



PowerHour

:making minutes count



BOYS & GIRLS CLUBS
OF AMERICA

ROSS®

RECHARGED FOR THE 21ST CENTURY



Activity Book:
K-2 Math

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SECTION 1: INTRODUCTION

Program Overview

Power Hour: Recharged for the 21st Century: Elementary Edition is designed to develop the abilities young people need most in order to be college- and career-ready in the 21st century – including skills such as collaboration, knowledge construction, accessing and analyzing information, critical thinking and problem-solving, effective written and verbal communication.

The recharged Power Hour program enables Club members to develop many of these skills through intensive homework assistance that matches the rigor of today's homework trends. Most importantly, the new version of Power Hour embraces technology not as a tool to be used occasionally for completing homework, but as the centerpiece of engaging activities youth complete in each after-school session. Members use technology to enhance their learning and work collaboratively with their peers and Club staff to develop academically.

Power Hour also includes an extensive focus on the reading and mathematics skills that students need for success after high school, and this Lesson Guide directly addresses that need. Based on the Common Core State Standards – a set of clear, consistent guidelines for what every student should know and be able to do in math and language arts from kindergarten through grade 12 – the lessons included here provide review, practice and reinforcement for youth in essential reading and math skills.

Through their participation in the Power Hour program, Club youth will be more prepared than ever to enter the workforce and higher-education institutions with the skills needed to compete globally and to experience success in their academic and vocational pursuits.

SECTION 1: INTRODUCTION

The Power Hour Lesson Guide

The purpose of this Power Hour Lesson Guide is to give Club staff, volunteers, peer mentors and other tutors easy-to-use lessons for reinforcing essential reading and math skills in Club youth.

- Lessons can be completed in 25 to 30 minutes.
- Tutors can work with youth individually or in small groups
- Each lesson can be completed with a minimum of preparation.
- Tutors do not need prior knowledge of the subject in order to facilitate a lesson.
- Individual lessons are designed for youth in grades K-2 or in grades 3-5 and can be used with members in any of those grade levels.
- The content of a lesson may present new learning for members at the lower end of the grade spectrum, or it may offer practice and reinforcement for youth in higher grades.
- Lessons often feature an engaging game to provide skill practice or reinforcement.

SECTION 1: INTRODUCTION

Facilitating the Lessons

The following are some simple guidelines for using the lessons effectively with youth.

1. **Become familiar with the lesson format.** Each lesson is structured for ease of use, featuring three simple steps:



GET READY – a brief review of a specific topic youth are learning about in school



GET SET – a guided practice to give youth a chance to check their understanding



AND GO! – a game or independent practice in which youth try the skill on their own

2. **Select an appropriate lesson.** The lessons do not have to be completed in any particular order, but because topics and skills are sequenced from basic to more advanced skills, an order is recommended. There are several options for selecting a lesson:

- Match the lesson to the topic or skill members are working on currently in school.
- Talk to members about areas where they are having trouble or need help, and select a lesson that most closely fits their needs.
- Select an earlier lesson that focuses on basic skills, if you have a mixed group or are unsure about the skill level of members. Choose a lesson at a level where members can work with some success and then move gradually to the next level of difficulty.

3. **Prepare for the lesson.** Once you've selected a lesson, follow these steps to get started:

- Download the lesson materials.
- Complete the basic preparations (such as making copies or gathering materials).
- Read through the lesson quickly to become familiar with the content and process.

4. **Lead the lesson.** In leading the lesson, keep in mind the following:

- Keep the lesson simple, focusing on the one or two skills being reviewed.
- Allow members to complete the independent practice or game on their own.
- Encourage more advanced members to help younger peers or those who need help.

SECTION 1: INTRODUCTION

Facilitating the Lessons, cont.

5. **Check for understanding.** At the end of each lesson:

- Check to make sure members understand the concepts and are able to do the skills.
- Walk them through the lesson again if they need additional reinforcement.
- Encourage them to access one of the websites listed (“Additional Resources”) so they can practice on their own through a fun game.
- Take note of where members succeed or need more practice so you can select future lessons to give them more practice or challenge.

SECTION 1: INTRODUCTION

General Tutoring Guidelines

The Resource Guide for PowerHour: Recharged for the 21st Century (Elementary Edition) includes detailed guidelines for using volunteers in the program – including what to look for in volunteers, where to find volunteers, strategies for engaging volunteers, interview and assessment techniques and peer-to-peer tutoring (see “PowerHour Staff and Volunteers”).

The following general guidelines are designed to help you in preparing potential tutors to work with Club members in reading and mathematics. You may want to use these guidelines in a formal training session with tutors or have an informal conversation with them.

Know yourself: the role of the tutor is to provide experience, guidance and encouragement, but you’re not expected to have all the answers.

- Have a clear idea of your own strengths and limitations and what skills or knowledge you can offer as a tutor.
- Don’t be afraid to show that you don’t know something. You can refer members to other sources, including their teacher. You also can model how to solve a problem – showing that you are in a learning process as well.

Know your members: by getting to know individual members, you can discover their strengths and challenges in learning.

- Listen closely to members so you can help them work out the real problem. Read the signals (when they are comfortable, uncomfortable, enjoying themselves) to see how engaged they are and to see if they really understand something.
- Take short breaks when needed. If members seem bored, it may mean they’re having a hard time and would rather do something else.

Build trust and safety: if members feel safe not to succeed at first, they’ll see that learning is a process that often involves unsuccessful tries.

- Be aware that all learners are different. Do not try to change the member’s style; since you are the more experienced person, it is your job to adjust or adapt.
- Do not tease or make jokes at the member’s expense. Your job is to support and encourage the member to do his or her best.
- Be a good listener and a positive role model.

SECTION 1: INTRODUCTION

General Tutoring Guidelines, cont.

- Give positive feedback but don't exaggerate their accomplishments. If they are incorrect, say so supportively ("No, that's not right, but it's a good guess").
- Celebrate members' achievements.

Teach members how to learn: by building confidence and competence, you help members strengthen the ability to learn on their own.

- Make things easy for members to understand. Give different examples or think of alternative ways to explain something.
- Use reflective questions that will help them think through the problem and be self-directed (such as "How do you think we can find an answer to this?"). Partner with them to assist them in finding the answers themselves.
- Build on what members know ("What are some things you already know about this?"). Help them find a connection between new learning and something they know. If they need to repeat a lesson, do it as often as necessary – but use less support with each repetition. This provides scaffolding for members to move to the next level.
- Do not do the work for them; this does not teach or help them.

SECTION 1: INTRODUCTION

Tips for Mathematics Tutors

Keep it simple. Be aware of how a member is being taught math, and don't teach strategies and shortcuts that conflict with the approach the teacher is using. If math makes you nervous, try not to communicate this to members. Share only what is helpful, not harmful.

Connect math to life. Explore math in everyday life. When members realize that math is all around them, they begin to relax and see its meaning in their lives.

Check for understanding. Ask members to explain their problem-solving process so you can understand their reasoning.

Model mathematical thinking. Be a problem solver, pose questions and find solutions. Talk about how things are alike and different and explain your thinking.

Ask guiding questions. When helping members with math concepts, ask questions to guide them through the process, such as "Where do you begin?" or "What do you need to find out?" These kinds of questions encourage members to think on their own and identify the process needed to solve the problem.

Lead by example. Let members know that you were once a student who struggled sometimes. If you encounter a stumbling block during a lesson, lead by showing members how to overcome it. (For example, you might say, "I remember getting stuck with this kind of problem. Let's take a look at the textbook and see what it says.")

Let members do their own work. If you do a problem for them, even just a little, you send the message that members aren't able to do it. This does more harm than good.

SECTION 1: INTRODUCTION

Tips for Mathematics Tutors, cont.

