

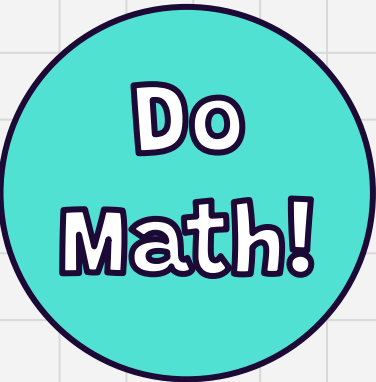
Concepts and Methods in Elementary Math

Class 1 - Introduction




Agenda

This afternoon's work and topics:



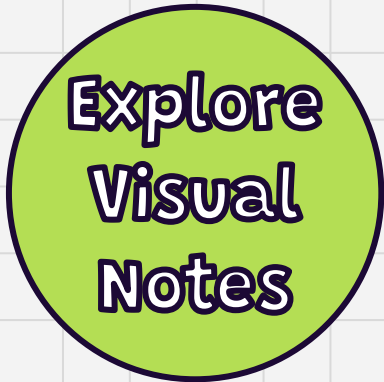
**Do
Math!**



**Overview
the Course**



**Solve
Problems**



**Explore
Visual
Notes**

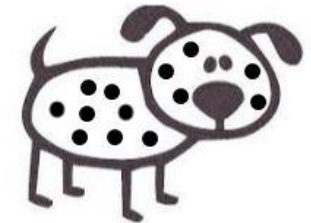
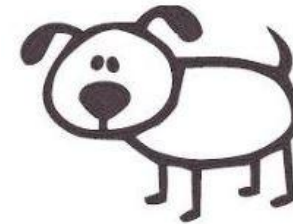


Reflect

Which One Doesn't Belong?

Students are presented with four numbers, shapes, visual images, data sets or graphs and asked to share their reasoning as to which one doesn't belong and why.

The focus of this routine is not simply on the answer, but on students being able to communicate their reasoning and justify their choice(s).



Which One Doesn't Belong

WODB Photo Site

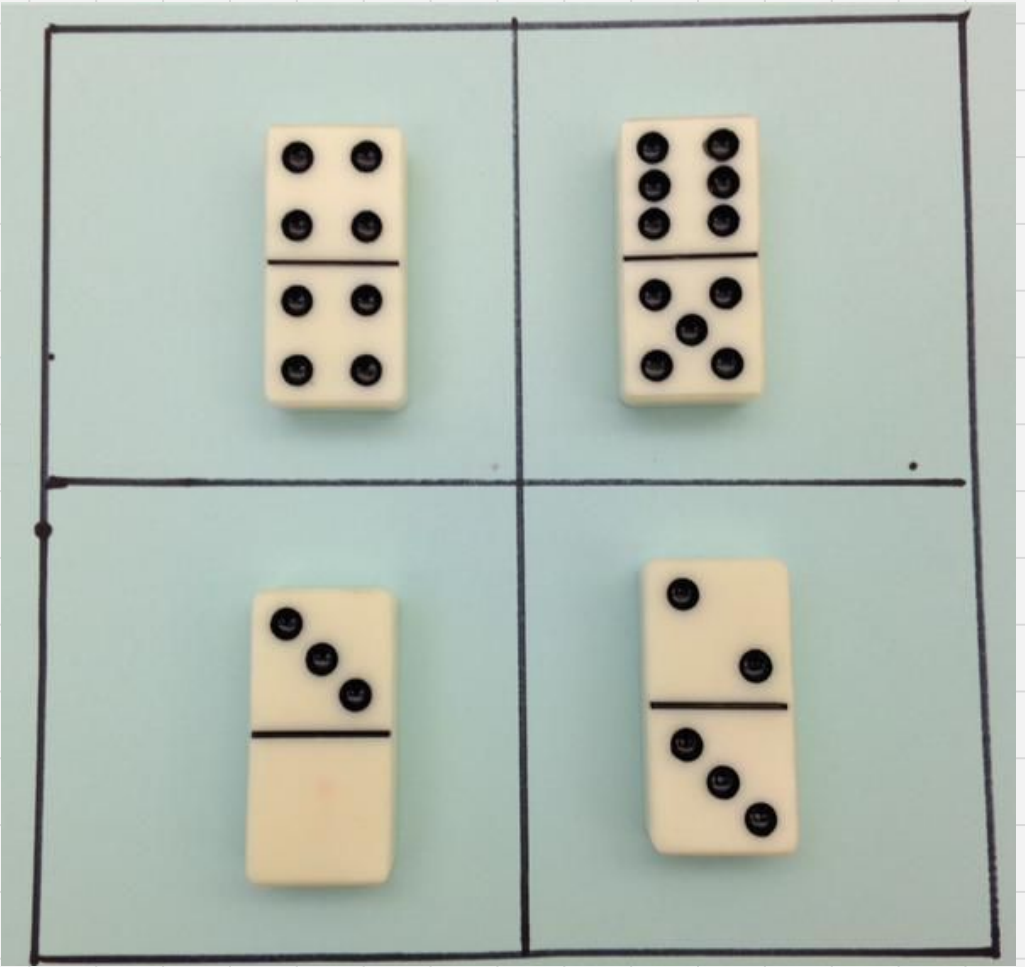
Math Talk for Slides - WODB (Click on Shapes or Numbers.)

