Moving Beyond Think-Pair-Share:

Routines for Mathematical Discourse

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@HowWeTeach

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@DrIlaria

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Today's Expression

Represent today's expression in many different ways.

Consider using words, pictures, graphs, numbers, symbols, equations, examples, etc…

4 x 26

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Introductions

Who are we as a community of learners?

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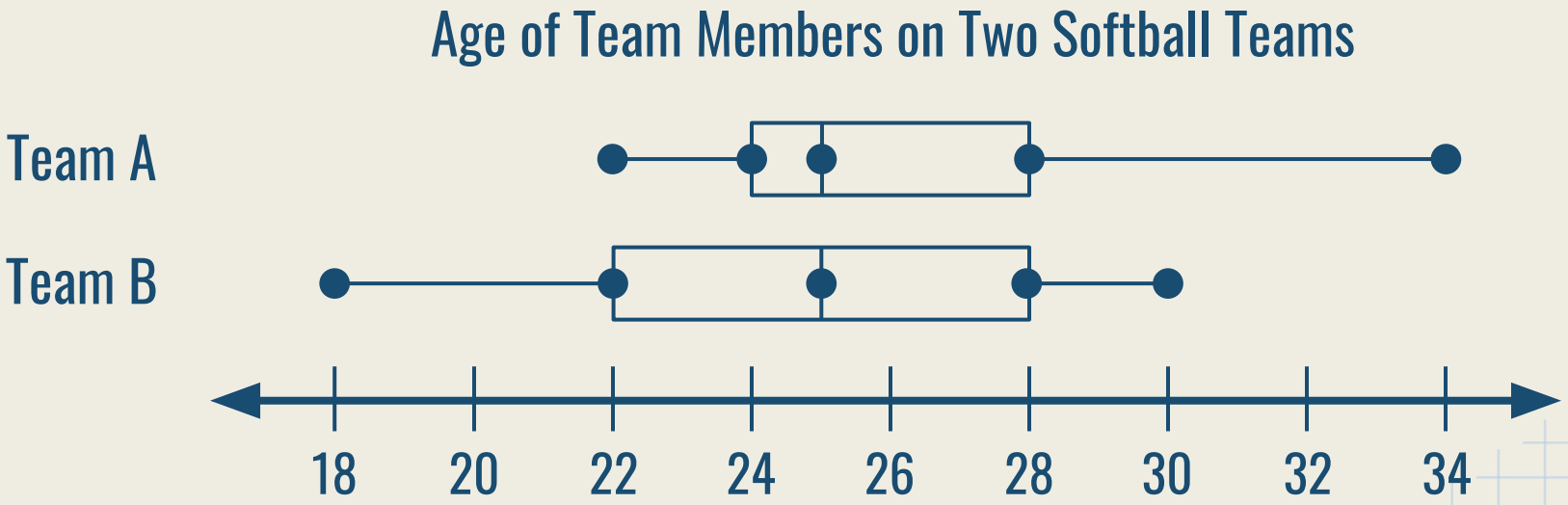
Alike & Different

How are these teams alike? How are they different?



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How do students respond?

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They both have the same median, Q3 are the same, They have the same range

Team a is skewed right, Team b is semitrical

Team b's maximum is lower than Team A

Alike	Different
• Same median • Q3 is both 28	• A is skewed right, B is skewed left. • Team B's box is bigger.

Alike	different
• they Pretty much the same median • The same Q3 • Team A's whisker on Q1 and team B's on Q3 is the same length • have the same range	• one is skewed right one skewed left. • Team A's upperhalf are spread out • Team B lowerhalf is spread out more • quartile range is different • Team B is younger • Team A is older

both of the teams dont go below 18 years old. Nather one is semetrical

team A doesnt go below 22 years

team B has some younger people

they both have the same median

Compare these routines:

What kinds of mathematical thinking did each routine elicit?

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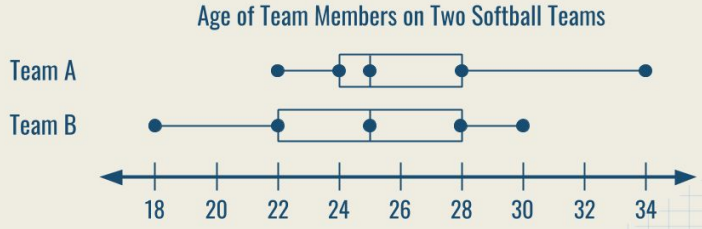

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Extend our thinking:

How do these routines engage learners in mathematical discourse?