Teach vocabulary. When members learn math vocabulary, it can help them understand the concepts. Even if a member is unable to recall how to solve a particular problem, the vocabulary associated with it can give insight to solving it.

Use diagrams. Math is a complex subject to learn and should be approached with drawings and diagrams to promote understanding (for example, “Can you show me in a drawing how you got this answer?”)

Sources:

U.S. Department of Education. (2003, May). Homework tips for parents. Office of Intergovernmental and Agency Affairs. Retrieved from <https://www2.ed.gov/parents/academic/involve/homework/homeworktips.pdf>

Palumbo, D. (2009, February 24). Five simple tutoring techniques for teaching math. Retrieved from <http://www.homeworkhelptoday.com/2009/02/five-simple-math-tutoring-techniques-for-teaching-math/>.

SECTION 2

Lessons Correlated to Common Core State Standards

In 2010, states across the country adopted a set of high-quality academic standards in mathematics and English language arts/literacy designed to outline skills young people should be able to master by the end of each grade. The lessons in this guide have been specifically designed to meet the more rigorous academic needs of students in Clubs across the country, and the following chart details which standard each lesson is designed to address.

Standards for Mathematical Content and Practice (K-12): General Standards			
CCS #	Common Core Standard	Power Hour Lesson	Lesson Content
MP.4 MP.7	Model with mathematics. Look for and make use of structure.	Lesson 1 – What Comes Next?	discovering, building and reproducing linear patterns; using shapes and colors to make predictions; applying math to the everyday world
Standards for Mathematical Content and Practice (K-12): Operations and Algebraic Thinking			
CCS #	Common Core Standard	Power Hour Lesson	Lesson Content
K.OA.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.	Lesson 3 – How Many Ways?	developing number sense using context of 10; solving problems using addition and subtraction; understanding the relationship between numbers
		Lesson 5 – What’s in a Number?	understanding the relationship between addition and subtraction; solving problems using addition and subtraction; creating equations

K.OA.2	Add and subtract within 10, e.g., by using objects or drawings to represent the problem.	Lesson 3 – How Many Ways?	investigating patterns of data with multiple variables
K.OA.3	Decompose numbers less than or equal to 10 into pairs, and record each by a drawing or equation.	Lesson 2 – Addition and Subtraction Stories	developing a poll; collecting, visualizing, describing and explaining the data
K.OA.4	For any number from 1 to 9, find the number that makes 10 when added to the given number.	Lesson 2 – Addition and Subtraction Stories	understanding number sentences and equations; using mathematics to solve word problems
1.OA.3	Apply properties of operations as strategies to add and subtract.	Lesson 4 – What's Missing?	discerning relationships between numbers; turning incomplete number sentences into equations
		Lesson 5 – What's in a Number?	understanding the relationship between addition and subtraction; solving problems using addition and subtraction;
1.OA.4	Understand subtraction as an unknown-addend problem.	Lesson 3 – How Many Ways?	developing number sense using context of 10; solving problems using addition and subtraction; understanding the relationship between numbers
		Lesson 4 – What's Missing?	discerning relationships between numbers; turning incomplete number sentences into equations
		Lesson 5 – What's in a Number?	understanding the relationship between addition and subtraction; solving problems using addition and subtraction;
1.OA.5	Relate counting to addition and subtraction.	Lesson 3 – How Many Ways?	developing number sense using context of 10; solving problems using addition and subtraction; understanding the relationship between numbers
		Lesson 5 – What's in a Number?	understanding the relationship between addition and subtraction; solving problems using addition and subtraction; creating equations

CCS #	Common Core Standard	Power Hour Lesson	Lesson Content
1.OA.6	Add and subtract within 20, demonstrating fluency for addition and subtraction within 10.	Lesson 2 – Statistics and Probability	understanding number sentences and equations; using mathematics to solve word problems
		Lesson 3 – Modeling and Graphing	developing number sense using context of 10; solving problems using addition and subtraction; understanding the relationship between numbers
		Lesson 4 – Modeling and Graphing	discerning relationships between numbers; turning incomplete number sentences into
1.OA.7	Understand the meaning of the equal sign, and determine if equations are true or false.	Lesson 2 – Addition and Subtraction Stories	understanding number sentences and equations; using mathematics to solve word problems
		Lesson 4 – What's Missing?	discerning relationships between numbers; turning incomplete number sentences into equations
1.OA.8	Determine the unknown whole number in an addition or subtraction equation relating three numbers.	Lesson 2 – Addition and Subtraction Stories	understanding number sentences and equations; using mathematics to solve word problems
		Lesson 4 – What's Missing?	discerning relationships between numbers; turning incomplete number sentences into equations

Standards for Mathematical Content and Practice (K-12): Measurement and Data

CCS #	Common Core Standard	Power Hour Lesson	Lesson Content
K.MD.1	Describe measurable attributes of objects, such as length or weight.	Lesson 6 – As Time Goes By	appreciating/understanding time; understanding the relativity of concepts
		Lesson 7 – Measuring Myself	understanding measures and comparisons using non-standard units of measure
		Lesson 8 – Three-throw Ball	understanding distance and linear measurement
K.MD.2	Understand concept of ratio; use ratio language to describe ratio relationship between two quantities.	Lesson 6 – As Time Goes By	appreciating/understanding time; understanding the relativity of concepts
		Lesson 7 – Measuring Myself	understanding measures and comparisons using non-standard units of measure
		Lesson 8 – Three-throw Ball	understanding distance and linear measurement
K.MD.3	Classify objects into given categories; count the numbers of objects in each category.	Lesson 9 – What Can You Discover?	organizing and sorting by measurable attributes
		Lesson 12 – What Do We Like?	collecting information; using graphs to represent data
1.MD.1	Order three objects by length; compare the lengths of two objects indirectly by using a third object.	Lesson 7 – Measuring Myself	understanding measures and comparisons using non-standard units of measure
		Lesson 8 – Three-throw Ball	understanding distance and linear measurement

CCS #	Common Core Standard	Power Hour Lesson	Lesson Content
1.MD.2	Express the length of an object as a whole number of length units.	Lesson 7 – Measuring Myself	understanding measures and comparisons using non-standard units of measure
		Lesson 8 – Three-throw Ball	understanding distance and linear measurement
1.MD.4	Organize, represent and interpret data with categories; ask and answer questions about the total number of data points, how many in each category and how many more or less in one category than another.	Lesson 9 – What Can You Discover?	organizing and sorting by measurable attributes
		Lesson 12 – What Do We Like?	collecting information; using graphs to represent data
2.MD.10	Draw a picture graph and a bar graph to represent a data set with up to four categories.	Lesson 12 – What Do We Like?	collecting information; using graphs to represent data

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LESSONS - K-2 MATH

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SECTION 3

Vocabulary Words for K-2 Math Lessons

Pour Hour Lesson	Word	Definiton
Lesson 1 – What Comes Next?	Pattern	a design that is repeated or a set of shapes arranged in a certain way
Lesson 2 – Addition and Subtraction Stories	Equation	a statement that says “this equals that” (sometimes called a “number sentence”)
Lesson 3 – How Many Ways?	Ten-frame	a simple rectangular frame with 10 boxes that helps us “see” numbers
Lesson 4 – What’s Missing?	Expression	numbers, symbols and operators (like + and x) grouped together
	Equation	a statement that says “this equals that” (sometimes called a “number sentence”)
Lesson 5 – What’s in a Number?	Equation	a statement that says “this equals that” (sometimes called a “number sentence”)
Lesson 6 – As Time Goes By		
Lesson 7 – Measuring Myself	Dimension	a measurement of length in one direction (from shoulder to finger, for example)
	Measurement	a number that shows the size or amount of something
Lesson 8 – Three-Throw Ball	Length	the distance from one end of something to another (or from one point to another)
	Width	the distance from one side of something to the other side

