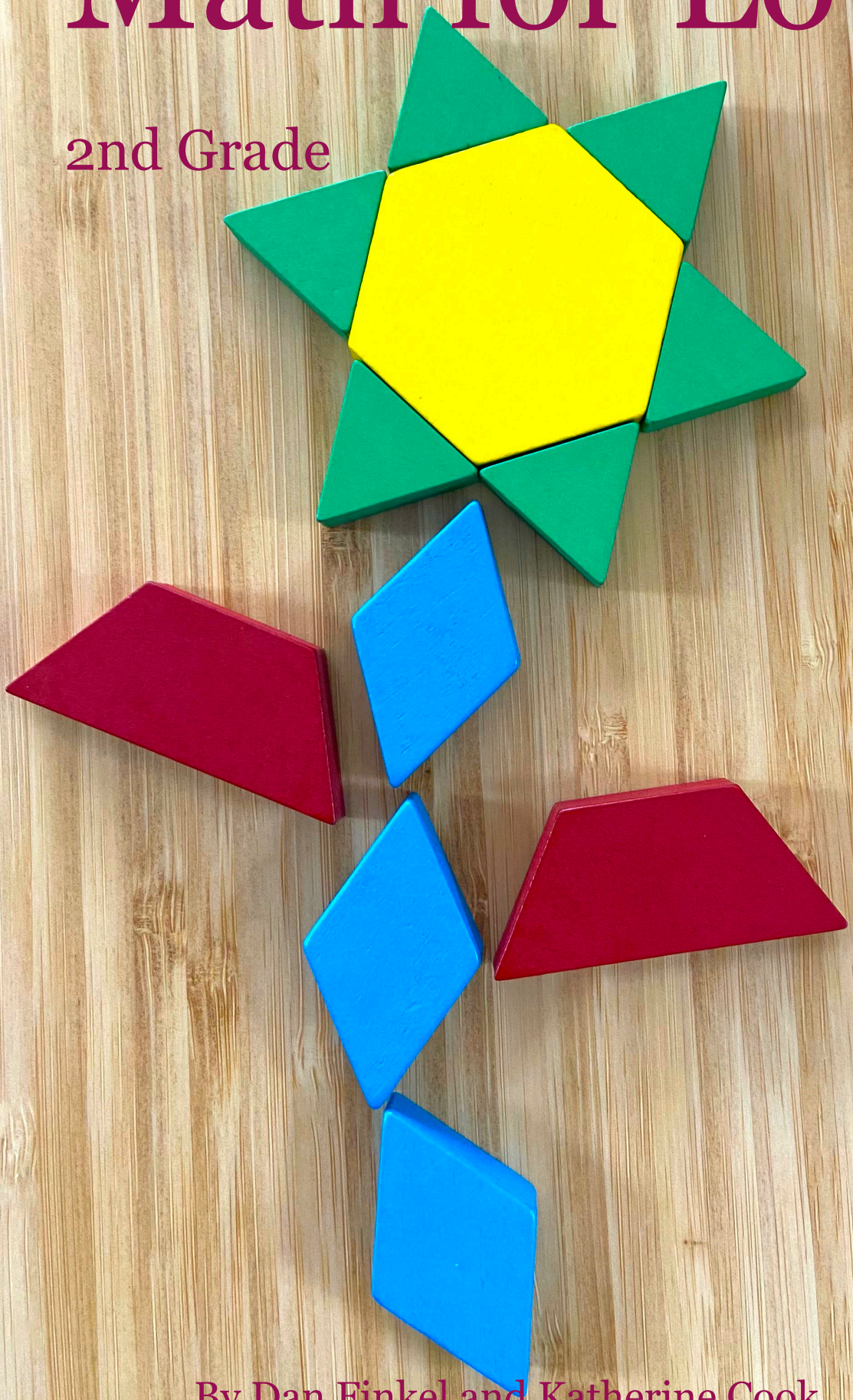
Math for Love

2nd Grade



By Dan Finkel and Katherine Cook

A word about using this book

This book was designed to support a summer math program lasting sixteen 75 - 90-minute days. With minimal adjustment it can be used for longer programs, programs with shorter or longer class times, or other variations.

You can also use these activities to supplement a normal math class. There are enough activities to do something from this book 1-2 times a week for an entire school year. Most of the games can be played many times. Openers can be used in the first ten minutes of class. Games can be played for 5 - 30 minutes. Activities might be good for sparking your students' curiosity and digging in on a multi-day project. Use these materials in the way that works for you and your students.

The introduction in the following pages is worth reading, and can help get you started. We also have a video PD series to support this curriculum that should be helpful: mathforlove.com/video/math-for-love-video-pd.

Enjoy!

A word about the copyright

We want this book to be used by teachers to help students explore math in a positive way. Feel free to make photocopies, share ideas with parents and colleagues, and use this as a resource draw on. In general, we support this kind of fair use of our materials.

Please don't post elements from this book online without citing the source, share large chunks of the book electronically, or sell parts of the book to anyone.

Table of Activities

Where to find each activity the FIRST time it's used in this curriculum

Introduction

Welcome to the Math for Love curriculum! We are thrilled to have you on board. We've seen this program make a meaningful difference in the lives of the students who have used it as a summer or supplemental curriculum. We hope it will do so for your students too.

Goals of the Math For Love Curriculum

We wrote this program to be both *play-based* and *rigorous*. The goals of the program are two-fold:

- Improve conceptual understanding of and fluency in mathematics
- Give everyone an opportunity to have fun and enjoy math

Many students haven't had enough time working with conceptual models of mathematics before being pushed into abstraction. To remedy this, the curriculum spends ample time exploring conceptual models, giving students opportunities to work concretely and pictorially while making connections to abstract reasoning.

Program Values

The goals 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 a 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 in *productively struggle*, actively working to understand, make meaning, and develop ownership of mathematical problems as they think through problems.
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 it if you tackle these responsibilities head on. Here are some concrete ideas on how to go about it.

★ **Be ready with questions**
Rather than simply telling students 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. This shows them that you value *their* thinking and contributions, not just the answer.

★ **Model how to play games, and teach how to win and lose**
Students can sometimes get overly 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. You can also adjust many of the games to be collaborative rather than competitive, if that works better for your students.

★ **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 Two-Color Dot Talk or opening game (see the Opener in the daily plan). Use the Math Games and Station Breaks (See **Appendix 2**) for transitions between Activities. 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 being good or bad at math is an unchangeable personality trait. 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.

★ **Encourage conjectures and counterexamples**
Establish a habit of supporting students' conjectures, hypotheses and predictions, and students will learn more and commit to the thinking process. Help them use

counterexamples as a tool to break and improve conjectures (see the **Counterexamples** lesson plan on **Day 1**), and they'll begin behaving like true mathematicians. Making conjectures and counterexamples normalizes mistakes as part of the learning process, and gives students a practical way to learn from them. It also makes doing and thinking mathematics the central activity of your class.

★ **Give your students *time* to think and explore**
Many students are not given enough time to establish solid conceptual models. Don't feel like you need to rush in order to get through the entire curriculum, if pausing and doing less in more depth would serve your students better. Make sure you don't push students to stop using blocks or pictures too quickly, either. Also note that a central place in the curriculum to practice fluency is in the games. That's why Choice Time features prominently every day. 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 get started on problems with support when necessary. But 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 will be more familiar with the "stuck" part, so try to start them with successes, and then move them slowly 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.

Using this curriculum

If you use this curriculum to supplement math in a classroom, you'll find that you should have enough here to do one or two Math for Love activities a week, some relatively brief, like openers or games, and some activities taking longer. Many of the activities, and especially the games, can be returned to more than once. We recommend you move through the curriculum roughly in order. Use your best judgment, and adapt as necessary.

If you use this curriculum for a summer program, it can serve for a 16-day program of 75 - 90 minute days. If you need it for less, you can end sooner. If you need something longer, you'll find that many of the activities naturally extend to fill a second day. No matter how you use it, we encourage you not to feel like you have to "cover" all the material. Give students the time they need to explore the ideas and activities at a comfortable pace.

Day Plan

The Day Plan lets you know exactly what's happening on a given day. The components of a typical Day Plan are:

- *Goals*
- *Opener*
- *Activity*
- *Game*
- *Choice Time*
- *Closer*

Goals

These are the learning content goals that are the target of the lessons and activities for the day. These are meant to help the teacher know what to focus on throughout the day. The goals do not need to be shared with students.

Opener

The Opener is the first activity of math class. The goal of the Opener is to get students relaxed, focused, and thinking. The teacher typically leads a math talk or game, built to help the students begin thinking and engaging right away. The Openers should be at a level of challenge that provides all students a positive, successful encounter with math first thing.

In general, the Opener should last about 5 - 10 minutes.

Activity, Game, Choice Time

Following the opener, there is a suggestion for an activity, a game, and Choice Time. There are two recommended ways to approach these three elements.

1. Have students rotate between three stations. This is especially recommended when you have additional adults (instructional aides, parent volunteers, tutors) in the room aside from the teacher.
2. Take the whole class through the activities one by one. This is recommended when the teacher is the only adult in the classroom.

Either way you run your classroom, the elements are designed to give students the maximum opportunity to think & engage, practice skills, explore questions, and have fun.

Choice Time includes a suggestion of a small group of past games and activities for the students to try. This time is a fun and vital opportunity for students to practice skills and explore deeper some of the games they've had a chance to play only briefly when they were formally introduced.

Closer

The Closer gives students a chance to reflect on what they learned or still have questions about in the day, and for the teacher to lead a closing discussion, or pose a final challenge related to the new material from the day.

There is a suggested question to pose at the end of each lesson. These are designed to promote reflection some important element of the day's learning. Ideally, these questions will be accessible to everyone, or review. They can usually be discussed in pairs or small groups, and then briefly with the entire class.

Instead, the teacher might prefer to let students discuss another element from the class that they noticed or that they're still wondering about. When students share what they noticed, it's a chance for their observations to come to the attention of the class; when students share what they wonder, it's a chance to see their questions, conjectures, and current state of understanding.

The Closer should take 5 minutes or less.

Other Notes and Best Practices

★ **Math Breaks and Physical Games**
Check out the math-based movement breaks in **Appendix 2**. These are excellent as transitions.

★ **Folder for Worksheets**
Give each student a folder where they can keep their worksheets. If they finish an activity early, they can turn back to their unfinished worksheets and finish them. They can also work on them during Choice Time.

★ **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 both choose the activity that is right for them, and then stick with it for at least half of the time.

★ **Challenge Problems**
Challenge problems (see **Appendix 3**) are great options for Choice Time any day. Offering “spicy" variations of worksheets or unfinished activities as Choice Time activities can be another nice option.

