Math for Love

2nd Grade

by Dan Finkel & Katherine Cook

Introduction

Welcome to the Math for Love Curriculum! This draft was adapted from a summer program we designed in 2017. The materials are ideal for use in a summer program, or as a supplemental curriculum to provide remediation or enrichment to students.

Goals of the Curriculum

The goals of the program are two-fold:

- Improve student conceptual understanding of mathematics, while exercising skills and fluency
- Give everyone an opportunity to have fun and enjoy math

This curriculum spends ample time exploring conceptual models, giving students opportunities to work concretely and pictorial while making connections to abstract reasoning.

Program Values

The goals of this curriculum are to strengthen student understanding and deepen their enjoyment of math. The values of the program help work toward those goals:

- Students should play, with both games and ideas
- Students should have hands-on experiences, exploring math with manipulatives
- Students should experience math as a meaningful, compelling activity, with multiple ways to approach solving a problem, representing a situation, and developing a strategy.
- Students should have time to think deeply about mathematics.

In short, this curriculum is designed to help you build a classroom where students are *doing math* and *thinking math*.

Teacher's Responsibility

As a teacher in the program, you are tasked with establishing a healthy and dynamic classroom environment where these values are expressed. Your responsibilities are:

1. **Engagement**. Create an classroom where your students spend the bulk of their class time actively engaged in mathematical play and problem-solving.
2. **Differentiation**. Help students encounter problems, games, and activities of the right level of difficulty to create engagement.
3. **Thinking**. Get students thinking as soon as possible every day, and help keep them *productively stuck*, actively working to understand and make meaning in a situation they don't yet fully understand.

4. **Positive Environment**. Help the classroom be a place where students trust themselves, their teacher, and each other, and can make mistakes, ask questions, and grow.

The curriculum is designed to help you in these tasks, and your students and you will get the most out of the summer if you tackle these responsibilities head on. Here are some concrete ideas on how to go about it.

★ **Ask students questions rather than telling them answers**
Rather than telling them whether their answers are correct or not, ask them what they did to solve the problem. Ask them what they think the answer is and why. Invite them to share their thinking with you and their classmates.

★ **Model how to play games, and teach how to win and lose**
Students can sometimes get really attached to winning, and take their wins and losses as deeper signs about themselves. It's best to get ahead of this right away. Talk about how the players of a game are working together to learn about the game, and every loss is a chance to get more information about how to win. Rather than thinking about the other player as your rival, think of them as your collaborator, there to help you learn.

★ **Avoid what doesn't involve math; get students into actual, active thinking situations about mathematics as fast as you can**
Our goal is to make the most of classroom time, and avoid things that use up too much time without much gain in mathematical understanding. Start class right away with a Number Talk or opening game (see the Warm Up in the daily plan). Use the Math Games and Movement Breaks from Appendix 1 for transitions between stations. Establish the classroom as a place where we all are committed to working on improving our understanding of math.

★ **Have a *growth mindset* classroom**
Some of your students will believe that they are just bad at math. They will think this is an unchangeable personality trait. These students have what is known as 'fixed mindset' about math. The truth is that every student can succeed in mathematics, regardless of how they've done in the past. Convey to your students, early and often, that math is something you learn to be good at, not something you just know; how making and learning from mistakes is the key to improving; and how everyone can be good at math if they put in the time and the energy.

★ **Embrace mistakes**
One important way to encourage growth mindset is to embrace mistakes. They are a natural part of learning, and even more than that, they actually help us learn more and help us remember what we've already learned. Model for your students how to make mistakes, and how to use mistakes productively.

★ **Give your students *time* to think and explore**
Remember that many of the students in the program are here because they weren't given enough time to establish solid conceptual models. We are going to protect their time to develop those models in the summer. Make sure you don't push them too fast to drop the blocks or pictures. If you need to take more time on some lessons and don't make it through everything that's fine; this curriculum is built to give you more than you might need. Also note that a central place in the curriculum where the students practice fluency is in the games, and the goal is for the practice and experience of growing mastery to be tied to the experience of playing.

★ **Give your students the right amount of struggle**
We want the students to be 'productively stuck', i.e. we want them to be working on material they haven't mastered yet but not material that is so hard they can't get started. Most of the lessons in the curriculum start easy, so make sure everyone is able to begin, and help students break down problems if necessary. However, don't offer so much help that you take away their opportunity to learn. Learning happens when we are trying to do something we know how to begin and don't know how to finish. Keep in mind that many students in this program will be more familiar with the "stuck" part, so try to start them with successes, and then slowly move them toward greater problem-solving stamina.

