.

3.MD.C.6 Measure area by counting unit squares.

**Materials:** Number Rods; 1 Number Rod Fill-ins paper per student, crayons or colored pencils.

<b>Opener</b>	<b>Bullseyes and Close Calls</b>	10 – 15 minutes
<b>Main Activity</b>	<b>Number Rod Fill-Ins</b>	20 – 30 minutes
<b>Closer</b>	<b>Discuss Number Rod Fill-Ins</b>	5 – 10 minutes
<b>Choice Time</b>	<ul style="list-style-type: none"> <li>● Pig</li> <li>● Forty Faces</li> <li>● Challenge Problems</li> </ul>	5 – 25 minutes

### Standards Connections

MP1 | MP2 | MP5 | MP6 | MP7 | MP8 | 3.MD.B.4 | 3.MD.C.6 | 3.MD.D.8

## DAY 4

## Opener

## Main Activity

## Closer

## Choice Time

## Bullseyes and Close Calls

Secretly choose a number with no repeated digits and write it down where no one can see it.

Students attempt to guess the number. After each guess, respond using the following options:

Outcome of Guess	Feedback
Correct digit in the wrong place	“Close Call”
Correct digit in the correct place	“Bullseye”
No correct digits	“Nothing”

### Tips for the Classroom

- Note that students DON'T get a Bullseye or Close Call for each digit. The clue applies to the entire 2- or 3-digit number.

### Prompts and Questions

- What numbers can I cross off after that guess?
- Is there anything you know after that guess? Any number that is or isn't in our mystery number?
- Why are you so sure the number doesn't have a 5?

## DAY 4

## Opener

## Main Activity

## Closer

## Choice Time

# Number Rod Fill-Ins

## Materials and Prep

Number Rods, 1 Number Rod Fill-in paper per student, crayons or colored pencils.

## Motivating Question

Can you fill in all the numbers using the illustrated number of rods?

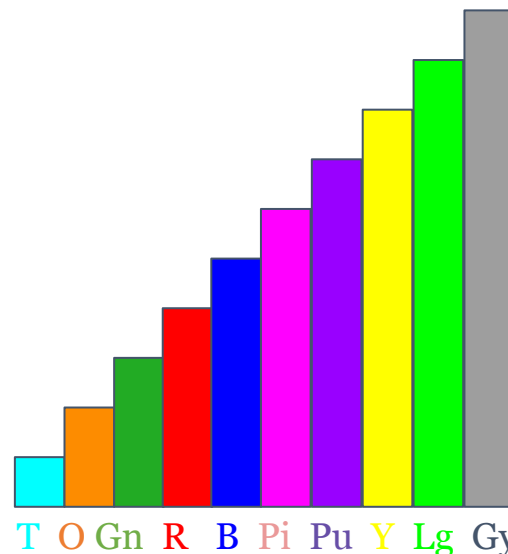
## Launch

Start by giving students 5 - 10 minutes to explore the Number Rods.

Next, ask students to fill in the Numbers Fill-ins with Number Rods. For the first 5-10 minutes, let students work on their own.

After 5-10 mins, gather students to discuss and ask how many rods it took to fill in the "6." Some may have used more than 6 rods while some used less than 6 rods. Ask students if they think it's possible to fill in the 6 with exactly six rods. Let them work for a minute or two then share an example.


The goal for the day is for students to figure out which numbers can be filled in with that number of Number Rods.



## Launch Key Points

- Offer 5-10 mins of open exploration with the Number Rods at the beginning of the launch. Invite students to share what they notice.
- Refrain from explicitly stating rod lengths to students. Instead, wait for students to generate values.

## DAY 4

## Opener

## Main Activity

## Closer

## Choice Time

## Work

Students work in pairs/trios to figure out which numbers can be filled in with that number of rods, and which can't. Some may be more straightforward: 0 is certainly impossible, while some numbers can simply be shown to be possible by filling them, as in the class demonstration of 6.

Let students work to tackle the questions. When they find a way to build a number with that number of blocks, they can record it by coloring in outline or writing what blocks they used.