★ **Station Transitions**
If you use stations, provide 1-2 minute warnings before station transitions, to apply a gentle transition, cleanup, and—especially at the Activity—a brief reflection or wrap-up. If you use an alarm, make it a gentle sound (i.e., a gong) rather than an abrasive one (i.e., a clock radio alarm).

★ **Letters home**
See **Appendix 1** for games to send home. These will help parents/guardians and students play math games at home. You can always send other favorite games home, or encourage students to share games they've learned with people at home. Note that there is no homework for this program otherwise.

★ **Dot Talk Images and other Openers**
For Dot Talks, you might decide to create physical versions of them with magnetic ten frames or other blocks. Physical versions are often preferable, since students can manipulate the blocks directly.

Day 1

Goals

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

Opener

Mingle (or Guess My Number from Day 2)

Note: if you have a name game you like to use to get acquainted with your students, feel free to use it instead.

Activities

Preassessment
Counterexamples & Pattern Block Triangles

Note: a fantastic way to transition from Counterexamples to Pattern Block Triangles is with a false conjecture, like “it must be impossible to make a triangle using 2 blocks.” This gets students playing counterexamples again, and launches into Pattern Block Triangles beautifully.

Game

Dots and Boxes

Choice Time (if time allows)

Dots and Boxes
Block free play

Note: block free play gives students a chance to explore the blocks and manipulatives they'll be using throughout this program. Block free play is a good option for Choice Time, especially in the early part of the program.

Closer

Tell students that someone recorded the blocks they used to build a pattern block triangle with the equation 1 + 3 + 4. Use the following questions to spark a closing discussion.

- What can students figure out about the triangle?
- Can students tell from that how many blocks they used? (8)
- How many different types of blocks? (3)
- Which types of blocks? (Much tougher to say)

Mingle

The teacher calls out a number (e.g., 3), and the students get themselves into groups of that size 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 students get in groups, they can learn each other's names.

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

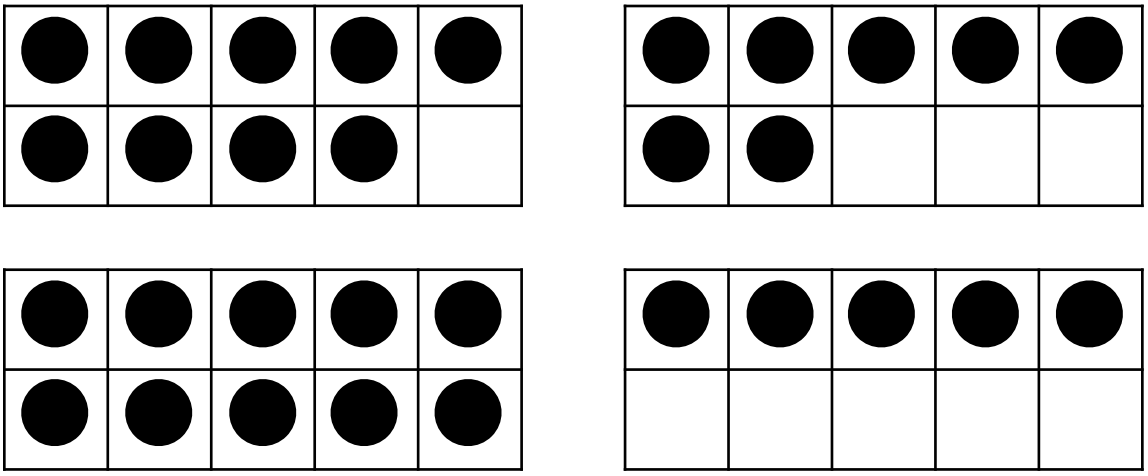
Tips for the Classroom

1. The teacher can get into or out of the groups in order to make sure no student is by themselves.

Name_____

Preassessment

1) How many dots are in the ten frames below?
Write an equation and solve.



Equation:_____

2) Fill in the blanks to make the equation true.

20 - _____ = 10 + _____

Name_____

Fill in the blanks to make the equations true.

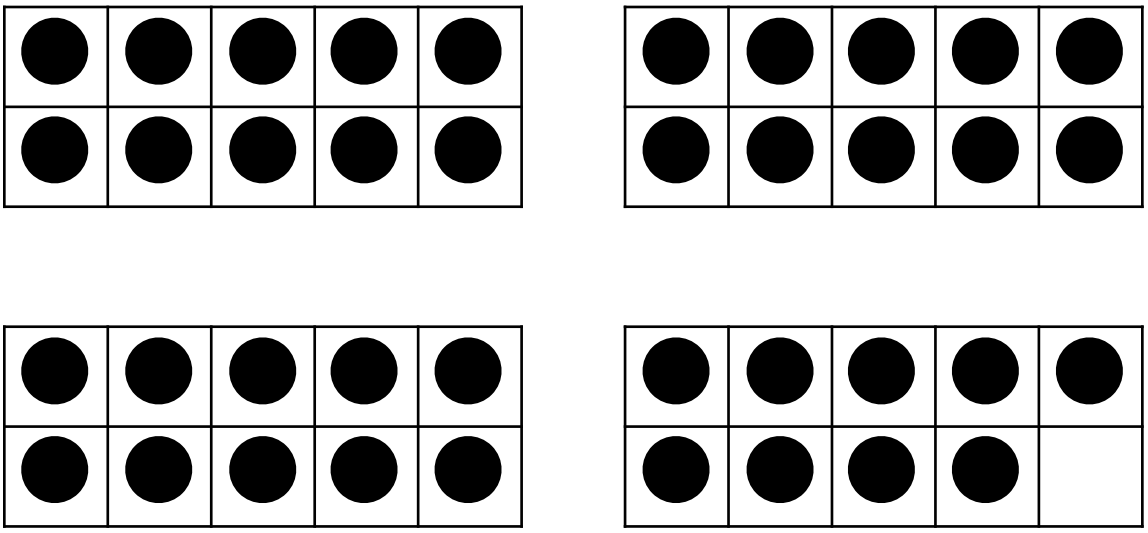
3) 31 - 12 = _____

5) _____ = 16 + 23

4) 17 + 68 = _____

6) 35 + _____ = 63

7) How many <u>more</u> dots to you need to have **100 dots**?



8) I had 45 books. Then I gave away 19 books.
How many books do I have?

9) Julie started with six $20 bills.
Then she got $25 from her mom.

How much money does Julie have now?

10) Mariah has 18 shells.
Aaliyah has 17 shells.
Martin has 14 shells.
Kwan has 20 shells.

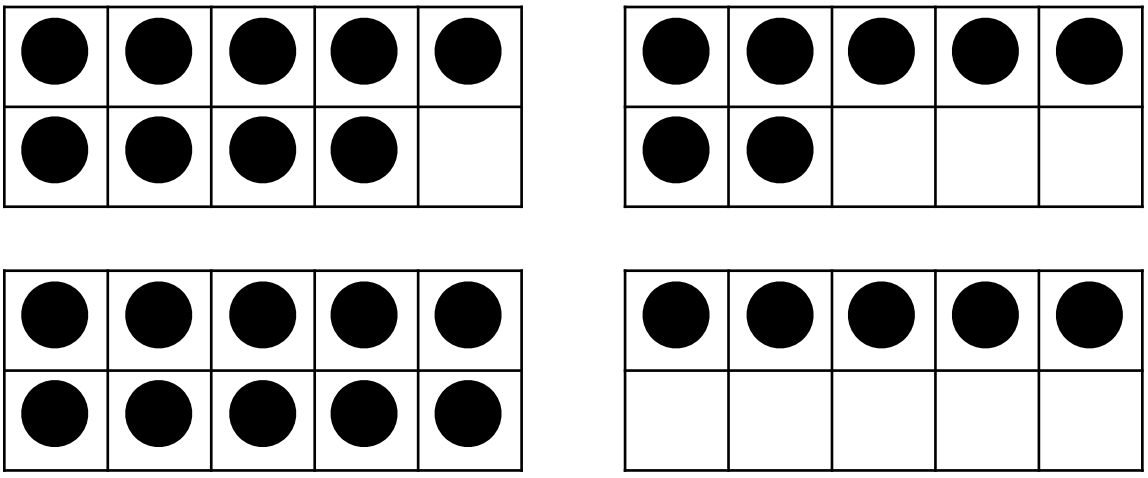
Kwan says that he and Martin have more shells together than Mariah and Aaliyah. Is he right or not?
Explain.

Name_____

Pre-assessment
Solutions and Rubric

Each question worth up to 10 points.
Some partial credit available.

1) How many dots are in the ten frames below?
Write an equation and solve.



Equation:_____**9+7+10+5 = 16 + 15 = 31**_____

5 points for any correct expression
(i.e., 9+7+10+5)
5 points for correct answer

2) Fill in the blanks to make the equation true.

20 - _____ = 10 + _____

10 points for any correct answer
i.e., 20 - 6 = 10 + 4

Name_____

Fill in the blanks to make the equations true.

3) 31 - 12 = ___**19**_____

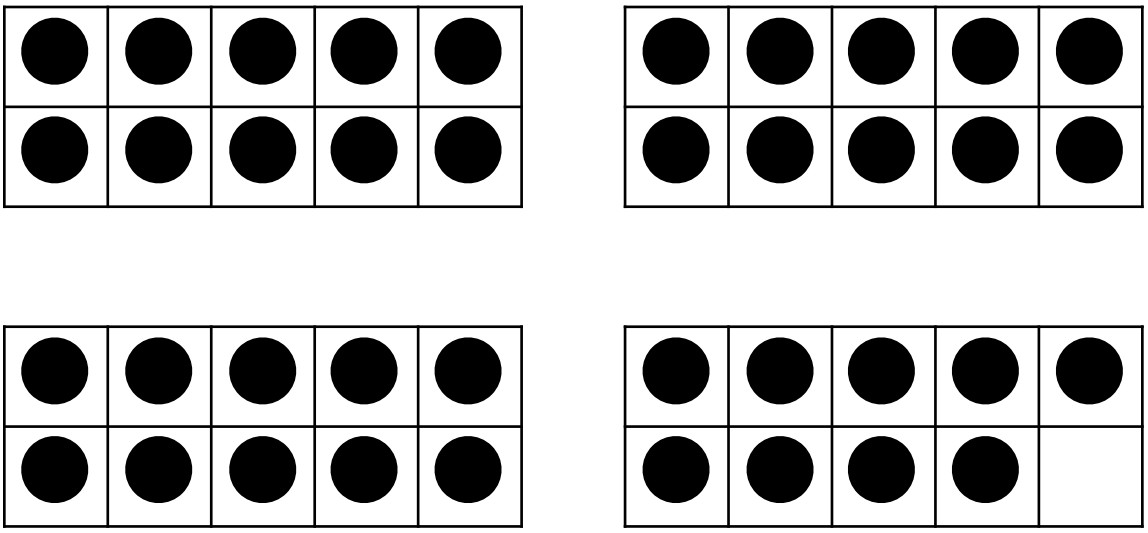
5) ___**39**_____ = 16 + 23

4) 17 + 68 = ___**85**_____

6) 35 + ___**28**____ = 63

10 points for correct answers

7) How many <u>more</u> dots to you need to have **100 dots**?