★ **Value play**
It's easy to feel like students have to suffer to learn math. In fact, the opposite is true. Approach math in a playful way, and you'll see students more willing to struggle and persevere, more willing to take risks and learn from mistakes, and more able to absorb new ideas and put them into practice.

Other Notes and Best Practices

If you use this curriculum as a standalone for a summer program or other intervention, here are some ideas to help get the most out of it.

★ **Math Games and Movement Breaks**
Check out the math-based movement breaks in Appendix 1. These are great to mix in as breaks between activities.

★ **Folder for Worksheets**
Give each student a folder where they can keep their worksheets. If they finish another activity early, they can turn back to their unfinished worksheets and finish them.

★ **Choice Time**
Provide a structure for Choice Time like putting up the choices on a white board and having students put their names at the games or activities they want to try that day. Ideally, they should choose an activity that is right for them, and then stick with it for at least half of Choice Time.

★ **Number Talk Images and other warm ups**
For the Number Talks that require images, see Appendix 2. You can project these images to your class, or, where possible, create physical versions of them with magnetic ten frames or other blocks. Physical versions are sometimes preferable, since students can manipulate the blocks directly.

Index of Lessons, Chronological

Index of Lessons, Alphabetical

Day 1

Goals

1. Establish class norms and community.
2. Connect counting, addition, and equations.
3. Practice addition within twenty and comparing two digit numbers.

Part 1

Opener

Introduction, name games (i.e., Mingle), class agreements.

Warm Up

Guess My Number

Exploration

Pattern Block Triangles
Note: start with free building, and transition into building triangles.

Game

Pico Fermi Bagels

Part 2

Warm Up

Number Talk

Game

PowerDot Pro

Game

Dots and Boxes

Choice Time

PowerDot Pro; Dots and Boxes; Free Block Play

Wrap Up

Mingle
Opening Game or Station Break

Mingle is a quick name game you can play on the first day of class. You can also return to its more mathematical versions later in the course as a station break.

How to play

The teacher calls out a number (i.e., 3), and the students get themselves into groups of that size (or as near as possible to that size as possible) as quickly as they can. It might be impossible for everyone to get in a group every time, but each new number gives everyone another chance.

Once they are in groups, students can each learn each other's names. Then the teacher calls out a new number.

In the basic game, just call out single numbers. Once students get the idea, you can call out addition or subtraction problems (i.e., "get into groups of 7-4").

Tips for the classroom

1. Call the adults in or out of the game depending on the number of students you have and what numbers you call, in order to give everyone at least one other person to have in their group.

2. Keep the game moving quickly to keep the energy up.

3. Don't forget to call out a group of 1 and a group of however many students are in the entire class at some point in the game.

4. For future games, once everyone knows each other's names, you can can lead an optional skip-count with the class by counting the students in the class by group size (i.e., 3, 6, 9, ...).

Guess My Number

Topics: Greater than/less than, logic
Materials: Whiteboard or paper and pencil
Common Core: MP1, MP3, K.CC.C7, 1.NBT.B.3

Guess My Number is a quick, fun, and easy opening game to lead with a small group or the entire class. Students try to guess the number you're thinking of in the fewest number of guesses possible.

Why We Love Guess My Number

It's hard to think of a game more natural than Guess My Number. Kids can immediately start playing, and have a great time doing it. The game is also a perfect way to introduce the basics of logical thought and strategy, and let the game do the teaching with only minimal extra observations from the teacher. Surprisingly replayable and enjoyable, this is a great game to play early and often.

The Launch

As you write the numbers from 1 to 10 down on the board, tell your students that you are going to think of a number from 1 to 10, and they will try to guess it in the fewest number of guesses possible. After every guess, you will tell them whether your number is greater or less than their guess.

Example
Teacher: Who would like to make the first guess? [Students raise hands. The teacher calls on different students for each guess.]
Student: 3.
Teacher: My number is not 3. But my number is greater than 3. [Optional: write "My number >3".] Are there any numbers I can cross off my list?
Student: It's not 3. [Teacher crosses off the 3]
Student: It's not 2 or 1 either.
Teacher: Right. Because my number is greater than 3, but those numbers are less than 3 [Teacher crosses off 1 and 2.] Who has another guess?
Student: 9.
Teacher: My number is not 9, but my number is less than 9. [optional: write "My number <9".] Can I cross any more numbers off the list?
Student: The 9 and the 10.
Teacher: Because my number is less than 9, so it can't be 9 or 10. [Crosses them off. Looks at the board.] So the only options left are 4, 5, 6, 7, or 8. Take a minute to think about what would be a good next number to guess. Then tell someone sitting next to you what you would guess next, and why. [Students pair and share.] Who has another guess?
Student: Is it 7?
Teacher: My number is not 7, but my number is less than 7 [optional: write "My number

