

OAKLAND SCHOOL VOLUNTEERS

MIDDLE SCHOOL MATH VOLUNTEER TRAINING

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I. Equity and OUSD's Vision for Math

A. OUSD's Vision for Math

Through productive struggle, academic discourse, and performance tasks, OUSD students become problem-solvers, collaborators, communicators, and owners of mathematics, to ensure college and career readiness.

• What is one part of this vision that you find particularly motivating or resonant?

B. Supporting Students to become Owners of Math

How did you experience math as a middle-schooler? Complete the MentiMeter here.

Developing math identity with our words

We say	Students think
I'm not good at math either.	Math is only for some people.
Math is hard.	I should be scared of math.
Just follow the steps I tell you.	Math isn't something that makes sense.
Show me your thinking in any way you like.	This is a safe space for me to be curious.
What do you think about my, or your friend's, thinking?	My ideas are valuable.
What tool or strategy do you think would work best?	l'm not a passive learner. I have agency.



Affirming Math Identity





A student you're working with is worried that they are "behind" their peers in math due to missing a lot of school over the past two years.

What might you say or do in response?

C. Supporting Students to become Problem-Solvers

Videos:

- *<u>How Old is The Shepherd?</u>* (Robert Kaplinsky)
- *Ever Wonder What They'd Notice?* (Annie Fetter)

OUSD's Vision for Math:

Through productive struggle, academic discourse, and performance tasks, OUSD students become **problem-solvers**, collaborators, communicators, and **owners of mathematics**, to ensure college and career readiness.

STOP & JOT: What role do you play in this vision as a math tutor?

II. What do students need to learn in middle-school math?

A. Key Common Core Shifts

<u>#1 FOCUS:</u>

Rather than racing to cover many topics in a mile-wide, inch-deep curriculum, the standards ask math teachers to significantly narrow and deepen the way time and energy are spent in the classroom.

GRADE	FOCUS AREA
6	Ratios and proportional relationships; early expressions and equations
7	Ratios and proportional relationships; arithmetic of rational numbers
8	Linear algebra and linear functions

Resource: Math Milestones

#2 COHERENCE:

Math is a coherent body of knowledge made up of interconnected concepts. Learning is carefully connected across grades so that students can build new understanding onto foundations built in previous years. <u>Coherence</u> is also built into the standards in how they reinforce a major topic in a grade by utilizing supporting, complementary topics. For example, instead of presenting the topic of data displays as an end in itself, the topic is used to support grade-level word problems in which students apply mathematical skills to solve problems.

<u>#3 RIGOR:</u>

Each standard calls for a specific approach based on where students are in the learning progression.

- **Conceptual Understanding**: Deeply understand mathematical concepts; see math as more than a set of mnemonics or procedures
- **Procedural Skill and Fluency**: Learn methods to calculate with speed and accuracy, including the standard algorithm
- **Application**: Apply math concepts in "real world" and problem solving situations

Task C (8th grade)

Task A (6th grade)

Pencils down If r = 1.748, what is the value of 0.96r + 0.04r - r?

Task B (7th grade)

Pencils down Think about the equation $x + 4\frac{1}{8} = \frac{2}{3}$. Is there a positive number that solves it? Is there a negative number that solves it? Tell how you decided.

On this blueprint for building a bike, part of the bike is shaped like a right triangle. The longest



side length is illegible because water spilled on the blueprint. Calculate that side length.

How should I choose what to work on with students?

- Talk to the students' teacher: what are their strengths and needs?
- Talk to the students: What are they interested in? How do they learn best? What are their goals?
- For students who need a confidence boost, try pre-teaching them concepts that their class will learn in the next few days.
- The best source for tasks is students' core curriculum.*

*However, you can find more tasks in the resources at the end of this packet, if needed.

III. 3 Tutoring Strategies That Promote Sense-Making

Hands-on Practice in Small Groups

#1 NOTICE & WONDER

Show students a task with the question covered.

1

Ask students what they notice and what they wonder about the information they have. Write down what students say.



Reveal the question.



<u>#2 THREE READS</u>

Show students a task with the question covered.

- Students read the situation with the goal of comprehending the text (describe the situation without using numbers). "What is this situation about?"
- 2 Students read the situation with the goal of analyzing the language used to present the mathematical structure. "What are the important information and amounts?"
- 3 Students read the situation in order to brainstorm possible mathematical solution methods. **"What are all the questions we could ask?"**
- 4

Reveal and solve!

Three Reads: Pairs practice

First person: Grade 8

Xavier's assignment for science class was to write notes to summarize a chapter in his textbook. At 4:45 PM, he had 12 pages left to summarize. At 6:00 PM, he had 7 pages left.

Assuming a linear model, about how many more hours will it take him to finish summarizing?

if time Second person: Grade 7

In 2018, an oil company rented an oil rig for \$100,000 per day. The company drilled a well and started pumping oil. At the time, 42 gallons of oil could be sold for \$70.