10 points for correct answer: 61 dots
Up to 5 points partial credit for a correct picture answer that students miscount (i.e., drawing in 6 ten frames and 1 extra dot)

8) I had 45 books. Then I gave away 19 books.
How many books do I have?

26 books
full 10 points for correct answer, including unit

-1 point for leaving off "books"
up to 5 points partial credit for setting up correct equation (45 - 19 = ____)

9) Julie started with six $20 bills.
Then she got $25 from her mom.

How much money does Julie have now?

$145
Full 10 points for correct answer

-1 point for leaving off "$" or "dollars"
up to 5 points partial credit for setting up correct equation or picture, i.e.
20 + 20 + 20 + 20 + 20 + 20 + 25 = ____ or
6 x 20 + 25 = ____

10) Mariah has 38 shells.
Aaliyah has 37 shells.
Martin has 34 shells.
Kwan has 40 shells.

Kwan says that he and Martin have more shells together than Mariah and Aaliyah. Is he right or not?
Explain.

Kwan is wrong, because he and Martin have
34 + 40 = 74 shells, while Mariah and Aaliyah have
38 + 37 = 75 shells.

5 points for correct answer
5 points for showing work correctly
-1 points if units are never mentioned.

Counterexamples

Topics: logic, deduction, mathematical argument, communication
Materials: None
Common Core: Variable, but especially MP3

Prove the teacher wrong. Rigorously.

Why We Love Counterexamples

Every kid loves to prove the teacher wrong. With Counterexamples, they get to do this in a productive way, and learn appropriate mathematical skepticism and communication skills at the same time.

It is possible to play Counterexamples with kids as young as kindergarteners as a kind of reverse "I Spy" ("I claim are no squares in this classroom. Who can find a counterexample?"). What's great, though, is that you can transition to substantial math concepts, and address common misconceptions. Counterexamples is a perfect way to disprove claims like "doubling a number always makes it larger" (not true for negative number or 0) or sorting out why every square is a rectangle, but not every rectangle is a square. For older kids, you can even go into much deeper topics, like: "every point on the number line is a rational number."

The language of counterexamples is crucial to distinguish true and false claims in mathematics; this game makes it natural, fun, and plants the skills to be used later. Counterexamples is also a great way to practice constructing viable arguments and critiquing the reasoning of others.

The Launch

Counterexamples is a fun, quick way to highlight how to disprove conjectures by finding a counterexample. The leader (usually the teacher, though it can be a student) makes a false statement that can be proven false with a counterexample. The group tries to think of a counterexample that proves it false. The leader can then continue the game by refining the conjecture to absorb the information from the counterexample. This gives a better conjecture, which students can then find another counterexample to disprove.

The best statements usually have the form "All _____s are _____" or "No _____s are _____." You can also play around with statements like "If it has _____, then it can _____."

For instance:

- All birds can fly. (Counterexample: penguins)
- No books have pictures in them.
- All books have pictures in them.

- If something produces light, then it is a light bulb.
- If something has stripes, then it is a zebra.

Once students have the hang of it, you can make the examples more mathematical.

- There are no squares in the room.
- Odd numbers have to have only odd digits (counterexample: 21)
- Even numbers have to have have only even digits (counterexample: 12)
- If a shape has all sides the same length, then it is a square (counterexamples: equilateral triangle; rhombus; many more)
- Adding makes number larger (counterexample: adding 0. Also, -1, etc.)
- You can't make a triangle using 2 or more pattern blocks. (This is a great transition into Pattern Block Triangles.)

Example
Teacher: I claim all animals have four legs. Who can think of a counterexample?
Student 1: A chicken!
Teacher: Why is a chicken a counterexample?
Student 2: Because it has two legs.
Teacher: Right. I said every animal has four legs, but a chicken is an animal with just two legs. So I must have been wrong. Let me try to refine my conjecture then. I should have said that animal must have 2 or 4 legs. That feels right.
Student 3: What about a fish?
Teacher: Aha. A fish is an animal with no legs. Thank you for showing me the error of my ways. What I should have said is that animals have *at most* four legs.
Student: 4: What about insects?
And so on.

When the moment feels right, you can transition into Pattern Block Triangles (see next lesson) by posing the conjecture:

"All triangles you can make from pattern blocks are green."

One counterexample is a triangle made from a trapezoid and a green triangle. From there, you can refine the counterexample to include numbers, e.g.:

"You can make a triangle from one or two pattern blocks, but no more than that."

This should provide some good momentum for Pattern Block Triangles! Keep the language of conjectures and counterexamples in mind for the rest of today, and throughout this program.

Tips for the Classroom

1. It's good to make up false conjectures that are right for your students. But start simple.
2. Kids can think of their own false claims, but sometimes these aren't the right kind, and they often have to be vetted.
3. Once you introduce the language of counterexamples, look for places to use it in the rest of your math discussions.

References: http://kuow.org/post/getting-kids-interested-math-without-their-knowing

Pattern Block Triangles

Topics: Addition, counting, geometry
Materials: Pattern blocks, scratch paper and pencil
Common Core: 1.OA.1, 1.OA.2, , 1.OA.4, 1.OA.5, 1.G.2, 2.OA.1, MP1, MP6, MP7, MP8

How many blocks can you 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

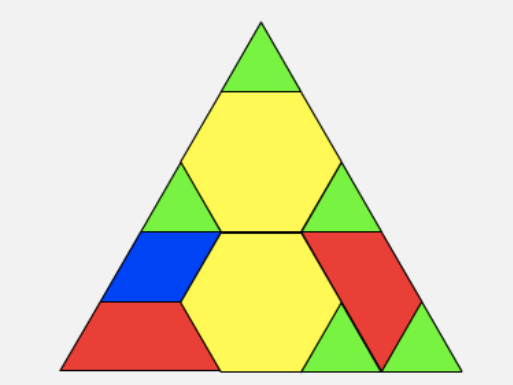
Prep the pattern blocks beforehand by removing the tan rhombuses and orange squares, or else tell students not to use those blocks.

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



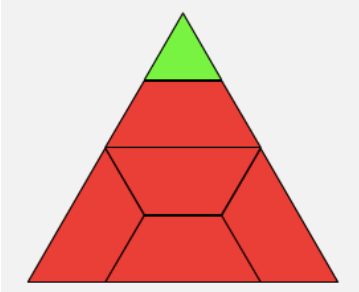
Or simply 2 + 2 + 1 + 5 = 10.

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.

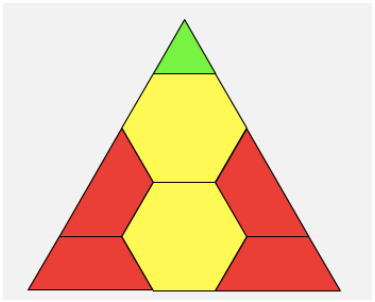
Prompts and Questions

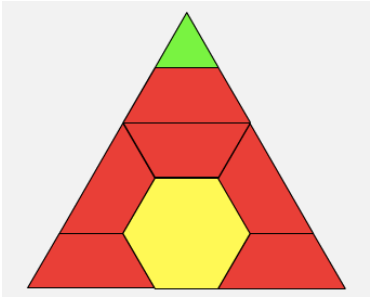
- How many blocks did you use in that triangle?
- Did you record it yet? Show me the equation for that triangle.
- Have you built a triangle with 11 blocks yet? How did you do it?

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



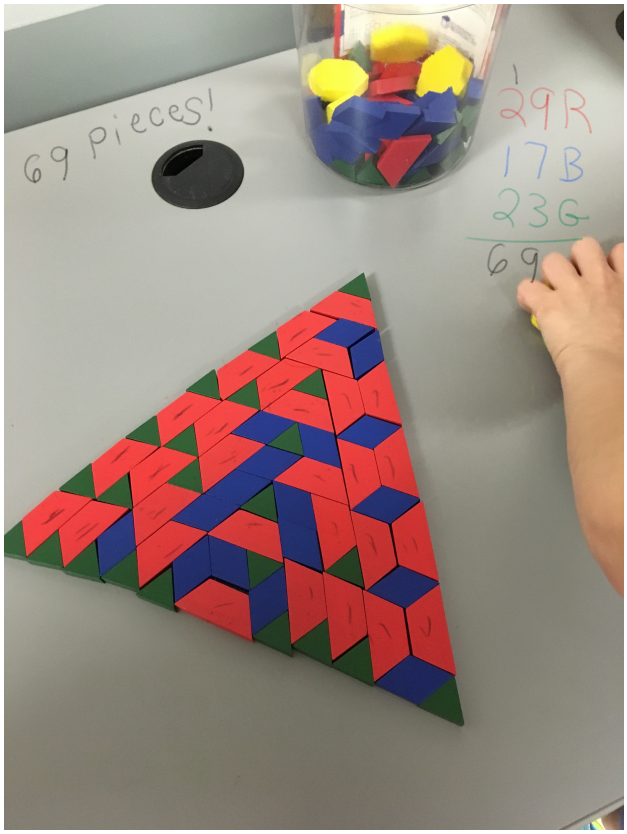


1 hexagon + **6** trapezoids + 1 triangle = **8** blocks

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.



Dots and Boxes

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.