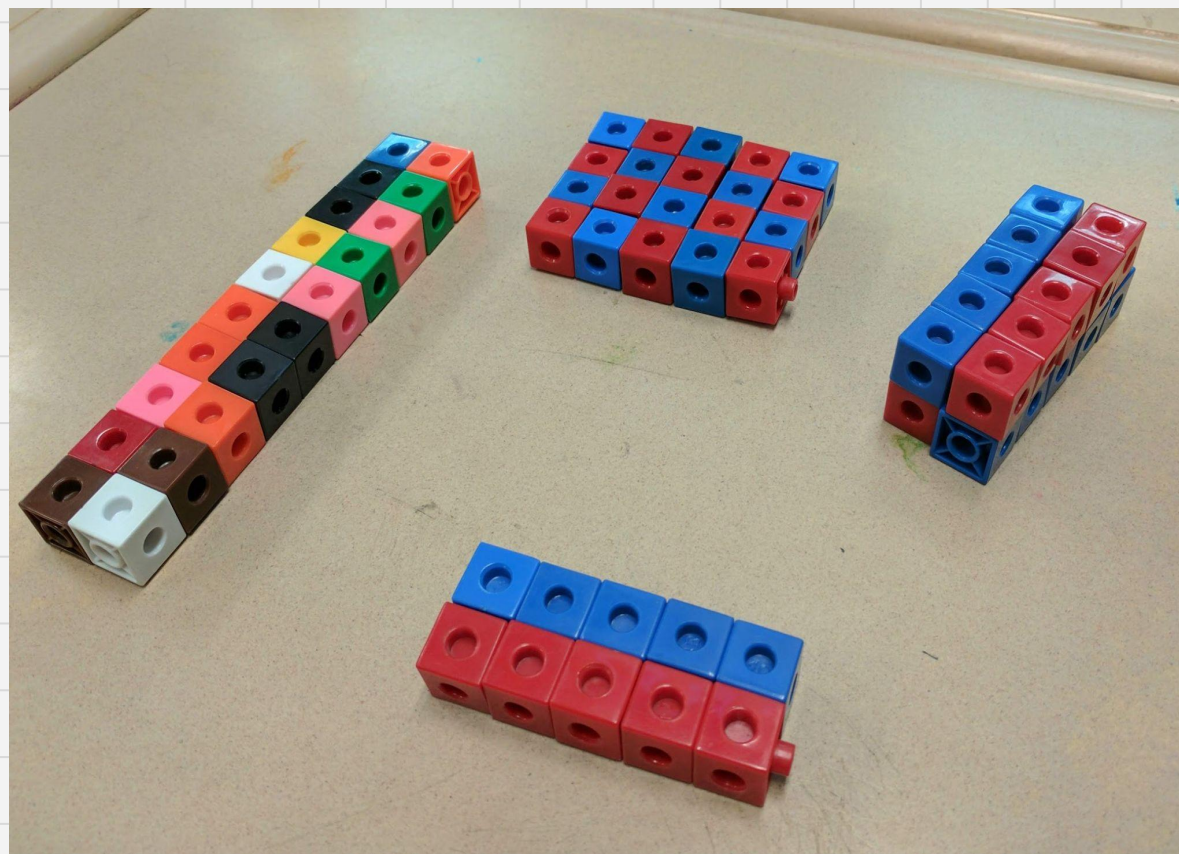