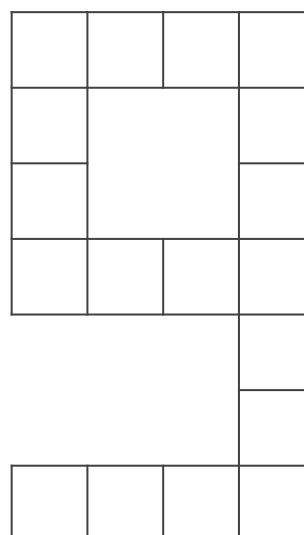
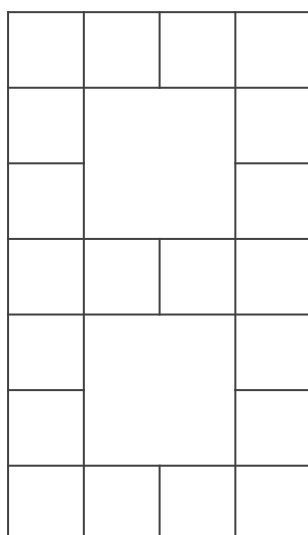
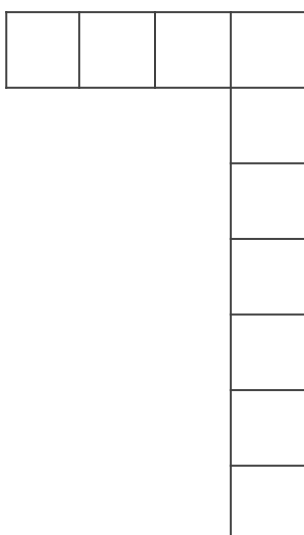
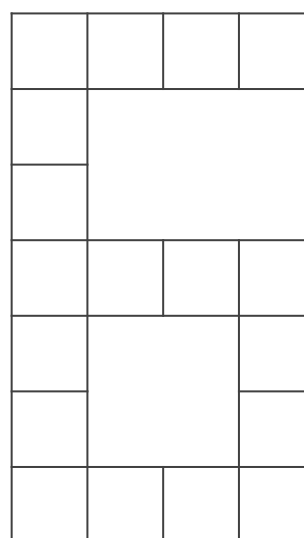
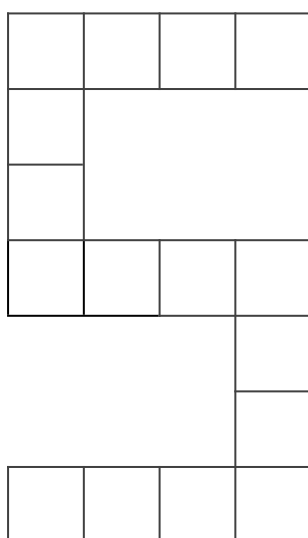
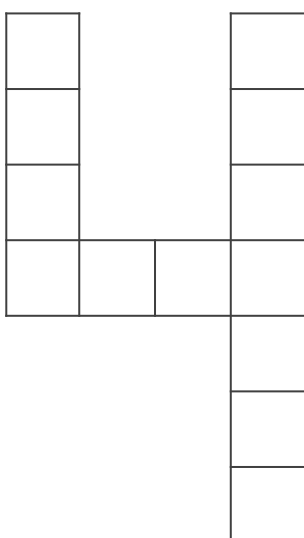
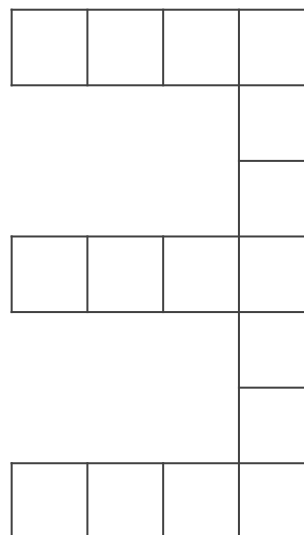
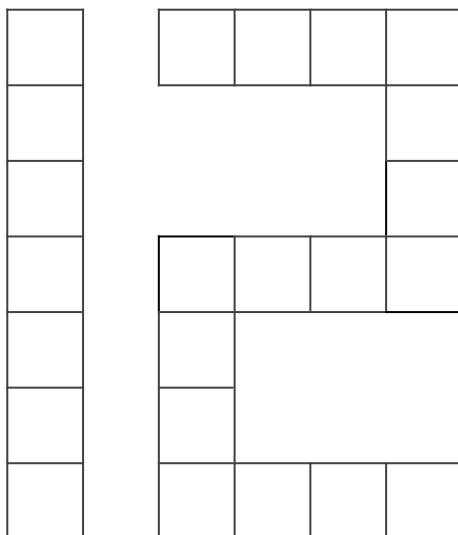
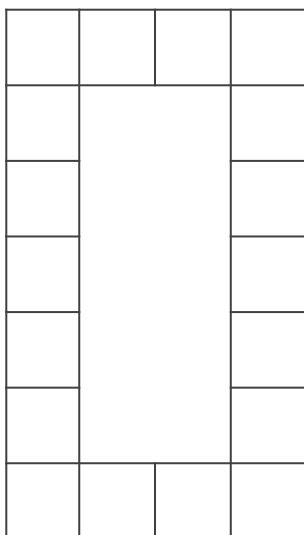
## Tips for the Classroom

1. Finding the appropriate colored pencils might be difficult; if so, students can record using abbreviations and numbers.
2. Challenge: If students have found how to build all the numbers, invite them to make two-digit numbers, starting with 11, 12, etc.