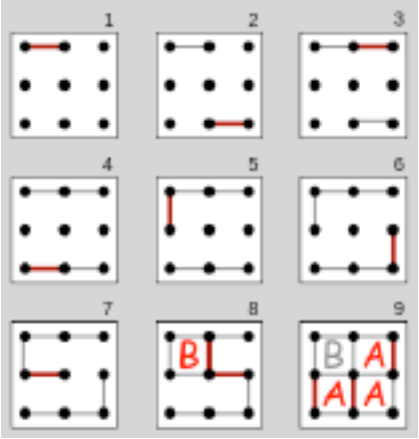


Image by of Wikipedia User Tiger66

Prompts and Questions

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

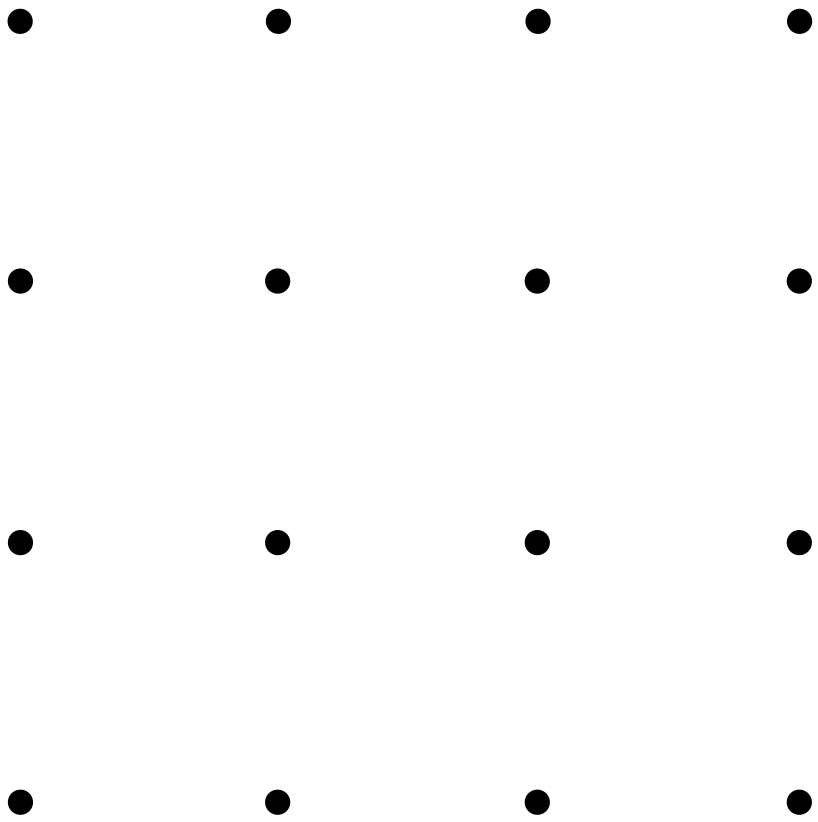
The Wrap

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.

Whoever has the most squares at the end wins.

Dots

On yc a
squar
squar

Whoever has the most squares at the end wins.

Day 2

Goals

1. Practice addition with multiple addends.
2. Explore solving rich problems with multiple steps.

Opener

Guess My Number

Activity

Flower Petal Puzzles

Note: Flower Petal Puzzles not done today make great problems for Choice Time later. This is also another spot to use the language of conjectures.

Game

PowerDot Pro

Choice Time

Block Free Play
Dots and Boxes
PowerDot Pro
Challenge Problems (See Appendix 3, or use Flower Petal Puzzles).

Closer

Tell students that there was a tie in PowerDot Pro. One student had a 6 and a 5. What two cards might the other student have had?

Let them discuss and see how many pairs of cards they can find that would also equal 11.

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.

Flower Petal Puzzles

Topics: addition, subtraction, logic
Materials: Worksheets, pencil and scratch paper
Common Core: 1.OA.A.2, 1.OA.C.6, 1.OA.D.8, 2.OA.B.2, MP1, MP7

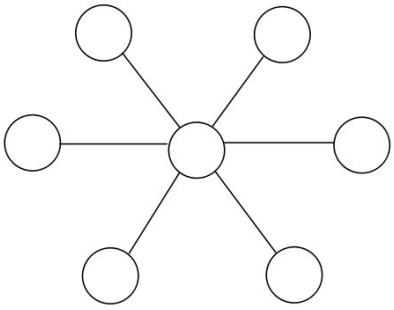
Put each number in a "petal" so each line of three numbers in a row has the same sum.

Why We Love Flower Petal Puzzles

This is a simple but thought-provoking puzzle. It's a great way to encourage students to make mistakes and learn from them in order to arrive at a right answer in the end. A fun structure to explore and build on, this is skills practice embedded in a more rigorous and interesting puzzle.

The Launch

Draw the "flower" drawing and explain that it is possible to put the numbers 1 through 7 into each "petal," using each number exactly once, so that each straight line adds up to 10. Take suggestions from students about which number could do where, making sure that a "1" does NOT go in the center.



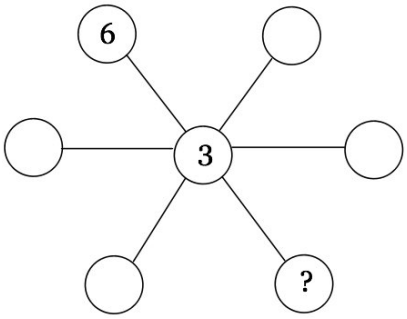
1 2 3 4 5 6 7

With student input, get as far as you can until you are stuck. Then distribute the template and let students try on their own.

Example Launch

Teacher: I've heard that it is possible to put the numbers 1 to 7 into the petals of this flower to make every line of three petals add up to 10. How can we do it, I wonder? What number could we put in the middle?

Student: Three?
Teacher: Let's try it. I'll cross the "3" off my list of numbers, since I want to use each number only once. Now what could I put in this next petal?
Student: I don't know.
Teacher: I don't either. But let's try something and see if it will work. We can always erase later.
Student: What about six?
Teacher (writing in 6, and crossing it out from the list of numbers): Ok, now we have a 6 and a 3 in one row. What should we put in the last petal to make 10? In other words, if we add up 6 and 3, what more do we need to add to make 10? Think about it, then pair and share.
[Kids think and discuss]



1 2 3 4 5 6 7

Student: It has to be 1.
Teacher: How do you know?
Student: Because 6 + 3 is 9, and then we need one more to make 10.
Teacher: Aha! I'll put that in too, then. So what can go here?
[Teacher continues until it becomes clear that the flower petal puzzle CANNOT be solved.]
Teacher: Hmmmm… it looks like this isn't going to work. Maybe we should have put a different number in the middle. What number would you try? [Students give suggestions.] You know what, let's go ahead and try it out on our own. I've got empty flower petal pictures right here (passes out the empty template). Try out different numbers in the petals and see if you can get each row to add up to 10. When you can solve that, I've got some followup challenges for you too.

The Work

Let students work individually or in pairs to solve the Flower Petal Puzzle. When they solve it, they can come to you for the next challenge.

- Challenge 1: All lines add to 10.
- Challenge 2: All lines add to 12.
- Challenge 3: All lines add to 14.
- Challenge 4: Students make their own Flower Petal Puzzles.
- Challenge 5: Advanced Flower Petal Puzzles

Prompts and Questions

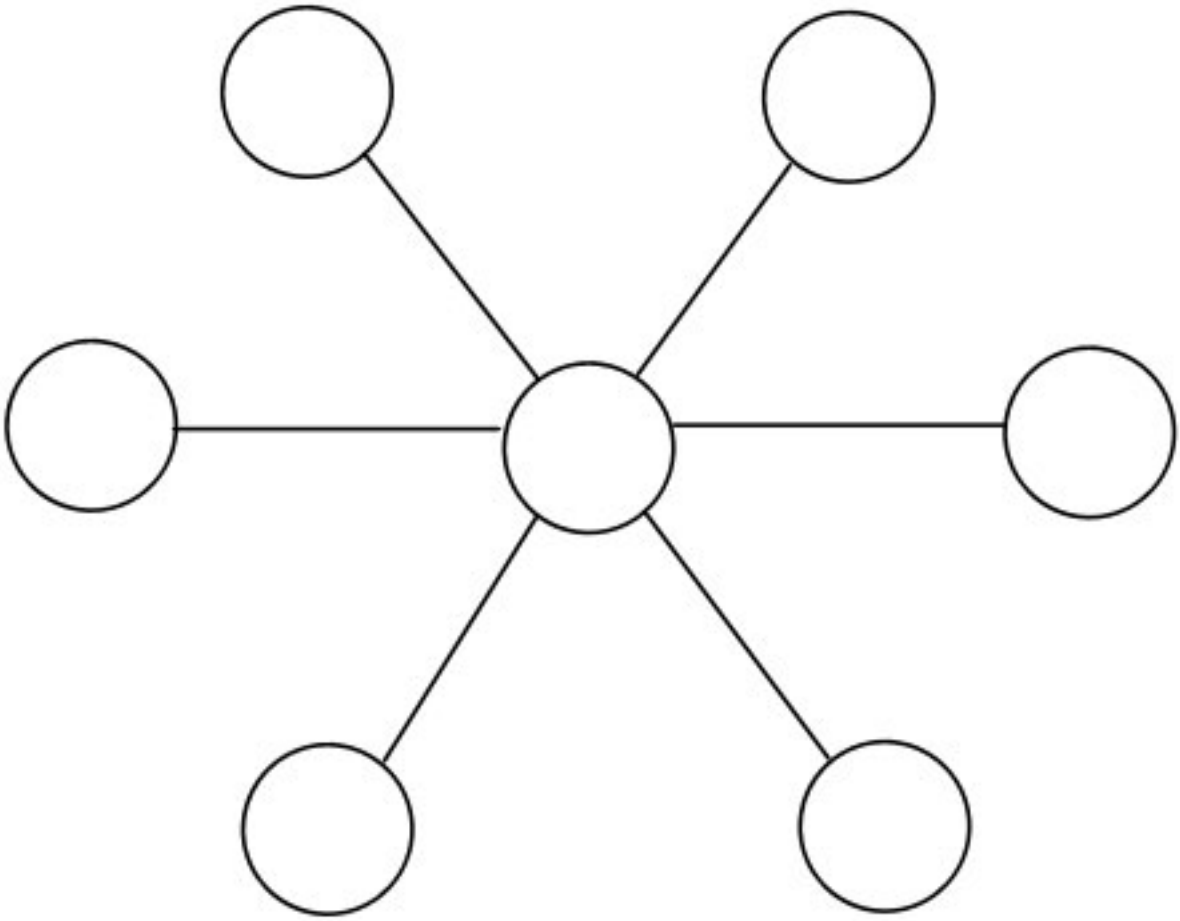
- What number could we try out in the middle?
- What needs to go in that spot for the three numbers to make 12?
- What do these two numbers in the row add up to now?

Tips for the Classroom

1. Hints: put a 1 in the middle to make each row add up to 10. To make 12s, put a 4 in the middle. To make 14s, put a 7 in the middle. Avoid accidentally getting the answer right when you demonstrate the puzzles.
2. Students can use counters to try moving numbers around if they need a more concrete look at the puzzle.
3. If students don't know what to try when they make up their own puzzles, encourage them to try drawing a flower with more petals, or give them the template with more petals and ask them what puzzle they can make from it.
4. If you can motivate students to create their own puzzles, this can be the start of an even richer exploration.