<7]. What numbers can I cross off?
Student: 7 and 8.
Teacher: Right. Because my number is less than 7, so it can't be 7 or 8. [Crosses them off.] So the only options are 4, 5, or 6. Who has another guess?
Student: Is it 5?
Teacher: My number is not 5, but it is… greater than 5. [Students' hands shoot up.] Whoever thinks they know my number, say it together.
Students: 6!
Teacher: You got it! Now that took you [counts] 1, 2, 3, 4, 5 guesses. Who thinks they could do it in fewer? [Optional: play again.]

Prompts and Questions

- How can you guess my number in the fastest, most efficient way possible?
- Talk to a neighbor about what you think the next guess should be, and why.
- How many numbers do you think that guess will cross out?

Tips for the Classroom

1. **Cheat**! By which I mean, don't actually choose your number ahead of time. If students guess 1, tell them your number is more than 1. Always make each guess give them the least amount of information possible, and deny them the lucky guess. Make them work for it, and they'll be more invested in working smarter.

   AVOID:
   Student: Is it 8?
   Teacher: It is! Lucky guess! You got it on the first try.

   BETTER:
   Student: Is it 8?
   Teacher: My number is not 8, but my number is less than 8.

2. You can slowly expand up to larger ranges of numbers as students are ready for them. I'll usually go up to 12 after a few games, and soon to 20. Kids love to see the game get harder, as long as it doesn't get too hard too fast. And because you write all the numbers up on the board at the start, they can always see what needs to happen.

3. If kids make a bad guess, don't try to steer them toward a good guess right away. But you can ask the students after you write the guesses down which guesses were most helpful, or whether they would make a different guess if they could take it back.

4. Don't play for too long at one time. One or two games is usually enough to get the kids mentally alert and ready for whatever is coming next.

Pattern Block Triangles

Math concepts: Addition, counting, geometry
Equipment: Pattern blocks, scratch paper and pencil
Common Core: K.CC.4, K.CC.5, K.OA.1, K.OA.2, 1.OA.1, 1.OA.2, , 1.OA.4, 1.OA.5, 1.G.2, 2.OA.1, MP1, MP2, MP6, MP7, MP8

How many blocks you can use to build a triangle from pattern blocks?

Why We Love Pattern Block Triangles

This beautiful lesson combines student creative work, counting and addition practice, combining geometric shapes, and a slow build from easier to more challenging work.

The Launch

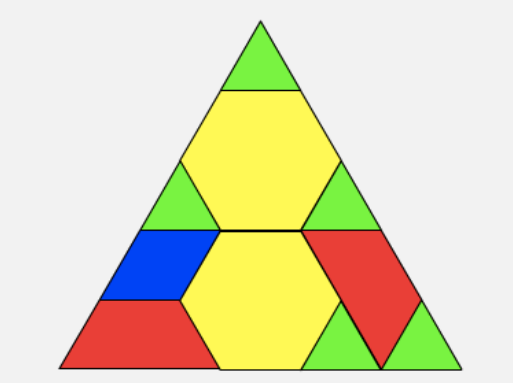
Prep the pattern blocks beforehand by removing the tan rhombuses and orange squares, or else tell students not to use those blocks.

Make sure every student has access to pattern blocks, and start with two warmup challenges: can students build a (filled in) triangle with pattern blocks using

1) Exactly 5 blocks?
2) Exactly 10 blocks?

Choose one student's work and show how to double-check the count by counting each type of block, and then adding those together, using an equation or a ten frame as necessary. For example, if you were using the triangle below as an example, you might write:

2 hexagons + 2 trapezoids + 1 rhombus + 5 triangles = 10 blocks



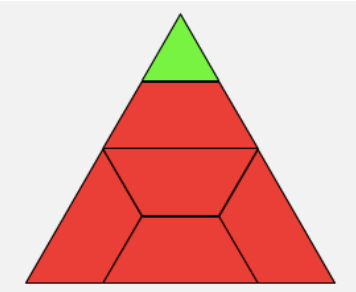
Or simply 2 + 2 + 1 + 5 = 10.

Once students are done with the warmups, pose a greater question: is it possible to build a triangle with whatever number of blocks you want? Can you build one with 2 blocks? With 3 blocks? 4 blocks? How far can you go?

