Learn at Home Resource Packet – Grade 6

Learn at Home Resource Packet – General Overview
Grade 6

This New York State Next Generation Mathematics Learning Standards aligned packet of resources is designed for students and their caregiver(s) who wish to support in-school learning with activities that can be done independently and/or with a partner at home. This work is not intended to be used for assessment or evaluative purposes.

Some of the task herein require internet access and others do not. The packet includes activities that support the major mathematical work of the grade with a particular focus on building grade level numeracy. In grade 6, students' ability to fluently add, subtract, multiply and divide multi-digit rational numbers, find common factors and multiples, evaluate arithmetic expressions and using the conventional order of operations, and use the properties of operations to generate equivalent expressions supports their ability to engage conceptually with important content of the year. These activities should each take 40-60 minutes (although many can be extended) and may be completed in any order.

How to use this guide - For these activities, you will find:

- information about the standards both content and practice that the activity supports;
- a description and/or instructions for the activity;
- questions that will help deepen the learning of the activity;
- and in some cases, suggestions for extending or adjusting the activity.

Activity: *Climbing the Steps of El Castillo*

NYS Next Generation Standards: NY 6.RP A – Understand ratio concepts and use ratio reasoning to solve problems.

Chichén Itzá was a Mayan city in what is now Mexico. Mayans civilization in the Americas predates Columbus' presence. The picture below shows El Castillo, "the castle", also known as the pyramid of Kukulcán, which is a pyramid located in the ruins of Chichén Itzá.

The temple at the top of the pyramid is approximately 24 meters above the ground, and there are 91 steps leading up to the temple. You can express all answers to the following questions in meters or centimeters, round it to the nearest tenth of a unit.

a. How high above the ground would you be if you were standing on the 50th step?
b. What about the 25^{th} step?
c. What about the 20^{th} step?
d. What about the 11^{th} step?

This activity was adapted from *Climbing the Steps of El Castillo* from Illustrative Mathematics.

Task: Band Fundraiser

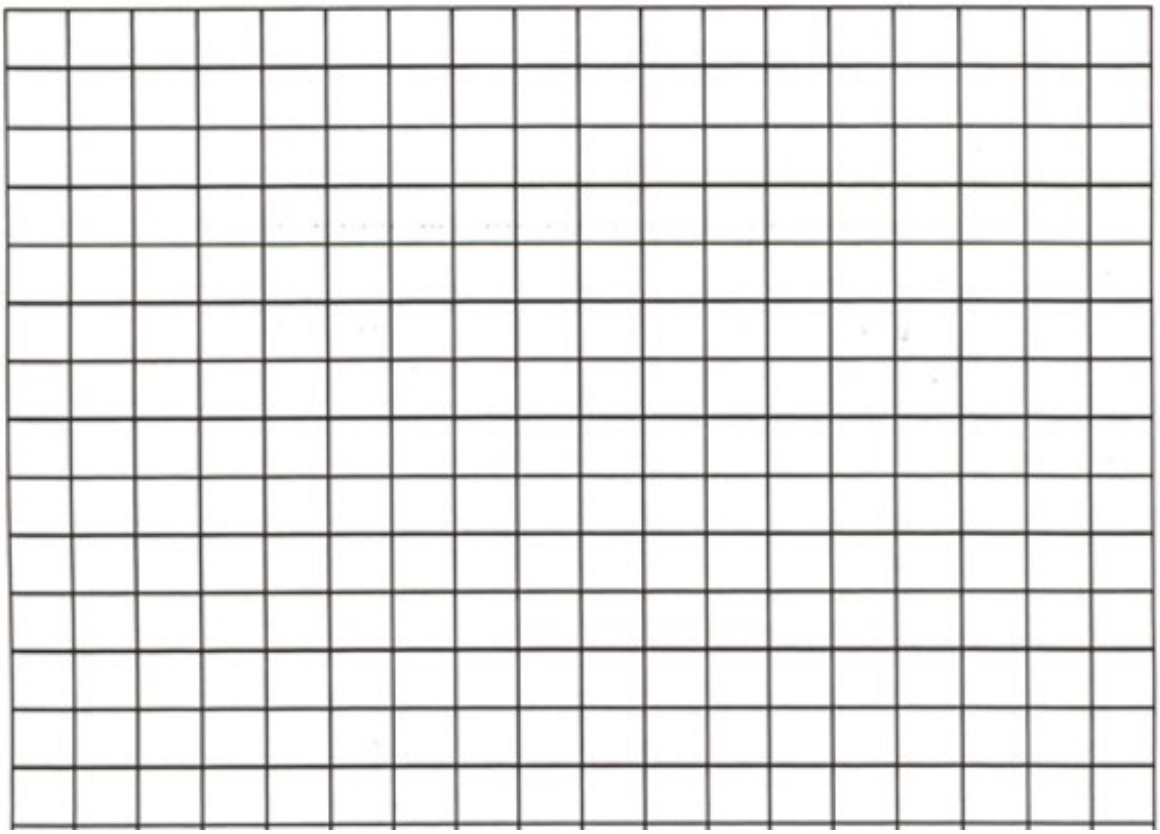
NYS Next Generation Standards: NY 6.EE. – Expressions, Equations and Inequalities