Flower Petal Puzzles

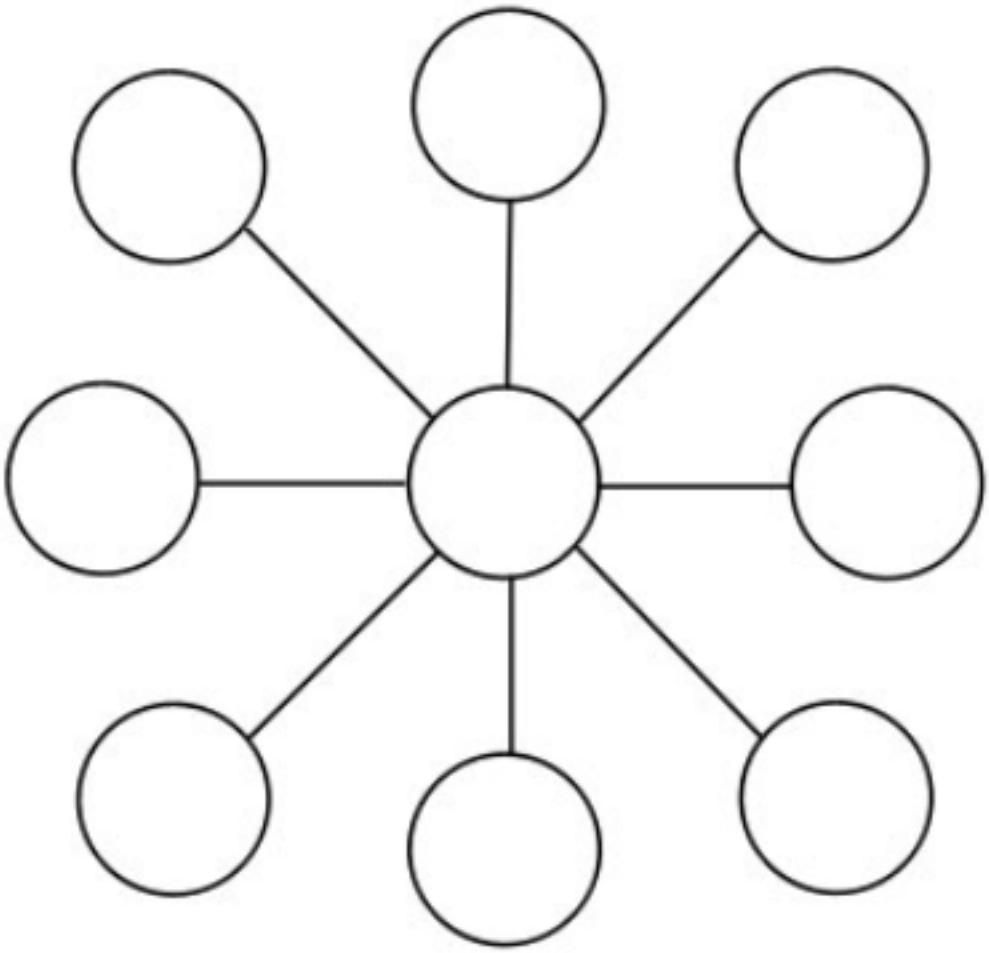
Write in the numbers 1 through 7 so that every group of three numbers in a line adds up to _____.



1 2 3 4 5 6 7

More Flower Petal Puzzles

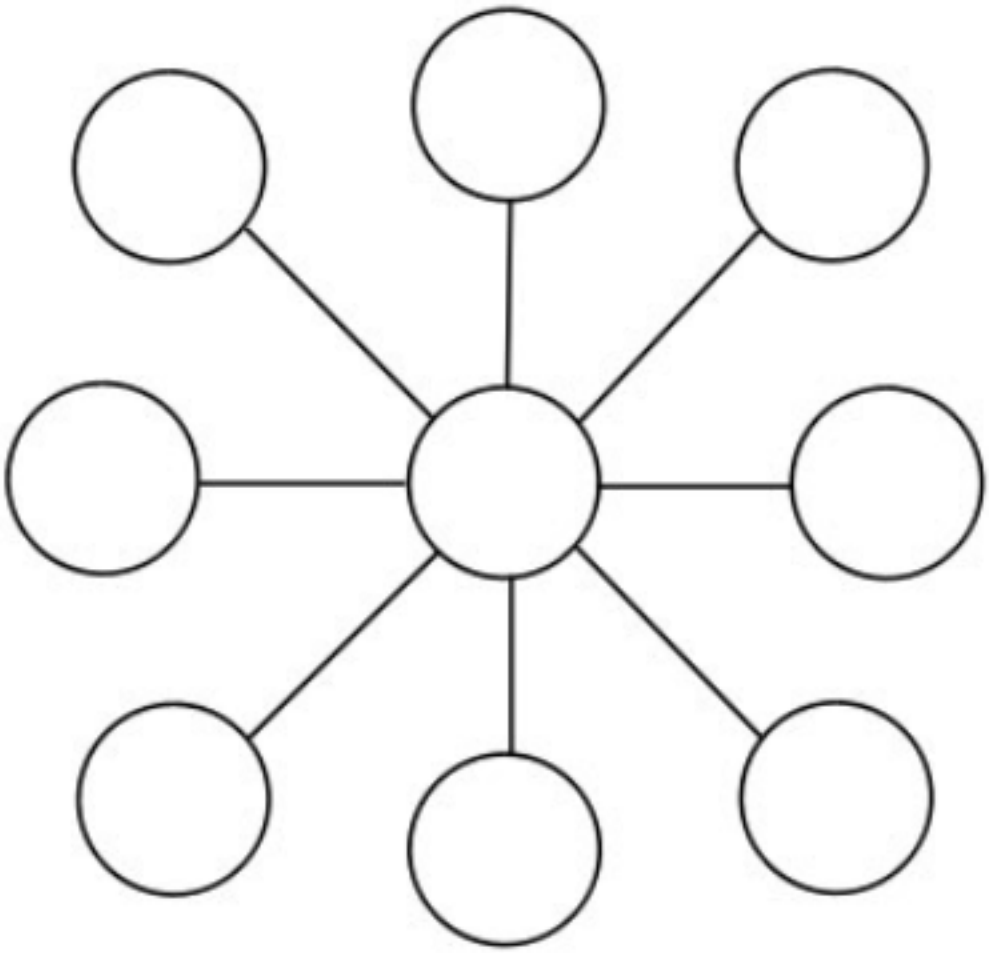
Write in the numbers 1 through 9 so that every group of three numbers in a line adds up to 15.



1 2 3 4 5 6 7 8 9

More Flower Petal Puzzles

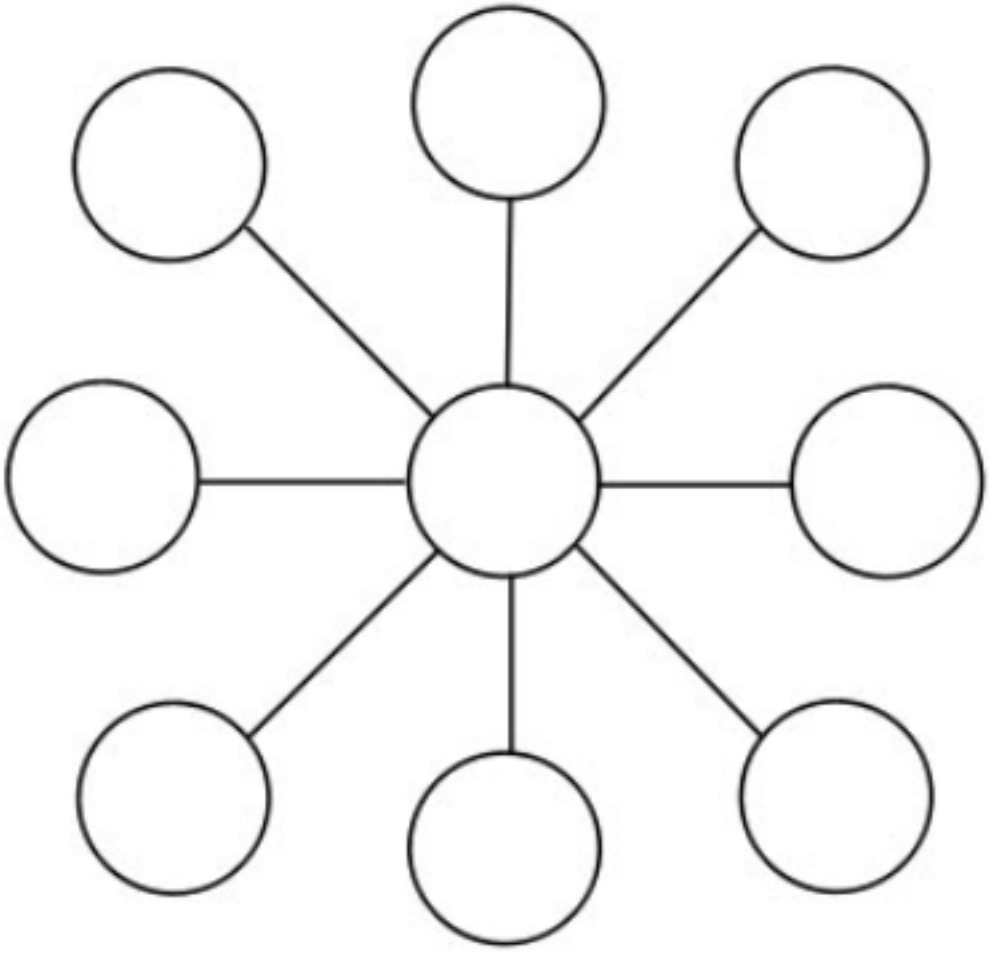
Write in the numbers 1 through 9 so that every group of three numbers in a line adds up to 18.



