West Milford Public Schools District Mathematics Goal

BOE Presentation 2/21/23

Enhance the District math program through a commitment to rigorous, standards-based instruction, professional development and best practice, and selection of quality materials.

Standards for Mathematical Practice

MP1. Make sense of problems and persevere in solving them

MP2. Reason abstractly and quantitatively

MP3. Construct viable arguments and critique the reasoning of others

MP4. Model with mathematics

MP5. Use appropriate tools strategically

MP6. Attend to precision

MP7. Look for and make use of structure

MP8. Look for and express regularity in repeated reasoning

STANDARDS FOR MATH PRACTICE POSTERS

created by simply creative teaching

1. **Make sense of problems and persevere in solving them.**
    a. Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution.
2. **Reason abstractly and quantitatively**.
    a. Mathematically proficient students make sense of quantities and their relationships in problem situations.
3. **Construct viable arguments and critique the reasoning of others**.
    a. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments.
4. **Model with mathematics**.
    a. Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another.
5. **Use appropriate tools strategically**.
    a. Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software.
6. **Attend to precision**.
    a. Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning.
7. **Look for and make use of structure**.
    a. Mathematically proficient students look closely to discern a pattern or structure.
8. **Look for and express regularity in repeated reasoning**.
    a. Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts.

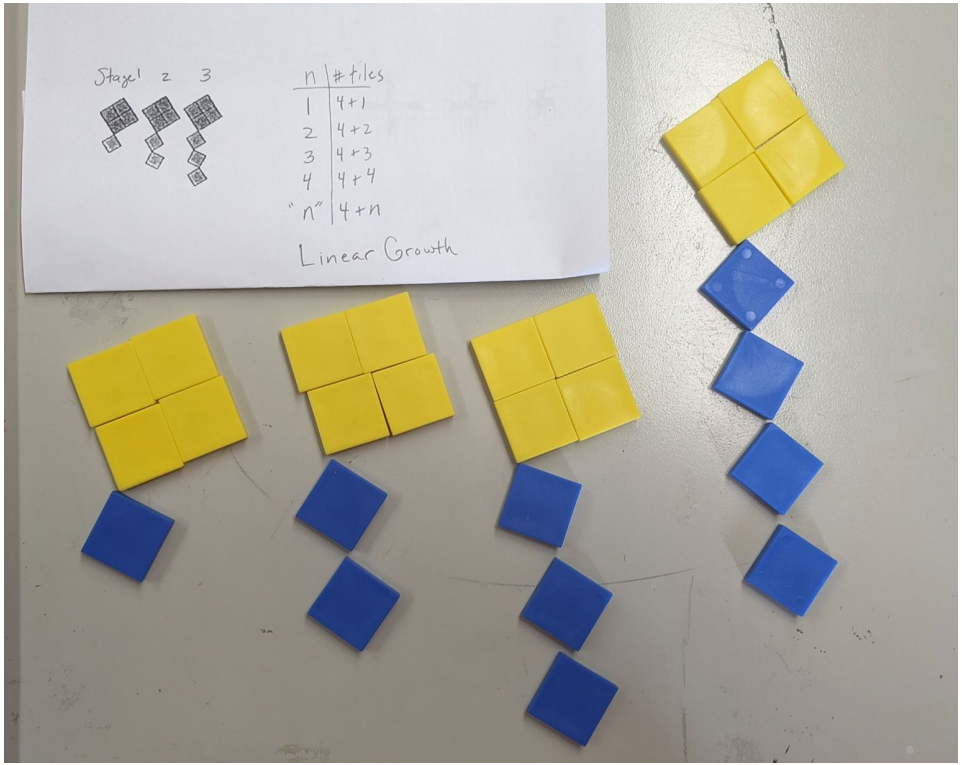
3 Stages of Learning Mathematics

Learning occurs in three stages: Concrete Stage, Representational or Pictoral Stage, and Abst

