MATH Literacy

Toolkit

Intro to Fractions Toolkit

SNIPPETS FROM THE LESSON

ProActiveEd

proactiveEd.net | info@proactiveEd.net

State Standards

☑ TEKS 3.3A-H

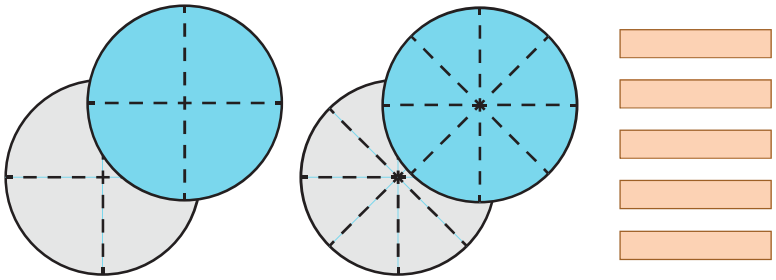
NCTM Process Standards

Problem Solving	Build new mathematical knowledge through problem solving. Solve problems that arise in mathematics and in other contexts. Apply and adapt a variety of appropriate strategies to solve problems. Monitor and reflect on the process of mathematical problem solving.
Reasoning and Proof	Make and investigate mathematical conjectures. Select and use various types of reasoning and methods of proof.
Communication	Organize and consolidate student mathematical thinking in written and verbal communication. Communicate mathematical thinking clearly to peers, teachers, and others. Use the language of mathematics to express mathematical ideas precisely
Connections	Recognize and use connections among mathematical ideas. Understand how mathematical ideas interconnect and build on one another to produce a coherent whole. Recognize and apply mathematics in contexts outside of mathematics.
Representations	Create and use representations to organize, record, and communicate mathematical ideas. Select, apply, and translate among mathematical representations to solve problems. Use representations to model and interpret physical, social, and mathematical phenomena.

Learning Objectives

Students represent fractions greater than zero and less than or equal to one using concrete objects and pictorial models, including strip diagrams and number lines. They also develop and express an understanding that the unit fraction 1/b represents the quantity formed by one part of a whole that has been partitioned into b equal parts where b is a non-zero whole number. Students compose and decompose a fraction a/b with a numerator greater than zero and less than or equal to b as a sum of parts 1/b and. They also represent equivalent fractions and compare fractions using a variety of objects and pictorial models, including number lines.

Toolkit Materials

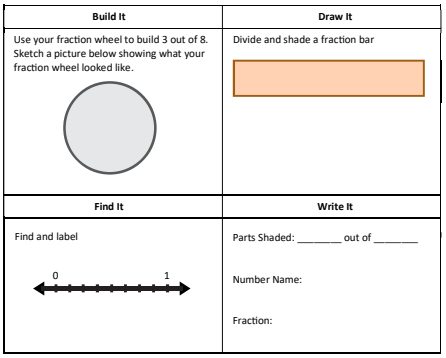


Concrete Representations

- ☑ See blackline masters section below

Blackline Masters

- ☑ Light Blue ¼ Circle
- ☑ White ¼ Circle
- ☑ Light Blue 1/8 Circle
- ☑ White 1/8 Circle
- ☑ Fraction Bars
- ☑ Number Line
- ☑ Blank Color Wheel
- ☑ "Build It. Draw It. Find It. Write It." Mat



Not Included

- ❒ Scissors

Literacy Guide

	Academic Discourse	Engage in conversations about the big ideas
	Conceptual Understanding	Explore the math using hands-on materials
	Informational Text	Read and write about concepts and problem solving strategies
	S.T.E.A.M. Connections	Investigate science, technology, engineering and art topics using the math
	Technical Writing	Present and write about the S.T.E.A.M. Connections

Recommended Intervention Toolkit

Foundations of Multiplication and Division Toolkits

Recommended Acceleration Toolkit

Adding and Subtracting Proper Fractions Toolkit

Teacher Tips

Anchor 1: Academic Discourse

- ☑ Use games like a scavenger hunt to help students see the mathematics in the universe that surrounds them.
- ☑ Connect prior learning to make real-world connections to the learning goal.
- ☑ Reduce the barrier of academic vocabulary by focusing on big ideas and real world representations.