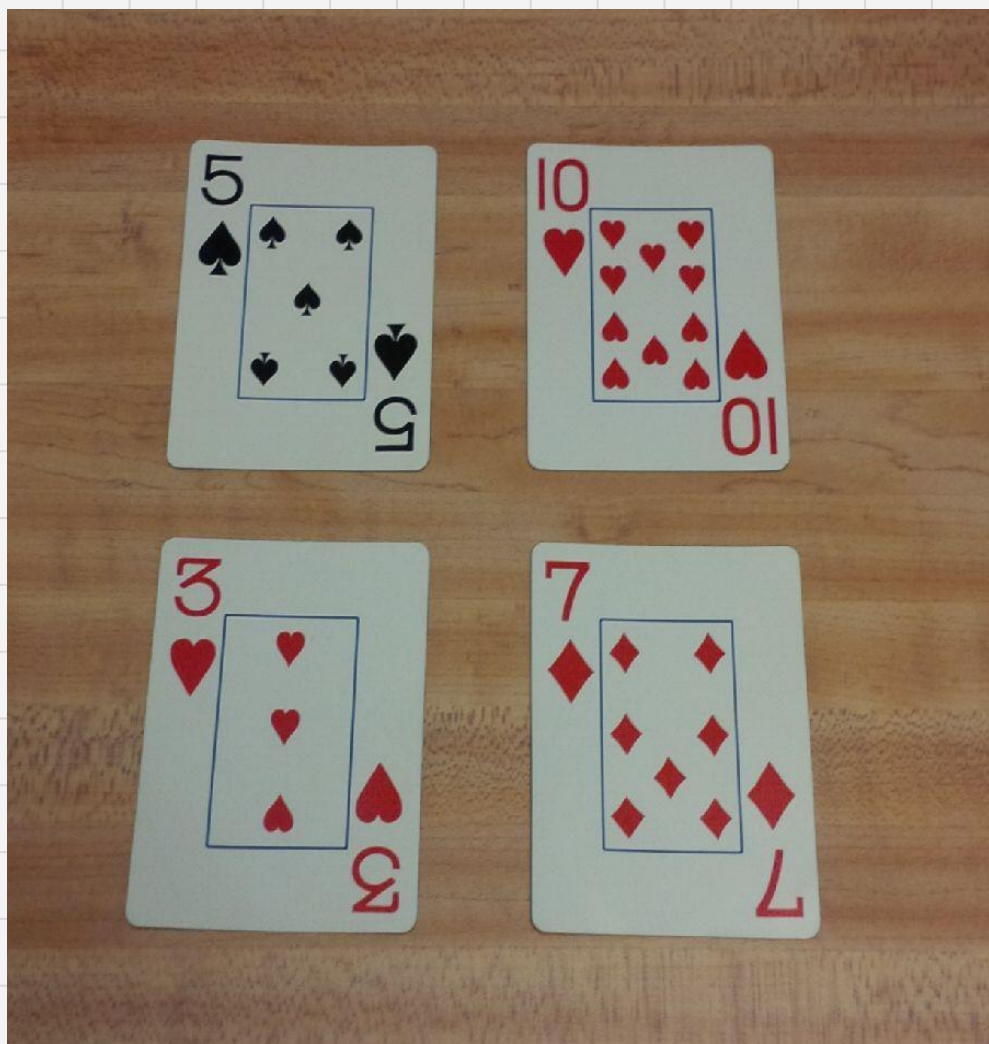
WODB Handout