Pour Hour Lesson	Word	Definiton
Lesson 8 – Three-Throw Ball	Linear measurement	a number that shows distance from one end of something to the other end
	Distance	a measurement of how far something is from another thing
Lesson 9 – What Can You Discover?	Characteristic	a special quality of a person or thing
	Sort	to group things together in a special way (objects of the same size or same shape, for example)
Lesson 10 – Finding and Making Shapes	Geometric shape	the outer outline or form of a flat object (like a square or circle)
	Two-dimensional shape	a shape that is flat, with width and height but no thickness
	Three-dimensional shape	a shape that has height, width and depth (like objects in the real world)
	Model	something that is made to be like another thing (usually smaller or larger)
	Triangle	a flat shape with three sides (of the same or different sizes)
	Rectangle	a flat shape with four straight sides
	Square	a flat shape with four sides that are all the same length
	Parallel	two things that are always the same distance apart and never touching
	Trapezoid	a flat shape with four sides (two of the sides are parallel to each other)

Pour Hour Lesson	Word	Definiton
Lesson 10 – Finding and Making Shapes	Parallelogram	a flat shape with four sides (with opposite sides that are parallel to each other)
	Circle	a flat round shape (made by drawing a curve that is always the same distance from a center)
	Oval	a curve that looks like an egg; a circle that has been stretched to be longer
	Hexagon	a flat shape with six straight sides
	Octagon	a flat shape with eight straight sides
Lesson 11 – Shape Enigmas	Geometric shape	the outer outline or form of a flat object (like a square or circle)
	Two-dimensional shape	a shape that is flat, with width and height but no thickness
	Three-dimensional shape	a shape that has height, width and depth (like objects in the real world)
	Model	something that is made to be like another thing (usually smaller or larger)
	Triangle	a flat shape with three sides (of the same or different sizes)
	Rectangle	a flat shape with four straight sides
	Square	a flat shape with four sides that are all the same length
	Parallel	two things that are always the same distance apart and never touching
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Pour Hour Lesson	Word	Definiton
Lesson 11 – Shape Enigmas	Trapezoid	a flat shape with four sides (two of the sides are parallel to each other)
	Parallelogram	a flat shape with four sides (with opposite sides that are parallel to each other)
	Circle	a flat round shape (made by drawing a curve that is always the same distance from a center)
	Oval	a curve that looks like an egg; a circle that has been stretched to be longer
	Hexagon	a flat shape with six straight sides
	Octagon	a flat shape with eight straight sides
Lesson 12 – What Do We Like?	Survey	to gather information on a few things to learn about a larger number of things
	Results graph	a simple graph that shows survey results as a picture

Lesson: Patterns

What Comes Next?

Time: 25 minutes

Objective: Mathematics is often described as a search for patterns. The more children and students become aware of patterns, the better they will perform in all areas of the arithmetic they are learning. In this activity, members discover, build and reproduce linear patterns. They use shapes and colors to make predictions simply by extending the pattern.

Materials

- White board
- Dry-erase markers
- Linking or snapping cubes
- Pattern blocks
- Two-color counters

Additional Resources

[Moon Rock Patterns](#)

[String of Beads](#)

[Color Pattern](#)



GET READY

5 min

1. **SAY:** Today, we're going to practice using different kinds of objects to make straight lines and other types of patterns.
2. **ASK:** Do you know what a pattern is?
3. **SAY:** A pattern is a repeated design – or a set of shapes arranged in a certain way.
4. **DO:** Give members an example of a pattern.
5. **DO:** Show members the different objects they can use to create patterns.
6. **SAY:** As we build different lines and shapes, you're going to pay attention to the pattern and then guess what comes next.



GET SET

5 min

1. **SAY:** We can find patterns all over – even in movement or sound.
2. **DO:** Demonstrate different patterns through movements:
 - *Snap and clap.* Snap your fingers and clap your hands in different patterns, then have members predict the next movement by demonstrating a snap or a clap.
 - *Sit and stand.* Ask members to stand up and sit down in a pattern, then have them demonstrate the pattern by sitting or standing.
3. **DO:** Guide members in using different types of real-world objects to make patterns.



AND GO!

15 min

1. **DO:** Have members to work in pairs.
2. **DO:** Call attention to the different objects members can use.
3. **SAY:** Use these different objects to create a pattern that has at least 20 objects in it. Make up your own pattern, then ask your partner to guess what the next object should be.
4. **WRITE:** members' patterns on the white board.
5. **DO:** Review each pattern and have members to hold up the next object in the pattern.
6. **ASK:** What is a pattern? How can you use patterns in your daily lives and in math class?
7. **CHECK FOR UNDERSTANDING:** If members have trouble with the concepts, walk them through the lesson again or help them access one of the additional resources listed.

Lesson: Shapes

Finding and Making Shapes

Time: 25 minutes

Objective: Classic geometric shapes are all around us, sometimes alone and sometimes as part of a more complex shape or design. Different shapes have different functions. For example, a three-legged table (think triangle) is more stable than the usual four-legged one. Shapes can be two-dimensional (2D) and three-dimensional (3D). In this lesson, members search for different shapes and recreate them by making models.

Materials

- White board
- Dry-erase markers
- Toothpicks
- Plasticene or modeling clay
- Colored markers
- Paper
- Overhead transparencies
- Projector

Preparation

Make an overhead transparency of “Geometric Shapes” to show members. Copy “Shape Chart,” 1 per member

Additional Resources

- [2D Shapes Jeopardy](#)
- [Shapes/Geometry](#)
- [2D and 3D Shape Sort Factory](#)



GET READY

8 min

1. **ASK:** What are some shapes that you know?
2. **DO:** Allow the members to draw the shape on the white board.
3. **WRITE:** Define “Geometric Shapes” and add missing shapes to the list to make sure it includes:

Shape	Description
triangle	three sides, many different shapes
rectangle	square corners, opposites of similar lengths
square	a rectangle with all sides the same length
trapezoid	four sides, with one pair of sides parallel
parallelogram	four sides, opposite sides parallel
circle	a round shape with diameter the same in all directions
oval/ellipse	an elongated circle
hexagon	a six-sided shape
octagon	an eight-sided shape

4. **WRITE:** the proper label on each shape on the board.



GET SET

2 min

1. **SAY:** We will locate some of these shapes in our environment and then make models using sticks and clay.
2. **DO:** Have members form pairs or small groups.
3. **DO:** Give members time to study the environment.

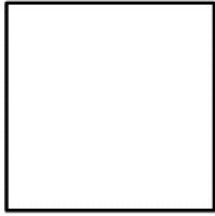


AND GO!

15 min

1. **DO:** Show the overhead transparency “Geometric Shapes” and point to each of the following: triangle, rectangle, square, trapezoid, parallelogram, circle, oval/ellipse, hexagon and octagon.
2. **SAY:** Let’s look for these shapes around us and then:
 - Make a small drawing of the shape.
 - Construct a model of the shape using clay.
 - Complete the “Shape Chart.”
3. **ASK:**
 - Which shapes were most common?
 - Which shapes were the least common?
 - Which shapes had the most variety?
 - Were there any shapes you did not find? Why do you think this is true?
 - Did you discover anything about shapes you did not know before?
 - Did you see any designs made with shapes? Which shapes?
4. **CHECK FOR UNDERSTANDING:** If members have trouble with the concepts, walk them through the lesson again or help them access one of the additional resources listed.

