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Please enjoy this complimentary excerpt from Daily Routines to Jump-Start Problem Solving, Grades K-8.

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CORWIN

ROUTINE 1

I WOULD SAY

About the Routine

Solving problems is hard because there isn't a formula or procedure that one can apply to each and every problem they encounter. Instead, the problem solver must think and reason. The act of solving a problem is within the individual. It cannot be delivered by a teacher to a student, but instead a student develops this skill through practice, experience, discussion, observation, and error. You might think of it as teaching reading comprehension to students. That is, you cannot understand a passage *for* your students. You must arm them with tools and experiences so that they can comprehend what they read on their own.

Problem solving starts with making sense of the problem in one's own mind. That means students must understand what is happening in the problem, identify what is being asked, determine what could be done to satisfy the question, and so on. Retelling stirs strategy selection and is useful for getting unstuck after a problem is started. Retelling is a "go to" strategy that every student can use and is one that potentially always works.

Brie's old phone could hold 2,500 minutes of music. Her new phone could hold 3,250 minutes of music. How many more minutes of music could her new phone hold?

Credit: alexey_boldin/istockphoto.com

Some students take to retelling problems (and stories) naturally while others need a lot of practice. In this routine, you provide that practice. You pose a problem and give students opportunities to retell what it is about in their own words. They share with partners and then the whole class discusses. The routine exposes students to others' thinking and perspective. The graphic organizers shared in the variations help you find ways to support students' retelling.

How This Routine Helps With Problem Solving

This routine builds problem-solving skill by providing opportunities for students to

- process information in a problem without pursuing an answer,
- retell a problem in their own words (identity),
- organize their thinking to formulate a strategy for solving a problem (agency),
- identify the action in a problem to select an operation that could be used for solving it,
- distill a problem into manageable chunks of information in order to solve it,
- listen to how others interpret and describe a problem in their own words,
- give feedback to others about their ideas,
- make sense of a problem by thinking about it in diverse ways (agency), and
- determine questions to ask oneself when reading and working through a problem (agency).

What to Do

1. Pose a problem.
2. Give students time to process the problem and think about how they would restate it in their own words. Optional: Use questions or sentence starters to guide student thinking. Recording these on an anchor chart would be a good idea. Some questions you might use are below. See Routine 2: 3Qs (page 33) for additional questions to use.
   - » What is the problem talking about?
   - » What is happening in the problem?
   - » What am I trying to figure out?
   - » What will my answer tell me?
3. Have partners describe the problem to each other.
4. Bring the class together to share ideas. Have students listen carefully to how others retell the problem. Have all students signal that they agree (thumbs up) or have questions (thumbs down) about the retelling.
5. Optional: Share your own retelling of the problem. Note that you should share last so that you don't influence student thinking or suggest there is a correct retelling.

Each time a student shares, reinforce the big ideas that their retelling has in common with a classmate's retelling. If conversation is stalled, refer to the questions or sentence starters you used to prompt independent thinking. Be sure to avoid going over the answer during this discussion. You want the sole focus of this routine to be about retelling and nothing more.

SOMETHING TO THINK ABOUT: AVOID PROCEDURALIZING STUDENT THINKING AND REASONING

When thinking gets hard, a teacher can be tempted to stop the conversation and show students how to solve the problem. In an effort to make problem solving clean and successful, teachers sometimes find themselves teaching the problem-solving process in a procedural way. That is, the teacher presents steps to solving a problem and has students practice those steps to mimic them with new problems. It creates new challenges. Students who blindly follow steps without understanding find answers that don't make sense. Students forget the steps and are unable to carry them out. They are unable to explain what they're doing or why. Frustration abounds.

Unfortunately, the nature of problems and thinking for that matter is not algorithmic. Elementary teachers can be lured into procedural approaches due to the somewhat basic architecture of word problems in these grades. But as problem types change and problems with more than one step are introduced, problem-solving methods grounded

in procedure lose efficacy. It is essential to make problem solving about sense making. It can be messy, and it will take time. But once realized, sense making and thinking do not fade away like poorly understood procedures. This routine focuses on the initial act of making sense—retelling. The upcoming variations give ideas about how you can help students structure and organize their thinking.

I WOULD SAY (VARIATIONS): GRAPHIC ORGANIZERS

Graphic organizers help thinking by providing organization and structure. To be effective, they must be simple and clear (Egan, 1999; William & Mary School of Education, n.d.). The graphic organizers highlighted in these variations can develop the act of summarizing and retelling a problem. There are different organizers because there are different ways to think about problems. Again, these should not be used procedurally. Use them to temporarily scaffold student entry points into retelling, until eventually students can retell without these tools. Each graphic organizer is available as downloadable content you can print out for students to use. Creating anchor charts or just sketching them freehand on the board would be also good supports for whole-class discussion.

