Mathematical Language Routines
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Learning Target

I can name the design principles for promoting mathematical language and several supporting mathematical language routines.
There are **four design principles** for promoting mathematical language use and development in curriculum and instruction.

**Principle 1: Support sense-making Design**

**Principle 2: Optimize output Design**

**Principle 3: Cultivate conversation Design**

**Principle 4: Maximize linguistic and cognitive meta-awareness**
What’s a MLR?

A 'math language routine' refers to a structured but adaptable format for amplifying, assessing, and developing students' language.
8 MLRs:
MLR1: Stronger and Clearer Each Time
MLR2: Collect and Display
MLR3: Critique, Correct, and Clarify
MLR4: Information Gap
MLR5: Co-Craft Questions and Problems
MLR6: Three Reads
MLR7: Compare and Connect
MLR8: Discussion Supports
Principle 1: Support sense-making Design

Let’s look at a 3 READS routine!
Describe the situation and connect it to your own baking experiences.
Grade 6 Unit 4 Lesson 3

MAKING GRANOLA

To make 1 batch of granola, Kiran needs 26 ounces of oats. The only measuring tool he has is a 4-ounce scoop. How many scoops will it take to measure 26 ounces of oats?
2nd READ:

Consider if the solution will be greater than or less than 1. Explain why.
Grade 6 Unit 4 Lesson 3

MAKING GRANOLA

3rd READ:

Write an equation or draw diagram to find the unknown quantity.
3 Reads - Ashley Pace at Enka Middle
Principle 2: Optimize Output

Let’s look at a STRONGER and CLEARER EACH TIME routine!
The routine structure:

- **Successive pair shares** to give students a structured opportunity to revise and refine their ideas and verbal output.
- Before writing, have **pairs talk** about what they will **write** and how to most clearly explain this important idea.
- Students **meet with two other partners** in a row to provide extra practice and idea sharing three times.
- Students should **borrow ideas** and language from each partner to **strengthen the final product**.
The ratios 5:3 and 10:6 are equivalent ratios.

1. Is the ratio 15:12 equivalent to these? Explain your reasoning.
2. Is the ratio 30:18 equivalent to these? Explain your reasoning.
3. Give two more examples of ratios that are equivalent to 5:3.
4. How do you know when ratios are equivalent and when they are not equivalent?
5. Write a definition of equivalent ratios.
Principle 3: Cultivate Conversations

Let’s look at an INFO GAP routine!
Lesson 2.14.2 Hot Chocolate and Potatoes

**Problem card:**

1. Read your card silently and think about what you need to know to be able to answer the questions.
2. Ask your partner for the specific information that you need.
3. Explain how you are using the information to solve the problem.
4. Once you feel you have all the info needed, give the problem card to your Data Card partner. Solve the problem and show your reasoning to your partner.

**Data card:**

1. Read your card silently.
2. Ask your partner “What specific information do you need?” and wait for them to ask for information.
3. If your partner asks for information that is not on the card, do not do the calculations for them. Tell them you don’t have that information.
4. Have them explain “Why do you need that information?” before telling them the information.
5. Solve the problem then compare solutions with Problem Card partner.
DATA CARD

- Noah has already peeled 8 potatoes.
- Noah has been peeling for 10 minutes.
- Noah needs to peel 60 more potatoes.
- Noah needs to be finished peeling in 1 hour and 10 minutes.
- There are 60 minutes in 1 hour.

DATA CARD QUESTIONS:

1. “What specific information do you need?”
2. “Why do you need that information?”
Noah needs to peel a lot of potatoes before a dinner party. He has already peeled some potatoes. If he keeps peeling at the same rate, will he finish all the potatoes in time?
Principle 4: Maximize Meta-Awareness

Let’s look at a Co-Craft Questions and Problems routine!
Co-Craft Questions and Problems

Grade 8 Unit 5 Lesson 8 Is It Filling up or Draining Out?

Read the situation
Visualize the situation- what’s happening?
Write possible MATHEMATICAL questions
PTT for 3 minutes.....GO!
There are two tanks of water. The amount of water in gallons, $A$, in Tank A is given by the function $A=200+8t$, where $t$ is in minutes. The amount of water in gallons, $B$, in Tank B starts at 400 gallons and is decreasing at 5 gallons per minute. These functions work when $t\geq0$ and $t\leq80$. 
Co-Craft Questions and Problems

1. Which tank started out with more water?

2. Write an equation representing the relationship between \( B \) and \( t \).

3. One tank is filling up. The other is draining out. Which is which? How can you tell?

4. The amount of water in gallons, \( C \), in Tank C is given by the function \( C = 800 - 7t \). Is it filling up or draining out? Can you tell just by looking at the equation?

5. The graph of the function for the amount of water in gallons, \( D \), in Tank D at time \( t \) is shown. Is it filling up or draining out? How do you know?
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MLRs

How do these ideas connect to what you already know?

What new ideas did you get that extend or push your thinking in new directions?

What is now a challenge for you to get your mind around? What questions do you now have?

What next step will you take back to your classroom?
Thanks!
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