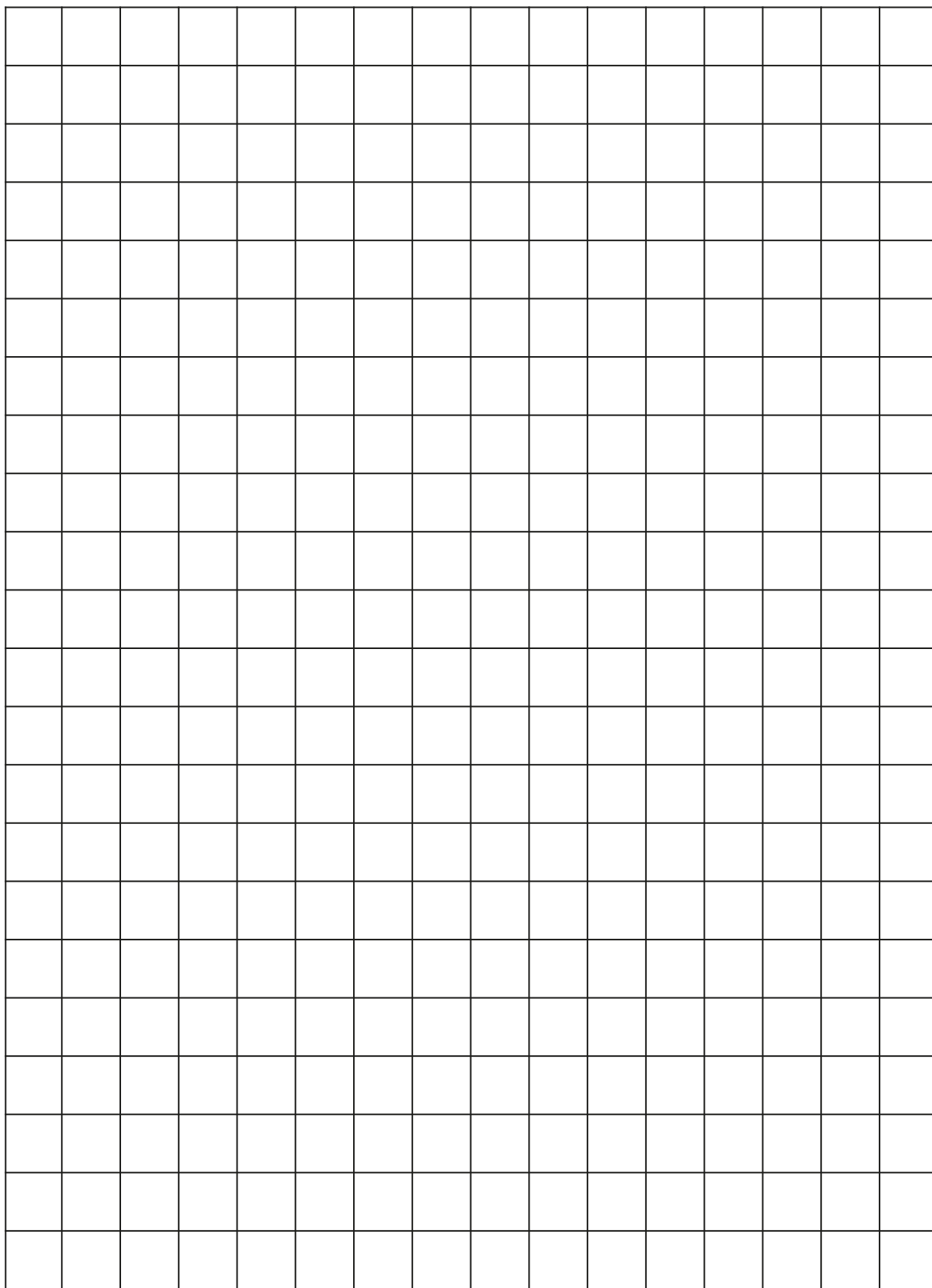
## Prompts and Questions

- Which numbers can be filled in using that number of Number Rods? Which can't?
- Is there a different way you can fill that number using the Number Rods?

# Day 4



# Day 4





## DAY 4

## Opener

## Main Activity

## Closer

## Choice Time

## Closer

Bring the class together to share thinking and discuss what students found.

One idea that might arise from students is to count the turns in the number. Since number rods are straight, two different rods are required every time the fill-in turns. The fact that 2 has four turns means that it will require at least 5 blocks to build!

## Choice Time

- Pig
- Forty Faces
- Challenge Problems

## Prompts and Questions

- Could all numbers be made using that number of blocks?
- If there's a number that couldn't be made, how can you be sure it's actually impossible, and not just hard to find?

**DAY 5**

Opener

Main Activity

Closer

Choice Time

## Overview

### Focus Standards

MP6 Attend to precision.

3.NBT.2 With accuracy and efficiency, add within 1000.

**Materials:** Fill the Stairs game boards or blank paper, 2 ten-sided dice, pencil and paper.

<b>Opener</b>	<b>Number Talks</b>	10 – 15 minutes
<b>Main Activity</b>	<b>Fill the Stairs</b>	20 – 30 minutes
<b>Closer</b>	<b>Fill the Stairs Discussion</b>	5 – 10 minutes
<b>Choice Time</b>	<ul style="list-style-type: none"> <li>● Pig</li> <li>● Pattern Block Free Play</li> <li>● Challenge Problems</li> </ul>	5 – 25 minutes

### Standards Connections

MP1 | MP3 | 3.OA.1

## DAY 5

## Opener

## Main Activity

## Closer

## Choice Time

## Number Talks

Write or project an arithmetic problem where everyone can see it.

The prompt is: find the answer *in as many different ways you can*.

Give students a couple minutes to solve the problem mentally, holding fingers up at their chests to indicate how many different approaches they have.

Once students have had enough think time, collect answers (without indicating which answer is correct) and write notes as students defend their answers and describe their approaches. In a Number Talk, the correct answer is not as important as how the problem was solved.

After students have shared 3 - 5 approaches and you have reached a consensus as to which answers and approaches are correct, move to a second question.

For today's Number Talk, start with problem A. Problem solving strategies might include adding by place value (tens and ones), using an algorithm, or counting up, among others.

### Tips for the Classroom

1. Students will be looking to see if you indicate what the right answer is. Don't favor right answers over wrong ones. Make sure that the explanations are what matters—as the teacher, you can always be the last to be convinced if an explanation needs more.
2. Give students constructive language to use in the discussion, like, “I respectfully disagree, because...” and “I agree with \_\_\_\_\_, because...” Keep the focus of the discussion to the math idea, not the person who shared that idea.
3. “Turn and Talks” are a powerful tool to use here.

A.  $21 + 42$

B.  $32 - 11$

### Prompts and Questions

- Who would like to defend this answer?
- How did you do that/know that?
- Does anyone else think they can explain what Shawn is saying?
- Turn to the person next to you and explain your approach.

## DAY 5

## Opener

## Main Activity

## Closer

## Choice Time

## Fill the Stairs

### Materials and Prep

Fill the Stairs page, two 10-sided dice per game (different colors), pencil.

### How to Play

Roll 2 ten-sided dice to make 2-digit numbers and write them on the stairs. The only rule is that numbers higher up on the stairs must be greater than all the numbers below them. Numbers that can't be played go at the bottom of the page. The game ends when all the stairs are filled. When the game is done, everyone adds up all the numbers at the bottom of their page. Whoever's sum is *smallest* is the winner.

### Launch

Project a Fill The Stairs sheet. Choose one 10-sided die to be the tens and the other to be the ones. Tell students the goal is to make 2 digit numbers and place them on the stairs in order from least to greatest.

Roll the dice and choose a place to enter the first 2 digit number, somewhere near the middle. Roll the dice again and ask students where they think you should enter this next 2 digit number. Make sure students understand why some of the board will no longer be an option, and that they can choose where they want to put the new number from among the remaining stairs.

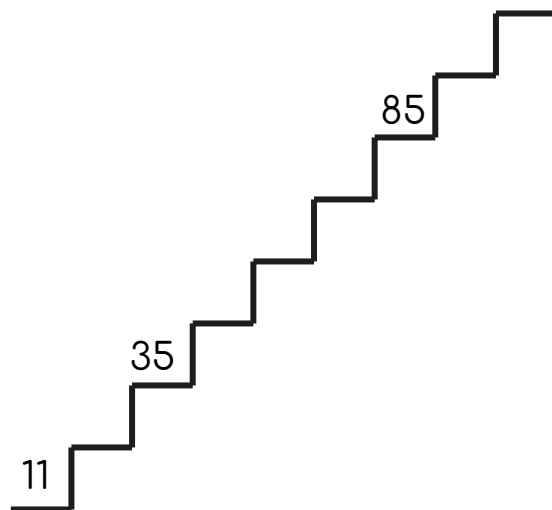
Continue the game, asking students to justify the placement of the numbers, until you fill up the stairs. If a number cannot be played because it would mean the numbers on the stairs no longer increase from least to greatest, write it at the bottom of the page.