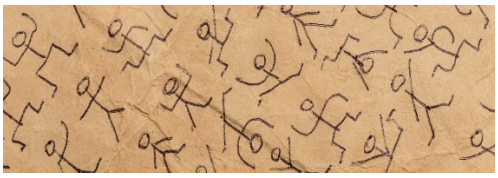
Kayvon is helping fundraise for the school band trip to the national competition in Washington, DC. The band decided to sell boxes of chocolate bars. Each bar sells for $1.50 and each box contains 20 bars. Below is a partial table of money collected for different numbers of boxes sold.

Boxes Sold – b	Money Collected– m
1	
2	
3	$90.00
4	
5	$150.00
6	
7	
10	
12	
15	

This activity was adapted from *Chocolate Bar Sales* from Illustrative Mathematics.

a. Complete the table above for values of m.
b. Write an equation for the amount of money, m, that will be collected if b boxes of chocolate bars are sold.
c. Which is the independent variable and which is the dependent variable? How do you know?
d. Graph the equation using the ordered pairs from the table. Determine the scale and label your axis.
e. Show 2 ways to determine the amount of money that will be collected if 100 boxes of chocolate bars are sold.
f. The band collected $1,530.00 from chocolate bar sales. How many boxes did they sell?





Task: What's the Secret Code?

Content and Math Practice Standards: Number Sense, Fractions, MP 1

Description: This task, from www.youcubed.org, asks students to use their number sense as they practice calculating. This task has more than one solution. How many can you find?!

Use these clues to find the code number:

1. It is between 8,500 and 8,800.
2. When multiplied by 8, the result is a whole number.
3. The digit in the hundreds place is ¾ the digit in the thousands place.
4. The sum of all digits in the number is 26.
5. The digit in the hundredths place is 200% of the digit in the tenths place.
6. There are no zeros in the decimal places.