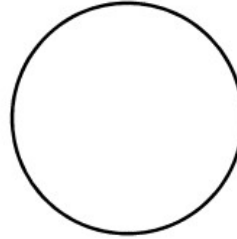
Geometric Shapes



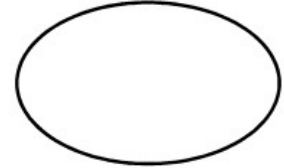
Square



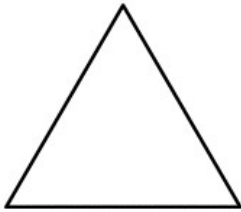
Rectangle



Circle



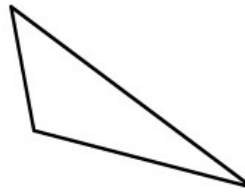
Ellipse



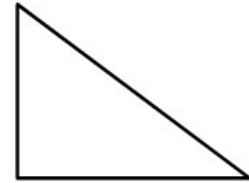
Equilateral Triangle



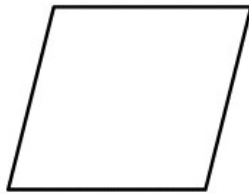
Isosceles Triangle



Scalene Triangle



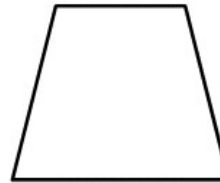
Right Triangle



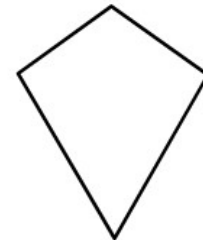
Rhombus



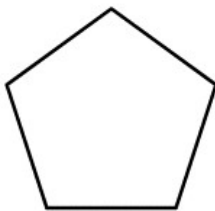
Parallelogram



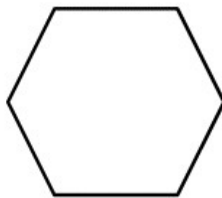
Trapezoid



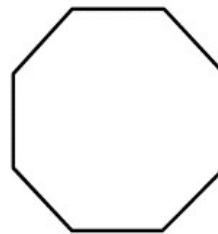
Kite



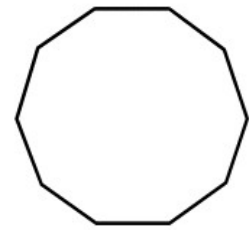
Regular Pentagon



Regular Hexagon



Regular Octagon



Regular Decagon

Shapes Chart

Shape	Where did you find it?
example: rectangle	The table at the front desk

Lesson: Reasoning Shape Enigmas

Time: 25 minutes

Objective: In this lesson, members become more familiar with the most common geometric shapes. They discover that there are many versions of these shapes by identifying examples and non-examples. Members examine geometric shapes from two perspectives and use them to create fantastical animals.

Materials

- White board
- Dry-erase markers
- Colored markers
- Paper
- Tape
- Overhead transparencies
- Projector

Preparation

Make an overhead transparency of “Geometric Shapes” to show members.

Additional Resources

- [2D Shapes Jeopardy](#)
- [Shapes/Geometry](#)
- [2D and 3D Shape Sort Factory](#)



GET READY

5 min

1. **DO:** Review geometric shapes by using pictures or drawings.
2. **DO:** Show the overhead transparency of “Geometric Shapes” to members.
3. **ASK:** How would you describe each of these shapes with words?
4. **WRITE:** their descriptions on the board by creating a chart similar to this:

Shape	Description
triangle	three sides, many different shapes
rectangle	square corners, opposites of similar lengths
square	a rectangle with all sides the same length
trapezoid	four sides, with one pair of sides parallel
parallelogram	four sides, opposite sides parallel
circle	a round shape with diameter the same in all directions
oval/ellipse	an elongated circle
hexagon	a six-sided shape
octagon	an eight-sided shape

5. **SAY:** A shape that fits these descriptions is still the same shape no matter how big it is, what the angles are or how it is turned.



GET SET

5min

1. **DO:** Select one geometric shape and draw on a piece of paper as many examples as you can.
2. **DO:** Tape the drawing to the white board.
3. **REPEAT:** with a few more shapes, drawing a page of examples for each.
4. **SAY:** Look at the drawings of individual shapes and let's answer the following questions:
 - Do all squares (triangles, rectangles, etc.) look the same?
 - How are they the same? How are they different?
 - How would you describe each shape to someone for the first time?
5. **DO:** Select a shape and create a page that contains examples and non-examples ("Yes and No!").
6. **WRITE:** several examples of the shape you have selected and hide a few different shapes among the examples. You'll have a page of examples and non-examples of the shape.
7. **DO:** Review the "Yes-No!" pages:
 - How easy is it to find examples of the shapes?
 - How easy is it to find non-examples of the shapes?
 - What do you use to tell the difference?

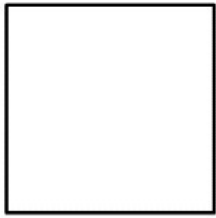


AND GO!

15min

1. **SAY:** Now you're going to show your creativity by drawing fantasy animals using these different shapes for body parts. You can decorate the animals and give them names. Write down on the drawing what the animal eats, where it lives and how it moves.
2. **DO:** Give members paper and markers and time to draw their animals.
3. **DO:** Invite members to share their animals.
4. **ASK:** What did you learn about geometric shapes that you didn't know before this activity?
5. **CHECK FOR UNDERSTANDING:** If members have trouble with the concepts, walk them through the lesson again or help them access one of the additional resources listed.

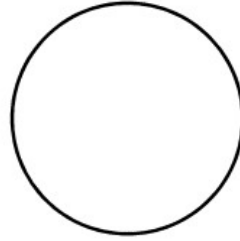
Geometric Shapes



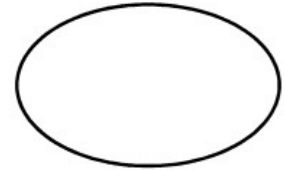
Square



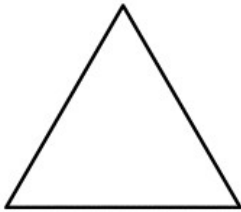
Rectangle



Circle



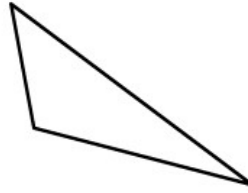
Ellipse



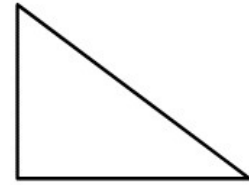
Equilateral Triangle



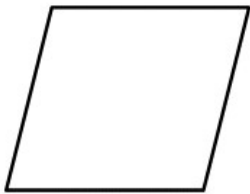
Isosceles Triangle



Scalene Triangle



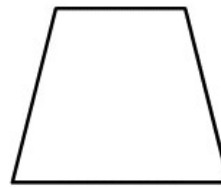
Right Triangle



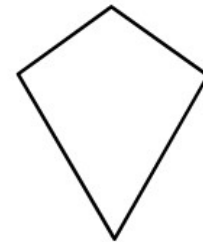
Rhombus



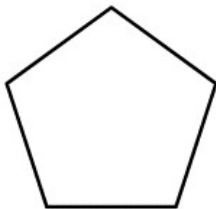
Parallelogram



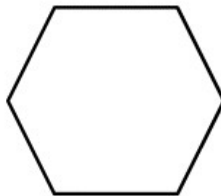
Trapezoid



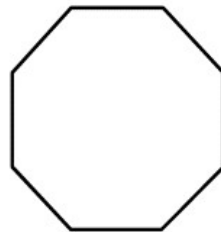
Kite



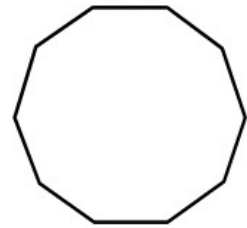
Regular Pentagon



Regular Hexagon



Regular Octagon



Regular Decagon

Lesson: Surveys

What Do We Like?