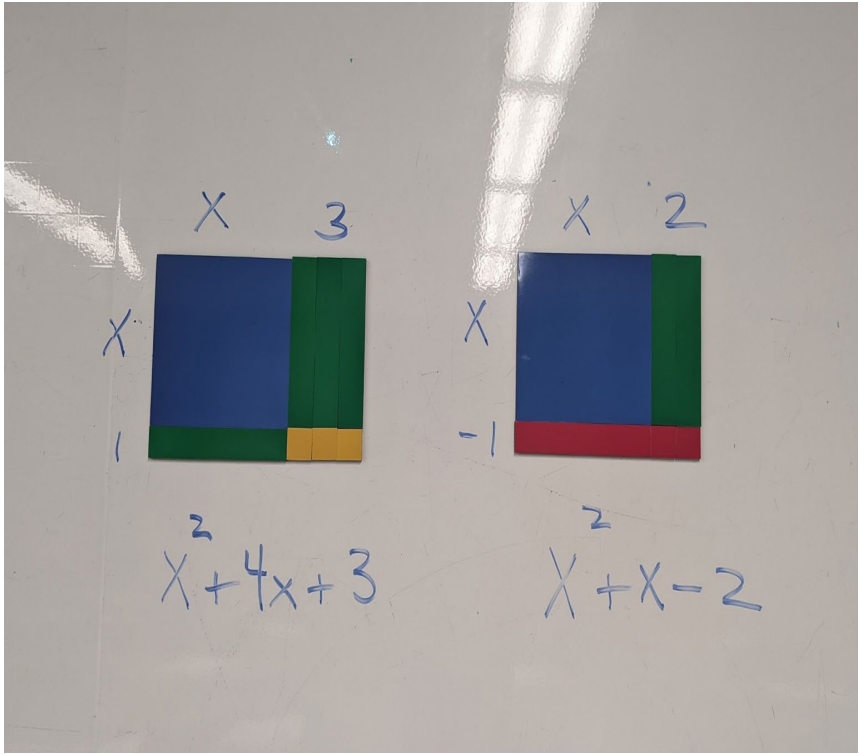
Manipulatives play an integral part in the Concrete Stage. This is where a concept is introduced and learners manipulatives in a meaningful way. In the Representational Stage, the manipulatives used in the Concrete Stage ar rather than concrete objects. Finally, in the Abstract Stage, mathematical signs (i.e. numerals, variables) are used to express the concept in symbolic language.

According to the National Council of Teachers of Mathematics (NCTM), manipulatives should be used in the topics include, but are not limited to, sorting, ordering, distinguishing patterns, making measurements, relationships, and engaging in problem solution.