A. What code numbers fit these clues?

B. Explain how you used these clues to find these possibilities.

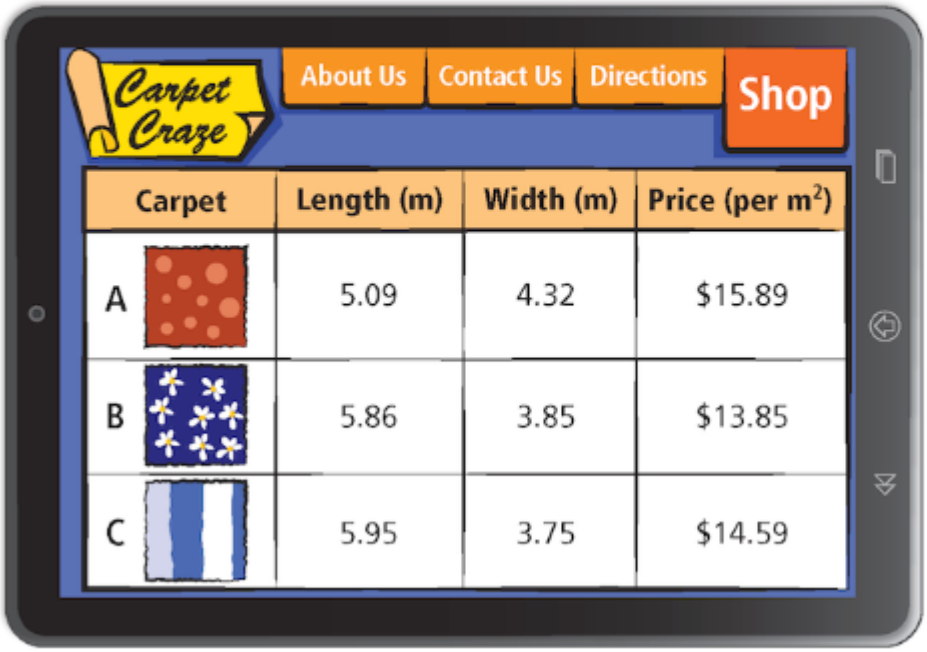
C. Write more clue(s) so that there is only one possible code number.

This task was adapted from youcubed.org

Task: Buying Carpet

Content Standards: Fluency with operations with decimal numbers.

Midge wants to buy a carpet for her new room. She finds three carpets that she likes, but they are different sizes and have different prices. She writes down the information about each size and price so that she can decide at home.



Carpet	Length (m)	Width (m)	Price (per m^2)
A	5.09	4.32	$15.89
B	5.86	3.85	$13.85
C	5.95	3.75	$14.59

Use the data above to answer the following questions.

a. Which carpet is the longest?

b. How much longer is the longest carpet than the shortest carpet?

c. Which carpet has the greatest area?

d. What is the total cost of each carpet?

e. Which carpet costs the most and what is that cost?

f. Which carpet costs the least and what is that cost?

This problem was adapted from Connected Mathematics Project – 3, Pearson Publishing

Task: Optical Art Task

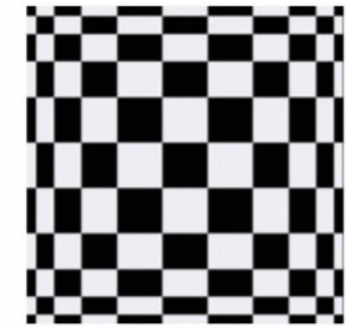
Standards for Math Practice: 1 – 7

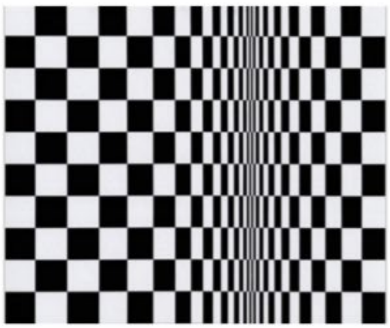
Various NY NGMLS content standards

Reference: Jo Boaler, Michael Jarry-Shore & Cathy Williams Optical Art Task; youcubed.org

Description: This is a task that combines art, mathematics and design. Students are asked to see and design optical illusions, think about the mathematics inside them and pose mathematical questions for friends.

Instructions: Optical art consists of geometric shapes and patterns, and is often colored in black and white. Look at the three examples, do you see anything about the patterns that cause them to create an optical illusion?





