Louisiana Department of Education
Mentor Teacher Training

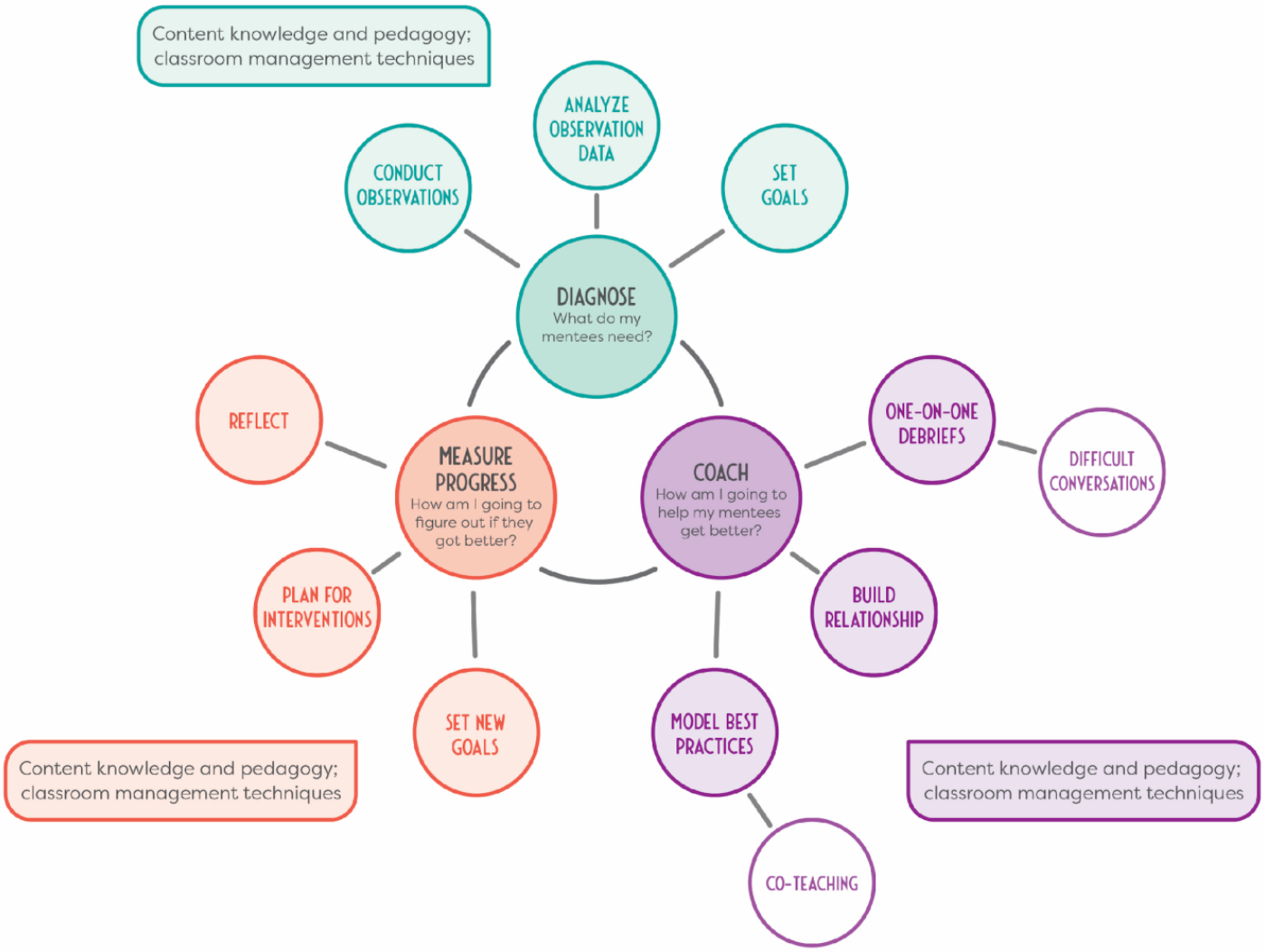
Module 4:

Mathematics Instructional Shifts in Practice

Elementary Cohort

Facilitated by Learning Forward

The Mentoring Cycle



Mentor Training Course Goals

Mentors will:

- Build **strong relationships** with mentees.
- **Diagnose and prioritize** mentee's strengths and areas for growth.
- Design and implement a **mentoring support plan**.
- Assess and deepen **mentor content knowledge and content-specific pedagogy**.

Module 4 Outcomes

- Conduct a classroom observation.
- Analyze data to identify needs for improving mentee instructional practice and student learning.
- Deepen pedagogical content knowledge of the mathematical shifts.
- Experience and analyze a Eureka lesson to identify evidence of key shifts in practice.
- Identify critical elements of a Partnership Agreement that supports relationships building with members.

Module 4 Agenda

Morning

- Welcome and outcomes
- Explore mathematics shifts in the Eureka curriculum
- Build relationships

Lunch (45 min.)

Afternoon

- Conduct observations
- Analyze observation data
- Wrap-up

Agreements

Make the learning meaningful
Engage mentally and physically
Notice opportunities to support the learning of others
Take responsibility for your own learning
Own the outcomes
Respect the learning environment of self and others

Failing by design: How we make teaching too hard for mere mortals

https://edexcellence.net/articles/failing-by-design-how-we-make-teaching-too-hard-for-mere-mortals

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Robert Pondiscio
May 10, 2016

If you caught your pediatrician Googling "upset stomach remedies" before deciding how to treat your child and home-brewing medications over an office sink, you might start looking for a new pediatrician. So how would you feel if you learned that Google and Pinterest are where your child's teacher goes to look for instructional materials?