How much oil must be sold each day to equal the rental cost?

5 minutes

#3 NUMBER TALK



More ideas for things to say during a number talk here, courtesy of Fawn Nguyen



<u>Click here for the closing reflection.</u>

APPENDIX

Helpful Links and Guides

These websites are great places to go if you want to continue your learning to support middle school math students. Always defer to your teacher's lessons. The videos and examples on these websites will prepare you to be a stronger tutor.

TOOL	USE	LINK
Common Core State Standards	It's not necessary for you to be very familiar with the standards to be a great tutor, but just in case you're curious about what students learn in each grade!	http://www.corestandards.org/Math/
Coherence Map	This website lets you explore learning progressions from grade to grade. This can help you understand what foundational knowledge from prior years students might need help developing.	https://achievethecore.org/coherence-map/
Grade-Level Grids	One-page selections of tasks that can help you develop a lens for what learning in each grade looks like.	<u>https://www.mathmilestones.org/gradelevel-</u> grids
Nix the Tricks	Some of the ways we learned to do math might not actually promote sense-making. This guide shows some common "tricks" that obscure mathematical meaning.	<u>http://www.nixthetricks.com/NixTheTricks2.</u> <u>pdf</u>
lllustrative Math Tasks	If the teacher you're working with asks you to find tasks to do with students, this website is a great source to use! Each task outlines questions for you to ask and potential things students might say.	http://tasks.illustrativemathematics.org/
Sources for Number Talks & Other Tasks	A variety of websites with rich, engaging mathematical content students will love.	Visual Patterns Math Talks Estimation 180 Robert Kaplinsky Lessons Graphing Stories Math Mistakes 101 Questions Would You Rather Open Middle Which One Doesn't Belong? Number Strings Fraction Talks Number Talk Images

Khan Academy	Free videos and example lessons to practice helping students develop their math skills. <i>Also great for brushing up your own math knowledge!</i>	Sixth Grade: <u>http://bit.ly/29m2nl5</u> Seventh Grade: <u>http://bit.ly/29ul28h</u> Eighth Grade: <u>http://bit.ly/29umebG</u>
LearnZillion	Free videos and example lessons to practice helping students develop their math skills	Sixth Grade: <u>http://bit.ly/29kup8g</u> Seventh Grade: <u>http://bit.ly/29rF5Tc</u> Eighth Grade: <u>http://bit.ly/29o9qlm</u>
Planning Virtual Tutoring Sessions	Best practices for structuring tutoring sessions	https://www.oaklandedfund.org/wp-content/ uploads/2020/07/Planning-Virtual-Tutoring-S essions.pdf
Guide to OUSD Apps/Platforms	Use this to familiarize yourself with OUSD-approved applications. *Use varies from school to school.	https://www.oaklandedfund.org/wp-content/ uploads/2020/07/Guide-to-OUSD-Online-Apps -and-Platforms.pdf

Scenario-Based Tutoring Tips by Julia Lehman, Math Educator at UPA

Fully engage. Watch the lesson and take notes along with the teacher or sit next to a student you will be working with and pay attention/help them make sure notes are clear. If a student is learning from an online video, make sure to watch the video and learn the math the same way the students are.

- As students are working, encourage them to explain what they are doing out loud and frequently ask why. What's the next step? Why do we do that? If they have an answer, encourage them to explain why it makes sense: how do they know it's correct?
- As students talk, prompt them with vocabulary words: ask them to be specific with units, operations, numbers. Specificity in explanation will lead to more precise math.
- 1. If a student is just starting a problem and feels stuck, ask them to:
 - a. Highlight and list important information
 - b. Draw a model, picture or table that will help them to solve the problem
 - c. Basic questions like, "What do we know?" "What do we need to find out?" "What kind of problem do you think this is?"
- 2. If a student is struggling, don't be afraid to show them a different method. Sometimes one approach works well for one student and not for another, so a second way could be very helpful.
- 3. Pay attention to basic math and use calculators when necessary. (Check with the teacher first as opinions on this might vary from class to class.) If a student is working on a ratio problem and spending 10 minutes doing the division, it might be helpful to provide them with a tool so that they are focused on the skill at hand. Let the teacher know and return to division at a later time. Often struggling students can do the grade-level math but fall behind because they are stuck on back skills. These should be covered but shouldn't slow a student down from learning the grade-level math.
- 4. When working on a particular concept, if you are giving practice problems give a few different problems requiring the same mathematical strategy until it seems like the student is understanding, then add on another layer, a differently worded problem or something a little more difficult, do a few of a different type and then spiral back to the first. You want to make sure students are understanding the concept and not just the steps to solve one specifically worded problem.

THANK YOU TO OUR THOUGHT PARTNERS FOR INSPIRING MUCH OF THIS TRAINING!

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