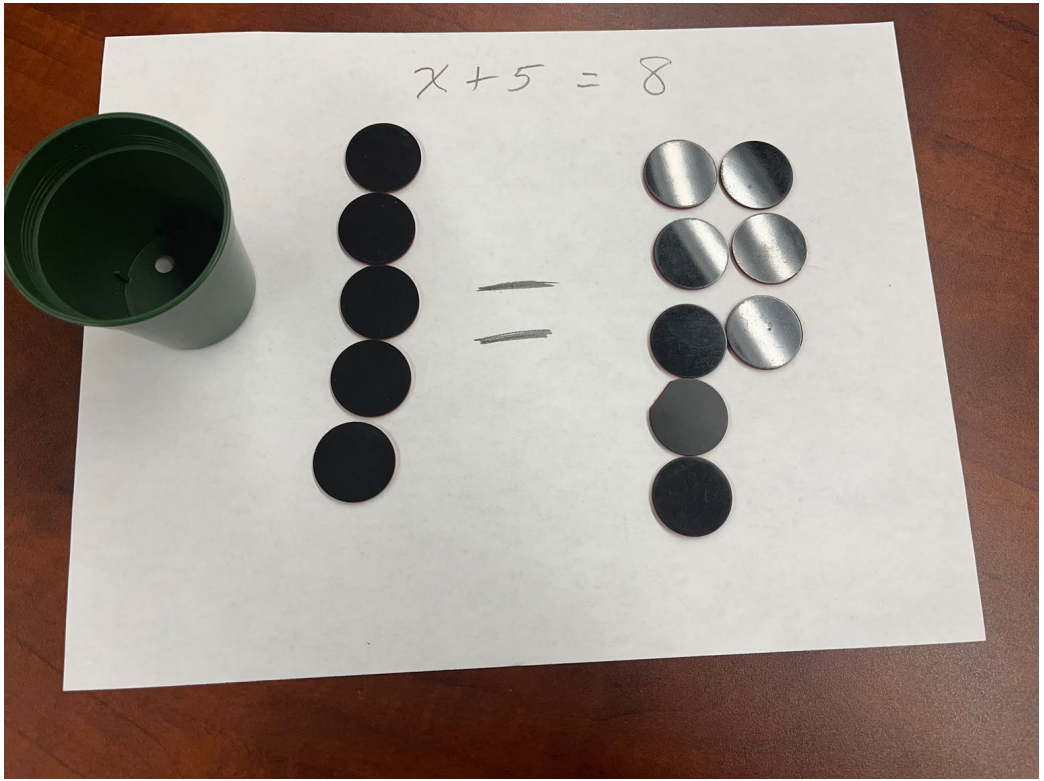
Concrete



Pictoral



Concrete



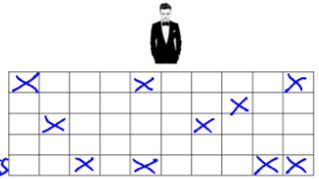
Pictoral

“I enjoy doing hands-on activities in Statistics that allow us to collect data that is meaningful in the real world. I particularly enjoyed the activity that used a Justin Timberlake concert scenario to learn about sampling types from a population. We took three different types of samples of seats, and used the visual model of shaded seats to determine which sample was the best encapsulation of the total population. We were trying to figure out how well the concert attendees enjoyed his concert, and the best way to get an answer that would speak for a majority of the population who attended the concert.”
-Brooke O’Connor, Grade 12

1. **Method #1**:
Take a simple random sample (SRS) of 10 fans.

Simple random sample

- Label each fan with a number 1-50.
- Use a random number generator to select 10 numbers (no repeats)
- Survey fans with selected numbers



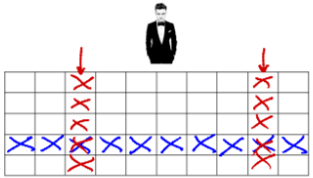
2. **Method #2:**
To make it easier to distribute the surveys, the promoter decides to pick one row and just sample every fan in that row. → cluster

Cluster sample

a. Use this method to select a sample of 10 fans.

b. Do you think this method will produce good estimates? Why or why not?

No. Front rows will be overestimates and back rows will be underestimates



Better approach
→ use columns as clusters
→ each cluster is heterogeneous

3. **Method #3:**
Justin’s manager thinks it is important to sample fans that have different views of the stage. He wants to sample every 8th fan.

Systematic random sample

a. First, we need to figure out the starting fan. Randomly select a fan and mark with an X.

*random starting point

b. Begin marking every 8th seat until you get a sample of 10 seats (start back at the beginning if you need to).

starting fan

* equal intervals

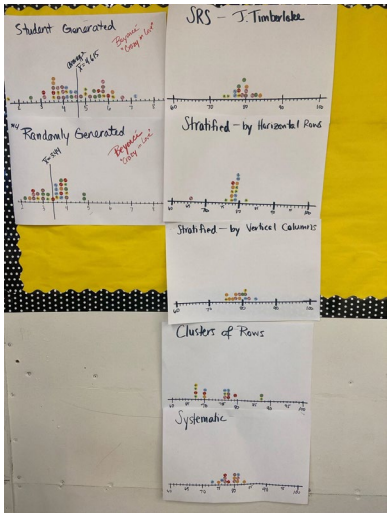
5. Now, it’s time for the actual data. For each of your samples on the previous page, calculate the average enjoyment. Add your average to the dotplots on the board.

Sample #1: $\bar{X} =$

Sample #2: $\bar{X} =$

Sample #3: $\bar{X} =$

92	89	90	88	95	100	98	93	95	84
82	86	90	88	86	91	90	89	85	83
80	74	80	67	81	82	76	77	74	65
72	68	74	73	70	69	72	70	68	67
69	67	68	68	64	66	63	63	70	68



Essential Goal of Mathematical Unde

As teachers of mathematics, it is essential that we transfer students from one stage to the next with valid and reliable assessment practices to determine when a child is ready to move on.