Well, brace yourself, because that's exactly what's happening. And no, your child's teacher is not an exception. A new study from the RAND Corporation finds that nearly every teacher in America—99 percent of elementary teachers, 96 percent of secondary school teachers—draws upon "materials I developed and/or selected myself" in teaching English language arts. And where do they find materials? The most common answer among elementary school teachers is Google (94 percent), followed by Pinterest (87 percent). The numbers are virtually the same for math.

But don't blame teachers. These data, for reasons both good and bad, reveal a dirty little secret about American education. In many districts and schools—maybe even most—the efficacy of the instructional materials put in front of children is an afterthought. For teachers, it makes an already hard job nearly impossible to do well.

Expecting teachers to be expert pedagogues and instructional designers is one of the ways in which we push the job far beyond the abilities of mere mortals. Add the expectation that teachers should differentiate every lesson to meet the needs of each individual student, and the job falls well outside the capacity of nearly all of America's 3.7 million classroom teachers (myself included).

If you're looking for the root causes of America's educational mediocrity, start with how poorly we prepare teachers for one of the most important parts of the job. "Few teachers ever take coursework on instructional design and, therefore, have little knowledge of the role it plays in student learning," notes Marcy Stein, an education professor with expertise in evaluating instructional design at the University of Washington Tacoma. It's like expecting the waiter at your favorite restaurant to serve your meal attentively while simultaneously cooking for twenty-five other people—and doing all the shopping and prepping the night before. You'd be exhausted too.

"Even if teachers were taught about instructional design, they would likely not have the time to prepare instructional materials, field test those materials to determine if they are effective, and modify the materials before using them to teach students. An iterative process is crucial for the development of effective materials," Stein points out.

There is good evidence to suggest that we are making a serious mistake by not paying more attention to curriculum, classroom materials, and instructional design. A 2012 Brookings study by Russ Whitehurst and Matt Chingos demonstrated that the "effect size" of choosing a better second-grade math curriculum was larger than replacing a fiftieth-percentile teacher with a seventy-fifth-percentile teacher. This is a powerful result, especially considering that it's relatively easy to give all children a better curriculum but extremely difficult to dramatically increase the effectiveness of their teachers. It's cost-neutral too: A Center for American Progress report by Ulrich Boser and Chingos showed virtually no difference in price between effective and ineffective curricula.

To be clear, there are perfectly good reasons why even the best teachers would be hitting the Internet for lesson planning—to find supplemental materials for individual students, for example, or adaptations for special needs kids. And teachers report using books and materials from myriad sources, including those selected by their schools and districts. But the RAND study offers a window into a phenomenon that is rarely discussed in American education: What children learn in school varies wildly from state to state, within districts, and even within grades in the same school.

If we're serious about raising the output of our K–12 system at large—not by a little, but a lot—here are some of the questions we should be asking: What exactly is the teacher's job, and what is the best use of her limited time? Is it deciding what to teach, or how to teach it? Is the soul of the work instructional design or instructional delivery? Do you want your child’s teacher to have the time to analyze student work and develop a keen eye for diagnosing mistakes and misunderstandings? Do you want her to give your child rich and meaningful feedback on assignments and homework? How about developing warm and productive relationships with your child and your family?

Now ask how you expect her to do all those things at a high level while spending precious hours every week creating curricula from scratch. Nearly half of teachers in the RAND study reported spending more than four hours per week developing or selecting their own instructional materials. Newer teachers almost certainly spend the most, hampering their ability to develop their craft.

To be sure, there are master teachers to whom we should eagerly grant nearly complete classroom autonomy, including over curriculum. You wouldn't tell Prince, "Just work on your guitar playing.

Someone else will write the songs." But it's simply unrealistic to assume that every teacher is a Prince-level virtuoso and polymath—let alone to base the job description on that assumption. No one would accuse Yo-Yo Ma of being a second-rate talent because he merely plays notes written by Bach.

Without question, we want our best teachers to play a significant role in instructional design so that more children and teachers can benefit from their expertise. But it is equally certain that twelve-plus years of a well-designed and sequenced curriculum would lead to better outcomes for children than the occasional year with a great yet isolated teacher. It would also let teachers focus more time on the art of teaching—that is, more time with student work and less time on Pinterest on Sunday night with an empty plan book at their elbow.

Great teachers need great instructional materials. It's time we got serious about providing them.

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Pondiscio, Robert. "Failing by design: How we make teaching too hard for mere mortals." Fordham Institute, 10 May. 2016, https://edexcellence.net/articles/failing-by-design-how-we-make-teaching-too-hard-for-mere-mortals.