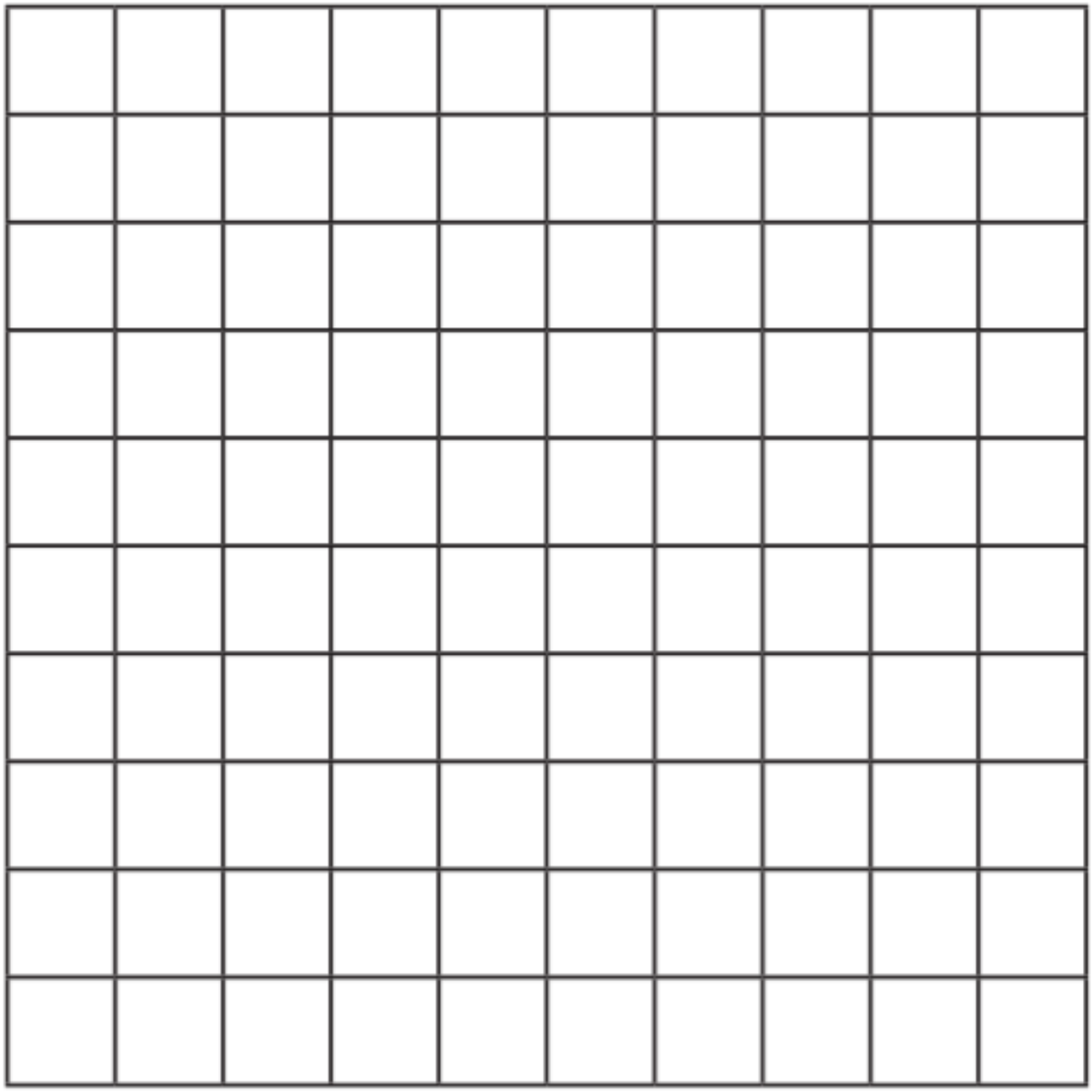
1. Using the 100-square grid, create your own interesting pattern. Share your designs with someone and find out if they see an illusion when looking at your pattern.
2. Did you get any more ideas about the ways to create an optical illusion? Describe your mathematical thinking about ways to do that.
3. Can you see any patterns, fractions, or decimals in your artwork? Describe them. Where are they?
4. Think of a mathematical question that you could ask about your artwork. Write it and ask someone to answer it using your design.
5. If someone else wanted to recreate your artwork, what directions would you give them? Try it!