### Work

Students can play on their own, in pairs, or in trios. In 2 or 3 player games, everyone uses the same rolls but chooses how to place the number on their own game board.

### Tips for the Classroom

1. If the dice roll off the table, both dice should be re-rolled.
2. A quick chant like "Shake, shake, roll" can help the game move, and avoid students spending too long to shake the dice.
3. Play Fill the Stairs collaboratively: students try to fill the stairs as a team with the fewest number of "wasted" moves.



### Launch Key Points

- After your first role, choose a stair somewhere near the middle for your first number. This will help anchor the reasoning for the next roles.
- Write numbers that cannot fit on the staircase at the bottom of the page.
- Make sure you encounter a roll that won't fit during the demo, so that students see what will happen.

### Prompts and Questions

- Where are you going to put that number? Why there?
- What number are you hoping for on the next roll?
- What numbers would be bad for your board if they were rolled?

# Day 5

## Fill the Stairs

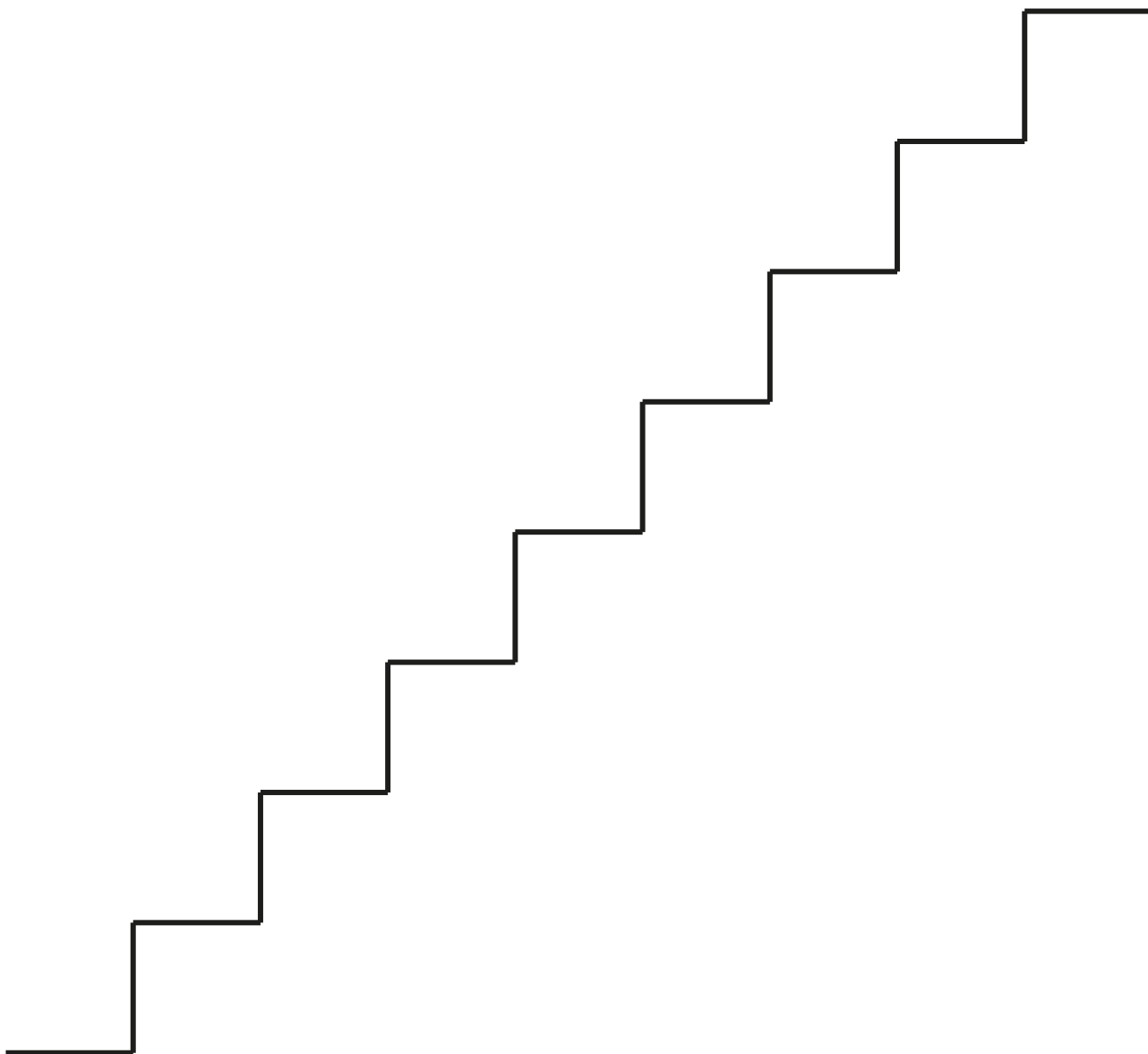
Roll two 10-sided dice.

Make a 2-digit number.

Write it on a stair.

If a number cannot fit, write it under the stairs.