Looking for Evidence of Student Engagement in the Key Shifts

Focus	Evidence
☐ The learning goal(s) of the lesson supports grade level standard(s).	
Coherence ☐ The lesson intentionally relates new concepts to students' prior skills and knowledge. ☐ Students set the foundation for future learning. ☐ Students access prior learning from major work in the grade in order to support new learning.	
Rigor **Conceptual Understanding** ☐ Students access concepts and ideas from a variety of perspectives. ☐ Students explain mathematical ideas behind a particular concept in a variety of ways. ☐ Students use examples and counterexamples to make and support conjectures applied to one problem to multiple situations. ☐ Students create and use a variety of models to analyze relationships. ☐ Students make use of patterns and structure to compose and decompose numbers, shapes, expressions, and equations. **Procedural Skills and Fluency** ☐ Students select tools (e.g. physical objects, manipulatives, drawings, diagrams, algorithms, or strategies) that are relevant and useful for the task or problem. ☐ Students communicate thinking using appropriate vocabulary, symbols and/or units in precise and accurate ways. ☐ Students look for patterns, generalizations, and shortcuts. ☐ Students are flexible in their use of procedures and skills to solve problems. **Application** ☐ Students decontextualize and contextualize quantities in problem situations. ☐ Students plan and choose a solution pathway when applying their mathematical knowledge to different situations.	

Note: To help educators look for evidence of grade-level-appropriate student engagement in mathematical tasks, these narrative descriptors are adapted from Illustrative Mathematics. (2014, February 12). *Standards for Mathematical Practice: Commentary and Elaborations for K–5 and 6-8*. Tucson, AZ. Available at http://commoncoretools.me/2014/02/12/k-5-elaborations-of-the-practice-standards

Lesson 4

Objective: Make a ten to add within 20.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(8 minutes)
Concept Development	(30 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**

Fluency Practice (12 minutes)

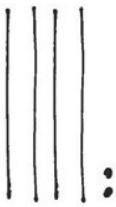
- Draw Tens and Ones **2.OA.2** (3 minutes)
- Make Ten **2.OA.2** (3 minutes)
- Make the Next Ten Within 100 **2.OA.2** (4 minutes)
- Take Out One **2.OA.2** (2 minutes)

Draw Tens and Ones (3 minutes)

Materials: (T) Linking cubes with ten-sticks and extra cubes, place value chart (S) Personal white board

Note: This fluency activity reviews place value as students analyze two representations of two-digit numbers.

T: Draw the number of cubes I show with quick tens and ones.
T: (Show 2 linking cube ten-sticks and 4 ones.)
S: (Draw as pictured to the right.)
T: Show me your boards. Tell me the number.
S: 24.
T: Draw the number I show with quick tens and ones.
T: (Write the number 42 on the place value chart.)
S: (Draw as pictured to the right.)
T: Tell me the number.
S: 42.



For the next minute, represent 18 and 81, 37 and 73, 29 and 92, alternating between showing the smaller number of each pair with cubes and the larger number with the place value chart.

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Make Ten (3 minutes)

Materials: (S) Personal white board

Note: This is a foundational skill for mastery of sums and differences to 20.

T: I'll say a number, and you say how many more to make ten.
T: 9. Get ready.
S: 1.
T: Write the addition sentence. (Pause.) Show me your boards.
S: (Show 9 + 1 = 10.)
T: (Scan each board, and accept 1 + 9 = 10, 10 = 9 + 1, etc.)
T: 8. (Pause as students write.) Get ready.
S: 2.
T: Write the addition sentence. (Pause.) Show me your boards.
S: (Show 8 + 2 = 10.)

Continue with the following possible sequence: 2, 5, 6, 4, 7, and 3.

Make the Next Ten Within 100 (4 minutes)

Materials: (T) Rekenrek (S) Personal white board

Note: In this fluency activity, students apply their knowledge of partners to ten to find analogous partners to 20, 30, and 40 to prepare for today's lesson. Keep them motivated to use the patterns by removing the Rekenrek at times.

T: (Show 19.) Say the number.
S: 19.
T: Write the number sentence, starting with 19, to get to or make the next ten on your personal white board.
S: (Write 19 + 1 = 20.)
T: (Scan the boards.) Tell me the addition sentence.
S: 19 + 1 = 20.
T: (Move 1 bead to make 20 as students answer.)
T: (Show 39.) Say the number.
S: 39.
T: Write the number sentence, starting with 39, to make the next ten on your personal white board.
S: (Write 39 + 1 = 40.)
T: (Scan the boards.) Tell me the addition sentence.
S: 39 + 1 = 40.
T: (Move 1 bead to make 40 as students answer.)

Continue with the following possible sequence: 15, 35, 85; 18, 48, 68; 12, 52, and 92.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Once the Rekenrek is removed, encourage students who need support to visualize the beads (ten-frames or 5-groups), or guide them to use fingers to model the number of ones in order to determine how many more make ten.

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Take Out One (2 minutes)

Materials: (S) Personal white board

Note: In the lesson, students add 9 and 6 by adding 9 and 1 and 5. They "take out 1" from 5.

T: Let's take out 1 from each number. I say 5. You write the number bond and say the two parts, 1 and 4.

T: 5.

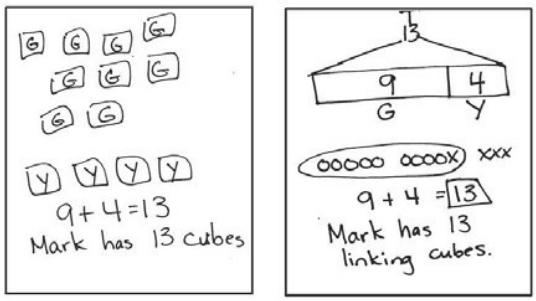
S: (Draw number bond.) 1 and 4.