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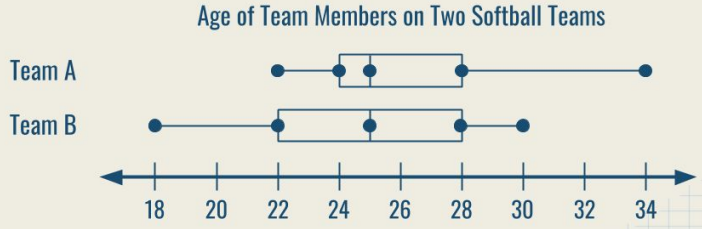

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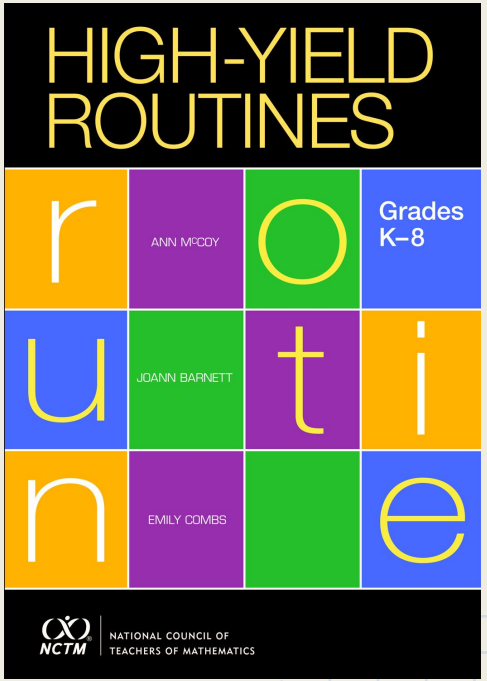
High-Yield Routines

- **Today's Number**
- Mystery Number
- **Alike and Different**
- Number Lines
- Quick Images
- Guess My Rule
- How Do You Know?



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Source: McCoy, A., Barnett, J., & Combs, E. (2013). *High-yield routines: Grades K-8*. Reston, VA: National Council of Teachers of Mathematics.

Agree or Disagree?

Word problems make the mathematical content more accessible to students.

There are 23 students in the class. The teacher wants them to get a new notebook and binder to use in the class. The notebooks cost $12 each and the binders cost $15 each. Find the total cost of the supplies for the students.

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What is this problem about?

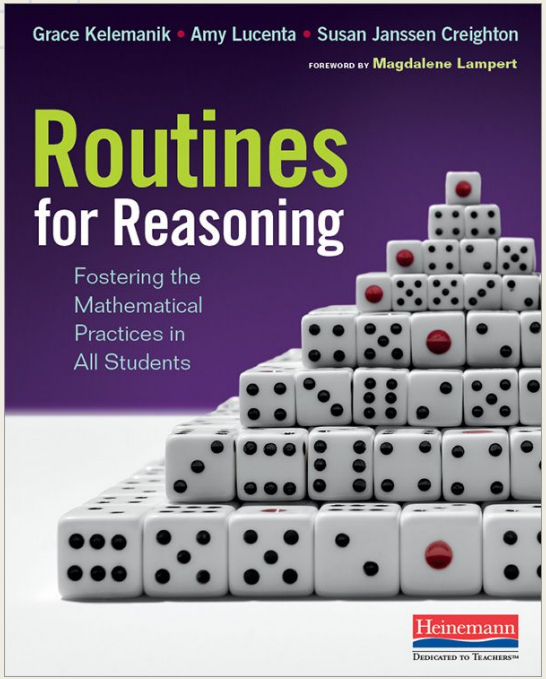
There are 23 students in the class. The teacher wants them to get a new notebook and binder to use in the class. The notebooks cost $12 each and the binders cost $15 each. Find the total cost of the supplies for the students.

What am I trying to find out?

There are 23 students in the class. The teacher wants them to get a new notebook and binder to use in the class. The notebooks cost $12 each and the binders cost $15 each. Find the total cost of the supplies for the students.

What are the important quantities and relationships in this problem?

Three Reads



- The purpose of the routine is to learn how to read and interpret math problems.
- There are three parts to the routine each with individual think time followed by partner and/or group sharing.

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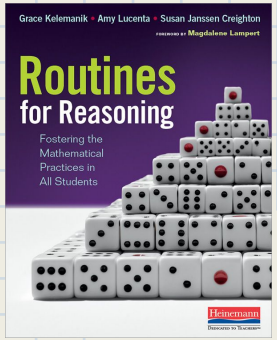
Source: Kelemanik, G., Lucenta, A., & Creighton, S. J. (2016). *Routines for reasoning: Fostering the mathematica practices in all students.* Portsmouth, NH: Heinemann.