Time: 25 minutes

Objective: Many questions are best answered by a survey or questionnaire. In this lesson, members collect information concerning a question they develop. Then they create a graph that provides a visual presentation of the data that can be used to answer questions and solve problems relating to the question. Different kinds of graphs provide ways of answering questions. Line graphs are used to indicate change over time. Circle graphs demonstrate relative parts to a whole. Here, members create a bar graph to compare responses.

Materials

- White board
- Dry-erase markers
- Pens/pencils
- Paper
- Survey Chart, 1 per pair
- Results Graph, 1 per pair

Additional Resources

- [Bar Graphs Sorter](#)
- [Create a Graph](#)
- [Introduction to Bar Graphs](#)



GET READY

5 min

1. **ASK:** What are some interesting topics you want to find out more about. Some possible topics are:
 - What are your favorite foods?
 - How many brothers and/or sisters do you have?
 - Do you have pets?
 - What pets do you have?
 - What are your favorite kinds of cookies?
 - What are your favorite sports?
2. **DO:** Help members decide on one question to study.
3. **DO:** Guide them in making the question as simple as possible. For example, instead of “What kind of cookies do you like?” suggest they try, “Do you prefer chocolate chip, oatmeal raisin or something else?” Make sure each question has no more than four choices.
4. **DO:** Help members make a Survey Chart to record answers. A possible chart might look like:

Cookie Type	Number of Responses
Chocolate Chip	
Oatmeal Raisin	
Snickerdoodle	
Other	



GET SET

5 min

- SAY:** With your partner, ask everyone around you your question and write down their answer on your chart.
Example:

Cookie Type	Number of Responses
Chocolate Chip	6
Oatmeal Raisin	4
Snickerdoodle	8
Other	8

- DO:** Give members time to finish their surveys and help them tally results if they need assistance.



AND GO!

15 min

- DO:** Have members use the “Results Graph” to record their data in a column chart like this:

10				
9				
8				
7				
6				
5				
4				
3				
2				
1				
	Chocolate Chip	Oatmeal Raisin	Snicker-doodle	Other

- ASK:**
 - How many total responses did you get to the survey?
 - How many people picked each choice?
 - How many more or less is found in each category?
- ASK:** If you were going to sell cookies, do you have enough information to decide which one to sell? If not, what would you have to do to be sure?
- CHECK FOR UNDERSTANDING:** If members have trouble with the concepts, walk them through the lesson again or help them access one of the additional resources listed.

Survey Responses

Category	Number of Responses

Results Graph

10				
9				
8				
7				
6				
5				
4				
3				
2				
1				
Type:				

Lesson: Addition

Addition and Subtraction Stories

Time: 25 minutes

Objective: Deciphering equations is a fundamental skill for children learning mathematics. The ability to understand number sentences is improved if children learn to create true number sentences. In this activity, members have the opportunity to design a variety of equations, which builds their number and operation skills.

Materials

- White board
- Dry-erase markers
- Cubes or counters

Preparation

Print out Triangle Equations and cut

Additional Resources

[Addition Facts](#)

[Addition and Subtraction Activities](#)

[Addition and Subtraction Soccer Game](#)



GET READY

5 min

1. **SAY:** Today we're going to review and learn more about equations.
2. **ASK:** What is an equation? Answer: **A mathematical statement that uses an equal sign to show two sets of numbers as equal, sometimes called a "number sentence."**
3. **WRITE:** Add the following equations/number sentences to the white board:
 - $6+7=13$
 - $4-2=2$
 - $3+7=11$
4. **SAY:** Look at these number sentences. What do you see? Answer: **Three equations**
5. **DO:** Demonstrate the equations using cubes or counters.
6. **DO:** Show that the first two are true equations because the value of the numbers on both sides of the equal sign (=) are the same.
7. **DO:** Show that the third is not an equation because it is an untrue number sentence.



GET SET

5 min

1. **DO:** Show an equation with counters (for example $3+2=5$).
2. **DO:** Have members to create an equation if one more counter is added to the right side ($4+2=6$ or $3+3=6$ are two examples).
3. **ASK:** What are some other combinations?
4. **DO:** Distribute several triangles equation to members.
5. **DO:** Explain how to play *Triangle Tangle*:
 - One member holds up a card for his or her partner.
 - The partner tries to say one addition fact (a true equation) for the three numbers.
 - For more challenge, members try to say a true *subtraction* fact for the three numbers.

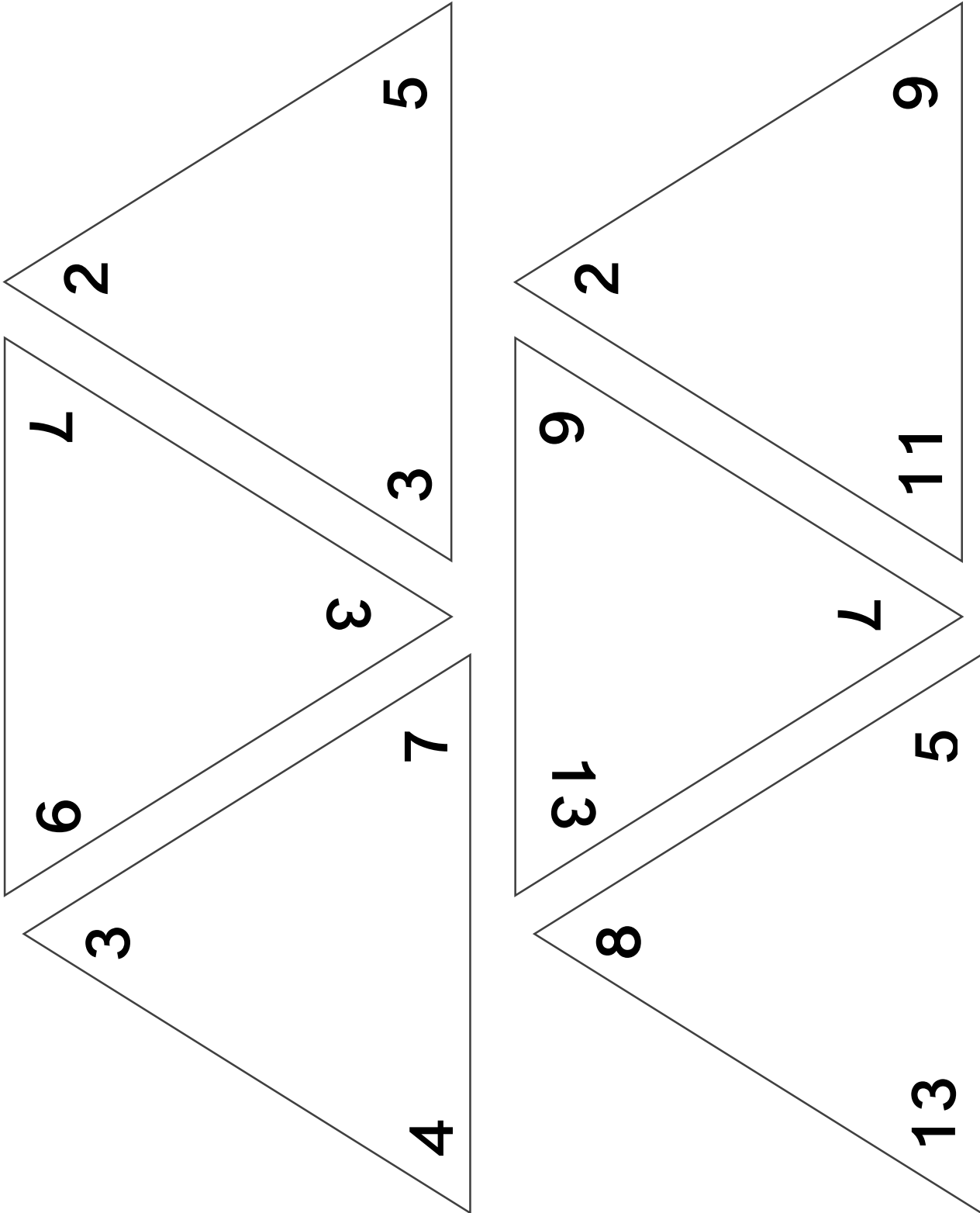


AND GO!