Anchor 2: Conceptual Understanding

- ☑ Use concrete realia or virtual manipulatives to represent the learning objective.
- ☑ Use hand-on manipulatives and student created pictures before transitioning to abstract concepts and standard algorithms.
- ☑ Use laboratory procedures that follow a constructivist approach to investigate the topic and learn key concepts.
- ☑ Communicate learning experiences through academic dialogue
- ☑ Write expository pieces to demonstrate conceptual understanding of the learning topic.

Anchor 3: Informational Text

- ☑ Use informational text to investigate the topic and learn key terms.
- ☑ Use reading strategies like previewing, chunking, annotating, and text dependent questioning to help students process the density text.
- ☑ Encourage reading and English teachers to utilize informational text about mathematics in their classroom settings.
- ☑ Communicate learning experiences through academic dialogue
- ☑ Write expository pieces to analyze the concepts and strategies presented in the text.

Anchor 4: S.T.E.A.M. Connections

- ☑ Use research, context clues, and access student schema to comprehend the given scenario
- ☑ Investigate invented strategies and standard algorithms to determine potential successes and failures.
- ☑ Design a prototype that satisfies the criteria outlined in the project before creating the final product.
- ☑ Collaborate with others to share strategies, critique reasoning, and justify methods.

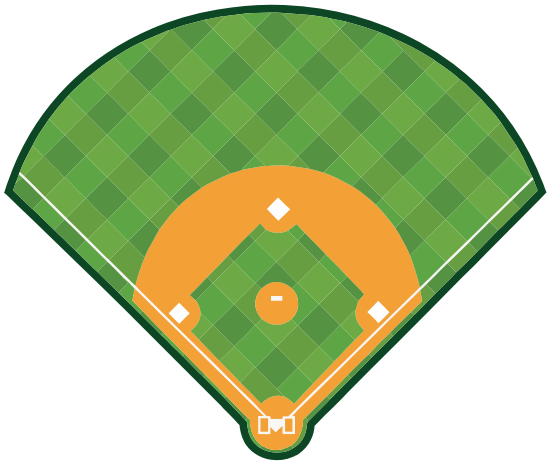
Anchor 5: Technical Writing

- ☑ Write paragraphs that summarize the S.T.E.A.M. scenario. Be sure to include the criteria and scoring guide.
- ☑ Write paragraphs that describes the steps that will be used to address the scenario. Be careful to use numbers with a description of the role those numbers play in those steps.
- ☑ Write paragraphs that incorporates the steps used to address the scenario into actual calculations that include graphs, charts, diagrams and other representations as deemed appropriate
- ☑ Write paragraphs that investigate alternative problem solving strategies as a means for verifying the accuracy and validity of solutions
- ☑ Write paragraphs that reflect on strengths, misconceptions, and potential future applications of the concepts that were addressed and the strategies that were used.

Math Conversations

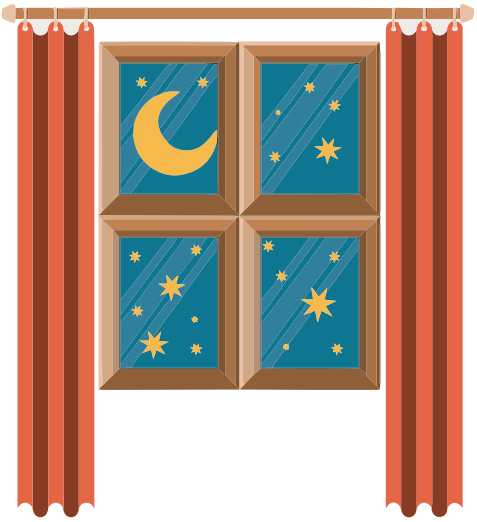
SETUP THE GAME

We see and experience parts of whole numbers all around us every single day. For example, when you are watching or playing baseball, if the batter hits a home run, the batter scores one WHOLE point (or run) for the team. If the batter doesn't get a home run, they might get part of the way home. Therefore, first, second, or third base would be considered part of the whole way home.