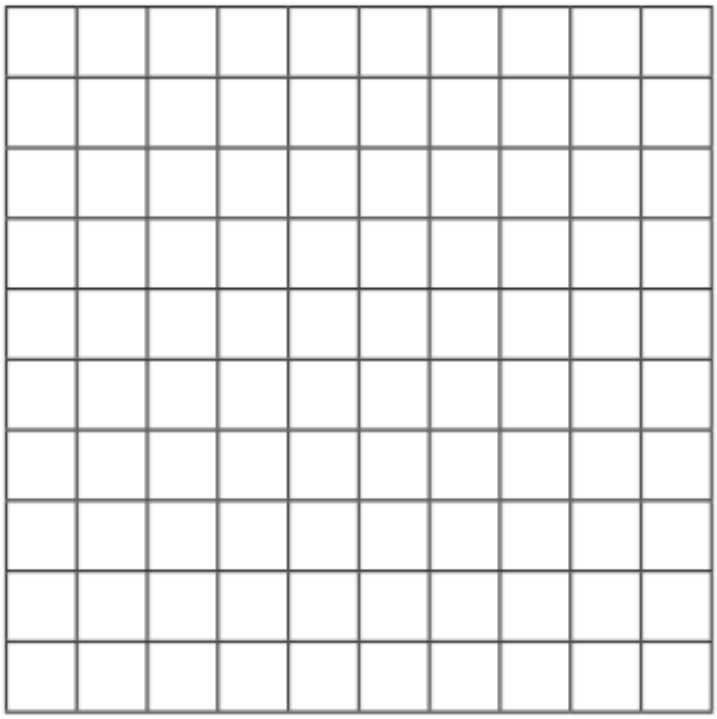
Materials:

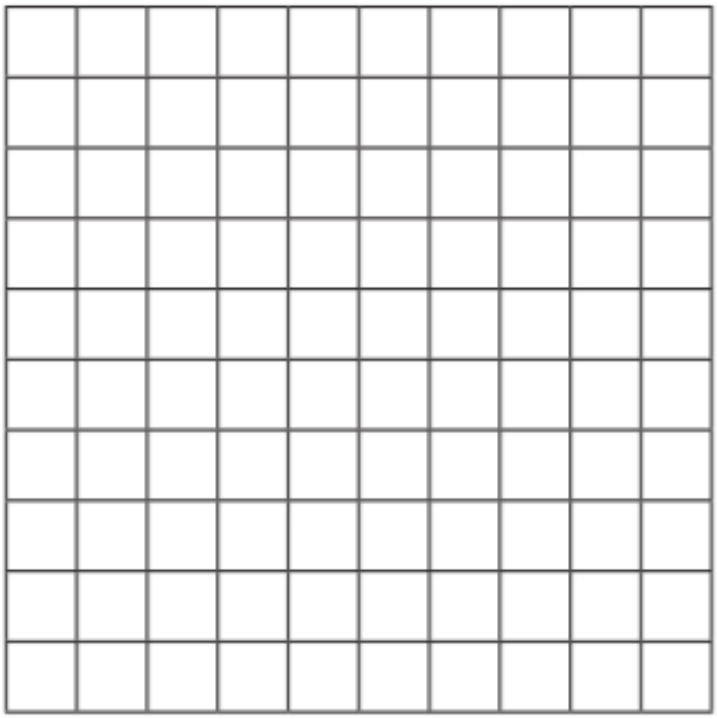
- 100 square grid (below)
- Ruler
- Pencil, colored pencil, crayons or markers