**The game is over when you have filled the stairs!**



## DAY 5

## Opener

## Main Activity

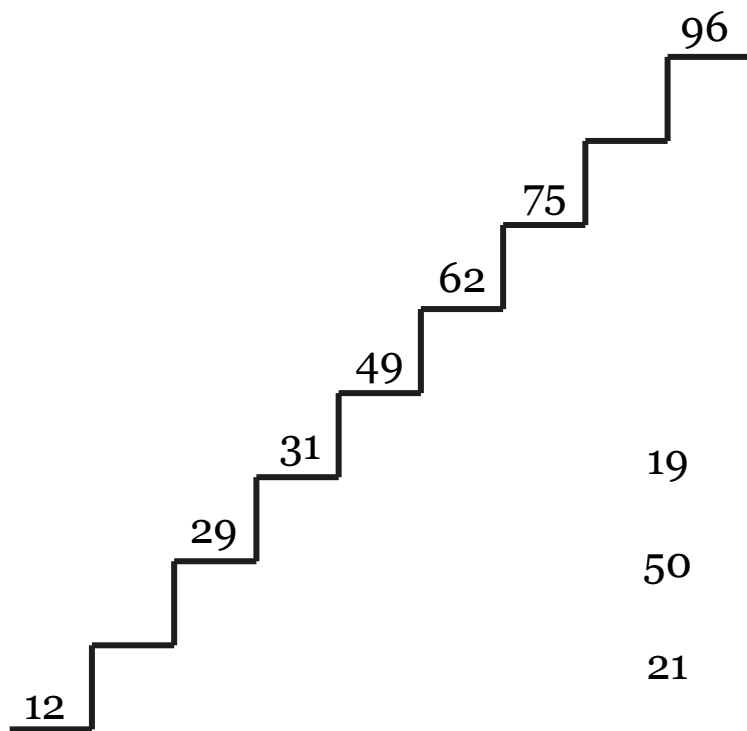
## Closer

## Choice Time

## Closer

Use the staircase below to pose a couple of final questions to students.

- What possible numbers can we place in the unfilled steps on the staircase?
- What would be this person's score at this point of the game? How would you add up these numbers?



Give students a few minutes to think about the question and come up with an answer (or answers). Then, discuss what they come up with.

Numbers 13 through 28 can be placed on the second step, and numbers 76 through 95 can be placed on the eighth step. A discussion could also focus on what the largest or smallest numbers are for the missing steps.

To figure out this person's score, students might suggest adding  $19 + 21$  first because the sum is easier to find.  $19 + 21 = 40$ ,  $40 + 50 = 90$

## Prompts and Questions

- What's the best way to win the game?
- Does your strategy work each time?
- How can we add up these three numbers?

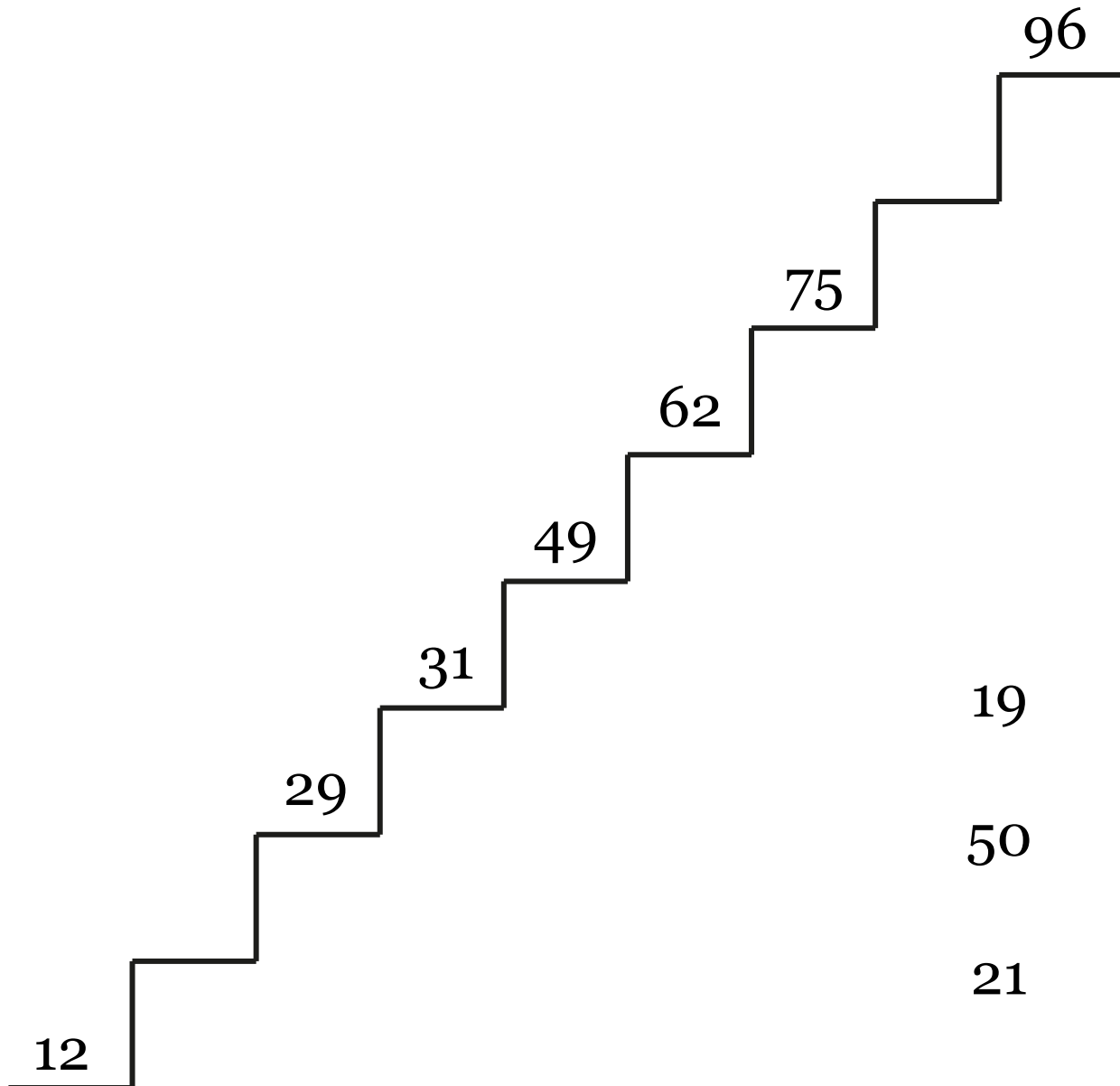
## Choice Time

- Pig
- Pattern Block Free Play
- Challenge Problems

**DAY 5**

Opener

Main Activity

**Closer****Choice Time**

**DAY 6**

Opener

Main Activity

Closer

Choice Time

## Overview

### Focus Standards

MP1 Make sense of problems and persevere in solving them.