Let's consider another example. If you build a whole house out of lego bricks, parts of the house might be different colors, shapes, or sizes than other parts of the house. In the lego house below, part of the whole house is red.

You can also see parts of a whole in a window frame. Look at the window below. The whole window is made up of four parts.



PLAY THE GAME
Look around your environment. Think about things you enjoy doing. Envision your favorite foods. Where do you see examples in your life of parts that make a whole? Add your ideas to the list below.

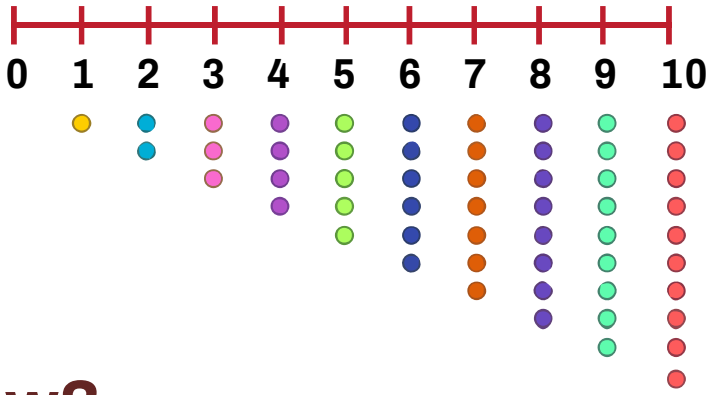
Example of Parts that make a whole	**Describe the example. What are the parts? What is the whole?**
Baseball Field	The bases are the parts The infield is the whole
Lego House	The colored bricks are the parts The house is the whole
Window pane	The separate sections are the parts The entire window is the whole

Math Conversations Wrap-up Questions

- Do you see whole items, numbers, and objects all around you? Explain.
- Do you think that most whole items/objects can be broken into parts? Explain

What's Old?

You already know a lot about numbers. You know that **whole numbers** start at 0 and go on forever. You know that numbers are used to count items and represent amounts. You know that numbers have value and can be compared.



What's New?

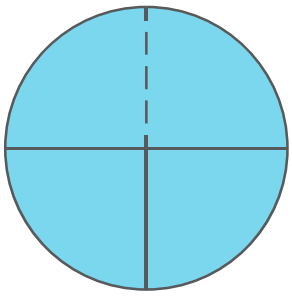
Wow, look at everything you already know about whole numbers! Did you know that numbers can also have parts? Today you will learn about parts of numbers.

Try it!

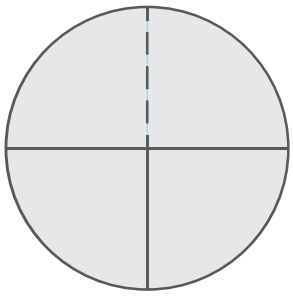
Sometimes a whole is divided into parts. Think of a pizza for instance. A whole pizza is always divided into equal pieces.

Let's try it!

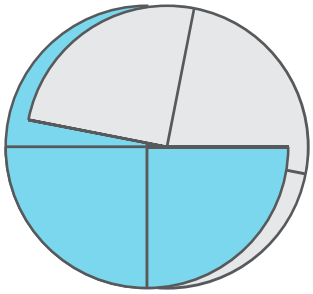
1. Take out your light blue circle that is divided into four pieces. Cut the dotted line on this circle.