9	16
25	43





20 Express (The Train Game)

Goal

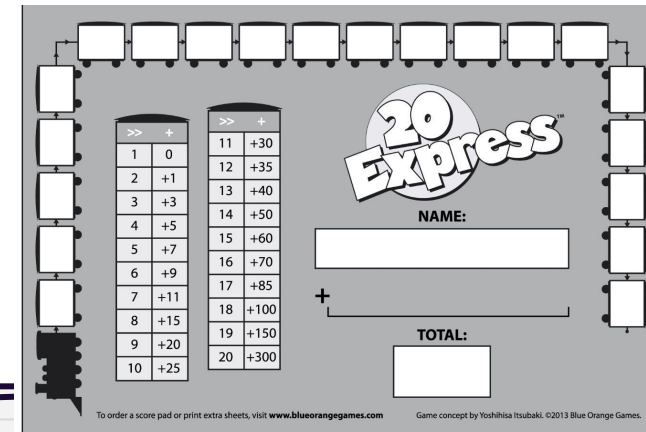
Each player has a train of 20 cars to fill with numbers. The goal is to create the longest ascending series possible.

Each series is worth a different number of points depending on its length. Players score each series and total the points.

The player with the highest total wins the game.

The Tiles and the Board

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
11	12	13	14	15	16	17	18	19	★
21	22	23	24	25	26	27	28	29	30



20 Express (The Train Game)

How to Play

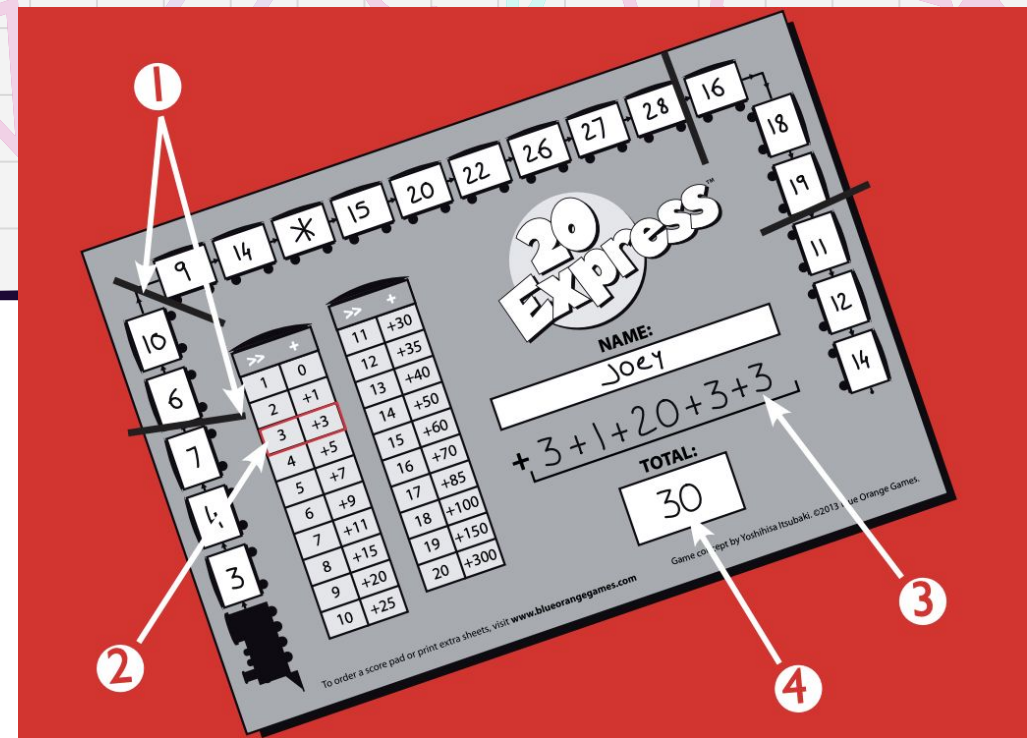
- A number will be drawn at random from a bag.
- All players write this number in any empty train car on their game sheets, using their best judgment when deciding where the number should go. Numbers should ascend from the left side of the sheet to the right side.
- Numbers only have to be in lowest to highest order. They do not have to be consecutive. Identical numbers may be placed next to each other.
 - Example: 7, 10, 11, 11, 15 is a series of five numbers.
- The game ends after the 20th tile has been drawn and each player's train is full.