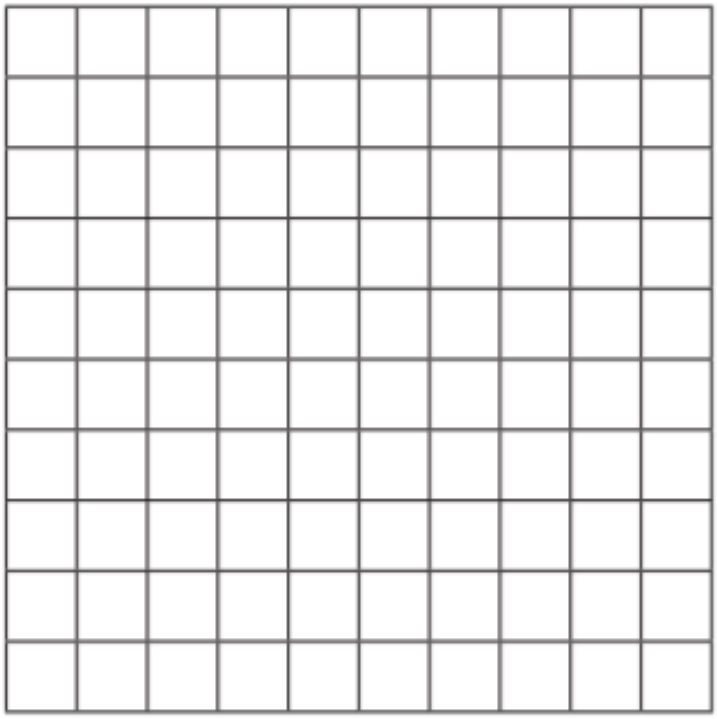
Using the 100-square grid below, create your own interesting pattern. It may help to use a ruler and it is a good idea to experiment with different designs; doing your best to create a piece of optical art that creates an illusion. Experiment with breaking the squares in the grid into triangles, rectangles, and other shapes.

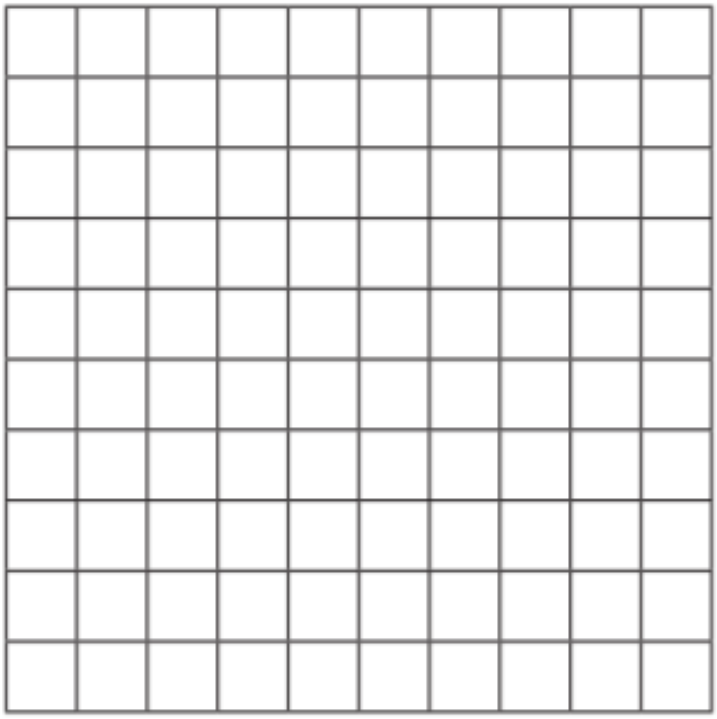
1. Describe your mathematical thinking about way to complete this task.
2. Can you see any patterns, fractions, fractions or decimals in your art work? Describe this.
3. Write a mathematical question you can ask about your artwork.











Activity: The 4's Game

Description: You can play this game with someone else.

Hint: write down the numbers 1- 20 and write a solution for each, crossing off the numbers as you find a solution.

Next Generation Mathematics Learning Content: Number Sense

Mathematics Practice Standards: MP1 - Make sense of problems and persevere in solving them.

Adapted from: You Cubed www.youcubed.org

Task Instructions: Can you find every number between 1 and 20 using only four 4's and any operation? Here's an example $\sqrt{4} + \sqrt{4} = 4$ for the number 4.

Call or text a friend to see what they come up with. Together, you can find all the number 1- 20?