Continue with the following possible sequence: 3, 10, 4, 7, 9, 8, and 6.

Application Problem (8 minutes)

MP.2

Mark had a stick of 9 green linking cubes. His friend gave him 4 yellow linking cubes. How many linking cubes does Mark have now?



Note: This *add to result unknown* problem's tape diagram can be compared to that of Lesson 3 when a part was subtracted.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

"Mark's Linking Cubes" bridges into today's Concept Development of making a ten to add. Rather than teach the make ten strategy during the Application Problem, notice what strategies students are independently using, and integrate these observations into the Concept Development. During the Student Debrief, consider coming back to the Application Problem, and invite students to apply today's learning to show another way to solve the problem.

Concept Development (30 minutes)

Materials: (S) Personal white board

Part 1: Making ten from an addend of 9, 8, or 7.

Note: In Grade 1, students used ten-sticks and quick ten drawings extensively when making ten. Now in Grade 2, the objective is to work at the numerical level as soon as possible.

T: (Write 9 + 4 on the board.)

T: Let's draw to solve 9 + 4 using circles and Xs.

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

If time or precision is a factor, create templates of pre-drawn circles to model addends of 9, 8, and 7. Then, students can attend to drawing Xs to complete the ten and model the remainder of the problem.

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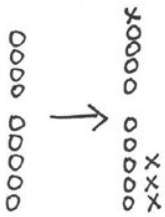
T: (Quickly draw and count aloud 9 circles in a 5-group column as seen in the first image.)



T: How many Xs will we add?

S: 4 Xs.

T: (Using the X symbol, complete the ten and draw the other 3 Xs to the right as seen in the second image.)

T: Did we make a ten?

S: Yes!

T: Our 9 + 4 is now a ten-plus fact. What fact can you see in the drawing?

S: 10 + 3 = 13.

T: 10 + 3 equals?

S: 13.

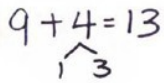
T: So, 9 + 4 equals?

S: 13. (Write the solution.)

T: What did we take out of 4 so that we could make 10?

S: 1.

T: (Draw the number bond under 4 as shown to the right.)



T: (Write 9 + 5.)

T: Solve using a number bond. (If students want or need to draw, allow them to.)

Continue with the following possible sequence: 9 + 6, 9 + 7, 8 + 9, 8 + 3, 8 + 4, 8 + 7, and 7 + 5. Have students explain their work to a partner.

Part 2: Observing patterns.

T: Look at our list of problems where one part, or addend, is 9. Tell your partner what you notice about adding to 9.

S: You get 1 out! → The answer is 10 and 1 less than the other addend.

T: Look at the problems with 8 as an addend. Tell your partner what you notice.

S: You get 2 out! → You always take 2 out of the other addend.

T: How is solving 9 + 4 and 8 + 4 different?

S: We used 2 to make 10 when we added to 8 and 1 to make 10 when we added to 9. → We used a different number bond.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. Some problems do not specify a method for solving. This is an intentional reduction of scaffolding that invokes MP.5, Use Appropriate Tools Strategically. Students should solve these problems using the RDW approach used for Application Problems.

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Student Debrief (10 minutes)

Lesson Objective: Make a ten to add within 20.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

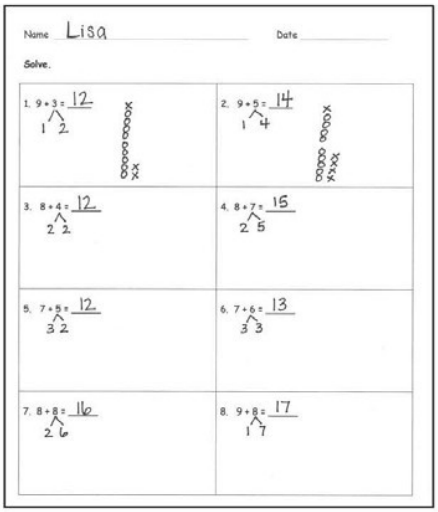
Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- Let's look at Problems 11–14. How are the problems the same and different?
- Do you notice a pattern that will help you memorize your 9-plus facts? What other patterns do you notice?
- Explain the strategy we reviewed today. Can you think of another problem that the make ten strategy will help us solve?
- Can you figure out the math goal of today's lesson? What name would you give this lesson?

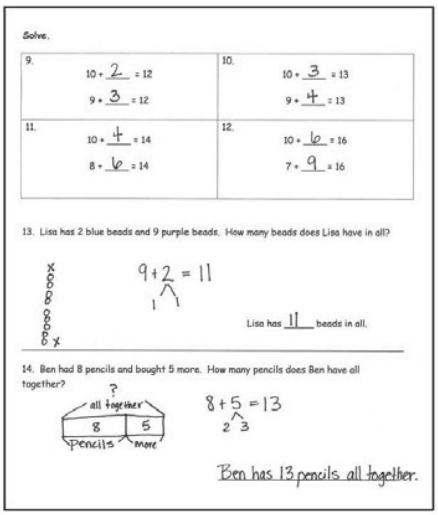
Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.


Name Lisa Date

Solve.