1 2 3 4 5 6 7 8 9

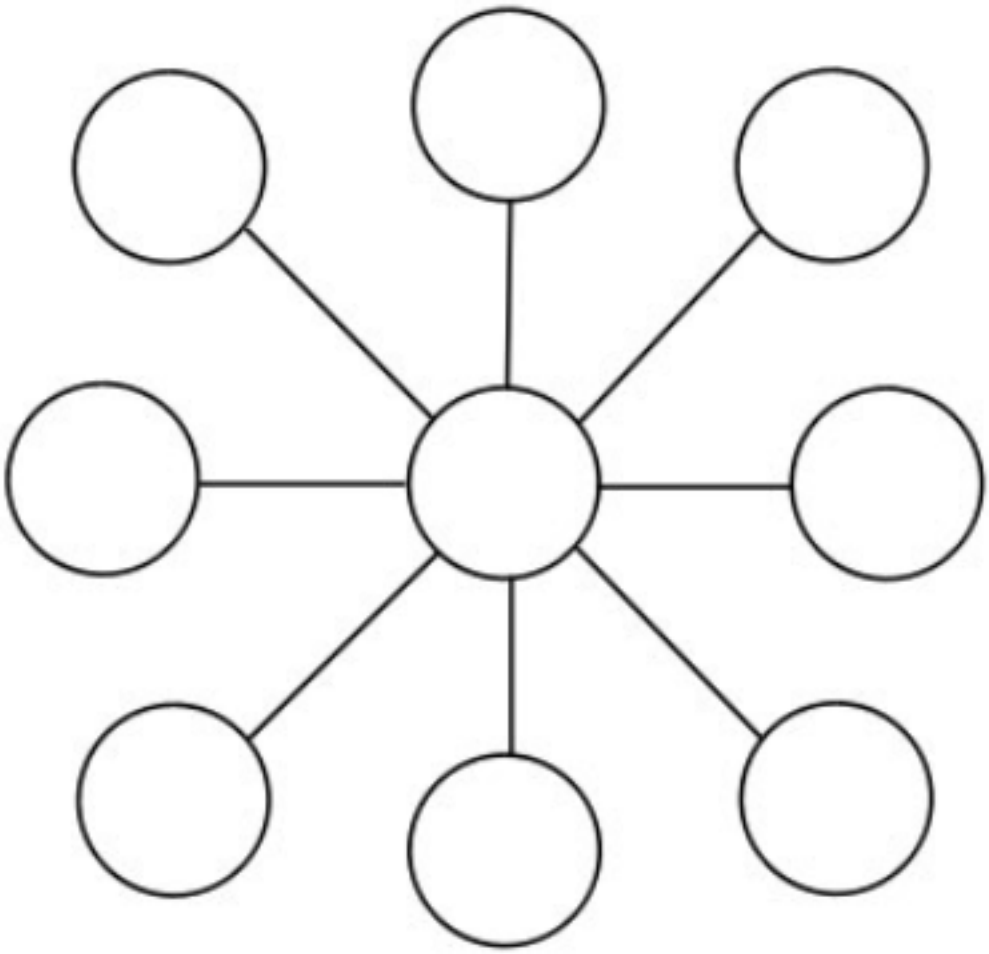
More Flower Petal Puzzles

Write in the numbers 10 through 18 so that every group of three numbers in a line adds up to 42.



10 11 12 13 14 15 16 17 18

Make your own Flower Petal Puzzle



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 turn 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 downlevel. 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.

Day 3

Goals

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

Opener

2-Color-Dot Talks

Activity

Speed Stars

Game

Save Twenty

Choice Time

Block Free Play
Save Twenty
PowerDot Pro
Challenge Problems (See Appendix 3)

Closer

Tell students that you rolled a perfect 20 in Save Twenty, and one of your dice was a 1, and another was a 3. Can they figure out what the other three dice were? Let them discuss and explore.

How did they figure it out?
Are there any other answers?
How do they know?

[Answers: 6, 5, 5 or 6, 6, 4]

Two-Color Dot Talks

Topics: Mental math, numerical fluency; argument & critique
Materials: White board & projector
Common Core: 2.OA1, 2.OA2, 2.OA3, 2.OA.4 2.NBT.2, 2.NBT.5, and especially MP3

This mental math routine creates powerful positive habits for students.

Why We Love Two-Color Dot Talks

In just 5 - 10 minutes, these openers get all students involved, help 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.

The Launch

The talk starts very simply. The teacher projects the image, with black and white dots, on the board where all students can see it, and asks students to figure out:

i) How many white dots there are

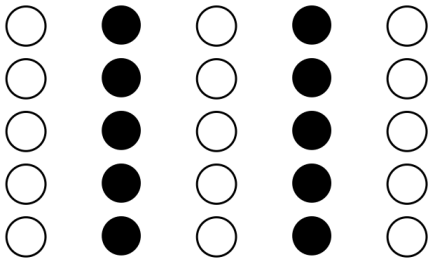
ii) How many black dots there are

iii) How many total dots there are

A common approach is to give students some time to think about these three questions on their own first, and then share with a partner. Once students have had time to think the question through, lead a class discussion where students share their answers and approaches.

The key elements to these talks are a de-emphasis on speed and right answers and an added emphasis on process and communication. Expect some disagreements over the answers, and try to use those disagreements as a motivation for students to articulate their ideas to their classmates.

The Work



Notice that once you know two of the answers, you can find the third by taking a sum or difference. For example, if you figured out that there were 10 black dots and 15 white dots in the image below, then you could figure out that there are 25 dots in all, just by adding 10 + 15 to find the total. Similarly, if you counted 10 black dots and 25 total, you could figure out that there are 25 - 10 = 15 white dots, without needing to count them. Depending on the talk, the order of which answer you choose to find first and second becomes part of the strategy of solving them in the most efficient way. Sometimes the

best move is to find the total dots first and work from there. Expect students to share substantially different strategies in how they approached the problems, and welcome the differences! The different approaches are exactly what makes the discussions so rich.

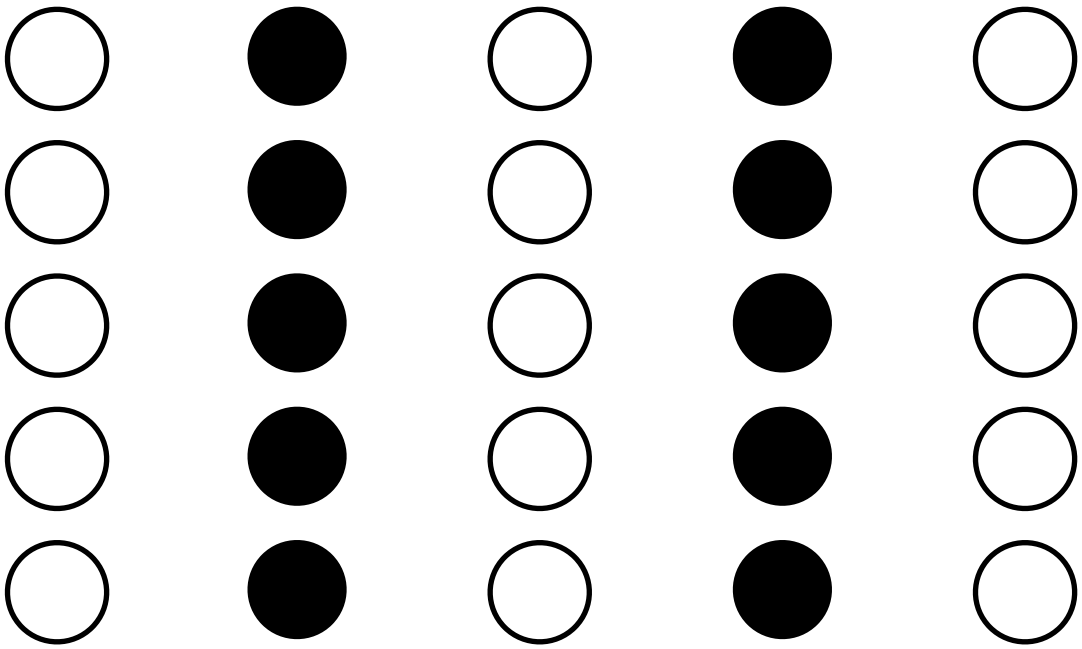
Prompts and Questions

- 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?
- It sounds like Anita noticed that there were ten dots in each row, and then counted by tens. Did anyone else use the same strategy?
- Turn to the person next to you and explain how you counted.

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. The explanations are what matter.
2. A useful protocol is to have students put a thumb up at their chest rather than waving a hand in the in the air.
3. Give students constructive language to use in the discussion, like, "I respectfully disagree, because…" and "I agree with _____, because…"
4. Always keep the environment safe and positive.
5. 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.
6. Doing short (5 - 10 minute) Two-Color Talks regularly is more powerful than long ones infrequently. Do a maximum of two talks per day.

Warm Up - How Many Dots?



How many black dots?

_____ black dots

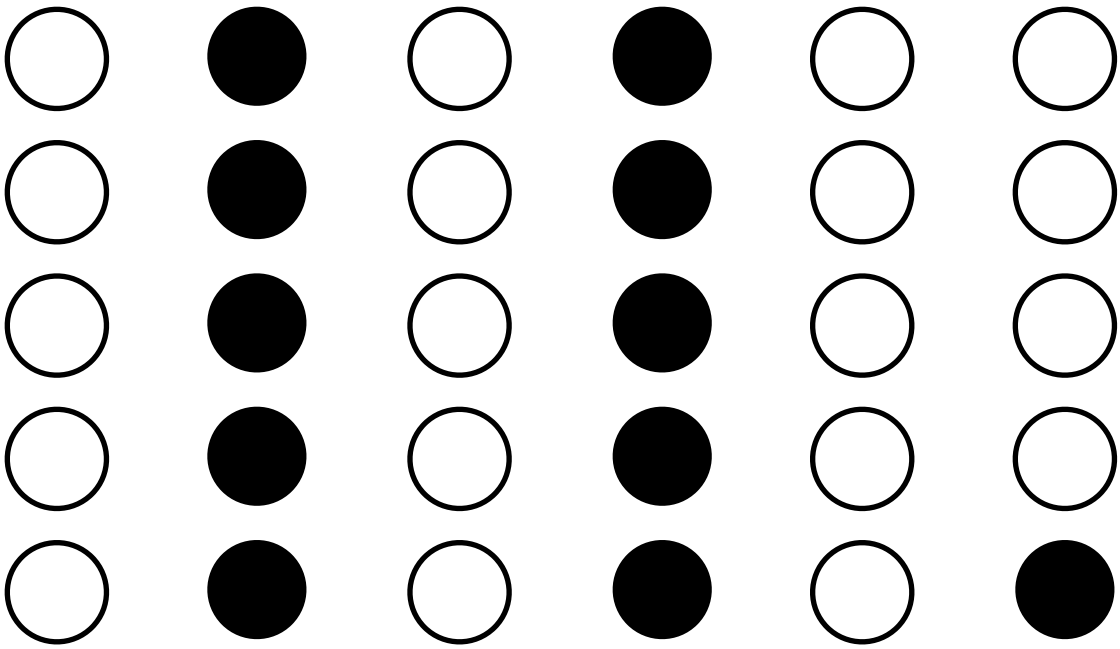
How many white dots?

_____ white dots

How many total dots?

_____ total dots

Warm Up - How Many Dots?



How many black dots?

_____ black dots

How many white dots?

_____ white dots

How many total dots?

_____ total dots

Speed Stars

Math concepts: Subtraction, classification, greater than/less than
Equipment: Hundred chart, pencils, paper, stop watch or timer
Common Core: 2.OA.2, MP1, MP6, MP7

How many stars can you draw in a minute? And how does the arrangement of them make them easier or harder to count?

What We Love about Speed Stars

Speed Stars is a hands-on introduction to the hundred chart that's fun and engaging for students.

The Launch

This activity involves a lot of teacher involvement. No preliminary is required.

The teacher explains that the students will have exactly thirty seconds to draw as many stars as they can. Every student gets a pencil and a blank sheet of scratch paper. As quickly as possible, get the students to start drawing stars!

The Work

When thirty seconds are up, students count how many stars they drew. This may take a little bit, and some students may have trouble counting, and not even come to an answer. Suggest that there must be a way to organize the stars to make counting easier. How could we do it?