3.NBT.2 With accuracy and efficiency, add within 1000.

**Materials:** Ant and Grasshopper story page, pencil and paper.

<b>Opener</b>	<b>Choral Counting</b>	10 – 15 minutes
<b>Main Activity</b>	<b>Story Problems Mini Lesson</b>	20 – 30 minutes
<b>Closer</b>	<b>How many tiny seeds?</b>	5 – 10 minutes
<b>Choice Time</b>	<ul style="list-style-type: none"> <li>● Pig</li> <li>● Fill the Stairs</li> <li>● Challenge Problems</li> </ul>	5 – 25 minutes

### Standards Connections

MP1 | MP3 | 3.OA.1



## DAY 6

## Opener

## Main Activity

## Closer

## Choice Time

## Choral Counting

Choral counting is an incredibly powerful activity for building numeracy. Students practice counting forward, backward, skip counting, and — critically — looking for patterns.

For this first Choral Count, explain to students that you'll be counting together as a whole class. The goal is to go slow and stay together. If students aren't sure what the next number will be, you'll be going slow enough that they'll have some time to think about it.

**Step 1.** Tell students you'll **start at 2 and count by 2s** until you reach 40.

**Step 2.** The students job is to predict to themselves what each next number will be as you write it, and to count along with you.

**Step 3.** Start writing out the numbers. Write 15 - 25 numbers. Do this slowly, so students have time to think of what might come next. Ask them to say each number with you as you write it. For today, write the numbers in **four rows of five**.

**Step 3.** Once you've written out the whole sequence, recount the numbers together as a class.

**Step 4.** Ask students to share what they notice about the number sequence. Write down their observations.

2	4	6	8	10
12	14	16	18	20
22	24	26	28	30
32	34	36	38	40

### Prompts and Questions

- What do you think the next number will be, and why?
- Let's count all the numbers together.
- Take a moment to look at these numbers. What do you notice?

### Tips for the Classroom

1. Changing the number of columns you use will create more or less emphasis on different kinds of patterns. You can experiment with this as you do more Choral Counts.
2. There may be some very interesting patterns that emerge. Some may be correct, some incorrect. Most important is to write students' comments down as clearly as you can, making notes/circles/arrows on the numbers if that helps.
3. Students might comment on first digits, last digits, digit sums, columns, rows, diagonals, or any other pattern. Prepare to be surprised!

## DAY 6

## Opener

## Main Activity

## Closer

## Choice Time

## Story Problem Mini-Lesson

### Materials and Prep

Square Tiles or other counters, pencils, paper, Ant and Grasshopper story problem page.

### Main Question

How many seeds did the ant collect?

### Launch

Read the entire story to students as if it were story time. Then ask the students questions they have about the story. One that will hopefully come up is: how many seeds did the ant collect? This can transition into having students solve the problems on the accompanying sheet. If the students don't specifically ask this question, see if you can guide them towards it.

#### **The Ant and the Grasshopper Part 1.**

*Winter was coming, and the Ant started to prepare. Every day for a week, it saved 3 tiny seeds.*

*At the end of the week, the Ant passed the Grasshopper. "Silly ant!" said the Grasshopper. "You work all day, when you could be having fun!" And the Grasshopper laughed and pointed at the ant.*

Ask:

- What did we learn about the Ant and the tiny seeds in this story?
- What can we build or draw that can help us find out how many tiny seeds the Ant gathered by the end of the week?

Build or draw student ideas for how to find out how many tiny seeds Ant has gathered in this first week. See below for a possible example.



### Launch Key Points

- Read the story through completely as a read aloud. Pause and clarify the actions and characters in the story.
- Record the questions student generate, then focus discussion on the question: how many seeds did the ant collect?
- Invite students to share different ways they can find the total - count all, skip count, repeated addition or multiplication equations.

## DAY 6

## Opener

## Main Activity

## Closer

## Choice Time

## Work

### The Ant and the Grasshopper Part 2.

Once the whole class has agreed on how many seeds the ant saved, read the second part of the story below.

*In the second week, the Ant worked even harder. It saved 4 tiny seeds every day. But when the Ant passed the Grasshopper at the end of the week, the Grasshopper laughed and pointed, saying, "Silly Ant!"*

Pause and elicit the following questions:

- What did we learn about the Ant and the tiny seeds in this part of the story?
- What can we build or draw that can help us find out how many tiny seeds the Ant gathered by the end of the week?

Send students to work in pairs or trios with counters, pencils and story problem pages.

## Tips for the Classroom

1. Circulate to support students with reading the story and understanding the story.
2. Support students to work collaboratively to model the story situation with counters, or drawings on white boards or paper.
3. Invite students to write their own story problems - they must solve their own story problems before asking others to solve them.

## Prompts and Questions

- What quantities or numbers are in this story?
- How can we use math tools or a drawing to show what is happening in this story?
- What is the question we are trying to answer?
- When you say the answer is 28, you mean 28 *what?* (Emphasize the unit.)

# Day 6

## The Ant and the Grasshopper

**Part 1:** *Winter was coming, and the Ant started to prepare. Every day for a week, it saved 3 tiny seeds.*

*At the end of the week, the Ant passed the Grasshopper. “Silly ant!” said the Grasshopper. “You work all day, when you could be having fun!”*

How many tiny seeds did the Ant gather the first week?

Answer: \_\_\_\_\_

**Part 2:** *In the second week, the Ant worked even harder. It saved 4 tiny seeds every day. But when the Ant passed the Grasshopper at the end of the week, the Grasshopper laughed and pointed, saying, “Silly Ant!”*

How many tiny seeds did the Ant gather the second week?