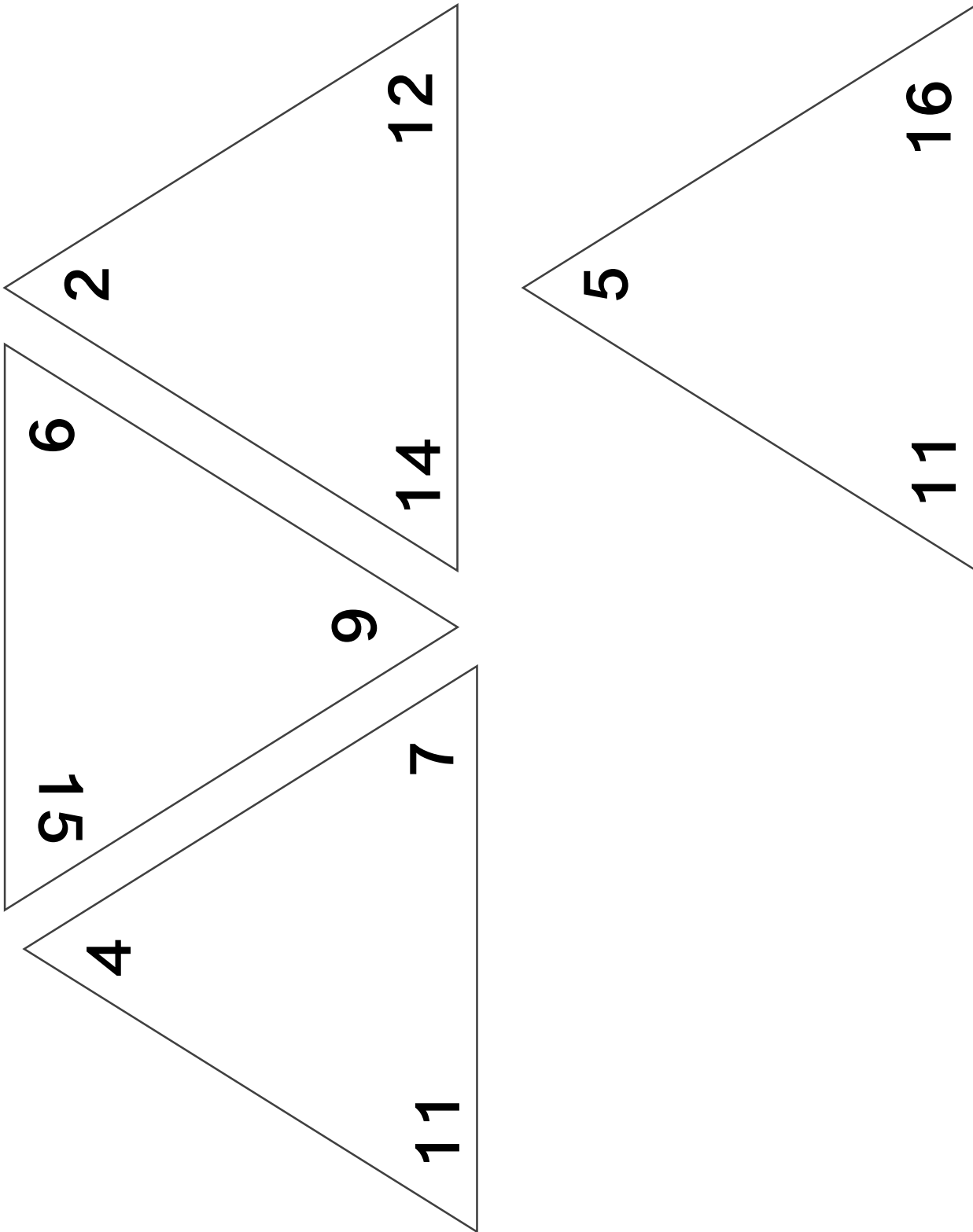
15 min

1. **SAY:** Now you're going to create equations on your own.
 - First, use the counters to create addition situations.
 - Next, write equations that represent what you've created with the counters.
 - Finally, make up a real-world or fantasy story for the equations
2. **DO:** Have groups list story topics that might interest them before they begin.
3. **DO:** Provide an example of a story: Six bears went into the cave to hibernate. In the spring only two bears came out. How many were left in the cave?
Answer: **The equation is $6-2=4$; if a baby was born in the cave, the equation would be $4+2+1=7$.**
4. **DO:** Have members share their stories and have their partners find the equation.
5. **CHECK FOR UNDERSTANDING:** If members have trouble with the concepts, walk them through the lesson again or help them access one of the additional resources listed.

Triangle Equations 1



Triangle Equations 2



Lesson: Counting

How Many Ways?

Time: 20 minutes

Objective: In this lesson, members play a simple game, *Toss and Make*, that helps them see the relationships between numbers. It focuses on the number ten because of the central role that ten plays in place value and our number system. The activity uses ten-frames, which are rectangular frames with 10 boxes (two by five) into which counters are placed to illustrate numbers less than or equal to ten. These are useful devices for developing a number sense using the context of ten.

Materials

- White board
- Dry-erase markers
- A number cube, 0-9 OR cards numbered 1 to 9
- A ten-frame (plastic or paper), 1 per member
- Ten markers per member

Additional Resources

[Ten Frame](#)

[Five & Ten-Frame Online Games](#)

[Ten-Frame Signs](#)

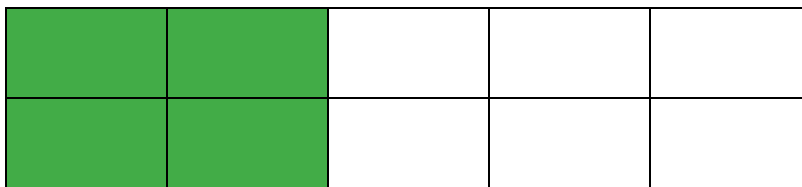


GET READY

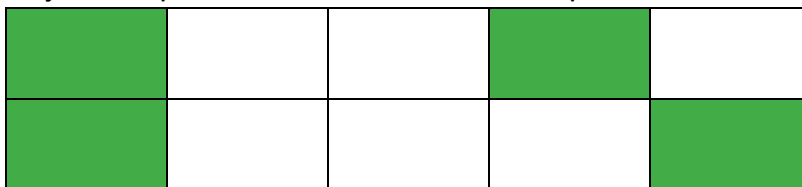
3 min

1. **SAY:** We're going to practice working with the number 10.
2. **DO:** Throw a number cube and say the number.
3. **DO:** Have members show that number on their ten frames using markers.

For example, if you throw a four, members' ten frames should have four squares filled in



Any four squares can be filled, for example:





GET SET

5 min

1. **DO:** Roll the cube several times so members can practice placing markers on the ten-frame.

Note: some members may need to remove all the markers each time to make a new number, and others will count on or back from the number that is there. For example, if four is represented on the ten-frame and you roll a six, members may start over or add two members to arrive at six.

2. **DO:** Continue practicing until all members are comfortable using the ten-frame.
3. **DO:** Distribute a ten-frame, 0-9 cube and 10 markers to each member.



AND GO!

12 min

1. **DO:** Explain the rules of the *Toss and Make* game:
 - Each member takes turns throwing the cube and showing the number on the ten-frame.
 - Each turn, members *add* markers to the ten-frame if the number thrown is larger and *remove* them if the number thrown is smaller.