First Read: Understanding the Context

- **Individual** — Students read the problem and ask "What is this problem about?"
- **Group share** — Students share a word or phrase description of the problem.

Key ask-yourself questions:

- What's this problem about?

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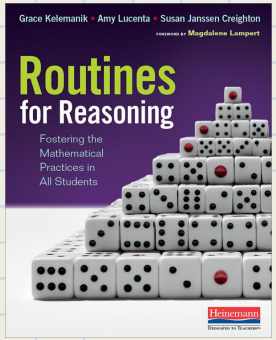

Second Read: Interpreting the Question

- **Individual** — Students read the problem and ask "What am I trying to find out?"
- **Pair** — Students articulate the question in their own words.
- **Group share** — Call on students to share possible wording of the question.

Key ask-yourself questions:

- What am I trying to find out?

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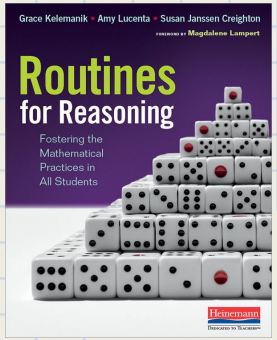

Third Read: Identifying Important Information

- **Pair** — Identify important information by asking the following questions:
  - What are the important quantities and relationships in this problem? (MP 3)
  - How is the situation behaving? (MP 7)
  - Is there a process that keeps repeating that I can generalize? (MP 8)
- **Group share** — Students share the important information.

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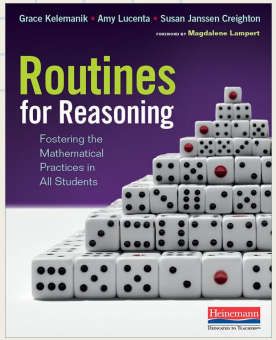

Why read a problem three times?

"Leaving a math lesson knowing the answer to one problem is not nearly as helpful as leaving the lesson having gained a new insight into how to approach any number of math problems."

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Source: Kelemanik, G., Lucenta, A., & Creighton, S. J. (2016). *Routines for reasoning: Fostering the mathematica practices in all students.* Portsmouth, NH: Heinemann. (p. 26)

How do students respond?

There are 23 students in the class. The teacher wants to get them a new notebook and a binder to use in class. The notebooks cost $12 each and the binders cost $15 each. Find the total cost of supplies for 23 students?

1st Read-Ask Yourself: **What is the problem about?** (Forget the numbers for now!)	2nd Read-Look for the Purpose: Think to yourself: **What am I trying to figure out? What mathematics operation might be involved?**
Cost of total of notebooks and binders for 23 students	The whole cost + − ÷ ×
3rd Read-Gather information: Look for Yourself: Find any important information and think what might be needed. **What are the important quantities?**	Solve the Problem-
23 students $15 binder cost $12 notebooks cost	

Moving Beyond Think-Pair-Share

How were these think-pair-share experiences similar to and different from other more traditional think-pair-share experiences?

Stronger and Clearer

1. Pre-Write
2. Think Time
3. Pair
4. Switch
5. Post Write

Prompt:

How do different instructional routines promote mathematical discourse?

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Source: Stanford Center for Assessment, Learning and Equity (https://scale.stanford.edu)
https://stanford.io/2UJ7XL5

Stronger and Clearer

How did this routine help communicate our thinking?

Source: Stanford Center for Assessment, Learning and Equity (https://scale.stanford.edu)
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Applying Routines to Practice

How might instructional routines help solve problems of practice?

bit.ly/NCSM19Routines

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- Stronger & Clearer
- + more...!

Problem of Practice #1:

Two girls don't volunteer to participate in class discussions. They don't ask questions or respond to questions either. The teacher believes these girls have important mathematical ideas and questions worth sharing and discussing.

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●

Problem of Practice #2:

Students are often intimidated by word problems and are unsure of what to do. They often pull numbers out of the problem and rely on key words to help them guess how to operate on the numbers. This strategy sometimes "works," but often leads to incorrect answers.

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Problem of Practice #3:

Students describe mathematical ideas in their own words, but are not incorporating more formal math vocabulary into their explanations and justifications.

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Problem of Practice #4:

Students rush to answer mathematical questions, often missing important details within the prompt (table, graph, representation).