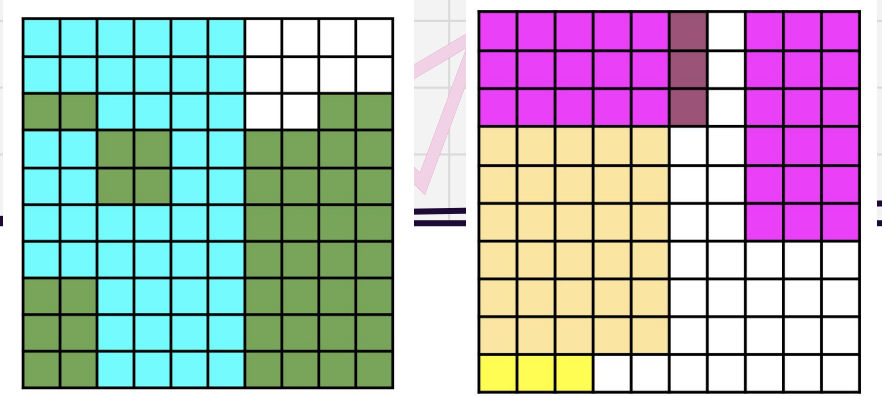
20 Express (The Train Game)

Determining your score

1. To score points, identify each series composed of at least two numbers in ascending order. Draw lines to separate your series.
2. Each series is worth a number of points depending on its length. Look for each series' point value on the scoring table.
 - Example: A series of 3 numbers is worth 3 points.
3. Write the score for each of your series.
4. Add up all your points to get your total score.



How Close to 100?



Directions

- Two players share a blank 10x10 grid and a pair of dice.
- Player 1 rolls two dice and multiplies the numbers to find the product. The player then draws an array of this area on the grid and colors it in.
- Player 2 repeats this process.
- The game ends when both players have rolled the dice and cannot put any more arrays on the grid.
- How much of the grid can you fill? How close to 100 can you get?

NOTE: The roll of the dice and dimensions of the array do **NOT** need to match. For example, if you roll 2 and 6, your array could be 2x6 or 3x4.



The Course

Overview

- [Course Blog](#)
- Syllabus and Assignments
- [Class Website](#)



Notebook Entries 1

Problem Solving Activities

- Each week in class you will be introduced to a new type of mathematical problem. I will conduct a think aloud and walk you through an example.
- You will then work with a partner to solve a new problem.
- Later, on your own, you will solve a problem in your notebook and write a reflection about it.

Problem Solving Reflection

15

STRINKO

Strategies

- Look at strands with numbers
 - can you fill others in strand?
- Look at rows
 - note which numbers could go where
- Look at columns
 - note which numbers can go where
- Repeat - go back thru and keep searching and completing!

Suggestions for Class

- Have a laminated copy of the starting boards
- Use dry erase until solved
- transfer answer to paper final copy
- Let students work with a partner

personal preference

- This one was hard for me
- I had to work on BOTH puzzles for a LONG time.
- Collaboration with my daughter helped!!

17

Problem Solving Oath

I will:

- make my best effort to solve the problem.
- make sense of patterns and numbers.
- use manipulatives and drawings.
- ask questions.
- listen to the ideas of others.
- stay engaged by trying to find another solution or representation.
- make mistakes and learn from them.

PS Activity 1 - SET

How to Play

A set is a group of 3 cards in which each individual feature is either **ALL THE SAME** on each card or **ALL DIFFERENT** on each card.

In the paper and pencil version, the goal is to find all possible 'Sets' in the cards shown. You may reuse any card to complete different 'Sets.'

Card Features

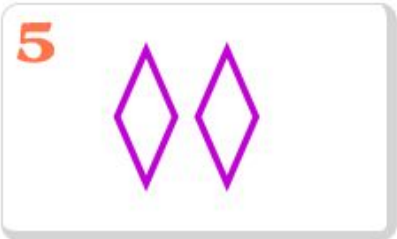
- **Colors** - red, green, or purple
- **Number of Symbols** - one, two, or three
- **Shading** - solid fill, striped fill, unfilled (white)
- **Symbols** - ovals, beans, or diamonds

Try the [Daily Set Puzzle](#).

















Color - All same or all different
Shape - All same or all different
Filling - All same or all different
Number - All same or all different





1 	2 	3 
4 	5 	6 
7 	8 	9 
10 	11 	12 



Notebook Entries 2

Visual Notes (Sketchnotes)

You will be keeping a visual notebook for class.

Making visual notes (sketchnoting) involves combining words and simple pictures to make sense of what you are learning.



What Research Says

Why Draw?