- If the number cube shows 0, any number from 1 to 10 can be added or removed.
- The game ends when a player runs out of markers

2. **SAY:** Here are a few examples:
 - If there are five markers on the ten-frame and an eight is rolled, add three markers.
 - If there are five markers on the ten-frame and a three is rolled, remove two.
3. **DO:** Challenge members by playing the game without the ten-frame or with a standard 1 to 6 number cube.
4. **ASK:**
 - Did the ten-frame help you play the game? How?
 - Did you always need the ten-frame to know how many markers were present?
 - Why is ten such an important number to learn?
 - Can you think of another way to play the game? What is it?
5. **CHECK FOR UNDERSTANDING:** If members have trouble with the concepts, walk them through the lesson again or help them access one of the additional resources listed

Lesson: Equations

What's Missing?

Time: 25 minutes

Objective: A major concept for all students to comprehend is the equation. Each equation consists of two sides separated by an equal sign (=). The word *equation* derives from the word *equal*, so each side of the sign must equal the other. Equations are true statements (for example, $4+4=8$). An expression such as $3+3=7$ looks like an equation but, since the sides are not equal, it is not an equation. Equations allow us to know the relationships between numbers and discover unknowns. In this lesson, members examine incomplete number sentences and turn them into equations by supplying the missing numbers. This is a foundation for all later mathematics and an early introduction to algebra. **O** represents the missing number and is the same as "x" in algebra

Materials

- White board
- Dry-erase markers
- Counters or linking/snapping cubes

Preparation

Make copies of "What's Missing," 1 per member

Additional Resources

- [Addition Demolition](#)
- [Magical Subtraction](#)



GET READY

5 min

1. **DO:** Review the concept of equations (under the Objective to the left).
2. **WRITE:** the following equations on the white board:

$4 + 3 = 7$
$15 - 5 = 10$
$1 + 2 + 3 = 4 + 2$

3. **DO:** Teach members to identify the parts of the equation:
 - First, be sure they can identify, name and explain the equal sign (=).
 - Next, check that they see that both sides of the equal sign (=) have the same total.
4. **SAY:** An equation is sometimes called a "number sentence." It uses an equal sign to show that the two sets of numbers on either side have the same value or total.



GET SET

10 min

1. **SAY:** Today, we're going to practice completing number sentences – filling in the missing numbers to make them into equations.
2. **WRITE:** an incomplete and complete equation on the white board to help members identify the missing number:

$$17-8= \bigcirc \text{ and } 17-8=9$$

3. **DO:** Give several incomplete examples and model these equations with objects:

- $7+8= \bigcirc$
- $3+9= \bigcirc$
- $7+4= \bigcirc$

4. **DO:** Give examples of number sentences with a missing number that is not at the end of the right-hand side of the equation. For example:

- $8+ \bigcirc =12$
- $\bigcirc +5=12$
- $4+\bigcirc =9$

5. **SAY:** The missing number, where the question mark is, is called an *addend*.
6. **DO:** Demonstrate the equations with objects so that all members become comfortable with the idea of “balancing” an equation.



AND GO!

10 min

1. **DO:** Distribute copies of “What’s Missing?” to all members.
2. **DO:** Have members see how quickly they can complete the number sentences by filling in the missing numbers to turn them into equations.
3. **CHECK FOR UNDERSTANDING:** by asking members to:
 - Say what they learned about number sentences and equations.
 - Demonstrate a number sentence that is not an equation and one that is.
 - Explain what knowing about equal signs (=) allows them to do.
4. **DO:** Help members access one of the additional resources listed, if they need more practice.

What's Missing?

$$\bigcirc - 5 = 7$$

$$3 + \bigcirc = 17$$

$$\bigcirc + 7 = 7$$

$$8 + \bigcirc = 12$$

$$18 - \bigcirc = 3$$

$$18 - \bigcirc = 9$$

$$2 + 6 = \bigcirc$$

$$\bigcirc - 5 = 11$$

$$\bigcirc + 7 = 11$$

$$8 - 3 = 2 + \bigcirc$$

$$6 + \bigcirc = 13$$

$$4 + \bigcirc = 10$$

$$3 + \bigcirc = 6 + 6$$

$$16 - \bigcirc = 4 + 4$$

$$1 + \bigcirc = 13$$

Lesson: Relationships

What's in a Number?

Time: 25 minutes

Objective: It's important to help children make sense of the relationship between addition and subtraction and to learn to apply the properties of the operations. Creating equations is one way to tell a story about objects. When one number is hidden in an equation, the other numbers can be used to discover it. Patterns can be found in equations. This activity focuses on creating all equations that relate to a particular group of numbers (although any group of numbers will be acceptable, in this lesson, we use 5, 6, 7 and 8). Working in pairs, members discover the idea that numbers are made up of other, smaller numbers. This appreciation forms the foundation for their knowledge of addition and subtraction.

Materials

- White board
- Dry-erase markers
- Two-color counters
- Pens/pencils
- Colored markers
- Paper

Additional Resources

[Balloon Pop Subtraction](#)

[Games Using Counters](#)



GET READY

5 min

1. **SAY:** We're going to practice equations. We're going to find out how many different equations there are for one set of numbers.
2. **DO:** Demonstrate with a set of six double-sided counters.
3. **DO:** Place three red sides up and three yellow sides up.
4. **ASK:** What are the two smaller numbers you see here that make up six? Answer: **three and three**
5. **DO:** Throw a number of counters and have members identify the equation that describes it.
6. **REPEAT:** The activity until everyone is comfortable finding the proper equation.
7. **WRITE:** An equation on the white board and ask members to demonstrate it with counters.
8. **REPEAT:** until everyone is comfortable.



GET SET

5 min

1. **SAY:** Now we're going to throw the counters to find all number pairs for the number 5.
2. **DO:** Have members keep throwing counters to find different number pairs that make up 5.
3. **DO:** Have members to make a picture chart of their findings:

Results for 5 Counters	Equation
2 red, 3 yellow	$2 + 3 = 5$
3 red, 2 yellow	$3 + 2 = 5$
1 red, 4 yellow	$1 + 4 = 5$
4 red, 1 yellow	$4 + 1 = 5$
5 red, 0 yellow	$5 + 0 = 5$
0 red, 5 yellow	$0 + 5 = 5$

4. **SAY:** Compare your results with your neighbor and make sure that you've found all the possibilities.



AND GO!

15 min

1. **DO:** Instruct each member pair to:
 - repeatedly throw either 5, 6, 7 or 8 counters
 - record the different ways the counters land with pictures
 - create equations (true number sentences) for each
2. **DO:** Have members to choose other numbers they would like to try, such as 9, 10 or 15.
3. **CHECK FOR UNDERSTANDING:** If members have trouble with the concepts, walk them through the lesson again or help them access one of the additional resources listed.

Lesson: Time

As Time Goes By

Time: 20 minutes

Objective: This activity gives members an appreciation of time. It also helps them understand the relativity of the concepts of fast and slow through personal physical activity.

Materials

- White board
- Dry-erase markers
- Paper
- Colored markers
- Timer (one-minute sand timer or phone timer)

Additional Resources

[Telling Time Quiz](#)

[Telling Time Song](#)



GET READY

5 min

1. **SAY:** We're going to review the idea of time and practice timing ourselves doing activities.
2. **SAY:** Let's try the following activities:
 - Clap your hands fast and then slow
 - Try to jump very quickly and then slowly
 - Click your tongue fast and slow
3. **DO:** Show members the sand timers.
4. **ASK:** What do you think the sand timers do?
5. **DO:** Demonstrate how timers work. (If you do not have sand timers, let members watch as an electronic timer counts out a minute.)