1. 9 + 3 = 12 (1 2)	2. 9 + 5 = 14 (1 4)
3. 8 + 4 = 12 (2 2)	4. 8 + 7 = 15 (2 5)
5. 7 + 5 = 12 (3 2)	6. 7 + 6 = 13 (3 3)
7. 8 + 8 = 16 (2 6)	8. 9 + 8 = 17 (1 7)


Solve.

9. 10 + 2 = 12; 9 + 3 = 12	10. 10 + 3 = 13; 9 + 4 = 13
11. 10 + 4 = 14; 8 + 6 = 14	12. 10 + 6 = 16; 7 + 9 = 16

13. Lisa has 2 blue beads and 9 purple beads. How many beads does Lisa have in all?

9 + 2 = 11 (1 1)

Lisa has 11 beads in all.

14. Ben had 8 pencils and bought 5 more. How many pencils does Ben have all together?

8 + 5 = 13 (2 3)

Ben has 13 pencils all together.

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Name _____ Date _____

Solve.

1. 9 + 3 = ____	2. 9 + 5 = ____
3. 8 + 4 = _____	4. 8 + 7 = _____
5. 7 + 5 = _____	6. 7 + 6 = _____
7. 8 + 8 = _____	8. 9 + 8 = _____

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Solve.

9. 10 + _____ = 12 9 + _____ = 12	10. 10 + _____ = 13 9 + _____ = 13
11. 10 + _____ = 14 8 + _____ = 14	12. 10 + _____ = 16 7 + _____ = 16

13. Lisa has 2 blue beads and 9 purple beads. How many beads does Lisa have in all?

Lisa has _____ beads in all.

14. Ben had 8 pencils and bought 5 more. How many pencils does Ben have altogether?

_____

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Name _____ Date _____

Solve.

1. 9 + 6 = ____	2. 8 + 5 = ____

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Name _____ Date _____

Solve.

1. 8 + 4 = _____ / \ 2 2 8 + 2 = 10 10 + 2 = 12	2. 9 + 7 = _____
3. 9 + 3 = _____	4. 8 + 6 = _____
5. 7 + 6 = _____	6. 7 + 8 = _____
7. 8 + 8 = _____	8. 8 + 9 = _____

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9. Solve and match.

A	B
10 + 2 = 12	9 + 8 = _____
10 + _____ = 13	9 + 6 = _____
10 + _____ = 17	7 + 6 = _____
10 + _____ = 15	6 + 8 = _____
4 + _____ = 14	3 + 9 = 12

10. Ronnie uses 5 brown bricks and 8 red bricks to build a fort.
How many bricks does Ronnie use in all?

Ronnie uses _____ bricks.

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Diamond Reflection
Unpacking the EngageNY Lesson

Observations: How are the mathematics content standards evident in the lesson?

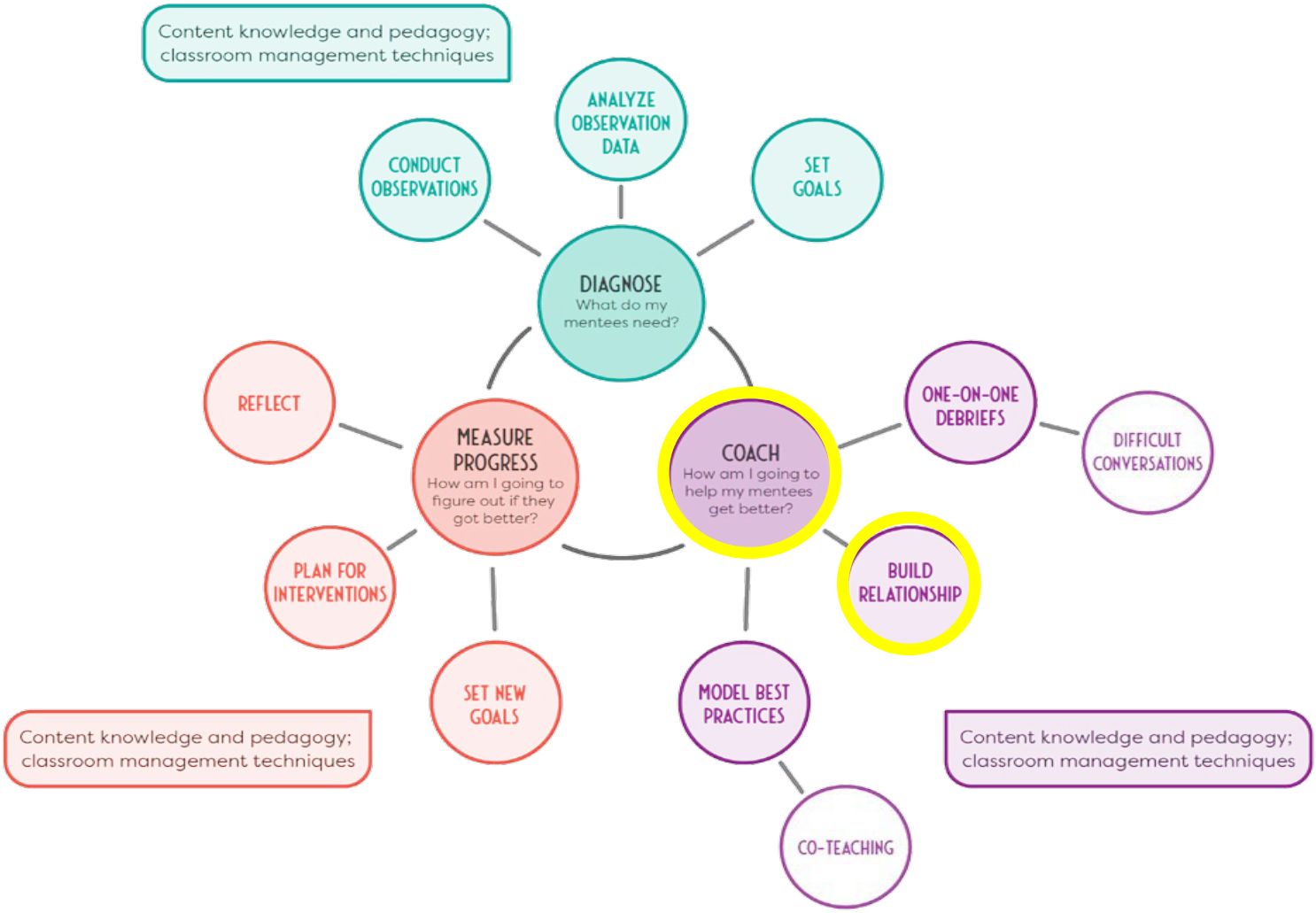
Reflections: How does student engagement in the SMPs help develop conceptual understanding, procedural skill and fluency and application skills?