Task: Falling Asleep in Class

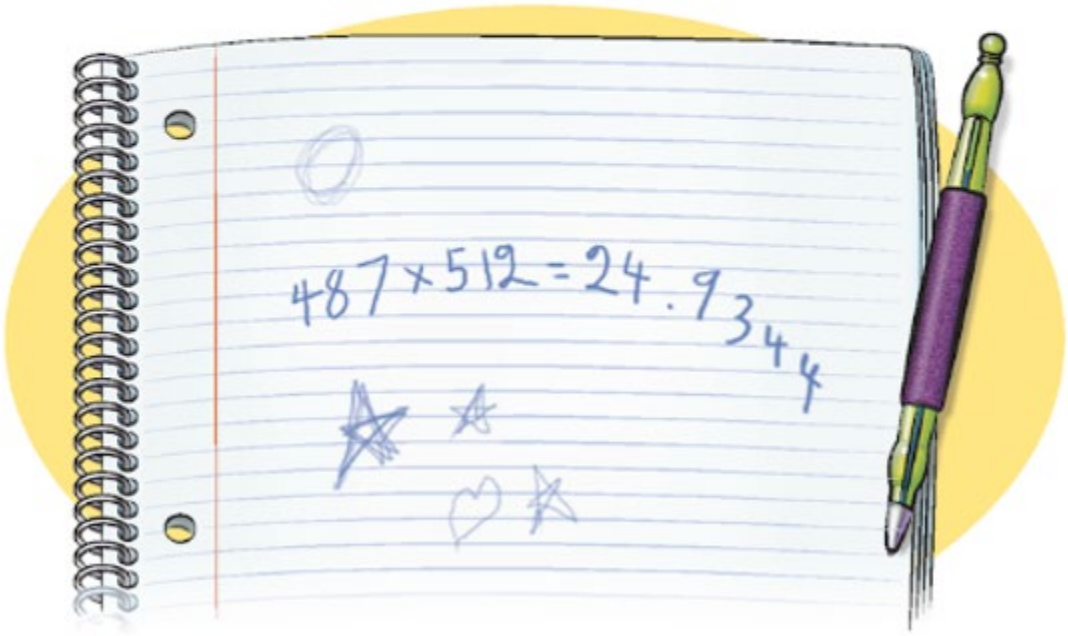
Description: Use what you know about measurement and geometry to find, describe and use a pattern.

New York State Next Generation Math Learning Standards: Geometry Content

Standards for Math Practice: MP: 1 Make sense of problems; MP2: Reason abstractly and MP 3: Construct viable arguments.

Task from: Connected Mathematics Project – 3, Pearson Publishing

One morning, Janet was feeling very sleepy toward the end of class when her teacher multiplied two decimal numbers and got 24.9344. Later, when Janet looked at her notebook, she realized that she had forgotten to put the decimal points of the two numbers in her notebook. Here is what she had written:



a. Where do you think the decimal points should be in the factors? Explain why.

b. Is there more than one possibility? Explain.

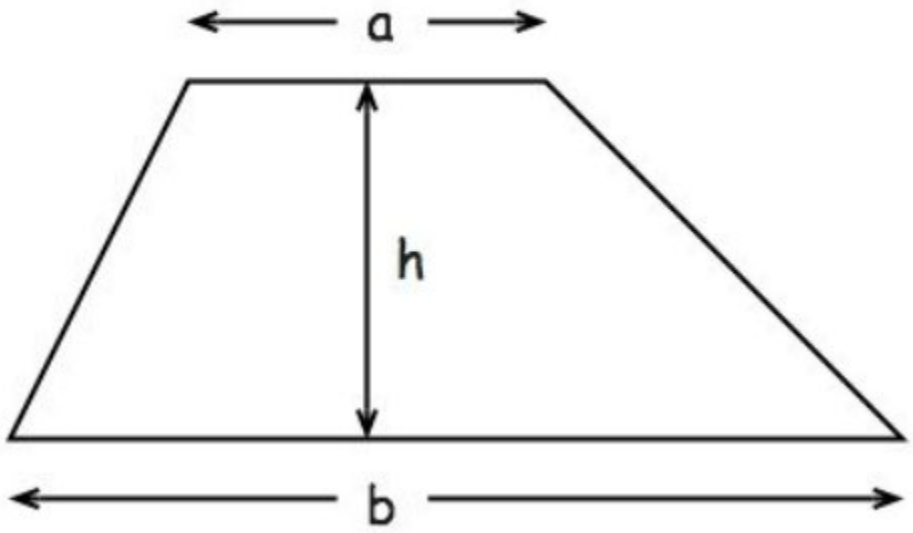
Task: Trap the Zoid

Description: Use what you know about measurement and geometry to find, describe and apply a pattern.