Write a list of numbers from 1 to 20, and have students make their own list of numbers. Leave enough space so students can write an equation for each number.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

If students can make a triangle using some number of blocks, they can write an equation for that number. For example, when they make a triangle using exactly 6 blocks, they can write an equation describing that triangle.
For the triangle to the right, for example, the equation might be 6 = 5 + 1.



The big challenge for students is: can they build a triangle for each number from 1 to 20? Or is there any number that they won't be able to build?

Students can work alone or with partners to build different triangles.

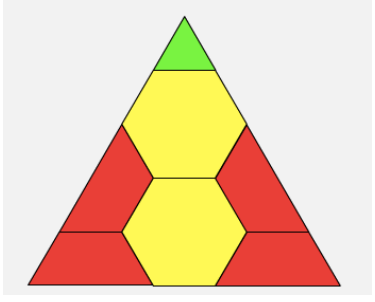
Prompts and Questions

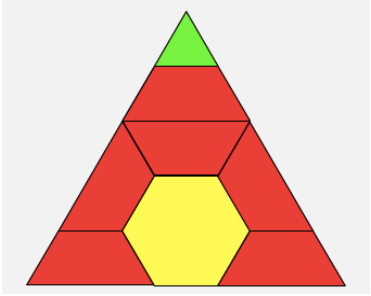
- How many blocks did you use in that triangle?
- Did you record it yet? Show me the equation for that triangle.
- Have you build a triangle with 11 blocks yet? How did you do it?

The Wrap

There is a powerful idea to underline as you wrap up this activity, which is that you can substitute smaller blocks—say, two trapezoids in the place of one hexagon—to raise the number of blocks you used in a triangle without changing anything else. Demonstrate this kind of substitution on a specific triangle, and then ask students if they can predict how making this substitution will change the number of blocks. For example:

2 hexagons + 4 trapezoids + 1 triangle = 7 blocks



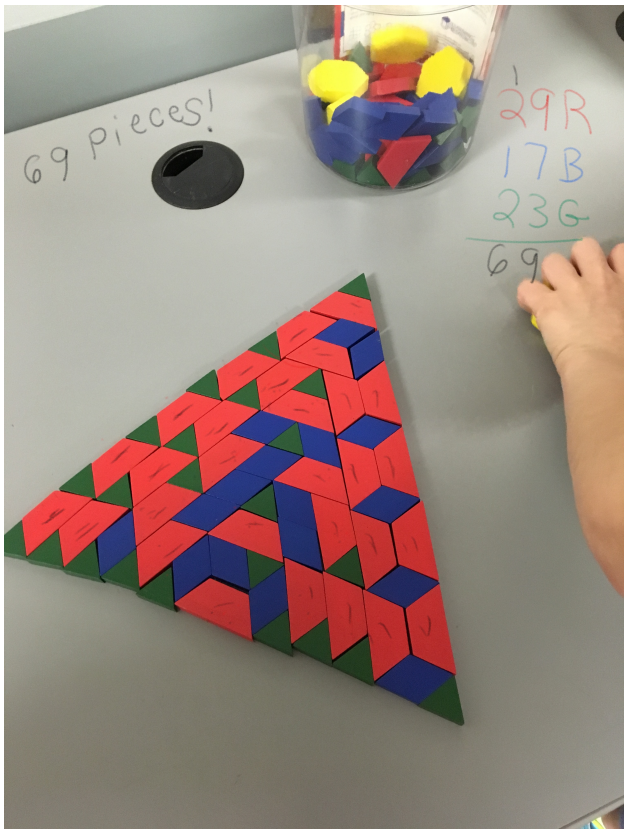


1 hexagons + **6** trapezoids + 1 triangle = **8** blocks

Can students use this idea to make triangles using any of the missing numbers from their list?

Tips for the classroom

1. The idea in using the list is that every triangle is a success to start, and then certain holes in the list become more challenging to make.
2. There are two excellent ways to challenge students who successfully make all the triangles from 1 to 20. First, ask them if they can make a larger number, say, 31.
3. Second, challenge them to make a much larger triangle, and show you how they can correctly add all the pieces inside it.
4. For today, by "triangle" we mean triangles made out of pattern blocks with no empty spaces inside. Alternative definitions may pop up from students. Let them know that for today, we just mean triangles of this type.
5. For young students, you can just go from 1 to 10 instead of 1 to 20, and not require writing equations for each triangle.



Pico Fermi Bagels

Math concepts: Logic and deduction, place value
Equipment: Paper or whiteboard to record guesses
Common Core: 1.NBT.B.2, 2.NBT.A.1, 2.NBT.A.3, MP1, MP3

Can you use the clues to get the number with the fewest possible guesses?