2. Take out your white circle that is divided into four pieces. Cut the dotted line on this circle.

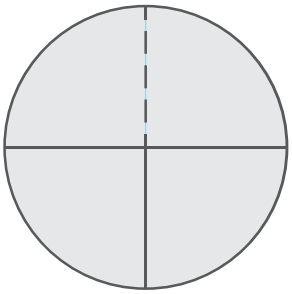


3. Connect the circles by sliding them into each other along the dotted lines that you cut.

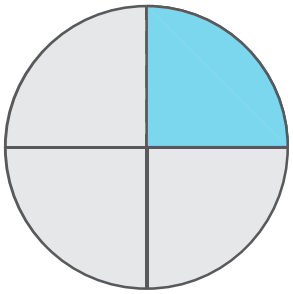


4. Now, when you spin the circle, you see different amounts of the circle shaded blue.
5. Now, let's say the white part is the pizza and the blue part is the "eaten part of the pizza"

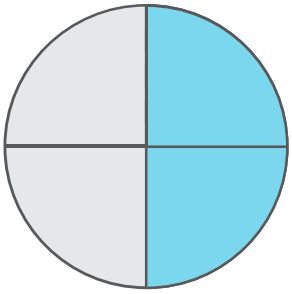
6. Start with your whole white circle. Here, you have a WHOLE pizza.



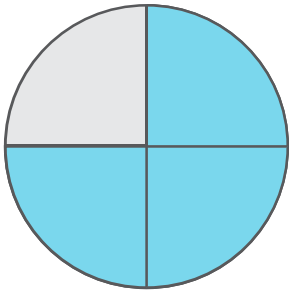
7. Spin your circles to show that one part of the pizza is gone.



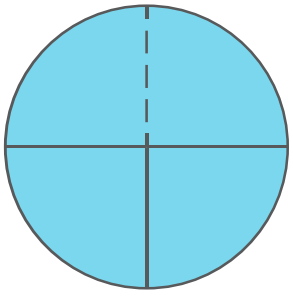
8. Now, spin your circles to show that 2 parts of the pizza are gone. Did you notice that this is half of the pizza?



9. Now, spin your circles to show that 3 parts of the pizza are gone.



10. Finally, spin your circles until the WHOLE pizza is gone.

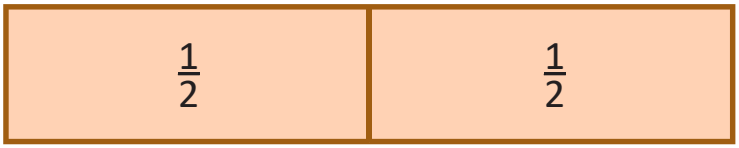


11. See! You started with a whole pizza, but as pieces were eaten, you had parts of a whole pizza.

Explore 2: Build It/ draw it- Fraction bars

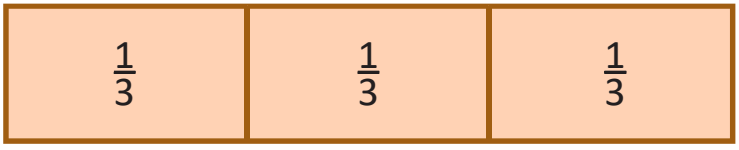
1. Circles are one way that we can represent parts of a whole. We can also use bars to represent parts of a whole.
   One bar represents one whole.
   This is one whole.

2. We can divide this WHOLE bar into equal parts.
3. Draw a line down the middle of the bar above to divide the bar into two equal parts. How many parts make the whole?
   Since two parts make the whole, two is the denominator. Each part of the whole is ½.
4. Label each half of the fraction bar above as ½ .



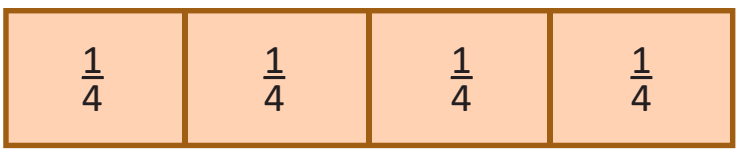
5. You can divide a fraction bar into as many parts as you want as long as the parts are equal!

   Below is a fraction bar divided into thirds.



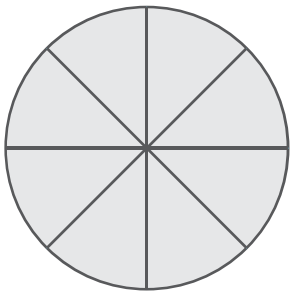
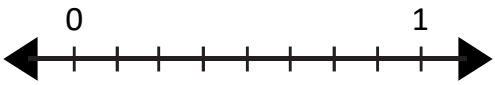
6. Shade two parts of the bar. What fraction of the bar is shaded?
   Yes, since two out of three parts are shaded, it is ⅔ or two thirds.