Other thoughts and considerations

Interpretations: What instructional strategies and facilitator moves brought out the content and practice standards?

Decisional: What am I going to do based on my learning?

The Mentoring Cycle – Build Relationships



Partnership Agreements

<u>Build Relationship: 3 Key Components</u>
- Establish Trust
- Maintain trust
- Build confidence
-

Partnership Agreements
- Support establishing trust between mentors and mentees

A partnership agreement is . . .

_____

_____

_____

They are important because . . .

_____

_____

_____

Mentors form partnership agreements with mentees about:

Areas	Notes/examples
Time	
Location/logistics	
Focus on mentoring	
Instructional goal of lesson	
Expectations	
Responsibilities of mentor and mentee	
Data to be collected	
Resources needed	
Confidentiality	
Logistics for follow-up	

Which areas of agreements do you think will be important to you and your mentee(s)?

How will you use agreements to build trust in your mentor-mentee relationship?

Partnership Agreement Practice Scenario

Read the following scenario. Identify the partnership agreements evident and recommend others that would be useful for this mentor and mentee to form.

Scenario, Part 1

Deciding to serve as a mentor was a difficult decision for Felicia Cordova. She cares deeply about her students' success and takes her responsibility for their learning seriously. She worried that having a mentee in her classroom might impact the quality of learning her students experienced. Ms. Cordova did not want to have a mentee limit her students' success.

On the other hand, she saw the benefits of working with a mentee, contributing to the growth of a new teacher, and having another adult with whom to exchange ideas. Ultimately, she decided that not only would this partnership contribute to her own professional growth, but she also decided that she had much to offer a mentee. She accepted the mentor responsibility and wanted to form a good relationship with her mentee, Alex Morris. Ms. Cordova wanted to start off on the right foot with Mr. Morris. She was eager to have stimulating, intellectual conversations with him, to help him grow professionally, and to raise his consciousness about the decisions he was making in the classroom and their effect on students. In her first meeting with Mr. Morris, Ms. Cordova was concerned about Mr. Morris's appearance. She communicated how important professional deportment and dress were to her during the time they worked together. She told Mr. Morris that she expected him to make the transition from a student to professional within the first week of school

After spending the first week of the school year observing Ms. Cordova teach and debriefing after each observation, Mr. Morris was ready to begin co-teaching. Mr. Morris made it clear that he felt unsure about teaching the math curriculum and asked for Ms. Cordova's support. He particularly asked for her help in using the curriculum resources and in assessing student learning. Ms. Cordova let Mr. Morris know that she wanted him to take a substantial role in teaching the math lesson and expected him to prepare and to ask any questions he might have about the lesson in advance. She suggested that one of their agreements be that either one of them feel free to add comments while the other was teaching.

One day, later in the school year, while teaching a lesson on adding two fractions with unlike denominators, Mr. Morris tells students that they should always multiply the denominators together. Mr. Cordova, recognizing that his statement is not completely accurate, raises her hand in the back of the classroom and asks Mr. Morris if his approach worked in every situation to get the least common denominator. For example, if we were adding 1/2 and 1/6, wouldn't a common denominator be 6? Mr. Morris responds, "Ms. Cordova, you are right. It is important to find the smallest denominator that both fractions share in common."

During the debrief of the lesson with Ms. Cordova, Mr. Morris analyzed his lesson, clarified his understanding of the math, described how he would clarify with students the error so that there were no lingering misconceptions.

Partnership agreements evident:

Other recommended agreements:

Sample Questions to Guide a Partnership Agreement Conversation

- What do you want to accomplish in our work together?
- What services and support can I provide that will help you accomplish this goal?
- When will we work together?
- What resources will we need that will be helpful in our work? Who will bring those resources?
- How long do we expect this will take?
- What data do we want to use to know if we are successful?
- What do you want me to know about your preferences for my work with you?
- What is the best way for us to communicate?