Why We Love Pico Fermi Bagels

Once you get used to the funny words, this game is a wonderful exercise in logic, and a nice way to get kids playing with the ideas of digits and place value. Pico Fermi Bagels is a perfect warmup.

How to Play

The teacher secretly chooses a number with no repeated digits. Students attempt to guess the number. After each guess, the teacher gives feedback:

- If the guess has no numbers correct, the teacher responds: "Bagel."
- For each digit the guess has correct, but in the wrong place, the teacher says: "Pico."
- For each digit the guess has correct and in the correct place, teacher says: "Fermi."

Example Game

Let's say you wrote down the secret number 487.
Guess 1: 139. Response: "Bagels" — no digit is correct.
Guess 2: 820 Response: "Pico" — the 8 is right, but in the wrong place.
Guess 3: 468 Response: "Pico Fermi" — the 8 is right, but in the wrong place, the 4 is in the correct place.
Guess 4: 568 Response: "Pico" — the 8 is right, but in the wrong place.
Guess 5: 482 Response: "Fermi Fermi" — the 4 and 8 are in the correct place.
Guess 6: 487 Response: "Fermi Fermi Fermi" — all digits are in the correct place.
The guessers got it in six guesses! Can they do it in even fewer next time?

Tips for the Classroom

1. Note that students DON'T get a Pico, Fermi, or Bagel for each digit. The clue applies to the entire 2- or 3-digit number.
2. Start with 2-digit numbers. Go to three-digit numbers only when the 2-digit numbers have become straightforward.
3. Write the guesses and the responses somewhere that everyone can see it.
4. Keep track of digits. The skill in the game is about using the feedback from the guesses to make educated future guesses.
5. 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?

References: Play online at http://communicrossings.com/html/js/pfb.htm

Number Talks

Topics: Mental math, numerical fluency; argument & critique
Materials: White board or projector
Common Core: Variable, and especially MP3

This mental math routine creates powerful positive habits for students.

Why We Love Number Talks

Number talks don't replace other instruction, but they are a powerful complement to it. They get all students involved, help them strengthen fluency, intuition, and mental math strategies, improve students' ability to explain and critique solutions, and allow teachers a valuable window into their students' thinking. A well-run number talk is an excellent example of Common Core Math Practices 1, 2, 3, 6, 7, and 8.

How Number Talks Work

If you implement one type of activity into your class routine, Number Talks might be the most bang for your buck.

In many ways, they're familiar. The teacher writes a simple problem down on the board, and students solve it mentally. The difference is that the students aren't just looking for the answer: *they're trying to find as many different ways to solve the problem as they can*.

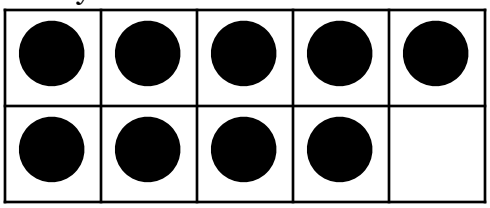
The key elements to number talks are a de-emphasis on speed and right answers and an added emphasis on process and communication. Here's how they work:

1. **The teacher writes a problem on the board.** For Kindergarten, the problem will usually be to count a collection of dots, or do a simple addition or subtraction problem.
2. **Students mentally solve the problem**. They show the teacher whether they have the answer by (quietly) giving a thumbs up at their chest. This prevents a small batch of quick students from shutting everyone else down. If students can come up with a second way to solve the problem, they hold up a second finger at their chest. This means that everyone can keep thinking about the problem even after they have the answer.
3. **Students share their answers**. After enough time has passed that everyone or nearly everyone has a solution, the teacher asks students what their solution are. She writes down all solutions; none are given preferential treatment, and she doesn't say whether they are right or wrong.
4. **Students explain their thinking**. Once all solutions are written down, the teacher asks students to explain how they got their solution. Students explain (from their seat) while the teacher writes the steps they describe on the board.

5. **Discussion and consensus**. Ideally, by the end of the discussion, the class should have a list of 3-6 different approaches to the problem, plus a consensus as to what the correct answer is.
6. **Followup**. If time permits, the teacher has the option to ask a followup questions that builds on the last.

Example Number Talk
[Note: this Number Talk is not necessarily the Number Talk you'll do on any given day. It's just a good example.]

Teacher: Time for our morning Number Talk. I'm going to put up an picture, and you can tell me how many dots you see in it. Remember that your job is to figure out as many different ways to count as you can.



(A student starts waving his arm in the air.) When you have the answer, show me with a thumb at your chest. (The student puts his arm down and holds up a thumb.) If you have one way to count the dots, see if you can find another. Show me by holding up two fingers instead of one.