   Below is a fraction bar divided into fourths.



Explore 4

Complete the organizer below for the amount of three out of eight.

Build It	Draw It
Use your fraction wheel to build 3 out of 8. Sketch a picture below showing what your fraction wheel looked like. 	Divide and shade a fraction bar 
Find It	**Write It**
Find and label 	Parts Shaded: _____ out of _____ Number Name: Fraction:

Math Explorations Wrap-up Questions

- Which representation do you prefer to use for fractions: fraction circle/wheel, fraction bar, or number line? Why?
- Why do you think that it is important that the whole is divided into EQUAL parts?
- True or false: A whole can be divided into any number of parts as long as the parts are equal pieces. Explain.

Reading & Writing Instructions

Identify the Craft and Structure

- Find and circle bolded words.
- Write your own definitions in the margins.
- Share your definitions with a partner.
- Read the passage and stop at every word you don't know. Place a dot above the words and keep reading.
- Compare your dotted words with a partner and try to figure out what they mean.
- Write your meanings in the margin
- Reread the passage using your definitions.

Find the Key Ideas and Details

- What is the text about?
- How are fractions different than whole numbers?

Integrate Your Knowledge and Ideas

- Provide an example of a time when you use parts of a whole in real life.

Write: Letter to Your Parent or Guardian

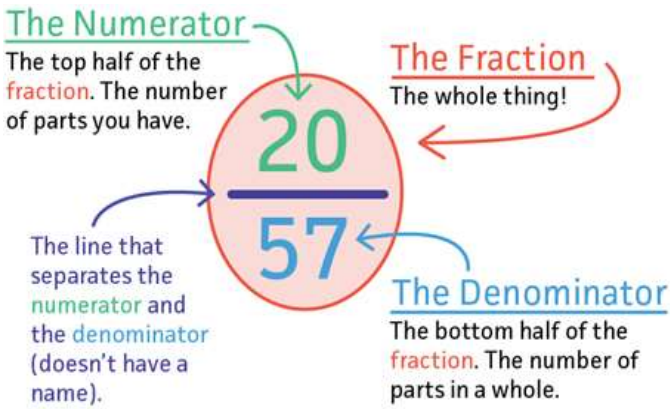
Explain

- The definition of fractions.
- The difference between a numerator and denominator.
- Three visual representations of fractions.
- An example of where you see fractions in everyday life.