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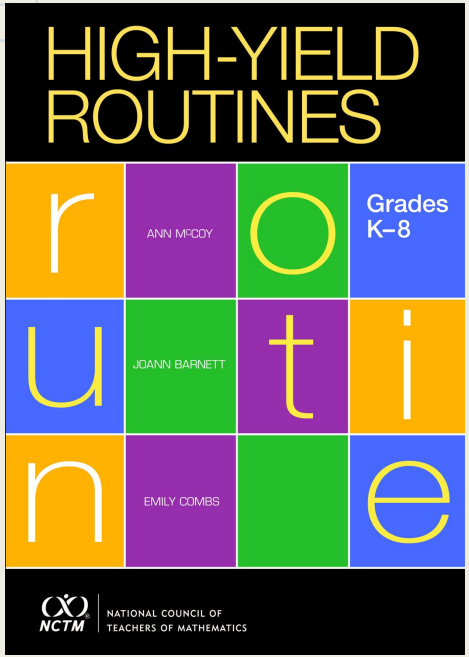
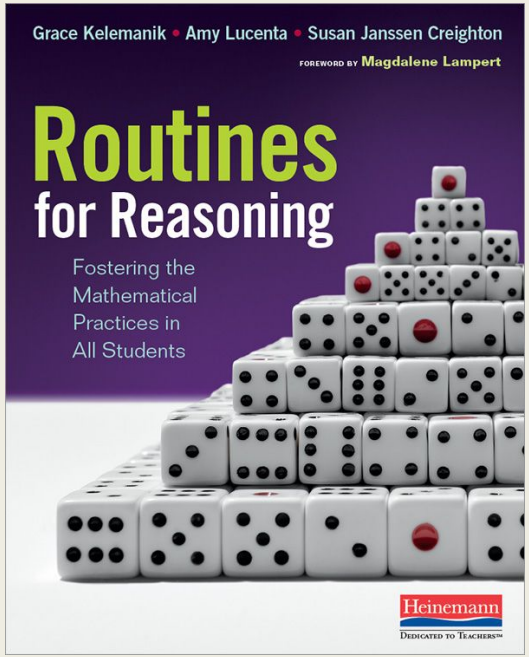
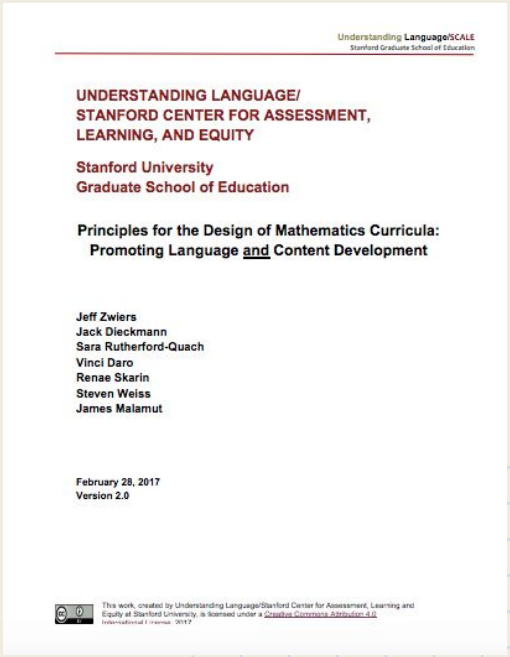
●

Resources for Routines







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Leadership Exchange

Facilitating Instructional Routines in Coaching and Professional Learning

11:15 - 11:45am

Exhibit Hall

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Monday 4/1/19 NCSM Leadership Exchange Sessions

11:15 am-11:45 am

Michelle Rinehart & Dr. Dan Ilaria

Facilitating Instructional Routines in Coaching and Professional Learning

1:45 pm-2:15 pm

Beatrice Moore-Luchin

How do you customize coaching and capitalize on individual and team Strengths?

3:00 pm-3:30 pm

Courtney Baker

Developing an Intentional and Proactive Coaching Practice

Come join the exchange in the Exhibit Hall

Session Objectives

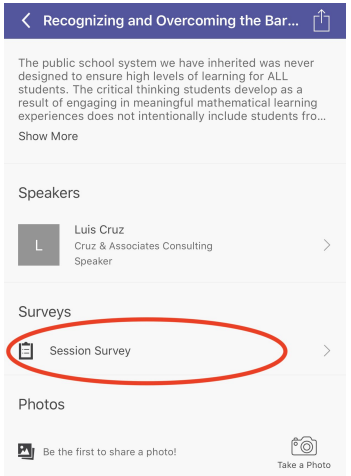
- Examine effective discourse routines and analyze how these routines can be applied across mathematics topics.
- Compare and contrast the different types of mathematical reasoning, justification, and analysis that emerge from different discussion routines.

Share Your Feedback

We strive to continually improve our educational programming. Please take a moment to evaluate this session by following the instructions below:

In the NCSM Conference App, click the "Schedule" icon and select this session (search function is available)

On the session page, scroll down to the "Surveys" section and click on "Session Survey" to begin



Thank you for sharing your feedback with us!