(She waits for 30 seconds. Several students are holding up two or more fingers, though many have just a thumb. The teacher is noting to see if anyone hasn't solved the problem—this is a great opportunity for formative assessment. Finally, she begins calling on students for their answers, starting with those who have only one solution.)

Teacher: Lucy?
Lucy: 9. (Teacher writes 9 on the board.)
Teacher: Charles?
Charles: 8 (Teacher writes 8 on the board.)
Teacher: Michelle?
Michelle: 9.
Teacher: So you agree with 9. Did anyone get a number that is not 8 or 9? (No one has any.) Who would like to explain how they got their answer? Tyrone?
(The teacher records what the students write as they explain.)
Tyrone: It is a 10 frame, except one is missing, so it's 9.
Teacher: Ah, I see. If you had one more dot, it would be a full ten frame, which is ten dots. But it's actually one dot less than 10, which means it must be 9. Anyone else?
Sarah: I counted by ones.
Teacher: Let's try that together. (Counts with the class) 1,2,3,4,5,6,7,8,9. So you got 9 dots Sarah? (Sarah nods.) Anyone else?

Charles: I'd like to change my answer. I think it's 9.
Teacher: Thanks for letting us know, Charles! You can always change your mind. And great arguments, everyone. We had different ideas about how many dots there were, and we actually managed to convince each other what was really true. Anyone else have another way to count the dots?
Kari: I counted on.
Teacher: How did you do that?
Kari: I know the top is five. So I said 5, 6, 7, 8, 9.
Teacher: Aha. You know that the full row is 5, so you don't need to count them one by one. Let's try that together, everyone. 5… 6, 7, 8, 9.
Teacher: I see that there are still more hands up, but hang on to your ideas. I'm going to show you one more problem, and you can see if you can use your counting method to count the dots. You can also use one of the methods we saw in this talk.

Prompts and Questions

- Who would like to defend this answer?
- I don't quite follow. Do you mean I should count this group first?
- 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 how you counted.

Tips for the Classroom

1. Start with questions that are accessible to everyone
2. 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.
3. Make sure you emphasize the Number Talk protocol—hands at chests rather than waving in the air, for example. This will pay off, and you can use it in other places.
4. Give students constructive language to use in the discussion, like, "I respectfully disagree, because…" and "I agree with _____, because…"
5. Always keep the environment safe and positive.
6. Don't worry if you don't reach total consensus on every problem. Sometimes a student will need more time to process. You can move on when it feels like it is time.
7. Number Talks can sprawl if you're not careful. Doing short (5 - 10 minute) Number Talks regularly is more powerful than long ones infrequently.

Resources

Find more specific Number Talks and variations like Unit Chats, Array Chats, and Fraction Talks at:

- http://mathforlove.com/lesson/number-talks
- http://visiblethinking.weebly.com/daily-routines.html

PowerDot Pro

Math concepts: Arithmetic, addition, greater than/less than
Equipment: Tiny Polka Dot cards OR dominoes
Common Core: K.CC.6, K.OA.5, 1.OA.5, 1.OA.6, 2.OA.2

Choose your challenge. Highest sum wins.

Why we love PowerDot Pro

PowerDot Pro adds an extra layer of challenge to PowerDot. Kids love challenging themselves, and differentiation is built in.

Launch

Take a volunteer from the class for a demonstration game, and explain the rules. This game is best with two players, though you can play with groups of three.

PowerDot is best for 2-3 players, though you can play with up to six if an adult is leading.

Divide the deck evenly among the players. On each play, a player issues a challenge of how many cards they will turn over. Then all players turn over that many cards from their deck. Whoever has the largest sum wins the round, and puts all the cards on the bottom of their pile. In case of ties, each player turns over another card and adds it to their previous sum.

The game is over when someone runs out of cards.

Example Play

Round 1: Player 1 calls for two cards. Then each player turns over two cards from their deck. Player 1 turns up a 4 and a 3, for a total of 7, and Player 2 turns up a 9 and a 0, for a total of 9. Player 2 wins all four cards, and puts them on the bottom of their deck.

Round 2: Players 2 calls for three cards. Player 1 turns up a 5, 6, and 8, for a total of 19. Player 2 turns up a 1, 10, and 8, for a total of 19. Since they are tied, they each turn another card over. Player 1 turns up a 3, and Player 2 turns up a 1, making their totals 22 to 20. Player 1 takes all the cards, and play continues.