Parts of a Whole

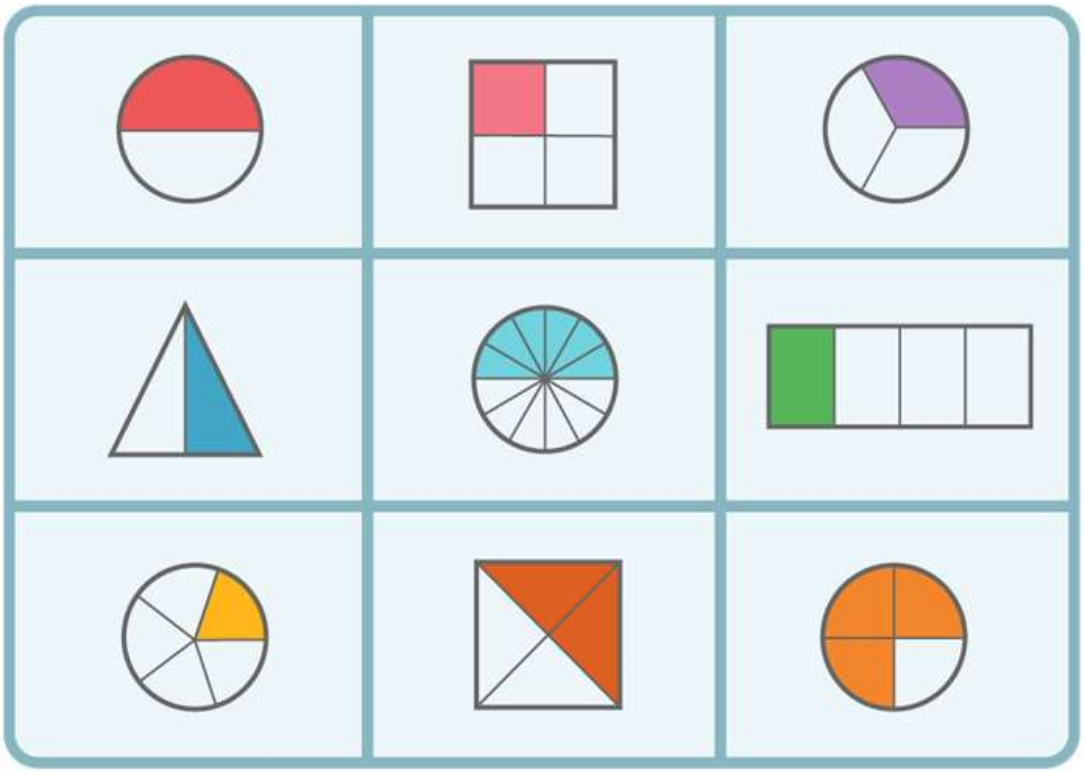
What is a fraction?

In the Explore section, you used fraction wheels, fraction bars, and number lines to represent **parts of a whole**. When a number is a part of a whole instead of a whole number, we call that number a **fraction**.



Fractions have a **numerator** and a **denominator**. The **numerator** is the number on top which tells us the part that we "have". The **denominator** is the number on the bottom which tells us how many parts make the whole.

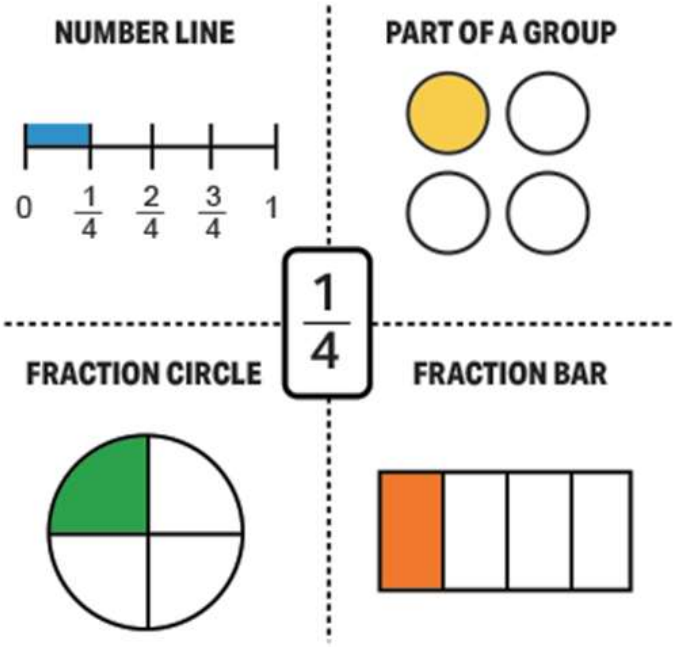
A whole can be divided into any number of parts as long as the **parts are equal** to each other.



Notice in the above examples. Each whole is divided into different numbers of parts, but in each example, all of the parts are the same size.

Where do we See Fractions?

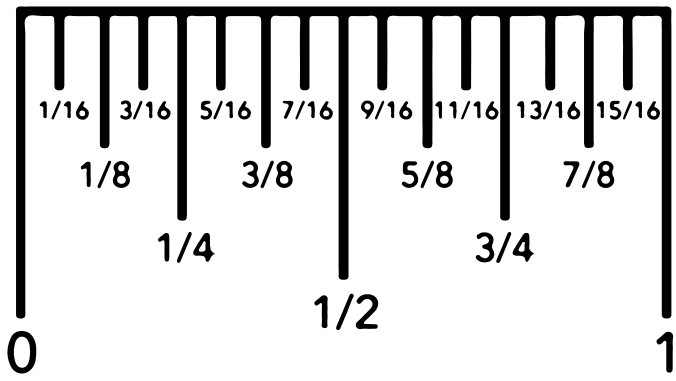
Fractions can be represented visually in multiple different ways, such as fraction circles and wheels, fraction bars, number lines, and multiple other drawings.