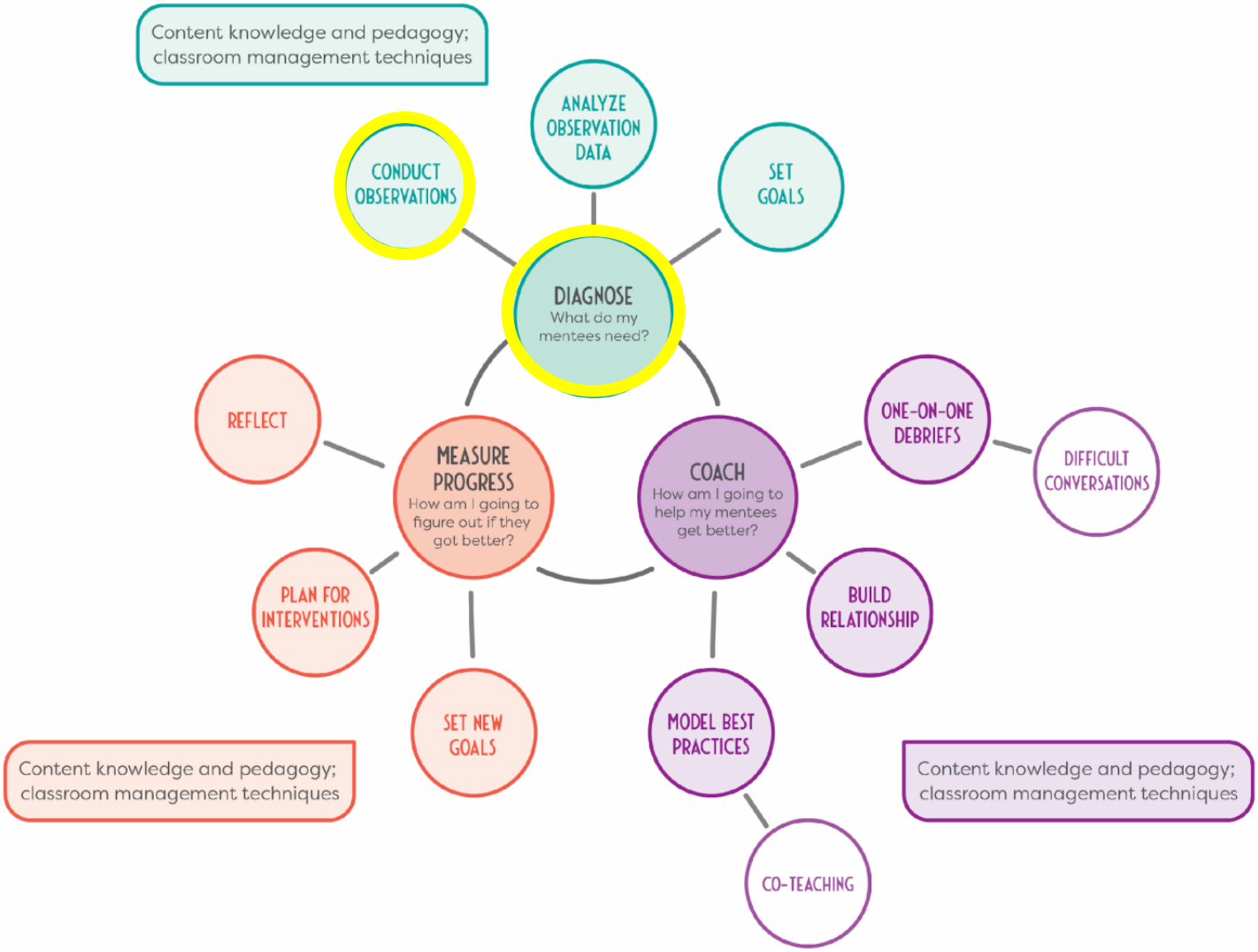
Handling Breakdowns in Partnership Agreements

Breakdowns are natural and can strengthen a relationship when handled immediately and positively. The process below is one way to address a breakdown when it occurs.

- Acknowledge the breakdown
- Clarify or renegotiate the partnership agreement—looks like and sounds like
- Recommit to the partnership agreement
- Check in on how it is going

Areas for Personal Partnership Agreements

The Mentoring Cycle – Conduct Observations



Conduct Observation

Conduct Observation: 3 Key Components
- Confirm Observation details
- Observe students and teacher in action
- Record notes using "look-fors"

Confirm Observation Details:
- Observation time
- Lesson instructional goal
- Specific skill or instructional practice being observed
- Mentor's observation location
- Look-fors and supporting data
- One-on-one debrief time/date/location

Observing a Teacher in Action: Dos and Don'ts

Do	Don't
Stay close to the action	Hang back and miss what's happening
Watch carefully and ask questions of students while they're working	Jump in to "fix" this one lesson
Look specifically for evidence of the focus of your observation and when it occurred during the lesson (e.g., rigor)	Take unfocused notes on a range of topics
Script exactly what you hear from teacher and students	Only write down things that fit a preconceived idea or jump to judgements

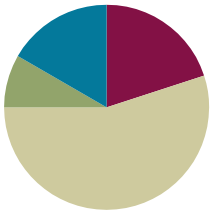
Classroom Observation Tool		
Focus:		
Look-Fors	**Student Behaviors**	**Teacher Behaviors**
Summary of Observation:		

Lesson 7

Objective: Multiply any whole number by a fraction using tape diagrams.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(5 minutes)
Concept Development	(33 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Read Tape Diagrams **5.NF.4** (4 minutes)
- Half of Whole Numbers **5.NF.4** (4 minutes)
- Fractions as Whole Numbers **5.NF.3** (4 minutes)

Read Tape Diagrams (4 minutes)

Materials: (S) Personal white board

Note: This fluency activity prepares students to multiply fractions by whole numbers during the Concept Development.