Take student suggestions. If anyone says anything like "space them in an array," or "group them by fives/group them by tens," mention that we have a tool we can use for that: a hundred chart. It's just an array of squares in rows of ten, and columns of ten.

Let each student have a blank hundred chart, and give them another thirty seconds to draw in stars. When time is up, let them count again. Then let students demonstrate how they counted using the chart. (Help here if necessary.) Ideally, the students will see how they can count the completed rows of ten (10, 20, 30, 40, 50…) and then count the additional stars in the next row (51, 52, 53, 54).

Play some more games of Speed Stars, varying the time to be longer (40 seconds, 50 seconds, 60 seconds, etc). Before each round, have students guess how many stars they'll be able to draw, then draw and see how close they were.

Questions and Prompts

- How can you count to this spot (i.e., to 50)?
- How do you count from 50 to here (i.e., to 57)?
- How many more stars did you draw this time than last time?

The Wrap

This can happen in the station, or in the whole-class wrap-up time after the stations are complete. Discuss how different spots in the hundred chart correspond to different numbers. Try pointing to a spot on the hundred chart and posing the question: "If you drew stars to here, how many stars would you have drawn?" Count together with students, and then put the number into that spot. Repeat this a few times, and ask the students to start to imagine how the chart would look if it were totally filled in with numbers. To conclude the lesson, show them a filled-in hundred chart, and let them know they'll be working with it more next class.

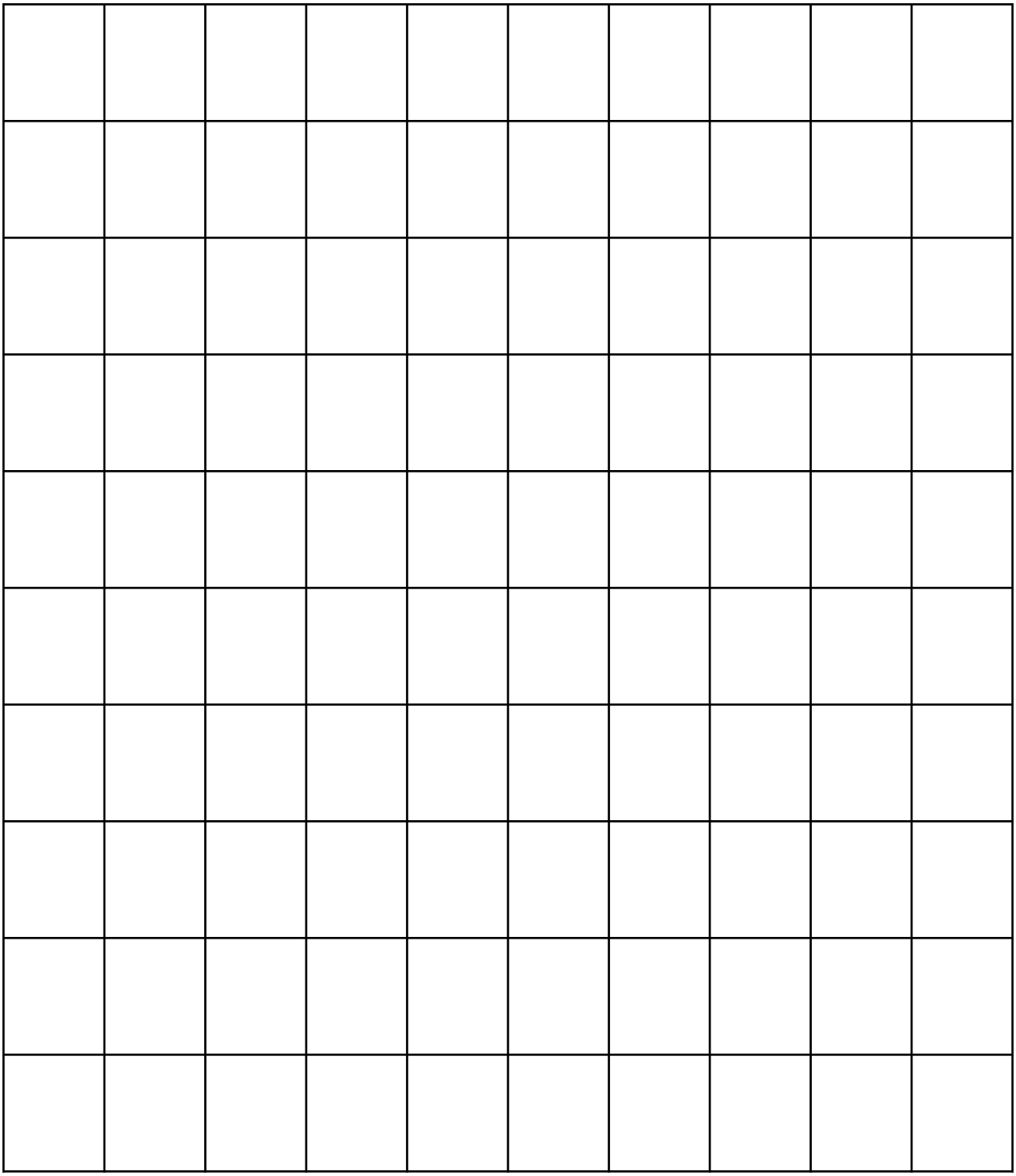
Tips for the Classroom

1. Don't take long explaining how Speed Stars works. Try to keep your explanation under a minute. Students will pick it up quickly once they start, and doing the activity will help motivate them.

2. Speed Stars can be a popular Choice Time activity in the future.

3. An excellent challenge question is to ask students how many more stars they would need to draw to finish coloring in an entire hundred chart.

Blank hundred chart



Hundred chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Save Twenty

Materials: Five dice per game; scratch paper and pencil
Topics: Addition, estimation, probability
Common Core: 1.OA.5, 1.OA.6, 2.OA.2

A quick, fun game for arithmetic practice with numbers up to 20.

Why We Love Save Twenty

Save Twenty is quick and fun, with an element of risk that makes each turn exciting. Lots of estimation and addition practice are built into every game. It is perfect for helping students develop their number sense for numbers under 20. Deeper probability questions lurk in the background.

The Launch

Choose a volunteer and demonstrate the game where everyone can see it. Once you have played through a few rounds with the volunteer, have students play the game in pairs or groups or three.

Rules

Play is best with 2 or 3 players. The goal of the game is to roll as close to (or equal) to 20, without going over. You'll have four rounds per turn.

For the first round, roll all five dice. You may save as many as you like, from zero to all. Any dice that are not saved are then re-rolled.
For your second and third round, roll the dice you haven't saved. You may save as many of these as you like and then re-roll the rest on your next round.
For the fourth and final round, roll any remaining unsaved dice.
Now score your points. If your five dice form a sum greater than 20, you score 0. If the dice sum to 20 or less, that number is your score for the turn.

Play for 9 turns. The winner is whoever has the greatest score at the end of the game.

Example Game

On my turn, I roll 2, 2, 3, 5, 6 in round 1. I save 3 and 5, and reroll the other dice.
In round 2, I reroll the three unsaved dice, and get 1, 1, 6. I don't save any of these dice.
On round 3, I reroll the three unsaved dice, and get 2, 5 and 6. I save 2 and 5.
On round 4, I reroll the only unsaved die and roll a 1.
My score for this turn is 3 + 5 + 2 + 5 + 1 = 16. Because I didn't go over 20, my score for this turn is 16.

When my turn is over, I pass along my dice, and the next player goes.

Prompts and Questions

- Is there a "best" strategy for Save Twenty? Are any strategies better or worse than each other?
- If you roll 18 on your first turn, should you take the 18 points, or keep trying to do better?
- If 20 is the best number to get to by round 4 using 5 dice, what's the best number to try to get to by round 3 using 4 dice?

The Wrap

Discuss student strategies and observations about Save Twenty. What's the best way to get to twenty exactly? Should you keep fours and fives, or just sixes? Should you re-roll a die if you are at 18? At 17?

Tips for the Classroom

1. Save Twenty is straightforward to use in the classroom. Once students know how to play, you can make it available for them as an option during free time/Choice Time.

2. Foam dice are a good option to prevent noisy dice rolls.

3. Make a class rule that if the dice roll of the table, it's a re-roll. If dice are flying too far, you can also make a class rule that if the dice roll off the table it counts as a lost turn.

4. If adding up multiple two-digit numbers to calculate the final score is too hard for your students, they can try one of the following easier methods:
   a. Add each new turn score to a running total (this still might be pretty challenging).
   b. Play fewer turns before ending the game, and instead play multiple games.
   c. Score 1 point for each won round rather than the final sum of the dice. The winner of 9 turns is the one with the most points.

5. For a more challenging game, use 10 or 12-sided dice, and play Save Thirty.

Resources

A virtual version of Save Twenty is available at mathforlove.com/lesson/save-twenty.

Day 4

Goals

1. Learn strategies for reading and solving story problems.
2. Practice making tens.

Opener

Target Number

Activity

Mini Lesson on Story Problems
In the Garden

Note: a wonderful extension for story problems is to let students write their own problem and challenge other students to solve it. This is recommended whenever you are working with story problems and a student finishes early, or has persistent trouble engaging.

Game

Dot Ten Memory

Note: also included is an optional worksheet that explains the rules. If you don't have enough cards, you can use the images of cards on the worksheet to let student draw lines between cards to make pairs that sum to ten.

Choice Time

Dot Ten Memory
Speed Stars
Save Twenty
Block Free Play
Challenge Problems (See Appendix 3)

Closer

Ask students to tell a story that fits the equation 16 - 7 = 9.
Let them discuss, then listen to the different stories they come up with.

Target Number

Math concepts: Arithmetic, equivalencies
Equipment: pencil & paper
Common Core: Variable, but especially OA, i.e., 1.OA.C.5, 2.OA.B.2, 3.OA.C.7

You know the answer. What's the question?

Why We Love Target Number

This is a quick check-in that adjusts to the abilities of each student, allows for creativity and arithmetic practice together, and is a lot of fun. Target Number is a perfect warm-up.

Launch

The teacher writes a "target" number on the board. The students try to write down as many different equations that have that the target number as the answer. Then students share their favorite answers. For younger students, drawing different pictures or arrangements of ways to see/understand that number is an okay alternative.

Example

The teacher writes 7 on the board, and lets kids write on their own paper for about a minute, then asks students to share what they found. Students raise their hands to volunteer solutions while the teacher writes them on the board. These equations may go from simple equations like 6 + 1 = 7 to the more complex (4 x 3) - 5 = 7. The great thing is, anyone can start, but the sky is the limit!

Prompts and Questions

Don't do these the first time you do Target Number, but if you want to go deeper with this activity in the future, here are some interesting questions to pursue.