New York State Next Generation Math Learning Standards: Geometry Content

Standards for Math Practice: MP: 4 Modeling with mathematics; MP 8: Look for an express regularity in repeated reasoning

Task from: Youcubed.org



Task Instructions

Definition: A trapezoid is a quadrilateral with 2 parallel sides.

1. Draw this trapezoid on graph paper (below)
2. Label the lengths of the parallel sides a and b, and the distance between sides a and b, h, the height
3. Measure a, b and h. Record the measurements of your trapezoid in the table and determine the sum of sides a and b and the area of your trapezoid
4. Draw at least 5 more trapezoids and record the measurements of a, b, h, a + b and the area in the table
5. Can you see a pattern in the data you have entered in your table? If not, draw some more trapezoids and record your results. Check for a pattern again.
6. Using your pattern, explain how you could calculate the area of a trapezoid

**This activity requires internet access. If you do not have access to the internet, try the extension part of the task only.

Activity: Deep Sea Dual

NYS Next Generation Mathematics Learning Standard(s)

Compute fluently with multi-digit numbers and find common factors and multiples.

NY-6.NS.3

Fluently add, subtract multiply and divide multi-digit decimals using a standard algorithm for each operation.

Mathematical Practice Standard(s)

MP7: Look for and make use of structure

Description

Deep Sea Dual: http://illuminations.nctm.org/Activity.aspx?id=3508 challenges you to be the first person to choose cards with a specified sum.

Focus questions for discussion

- How did you decide what number to choose?
- Do you like to play offense or defense? Why?

Extension - no internet access required

- Instead of playing against Okto the octopus, find all possible winning combinations in any set of cards.
- Use index cards to create your own game that you can play with a partner:
  - Fraction version
    - Cards: $\frac{1}{6}, \frac{5}{24}, \frac{1}{4}, \frac{7}{24}, \frac{1}{3}, \frac{3}{8}, \frac{5}{12}, \frac{11}{12}, \frac{1}{2}$
    - Target Number: 1
  - Multi-digit version
    - Cards: 93, 240, 387, 534, 681, 828, 975, 1,122, 1,269
    - Target Number: 2,043

Resources

Hooda Math - http://www.hoodamath.com/
Fun online math games for grades k - 8. Also includes iPad Games and works on Kindle and Android - HTML5 games. Select by grade, category and subject!

Math Play - http://www.math-play.com/Middle-School-Math-Games.html
Fun Middle School Math games. Choose from a range of games to practice your skills and fluency.

Johnnie's Middle School Math -
http://jmathpage.com/middleschoolmath/jmsmnumberoperations.html
Interactive fun math games for grades middle school. Scroll down the page and see the games get more challenging. Games for Algebra, Number Sense, Geometry, Logic and Problem Solving and Statistics and Probability.

Calculation Nation, http://calculationnation.nctm.org/, is a free education service that uses the power of the Web to let students play games and challenge opponents from anywhere in the world.

You Cubed - www.youcubed.org
Provides engaging mathematics puzzles and games for students of all ages.

Math Pickle - www.mathpickle.com
MathPickle.com is a free online resource of original mathematical puzzles, games and unsolved problems for K-12 teachers. It is supported by the American Institute of Mathematics.

Math 42 - http://math-42.com/
MATH 42 helps students from the 5th to the 12th grade with math.

Monkey in the Middle - http://www.monkeyinthemiddleapps.com/
Grades 6 -8. Play a cool game or practice your math skills. You can compete against your friends using Game Center leader boards and achievements. Can access tutorials and study notes too!

Figure This! - https://figurethis.nctm.org/index.html. Find interesting math challenges that middle-school students can do at home with their families.

NCTM Games for Middle School-
http://www.nctm.org/uploadedFiles/Conferences/Annual_Meetings/pdfs_for_jumpstarts/SarahNSarahMiddle.pdf
These games require paper and scissors. Games are great to play with friends and family. Grades 6 – 8.