Questions and prompts

- Show me how you counted/added.
- (After one card is flipped) Do you think they'll win this round?
- Did you get more than 10?
- Which colors are the easiest to count/add/count on?
- What's the most the cards can add up to?
- Are you ready to try going to three (or four, or five) cards?

The Wrap

The central practice here has to do with adding lots of smaller numbers together. A fun wrap project can be to take a challenge—like six cards—and take guesses for what they'll add up to (15? 30? 100?). Then turns them over and add them up as a class. How close did you get? What would happen if you tried again?

Tips for the classroom

1. This is a convenient game to up- or down-level. To make the game simpler, just remove some of the larger numbers from the deck, or remind students that they only need to turn over as many cards as they want to.
2. Use single dominoes as a down-level option as well.
3. To make the game more challenging, students can flip over more cards per turn.
4. Games with two players are best, but games with three are okay too. It's generally not recommended to have larger than four in a group if you can help it. The exception is if an adult is leading the game, in which case it's fun to play with lots of people. You may need to switch to dominoes or put cards back in a central pile if too many people are playing. Don't be afraid to give away some of your own cards to keep kids in the game.

Dots and Boxes

Topics: Logic, counting, shape recognition, strategy
Materials: Dot Paper, pencils or crayons
Common Core: K.CC.B.5, K.CC.C.6, K.G.B.5, 1.G.A.1, MP1, MP6, MP7

A game of squares and strategy that is easy to learn and hard to master.

Why We Love Dots and Boxes

This is a classic you may remember from childhood. The game is like a more sophisticated tic-tac-toe: fun and challenging for young kids, with simple counting and shape recognition practice built in, and connections to deeper mathematical strategy at play in the background. It's a perfect game for stations or ten extra minutes.

How to Play

Dots and Boxes is a game for two players, played on a small grid of dots. On your turn, add a vertical or horizontal edge between neighboring dots. If you complete a square, get one point and go again. Keep track of the score by coloring in your square, or writing your initial inside it.
Whoever has the most squares at the end wins.

Example Game

This graphic is of a small game of Dots and Boxes from Wikipedia. Players A and B play a game in nine turns. Notice that A's last turn consists of several moves, since every box completed gives A an extra move.

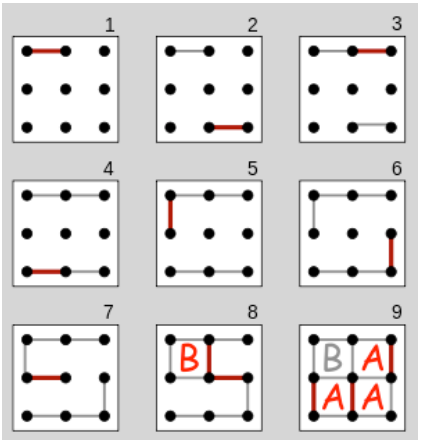


Image by of Wikipedia User Tiger66

Prompts and Questions

- Is it better to go first or second?
- Why did you win/lose your last game?
- Are draws possible?