- If we only add 2 numbers, how many answers can we find?
- What if we add 3 numbers, or 4 numbers?
- What about any number of numbers?
- What if we only subtract, or only multiply, or only divide?
- What's the longest number sequence you can find that hits the target number?
- Can you hit the target number if you only use a single number, such as the number 4, in your equation?

Tips for the Classroom

1. Don't praise answers with many steps as "smart." This activity gives everyone a chance to contribute and be valued. You can describe those answers as "long," or as having many parts.

2. If answers are wrong or unclear, you can take the opportunity to do the arithmetic with the class. On the other hand, if a student uses terms (like square root) that the class isn't ready for yet, you can write down their answer but move on to other solutions.

3. One opportunity this lesson gives you is the chance to emphasize equivalency. If one student knows that 6+1 = 7, and someone else knows that (3 x 4) - 5 = 7, then that means that 6 + 1 = (3 x 4) - 5. It's nice to underline the point that there are many ways to equal 7, and that these ways are all equal to each other.

4. Let's say someone says that 7 = 5 + 3. Rather than just saying "wrong," say that 5 + 3 gets us close to 7, but we need to do something else to get all the way there, then challenge students to find what still needs to be done. If someone can explain that 5 + 3 is 8, and so you need to take 1 away, you have the equation 7 = 5 + 3 - 1. This is both more sophisticated and accepts the original students wrong answer as a path toward a better, accurate answer, rather than a dead end.

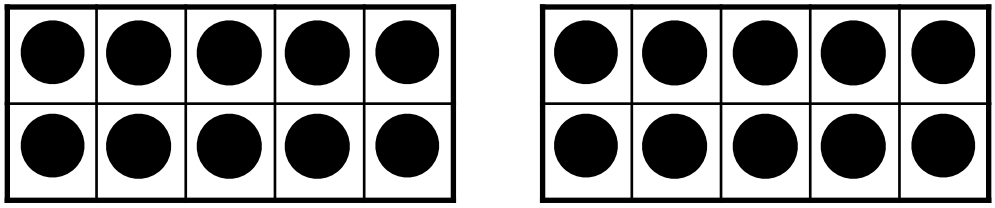
5. Sometimes kids offer new ways of making the number with units, i.e. if the target number is 7, a student might say "3 bunnies plus 4 bunnies is 7 bunnies". Depending on the class, once this has begun it is very seductive to the other kids, and can sometimes derail the mathematics. Be open at first, but if the game becomes more about picking different units than finding different expressions, you can say, "Okay, for the next 3 solutions, let's use numbers by themselves."

Mini-Lesson on Story Problems

The ten frame (used with counters or drawn) is a fantastic tools for solving problems. Now it's time to demonstrate how students can use the ten frame to model and solve a story problem.

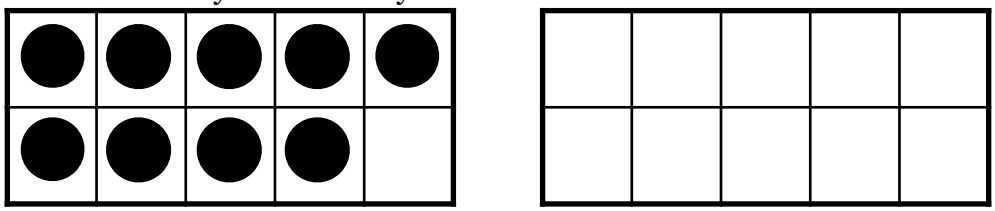
Example 1. (Use ten frames and counters on a document camera, or in a place everyone can see them.)
Destiny has 20 hats. She gave 11 away to friends. How many does she have left?

Answer:
Build this situation with ten frames. She starts with 20 hats. We could just jumble 20 counters together, but that's not easy to understand. What if we put 20 counters into ten frames?



This is much easier to see!

Now what comes next? Let's go back to the question. Destiny has 20 hats. We see them in our picture/model. She gives 11 away to friends. What do we do here? Well, we need to move 11 counters away. We could take them away one at a time [demonstrate this], but there's an even easier way. Let's take away 10, then 1 more to make 11 hats given away. That's another way to take away 11!



And the question was, how many does she have left. Can we see how many she has left? It looks like we can just count: there are 9.
So (20 hats) - (11 hats given away) = (9 hats left for Destiny).

Try one more with the group. Let students try on their own, then discuss using counters and ten-frames. You can also create a drawing of the situation.

Example 2.
Marshall found 5 clamshells on the beach this morning. He found 8 clamshells this afternoon. Then 2 of the clamshells broke. How many clamshells does he have now?

Name_____

In the Garden

Solve the problems below by drawing a picture, or using words and numbers.

1. Imani saw 6 snails and 7 slugs in the garden this morning. How many snails and slugs did she see in all?

2. Jayden picked 14 apples yesterday, and 7 apples this morning. How many apples does Jayden have now?

3. Martine had 18 carrots. She ate 5 carrots, then picked 3 more. How many carrots does Martine have now?

4. On Monday I picked 8 strawberries. On Tuesday I picked 9 strawberries. On Wednesday I picked 10 strawberries. On Thursday I *ate* 11 strawberries. How many strawberries do I have now?

5. Write a story problem to match this equation: 13 - 8 = 5.

Dot Ten Memory

Topics: Arithmetic, addition, greater than/less than
Equipment: Tiny Polka Dot cards
Common Core: 1.OA.5, 1.OA.6, 2.OA.2

Do you remember where the card is that makes it 10?

Why we love Dot Ten Memory

This memory-style game is easy to learn and fun to play, and is great practice for finding pairs that add to 10.

Launch

Take a volunteer for a demonstration game, and explain the rules while you demonstrate play. First, choose two suits, and take the cards (0 - 10) in those two colors. Mix them up and deal them out face down in a grid. Players take turns turning two cards face up. If these two cards add to 10, keep them, and take another turn. If not, turn them face down in place, and it is the next player's turn. Keep playing until all the cards are gone. Whoever has the most cards at the end is the winner.

If a group of four kids takes a single deck, they can split it into two piles of two suits and each pair can play a game. When they're all done, they can redivide the deck in a different way.

Prompts and Questions

- What number do you need to make ten with the one you've already turned over? Think about it before turning over the next one.
- Do you know of any pairs that make ten?
- Can you do anything with the card they just turned over?
- Show me how you know those two cards add up to ten.

Wrap Up

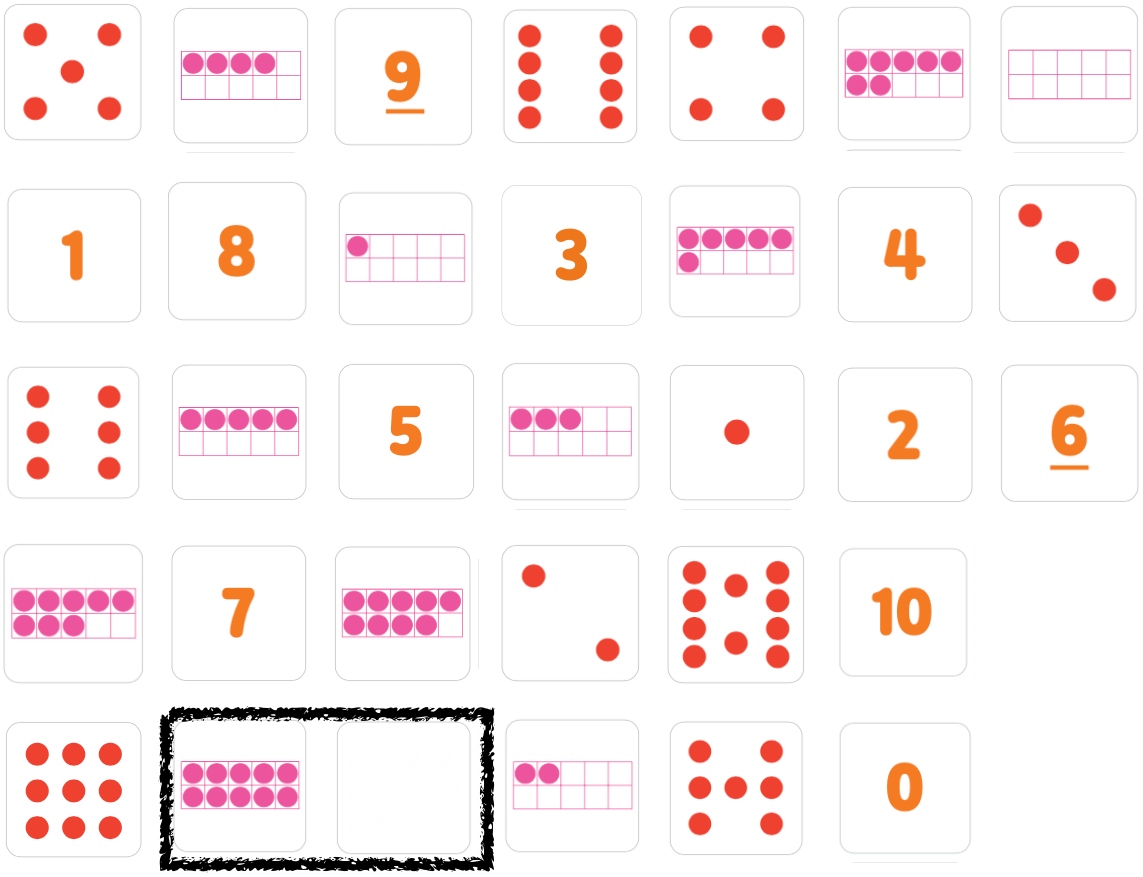
Let students share observations and questions they may have about the game. One nice closing question is whether certain pairs that sum to ten feel easier or harder.

Tips for the classroom

1. For students who need a simpler game, try Dot Five Memory, which starts with just the numbers 0 - 5, and pairs need to sum to 5 instead of 10.
2. Students may, after repeated playing, come up with interesting variations, like being able to turn over three cards to make ten. These may be worth exploring.

Dot Tens

Deal out all (or just some) of the Tiny Polka Dot cards face up.



Here's a pair!

If you can find two cards that add up to 10, pick them up and put them in a pile.

The game ends when there are no more pairs.

Day 5

Goals

1. Explore equality in the context of multiple units, using the pattern blocks.
2. Explore place value.

Opener

2-Color-Dot Talks

Activity

Pattern Block Balances

Note: this is another activity where students may find it fun and engaging to make up their own challenges and pose them to each other.

Game

Don't Break the Bank (tens and ones)

Choice Time

Don't Break the Bank (tens and ones)
Dot Ten Memory
Save Twenty
Block Free Play
Challenge Problems (See Appendix 3)

Closer

Ask students to find two collections of pattern blocks would balance with 3 hexagons. Then let them share their solutions with a partner, and the class.

(Example: 3 rhombuses, 2 trapezoids, and 6 triangles)