- Drawing improves memory by providing vivid contextual information that can later be called on to aid retrieval.
- Drawing is a robust encoding strategy that can, and does, improve memory performance dramatically.
- Drawing requires no more than 4s to provide a benefit.
- The benefit of drawing is comparable in magnitude across individual differences in artistic tendencies and ability. Drawing during encoding applies **regardless** of one's artistic talent.

Why Drawing Works

Dual Coding Theory

The idea that when we take in material that is made up of both verbal (written or spoken) information and visuals (drawings, diagrams, photos), these are each separately coded within our brains, but form linked memories.

This means that when we come to recall the material, we have two sets of retrieval clues to draw upon – we might remember the words or the visuals – perhaps a picture or a diagram, the color, the layout on the page and from this recall the fuller memory of the words and visuals.

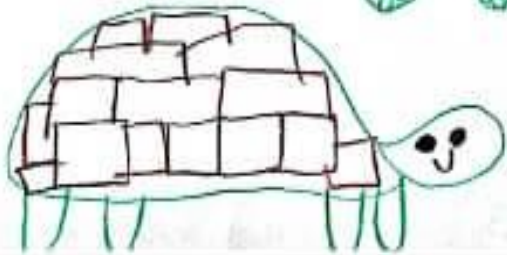
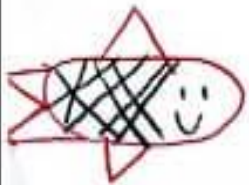
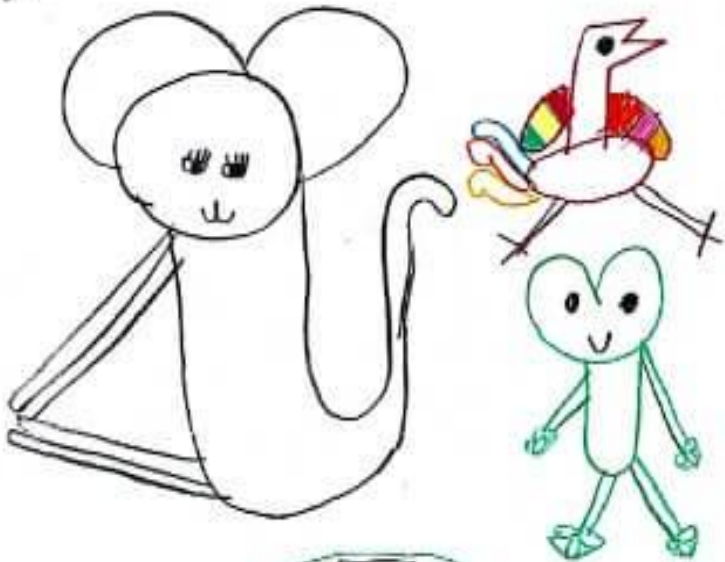
The Learning Scientists [podcast on Dual Coding](#) might be of interest to you.



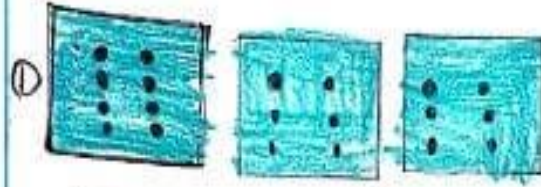
- ① rooster
- ② cats
- ③ frog
- ④ turtles
- ⑤ fish

$$1 + 2 + 3 + 4 + 5 = 15$$

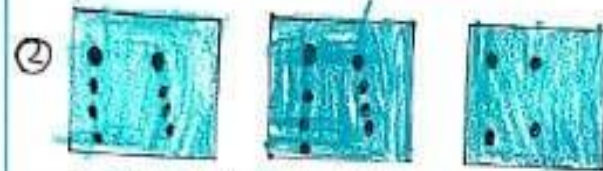
$$5 + 5 + 5 = 15$$



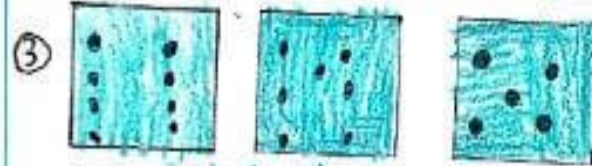
The 10 cards might be:



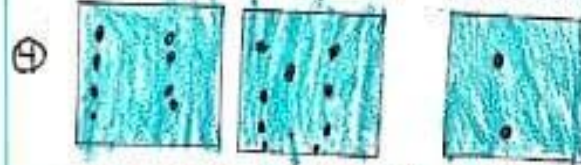
$$8 + 6 + 6 = 20$$



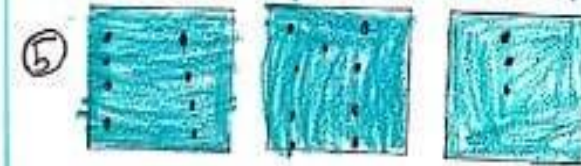
$$8 + 8 + 4 = 20$$



$$8 + 7 + 5 = 20$$



$$8 + 10 + 2 = 20$$



$$8 + 9 + 3 = 20$$

CHAPTER 4

4.1) What's average?



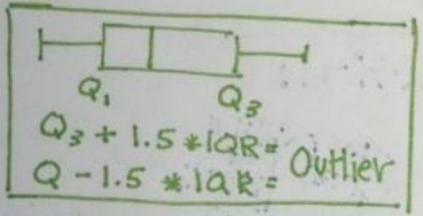
4 = mode median = middle #

$$\frac{4 + 4 + 6 + 7 + 11}{5} = 6.4$$

↑
mean = average

Outlier

- effect the mean
- median is resistant



MEAN

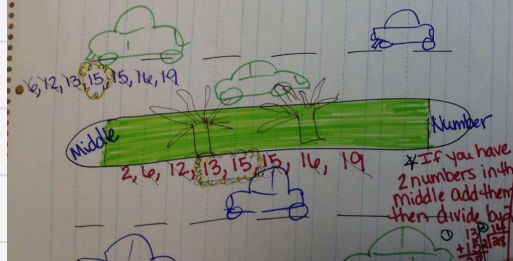
Mean - Add Divide

① 19.
16.
15.
15.
13.
12.
6.
2.
+ 2.

98

② 1.225
8 | 98

Median



Mode

- Both are 4 letter words
- Both words start with "MO"

1, 3, 5, 5, 5, 7, 9, 9, 10, 10, 10, 12

Mode: 5 and 10

Range

Smallest number is subtracted from the biggest

$$19 - 2 = 17$$

Why Kids
Should
**DRAW
MORE**



Let's Practice!

Visual Notes

In your group, talk about how you might represent the positive norms to encourage in math class.

Create a group example of a visual notebook entry on poster paper.

Everyone can learn math to the highest levels

Mistakes are valuable

Questions are really important

Math is about creativity and making sense

Math is about connections and communicating

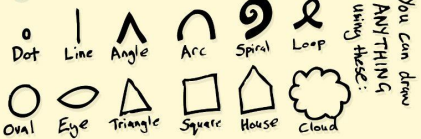
Math class is about learning not performing

Depth is more important than speed

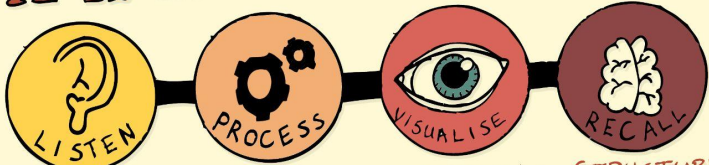
INTRO TO SKETCHNOTES

#1 RULE (and only)
IDEAS NOT ART!
 you're looking to create USEFUL notes

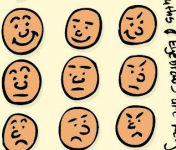
SIMPLE SHAPES // VISUAL ALPHABET



You can draw ANYTHING using these:



FACES



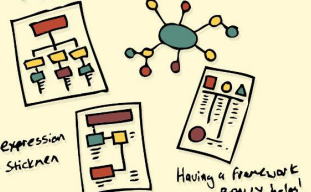
Practice your own

PEOPLE



Give Expression to your Stickmen

VISUAL STRUCTURE



Having a framework REALLY helps!

ICON LIBRARY



USE DIFFERENT FONTS FOR EMPHASIS

ORGANISE INFO WITH CONTAINERS

DIVIDERS | ALSO HELP! | **BUT!** Most importantly

HAVE FUN!