Variation A: K-W-S Organizer for Retelling

A Know-What-Solve (K-W-S) organizer is a take on the traditional Know-Want-Learn (K-W-L) chart used in elementary schools. It is a useful tool for supporting student thinking, strategy formation, getting unstuck, and retelling what a problem is about (SanGiovanni et al., 2020). The first step is to identify what students know about the problem. In the example, they might say that they know (K) there are rows of apps, that there are screens of apps, that apps are on the phone, and so on. They might even share things about the context that isn't in the problem, such as their favorite app. This is OK! It helps them build on schema for better understanding and increased likelihood of solving the problem. They should identify that they are trying to figure out how many apps Deryn has (W). In the last phase, they think about how they might solve the problem. Here, they might use a picture of each screen, repeated addition, or multiplication. For the purposes of retelling, you can choose to only do the K and W portion of the organizer or do those two parts first, discuss, and then move into the third stage.

A

There are 6 rows of 4 apps on each screen. How many apps does Deryn have on 6 screens?

Credit: alexey_boldin/istockphoto.com

A

K	W	S
What do I **KNOW** about the problem?	**WHAT** am I trying to find out?	How can I **SOLVE** the problem?

Variation B: Three-Read Organizer for Retelling

Three Reads is a good strategy for making sense of problems (Kelemanik et al., 2016). It can be leveraged to help students organize their thoughts for retelling about a problem. With it, students read a problem and tell what it is about. They read it a second time to identify the question. They read it a third time to identify important information. Over time, teachers have modified Three Reads in all sorts of ways. For example, some use the first read for important words, the second for identifying the question, and the third for finding important numbers. It is important to note that this routine, like others, can potentially become another layer of procedure if used in a narrow, inflexible way. Be careful with forcing students to reread two and three times when they can describe the story and identify the question after reading it once. Conversely, encourage students to reread the problem once or twice when they cannot describe it in their own words after just one read.

B

550 tacos were made for lunch. 236 were bought by second and third graders. How many tacos were there for other grades to buy?

Credit: fcafotodigital/istockphoto.com

B

First Read: Read and retell what the problem is about.

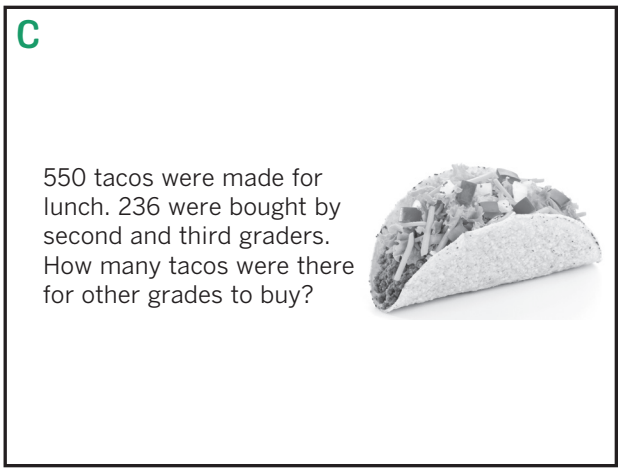
Second Read: Read and tell what the question is.

Third Read: Read and tell what the important information is.

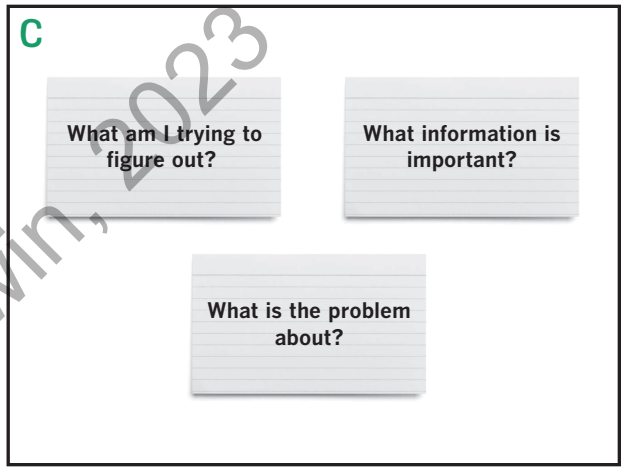
NOTES

Variation C: Three Asks for Retelling

Asking oneself questions is an approach to making sense of problems that you can read more about in Routine 2: 3Qs (page 33). When your students' retelling stalls, you want them to ask themselves questions to restart it. Sometimes, their experiences with questions in class lead them to believe that there are only certain questions of value when solving problems. When they can't remember those questions, the process grinds to a halt. To practice questioning for retelling, record different questions on index cards. Pose a problem like the one shown and have students think about how they might restate it. Without sharing their retellings, randomly select a question card for them to consider, such as, "What am I trying to figure out?" Discuss that question. Then, use another like, "what information in the problem is important?" Discuss that question and ask a third. After the third question, have students reconsider their retelling of the problem. Talk about how the questions used can help someone retell a problem when they are stuck. Close the routine with a few students sharing their retellings of the problem.