GET SET

5 min

1. **ASK:** How many hearts can you draw in one minute?
2. **WRITE:** their individual guesses on the white board.
3. **SAY:** “go” and give them a chance to draw as many hearts as they can in one minute. (Be sure they don’t begin until they hear “go” and stop on the word “stop.”)
4. **DO:** Check their drawings, making sure the hearts they draw look like hearts.
5. **WRITE:** their results on the board.



AND GO!

10 min

1. **DO:** Have members to create a list of things to try for one minute.
2. **WRITE:** their ideas on the board.
Examples:
 - drawing stars
 - hopping
 - blinking eyes
 - writing your name
 - linking or snapping cubes together
 - stacking pieces
 - writing the alphabet
3. **DO:** Have members work in pairs to test their one-minute abilities and record their results.
4. **ASK:** What have you learned about doing something for one minute? (This might be the first time some members have thought about how long one activity takes in comparison to another. Listen as they experience surprise about the tasks they can do in one minute.)
5. **DO:** Give members the opportunity to discuss some of the projects that they have to do at school, at home and at play.
6. **CHECK FOR UNDERSTANDING:** If members have trouble with the concepts, walk them through the lesson again or help them access one of the additional resources listed.

Lesson: Measuring

Measuring Myself

Time: 25 minutes

Objective: This activity is a chance for members to experience measures and comparisons using a standard of measurement. In this case, they use a non-standard unit of measurement. Members discover and record lengths of selected body parts. Using outline drawings of their bodies is fun for members and teaches them about non-standard units of measurement.

Materials

- White board
- Dry-erase markers
- Poster paper
- Colored markers
- Snapping/linking cubes
- Wooden sticks (of equal length)
- String
- Pens/pencils
- Paper

Additional Resources

[Measuring with Nonstandard Units](#)

[Measure with Silly Things](#)



GET READY

5 min

1. **SAY:** We're going to practice measuring different parts of the body.
2. **DO:** Ask members to work in pairs.
3. **DO:** Show members how to draw each other's outline on the poster-paper.
4. **SAY:** Label your outline with your name.
5. **DO:** Show the measuring devices they will use (cubes, wooden sticks and string).



GET SET

5 min

1. **DO:** Have members make some guesses of different body dimensions – such as from the shoulder to the tip of the longest finger, for example.
2. **ASK:** What are some body parts that we could measure? Examples: (arm, leg, hand, foot, head, waist, wrist, finger length, finger circumference, thumb, neck or height).
3. **SAY:** Use whichever measuring devices you want—whichever you think is best.



AND GO!

15 min

1. **DO:** Give pairs time to complete and record their measurements on their drawings.
2. **DO:** Guide members in knowing when cubes are best to use and how they relate to the sticks.
3. **DO:** Help members see that using the string is a good technique for measuring round shapes such as heads, necks and wrists.
4. **ASK:**
 - Whose arm measured 25 cubes?
Stand up if your arm is more than 25 cubes.
 - Put your hands on your head if your arm measured less than 4 sticks.
 - Can you compare cubes and sticks on your outline?
 - Which parts measured longer (shorter) than your waist?
5. **ASK:** Have you ever been any place where someone measured you (such as the doctor, the shoe store or in getting fitted for uniforms)?
6. **CHECK FOR UNDERSTANDING:** If members have trouble with the concepts, walk them through the lesson again or help them access one of the additional resources listed.

Lesson: Distance

Three-Throw Ball

Time: 25 minutes

Objective: This activity is modified from a Native-American children’s game. Its purpose is to give members experience in using linear measurement to solve a problem (measuring who is throwing a ball the farthest).

Materials

- White board
- Dry-erase markers
- 3, 4”-diameter foam balls
- Linear measuring device (yardstick, ruler, string/rope with units marked off)

Preparation

Mark off a ball-toss area in a safe place where activity is acceptable (two throwing areas make the game go faster).

Additional Resources

[Measuring Game](#)

[Measurement Game](#)



GET READY

5 min

1. **DO:** Ask members to name situations where they used measurement to solve a problem.
2. **ASK:** What kinds of everyday problems can be solved by using measurement?

Examples: fitting an object into a box, using the right ingredients for cooking, buying the right size clothes, placing art on a wall



GET SET

5 min

1. **WRITE:** a chart like the one below on the white board.

Distance Thrown (units)				
Thrower	Right Hand	Left Hand	Both Hands	Total

2. **SAY:** We’re going to practice throwing a ball as far as we can and then record the distance on this chart.
3. **SAY:** In this game, you will use measurement to find the relative distance you can throw balls in different ways.
4. **DO:** Ask members to decide how they want to score the game – such as awarding points for the total distance a player gets or one point for the longest in each category.



AND GO!

15 min

1. **EXPLAIN** the rules for the game:

- Members can compete as individuals, in pairs or as a team.
- Each player tosses the ball using the right hand, left hand and both hands.
- Teams may throw all at once or alternate.
- When throwing, members must lie on their backs and throw the ball backwards – first with the right hand, then with the left hand and then with both hands.
- Throws must be made with the shoulders flat on the ground.
- Measurements must be taken and recorded after each throw.

2. **WRITE:** the distance thrown in feet, meters or the non-standard units you created.

3. **ASK:** Why is it important to be precise in measurement?

4. **ASK:** What does the data that we collected tell us?

- Does the member with the longest total have all the longest throws?
- Is the longest thrower with one arm also the longest thrower with the other?
- Are you surprised with the results of the two-hand throw?

5. **CHECK FOR UNDERSTANDING:** If members have trouble with the concepts, walk them through the lesson again or help them access one of the additional resources listed.

Lesson: Sorting

What Can You Discover?

Time: 20 minutes

Objective: Experiencing how to organize events, objects, numbers or mathematical operations with a variety of attributes helps members work more effectively and efficiently in solving mathematical problems. In this lesson, members examine the attributes of a common object (shoes) by sorting them into various groups based on characteristics.

Materials

- White board
- Dry-erase markers
- Pens/pencils
- Paper
- One shoe from each member

Additional Resources

[Sorting Games](#)



GET READY

3 min

1. **SAY:** We going to practice sorting today by looking at a common object – your shoes.
2. **DO:** Have members form a circle.
3. **DO:** Instruct each member to place one shoe into a pile in the center.



GET SET

5 min

1. **ASK:** What are the characteristics you can see on some of the shoes? Answers: **color, laces, type, material, sole, buckles, slip-on, lights that flash**
2. **WRITE:** a list of the possible characteristics on the white board.
3. **DO:** Have members choose the characteristic they want to use first for sorting the shoes.
4. **DO:** Select one shoe and begin the first method for sorting.
4. **DO:** Call attention to one shoe at a time and ask members whether it belongs in the group or not (one group of shoes contains the selected characteristic and the other group does not).
5. **DO:** Count the number of shoes in each group and record the number on the white board.



AND GO!

12 min

1. **DO:** Return the shoes to the center.
2. **DO:** Have members to form pairs or small groups.
3. **DO:** Give members time to discover new groups based upon other characteristics listed earlier. If members have trouble selecting a characteristic, suggest one from the list or a new one.
4. **SAY:** Let's sort the shoes according to the chosen characteristic.
5. **DO:** Have members write the results including the characteristic selected and how many shoes that were in the group and outside of the group.
6. **ASK:**
 - Which group of shoes had the greatest number?
 - What is the number of shoes in the smallest group?
 - Why do you think the group sizes are the way that they are?
 - Did anyone think of a new group that was not on our original list?
 - What can we learn about shoes that fit into a variety of groups? Can you think of other objects that would work that way? (*rocks, dogs, cats, cheese, people*)
 - How can sorting items in groups help in school or home?
7. **CHECK FOR UNDERSTANDING:** If members have trouble with the concepts, walk them through the lesson again or help them access one of the additional resources listed.