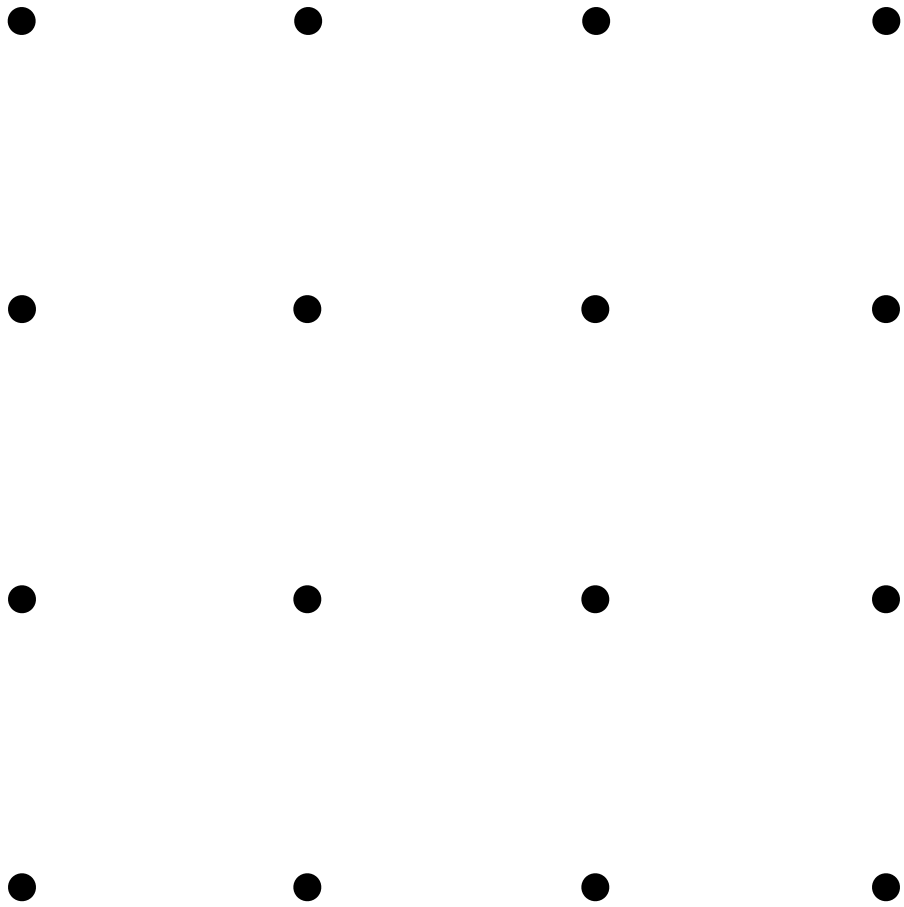
The Wrap

Ask students how many boxes there are altogether in a finished board. What are the possible scores? For example: 9 to 0, 8 to 1, etc. Can they come up with all the possible scores?

Tips for the Classroom

1. Small games are better, especially to start.
2. Play enough demonstration games with students so that the rules are clear.
3. Use different colored crayons or pencils while playing for a clearer game.
4. Placing square tiles on completed squares may help keep track of the score.

Dots and Boxes 3 by 3



Dots and Boxes is a 2-player game.

On your turn, add a vertical or horizontal edge between dots. If you complete a square, get one point and go again. Keep track of the score by coloring in your square, or writing your initial inside it.

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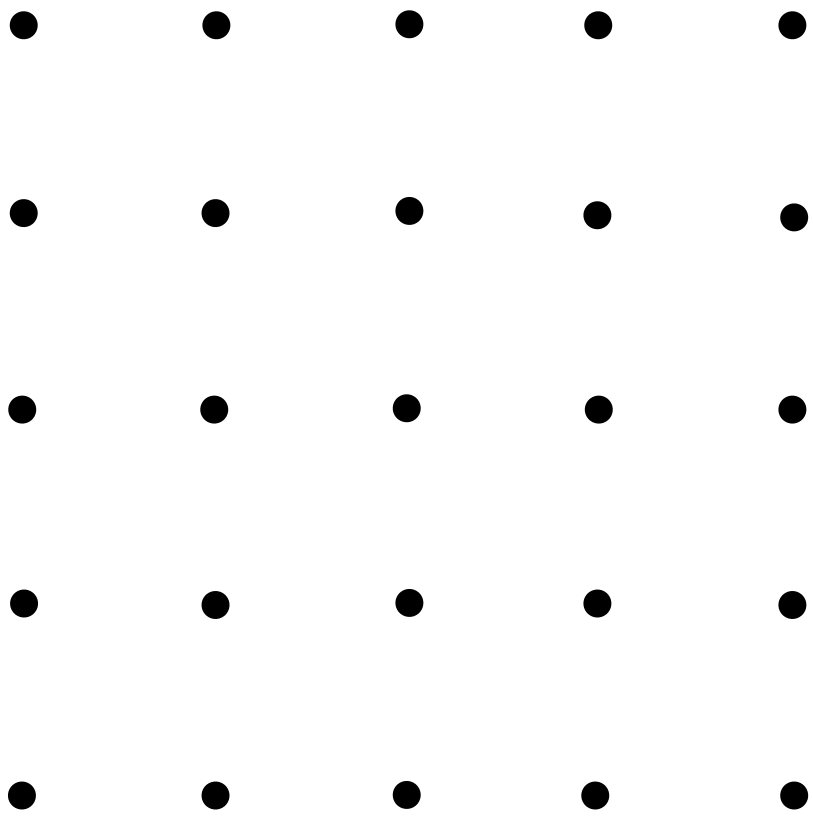
Dots and Boxes 4 by 4



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Day 2

Goals

1. Practice addition within 50 with multiple addends.
2. Explore place value and the hundred chart.

Part 1

Warm Up
Unit Chat

Mini-Lesson
On Story Problems

Story Problems
In the Garden

Game
Save Twenty

Game
Pico Fermi Bagels

Part 2

Warm Up
Guess My Number

Activity
Speed Stars

Game
Dot Ten Memory

Choice Time
PowerDot Pro; Save Twenty; Challenge Problems; Free Block Play

Wrap Up