Credit: fcafotodigital/istockphoto.com



Credit: Michael Burrell/istock.com

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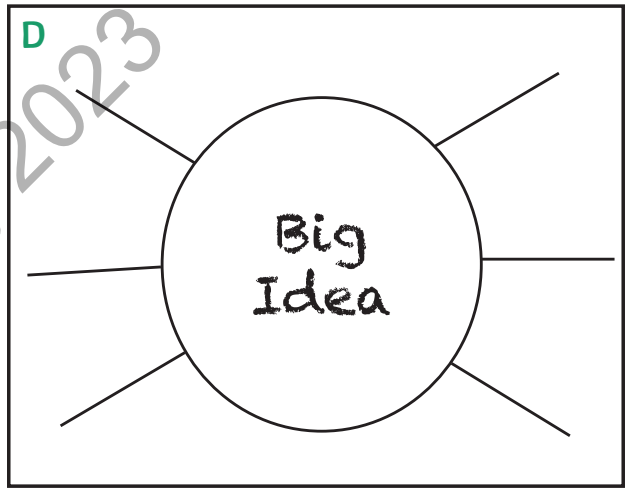
Variation D: Big Idea and Important Details for Retelling

One reading comprehension strategy is to identify a big idea and then determine some details. This is a skill useful for retelling a problem. This variation takes that approach using a concept web to capture student thinking. In this example, the big idea is donuts, eating donuts, giving out donuts, or something similar. After summarizing a problem around a big idea, one begins to think about details. The details in the problem include the numbers, what happened (Maria bought donuts to share.), how many were eaten, how many were left, and so on. While this problem seems straightforward, you might find that a student notices a missing detail—it doesn't say that the people ate the donuts! As you know, sometimes problems require inference. Discussion about that detail should take place and students should be comfortable assuming those 23 people ate the donuts. Using this organizer can be especially helpful with multi-step problems.

D

23 people had one donut. Maria bought 48 to share. How many donuts were not eaten?

Credit: GaryAlvis/istockphoto.com



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Variation E: Beginning, Middle, and End Organizer for Retelling

Thinking about a problem through the sequence of events is a way to retell it that works quite often. As shown in the organizer, you want students to think about the beginning, middle, and end of a problem. This connects with comprehensions strategies taught in reading class. This approach can be especially helpful with start unknown or change unknown problems like the one shown in the example. Notice that the context of the problem has a clear start (takeoff), middle (in flight), and end (landing). But this organizer doesn't work for certain problem types like comparison problems. For example, it wouldn't work if the problem said there were 38 people on the left side of the plane and 56 people on the right side of the plane and asked how many more people were on the right side of the plane.

E

38 windows were shut on the airplane at takeoff. 56 were shut when the airplane landed. How many more were shut when the plane landed than when it took off?

Credit: sharply_done/istockphoto.com

E

Describe the **BEGINNING**	Describe the **MIDDLE**	Describe the **END**

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Variation F: Teacher Retells and Students Agree or Disagree

Students can learn to retell a problem by listening to how others do it. In this variation of the routine, you want to pose a problem and have students think about how they would tell it in their own words. Then, you share how you might retell it or how someone else retold it. Have them listen to the example and decide if they agree or disagree with the retelling. Ask them to cite specifics in the retelling. Have them share their own to compare with the example. Be sure to occasionally leave out information or misrepresent the problem entirely. And when you use an accurate example, reinforce that it is just one example and not "the way" that they must think about how to retell the problem.

F

A plane flew 380 miles on its first trip and 495 miles on its second trip. How far did it fly on the two trips?

F

A plane makes 2 trips. The first trip is 380 miles, and the second trip is 495 miles. I'm trying to figure out how far it flew in total.

Credit: sharply_done/istockphoto.com

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Variation G: Extend to Two-Step Problems and Provide Choice

Putting a two-step problem into one's own words is both important and challenging. It is a good idea to circle back to this routine as your students begin to work with these types of problems. Try having them retell a one-step problem and then have them retell a related two-step problem. Doing this can help them transfer their retelling skills from one-step problems to two-step problems. It's possible that you have used some of the earlier organizers for retelling one-step problems. You can reintroduce them with two-step problems. You can even give students choice about the organizer they use if they choose to use one. Providing choice promotes student agency. Though choice is noted in this two-step problem, you would be wise to make use of it with one-step problems as well.

G

There 6 boxes of donuts for sale. Each box had 12 donuts. There were 30 sprinkled, 12 powdered, and the rest were glazed. How many were glazed?

Credit: GaryAlvis/istockphoto.com

Variation H: Solving Linear Equations

Solving equations with variables on each side can be just as challenging for eighth graders as solving two-step problems is for elementary students. In this problem, students must understand that they are not being asked to compare the prices but rather to determine at what point the cost for parking would be equal. They must make sense of the hourly rate and the additional fee at the West Garage. In this example, a K-W-S (Variation A) or a Three-Read tool (Variation B) can help them organize their thoughts and make a plan for finding a solution. You could also consider making other tools available, like a Beginning-Middle-End organizer (Variation F), asking students to think about the viability of the different options. In this problem, the Beginning-Middle-End organizer doesn't connect with the context and likely isn't very useful.

H

The West Garage charges a $7 fee plus $2 per hour of parking. The East Garage charges $4 per hour of parking. When will the cost to park be the same?

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