Number Lines

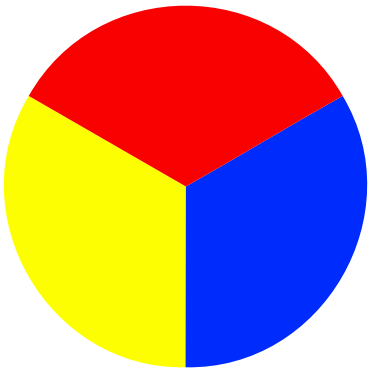
Fractions are all around us every day. Take this ruler for instance. Usually, when we take measurements, the length of the object that we are measuring is not a whole number. Below, you see a one inch ruler. Notice all of the fractions between 0 and 1 inch?

You were on a science field trip taking observations of the nature around you. When you measured an acorn, it was 7/8 , seven eighths, of an inch. Find and locate ⅞ on the ruler below.

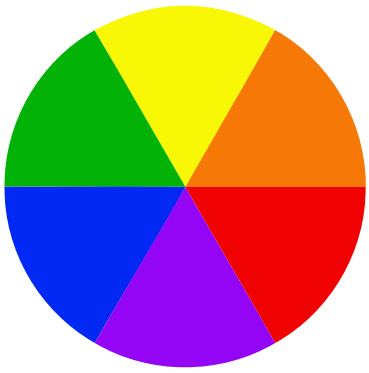


Color Wheel of Favorites

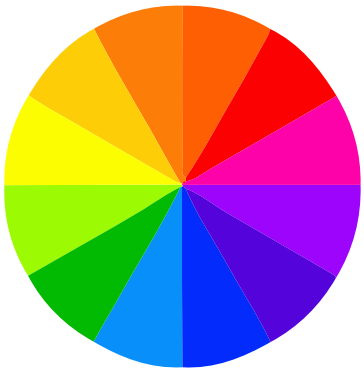
Artists use something called Color Theory to find the perfect color combinations to use in their art. Physicist Sir Issac Newton created the Color Wheel in the 17th century to show how colors work together. There are now many different color wheels, but they still show how colors combine and work together.



Primary Color Wheel



Secondary Color Wheel



Tertiary Color Wheel

Your task is to create a color wheel. You can use as many colors as you would like, but all color sections must be equal in size. Instead of just coloring the colors, you will draw/show your items of that specific color in each colored section. These can be your favorite items, items related to the same topic, items related to different topics, random items all of the same color, etc. It is your choice!

S.T.E.A.M. Presentation

Write a five paragraph essay describing the maze that you created, the program that you developed, and a descriptive explanation on how to maneuver your robot through the maze. This will serve as an instruction manual for the robot and maze. Remember to describe the decimal turns that the wheels are required to make. How did you determine where to include those decimals and how did you plan your maze accordingly?

Paragraph 1: Summary

Use complete sentences to restate the project in your own words, identifying important information in the project. Use numbers with units in your description of any quantities.

Paragraph 2: Strategy

Use complete sentences and academic vocabulary to write the steps you would take to solve the problem. Do not use any numbers or computations in your description.

Paragraph 3: Solution

Use complete sentences, an organized presentation of mathematical computations (e.g. graphs, tables, equations, etc.), and your strategy to demonstrate the solution to the problem.

Paragraph 4: Justification

Use complete sentences and flexible problem solving strategies to construct viable arguments that demonstrate the accuracy of your solution.

Paragraph 5: Reflection

Use complete sentences and academic vocabulary to reflect on what you did well, what you did not do well, and what will you do differently next time to fix any errors.