Answer: \_\_\_\_\_

# Day 6

## The Ant and the Grasshopper

**Part 3:** *In the third week, the Ant worked even harder. It saved 6 tiny seeds every day. But when the Ant passed the Grasshopper at the end of the week, the Grasshopper laughed and pointed, saying, “Silly Ant!”*

*Then winter came. The Grasshopper had nothing to eat. It went to the Ant’s hill, and asked if the Ant had any extra seeds for it to eat. And do you know what the Ant said? “Silly Grasshopper!”*

How many tiny seeds did the Ant gather this week?

Answer: \_\_\_\_\_

*Challenge:* Write a math question about the Ant & Grasshopper

Answer: \_\_\_\_\_

## DAY 6

## Opener

## Main Activity

## Closer

## Choice Time

## Closer

Gather the class to discuss their strategies for solving Part 2.

*In the second week, the Ant worked even harder. It saved 4 tiny seeds every day. But when the Ant passed the Grasshopper at the end of the week, the Grasshopper laughed and pointed, saying, "Silly Ant!"*

*How many tiny seeds did Ant gather?*

Share a student drawing that is organized so that the class can discuss their math thinking

Here is a possible drawing that you might share.



Now that you have a drawing, ask students to share their strategies for finding the total number of tiny seeds.

Possible student strategies might include:

- Skip count by 4s
- Add pairs of 4s
- Know the multiplication fact  $4 \times 7$

## Choice Time

- Pig
- Fill the Stairs
- Challenge Problems

## Prompts and Questions

- How many seeds did the ant gather per day?
- Can you draw it?
- How many days in a week?
- What's the unit on your answer?

**DAY 7**

Opener

Main Activity

Closer

Choice Time

## Overview

### Focus Standards

MP6 Attend to precision.

3.NBT.2 With accuracy and efficiency, add within 1000.

**Materials:** Dice, pencil and paper.

<b>Opener</b>	<b>Choral Counting</b>	10 – 15 minutes
<b>Main Activity</b>	<b>Penny Nickel Dime</b>	20 – 30 minutes
<b>Closer</b>	<b>Penny Nickel Dime strategy</b>	5 – 10 minutes
<b>Choice Time</b>	<ul style="list-style-type: none"> <li>● Pig</li> <li>● Fill the Stairs</li> <li>● Challenge Problems</li> </ul>	5 – 25 minutes

### Standards Connections

MP1 | MP3 | 3.OA.1

## DAY 7

## Opener

## Main Activity

## Closer

## Choice Time

# Choral Counting

Choral counting is an incredibly powerful activity for building numeracy. Students practice counting forward, backward, skip counting, and — critically — looking for patterns.

Here's how to lead a choral count.

- Step 1.** Tell students you'll **start at 22 and count by 2s until you reach 60.**
- Step 2.** The students job is to predict to themselves what each next number will be as you write it, and to count along with you.
- Step 3.** Start writing out the numbers. Write 15 - 25 numbers. Do this slowly, so students have time to think of what might come next. Ask them to say each number with you as you write it. For today, write the numbers in **four rows of five.**
- Step 3.** Once you've written out the whole sequence, recount the numbers together as a class.  
**Step 4.** Ask students to share what they notice about the number sequence. Write down their observations.

22	24	26	28	30
32	34	36	38	40
42	44	46	48	50
52	54	56	58	60

## Prompts and Questions

- What do you think the next number will be and why?
- Let's count all the numbers together.
- Take a moment to look at these numbers. What do you notice?

## Tips for the Classroom

- Changing the number of columns you use will create more or less emphasis on different kinds of patterns. You can experiment with this as you do more Choral Counts.
- There may be some very interesting patterns that emerge. Some may be correct, some incorrect. Most important is to write students' comments down as clearly as you can, making notes/circles/arrows on the numbers if that helps.
- Students might comment on first digits, last digits, digit sums, columns, rows, diagonals, or any other pattern. Prepare to be surprised!



## DAY 7

## Opener

## Main Activity

## Closer

## Choice Time

# Penny Nickel Dime

## Materials and Prep

One 6-sided dice, pencil and paper.

## How to Play

Roll the die 7 times. After every roll, players must take that many pennies, nickels, or dimes. You can only choose one type of coin on a given turn! For example, if a 4 is rolled, players choose whether to take 4 pennies, 4 nickels, or 4 dimes. After 7 rolls, everyone adds up their total. Whoever gets closest to \$1 without going over wins.

## Launch

Demonstrate the game with the entire class at once. Everyone should play their own game on their own game board (see next pages) to record their choices with each roll. You should also have your own game board projected. Give students a chance to choose their coins for each roll before you make your choice on your projected board.

Play until the game concludes. Everyone tallies their score at the same time. Students can ask a table partner if they need help with this, or raise their hand to get help from you. After everyone is done, ask who got within 10¢ of \$1 without going over, who got within 5¢, and whether anyone got even closer than that.

Let students know they will likely bust (go over \$1) their first few games, but they'll improve at estimating and choosing good strategies for themselves as they play more.

## Work

Student play in pairs or trios around the room. They take turns rolling the die, with each player using each roll. Ask students to verify one another's totals at the end of each game.

## Tips for the Classroom

1. Downlevel the game by removing nickels as an option.
2. Uplevel the game by adding quarters.
3. Some students will benefit from keeping track of their total with each roll. Others will prefer to wait until the end.

Penny, Nickel, Dime  
[Sample Game]

Roll	Dimes	Nickels	Pennies
1	4		
2		2	
3		3	
4			6
5			1
6	1		
7			5
Totals	5 dimes	5 nickels	11 pennies

## Launch Key Points

- Be sure to bust by going over \$1 during the first demo game.
- Pause after each roll in the demo game so that students can think about which coin to choose.
- You may need to discuss strategies for adding up your final score.

## Prompts and Questions

- Do you have a strategy to keep the total close to \$1?
- How are you deciding if your roll goes into dimes, nickels or pennies?
- When adding up your total, do you count up the dimes first? The pennies? How do you keep track?