SKETCHNOTE BASICS

In July 2012, Mike Rohde presented sketchnoting to the International Forum of Visual Practitioners at their annual conference. In the spirit of sharing, he chose not to restrict use of the term "sketchnote." In 2013, he published *The Sketchnote Handbook*. For more, visit sketchnotehandbook.com.



TITLES



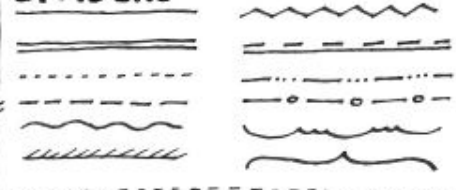
CONTAINERS



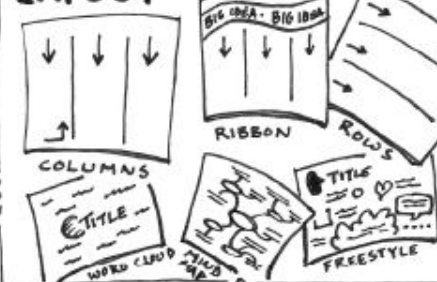
HANDS

regular text: slow down! neat, simple, clear
 double line: bold, headers
 BLOCK: titles
 italics: emphasis
 cursive: variety, fancy

DIVIDERS



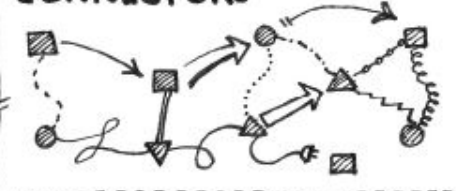
LAYOUT



PEOPLE



CONNECTORS



DIAGRAMS & DRAWINGS



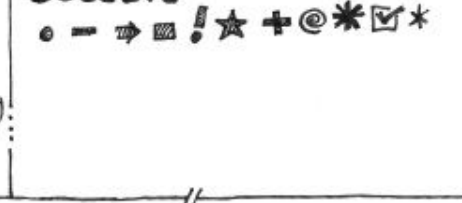
ICONS



SHAPES

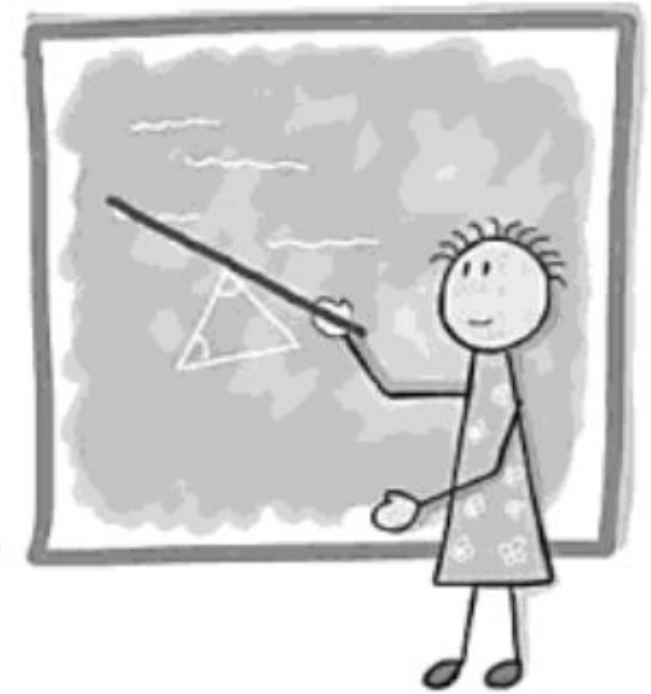


BULLETS



3 rules for sketchnoting

1. Everyone can draw.
2. You will improve with practice.
3. It's about the ideas, not the art.



Closure

Reflection

- What are you most excited about learning or doing this semester?
- What are you most nervous about?

Housekeeping

Work to complete before the next class

- Set up your Math Notebook - Title page (p. 1), Table of Contents (p. 2-3), write in page numbers
- “My life in numbers” visual notebook entry (p. 4)
- Autobiography of your experiences with problem-solving and mathematical puzzles (p. 5)
- Complete **SET** problem (p. 6) and reflection (p. 7)