# Day 7

## Penny Nickel Dime

Roll	Dimes	Nickels	Pennies
1			
2			
3			
4			
5			
6			
7			
Totals			
Total Score: _____			

# Day 7

## Penny Nickel Dime

Roll	Dimes	Nickels	Pennies
1			
2			
3			
4			
5			
6			
7			
Totals			

Roll	Dimes	Nickels	Pennies
1			
2			
3			
4			
5			
6			
7			
Totals			

Roll	Dimes	Nickels	Pennies
1			
2			
3			
4			
5			
6			
7			
Totals			

Roll	Dimes	Nickels	Pennies
1			
2			
3			
4			
5			
6			
7			
Totals			

**DAY 7****Opener****Main Activity****Closer****Choice Time**

## Closer

Ask students what strategies they used while playing Penny Nickel Dime.

Next, discuss the last roll of this sample game.

Show the game board (next page) and ask:

- What is the total so far?
- What would you hope to roll next?
- How close can you get to \$1 with this roll?

## Choice Time

- Pig
- Fill the Stairs
- Challenge Problems

### Prompts and Questions

- Are there strategies that helped you stay under \$1?
- Did you notice your opponent using an interesting strategy/ies?
- What roll would get you over \$1?

Penny, Nickel, Dime			
Roll	Dimes	Nickels	Pennies
1	2		
2		4	
3			4
4		2	
5			5
6	3		
7			
Totals			

**DAY 7**

Opener

Main Activity

**Closer**

Choice Time

<b>Penny, Nickel, Dime</b>			
<b>Roll</b>	<b>Dimes</b>	<b>Nickels</b>	<b>Pennies</b>
<b>1</b>	<b>2</b>		
<b>2</b>		<b>4</b>	
<b>3</b>			<b>4</b>
<b>4</b>		<b>2</b>	
<b>5</b>			<b>5</b>
<b>6</b>	<b>3</b>		
<b>7</b>			
<b>Totals</b>			

**DAY 8**

Opener

Main Activity

Closer

Choice Time

## Overview

### Focus Standards

MP6 Attend to precision.

3.NBT.2 With accuracy and efficiency, add within 1000.

**Materials:** Dice, pencil and paper, Big Pig game boards.

<b>Opener</b>	<b>Bullseyes and Close Calls</b>	10 – 15 minutes
<b>Main Activity</b>	<b>Big Pig</b>	20 – 30 minutes
<b>Closer</b>	<b>Strategy Discussion</b>	5 – 10 minutes
<b>Choice Time</b>	<ul style="list-style-type: none"> <li>● Penny Nickel Dime</li> <li>● Fill the Stairs</li> <li>● Pig &amp; Big Pig</li> </ul>	5 – 25 minutes

### Standards Connections

MP1 | MP3 | 3.OA.1

## DAY 8

## Opener

## Main Activity

## Closer

## Choice Time

## Bullseyes and Close Calls

Secretly choose a number with no repeated digits and write it down where no one can see it.

Students attempt to guess the number. After each guess, respond using the following options:

Outcome of Guess	Feedback
Correct digit in the wrong place	“Close Call”
Correct digit in the correct place	“Bullseye”
No correct digits	“Nothing”

### Tips for the Classroom

- Note that students DON'T get a Bullseye or Close Call for each digit. The clue applies to the entire 2- or 3-digit number.

### Prompts and Questions

- What numbers can I cross off after that guess?
- Is there anything you know after that guess? Any number that is or isn't in our mystery number?
- Why are you so sure the number doesn't have a 5?

## DAY 8

## Opener

## Main Activity

## Closer

## Choice Time

# Big Pig

## Materials and Prep

One 6-sided die per group, blank paper or the Big Pig Scoring Sheet (see next page), pencils.

## How to Play

Big Pig is the same as Pig, except that players roll 2 dice each turn and add them together.

- If they roll 2, 3, 4, 5, or 6 on both dice, they add their roll to their total for the turn and can choose to roll again or stop.
- If they roll a 1 on *either* die, they lose all their unbanked points.
- If they roll doubles, they get twice as many points as normal (e.g., double 5s are worth 20 points instead of 10).
- If they roll a pair of 1s, they gain 25 points and can keep rolling!!

## Launch

Introduce Big Pig. Mention that it is similar to Pig but with two dice and that if a 1 is rolled on either die, all points that are unbanked are lost and the turn ends for that player. Make sure you mention the doubles rules.

Invite a volunteer to play a quick demonstration game of Big Pig. Make sure you take lots of risks, and let the students advise you on whether they think you should keep rolling by giving a thumbs up/down.

## Work

Students play Big Pig in pairs. Consider having both students in a pair keep score for both players.

## Tips for the Classroom

1. Remind students that they will lose games and win games, and each loss can be a chance to re-examine how they are playing. It's hard to lose all your points, but it will happen to everyone!
2. Whoever isn't rolling is in charge of writing. That way, every student has something to do every turn.

## Launch Key Points

- Take risks and ask students to give a thumbs up/down on whether you should stop rolling.
- Demonstrate how to use the score sheet, where to keep track of rolls, and when to bank.
- It can be useful to roll recklessly until you get a 1 for one of your turns, to show losing all the points for that turn.
- It might take too long to get doubles, let alone double 1s, to demonstrate these extra rules, so just be sure they get mentioned.

## Prompts and Questions

- How long are you waiting before you stop rolling?
- Do you have a strategy?
- Before you roll again, tell me how many points you already have for this turn.
- What's the best way to add those numbers up?



Day 8

# Big Pig

Rolls

Rolls

Bank

Bank

## DAY 8

## Opener

## Main Activity

## Closer

## Choice Time

## Closer

Discuss what strategies students are using as they play.

You may find that some students play a riskier game than others. If time permits, consider selecting a student who plays a risky game (roll 10 times before banking) and one who plays a conservative game (bank after one roll) and have them play against each other in a demonstration game. You can take a vote ahead of time about which strategy is more likely to win.

There is an opportunity here to discuss the difference between a good strategy and a single loss—luck plays a big role here!

## Choice Time

- Penny Nickel Dime
- Fill the Stairs
- Pig & Big Pig

## Prompts and Questions

- What's your favorite winning strategy so far?
- Do you prefer to be more risky or more cautious? Which seems like it works better in the long run?
- Do you have a rule for when you stop rolling and bank your points?