T: (Project a tape diagram with 10 partitioned into 2 equal units.) Say the whole.

S: 10.

T: On your personal white board, write the division sentence.

S: (Write $10 \div 2 = 5$.)

Continue with the following possible sequence: $6 \div 2$, $9 \div 3$, $12 \div 3$, $8 \div 4$, $12 \div 4$, $25 \div 5$, $40 \div 5$, $42 \div 6$, $63 \div 7$, $64 \div 8$, and $54 \div 9$.

Half of Whole Numbers (4 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews content from Lesson 6 and prepares students for multiplying fractions by whole numbers during the Concept Development using tape diagrams.

T: Draw 4 counters. What's half of 4?

S: 2.

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T: (Write $\frac{1}{2}$ of 4 = 2.) Say a division sentence that helps you find the answer.

S: 4 ÷ 2 = 2.

Continue with the following possible sequence: 1 half of 10, 1 half of 8, 1 half of 30, 1 half of 54, 1 fourth of 20, 1 fourth of 16, 1 third of 9, and 1 third of 18.

Fractions as Whole Numbers (4 minutes)

Materials: (S) Personal white board

Note: This fluency activity reviews Lesson 5, as well as denominators that are equivalent to hundredths. Instruct students to use their personal white boards for calculations that they cannot do mentally.

T: I'll say a fraction. You say it as a division problem. 4 halves.

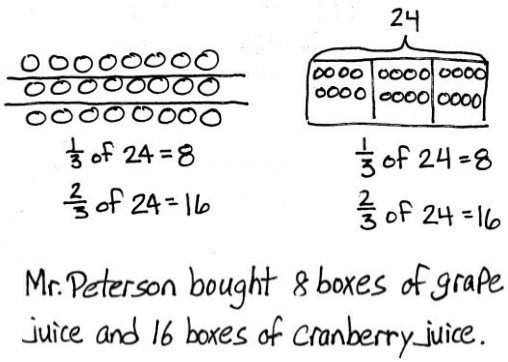
S: 4 ÷ 2 = 2.

Continue with the following possible suggestions:
$\frac{6}{2}, \frac{14}{2}, \frac{54}{2}, \frac{40}{20}, \frac{80}{20}, \frac{180}{20}, \frac{960}{20}, \frac{10}{5}, \frac{15}{5}, \frac{35}{5}, \frac{85}{5}, \frac{100}{50}, \frac{150}{50}, \frac{300}{50}, \frac{900}{50}, \frac{8}{4}, \frac{12}{4}, \frac{24}{4}, \frac{96}{25}, \frac{50}{25}, \frac{75}{25}$, and $\frac{800}{25}$.

Application Problem (5 minutes)

Mr. Peterson bought a case (24 boxes) of fruit juice. One-third of the drinks were grape, and two-thirds were cranberry. How many boxes of each flavor did Mr. Peterson buy? Show your work using a tape diagram or an array.

Note: This Application Problem requires students to use skills explored in Lesson 6. Students are finding fractions of a set and showing their thinking with models.



Concept Development (33 minutes)

Materials: (S) Personal white board

Problem 1

What is $\frac{3}{5}$ of 35?

T: (Write $\frac{3}{5}$ of 35 =_____ on the board.) We used two different models (counters and arrays) yesterday to find fractions of sets. We will use tape diagrams to help us today.

T: We must find 3 fifths of 35. Draw a bar to represent our whole. What's our whole?

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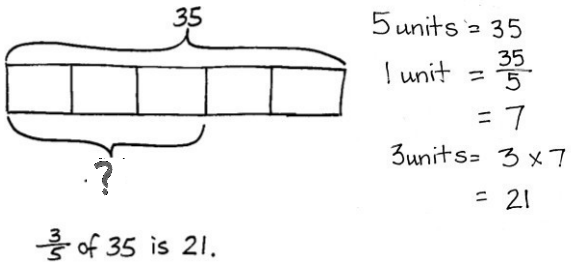
S: (Draw.) 35.

T: (Draw a bar, and label it as 35.) How many units should we cut the whole into?

S: 5.

T: How do you know?

S: The denominator tells us we want fifths. → Thatis the unit being named by the fraction. → We are asked about fifths, so we know we need 5 equal parts.



T: Divide your bar into fifths.

S: (Work.)

T: (Cut the bar into 5 equal units.) We know 5 units are equal to 35. How do we find the value of 1 unit? Say the division sentence.

S: 35 ÷ 5 = 7.

T: (Write 5 units = 35, 1 unit = 35 ÷ 5 = 7.) Have we answered our question?

S: No. We found 1 unit is equal to 7, but the question is to find 3 units. → We need 3 fifths. When we divide by 5, that's just 1 fifth of 35.

T: How will we find 3 units?

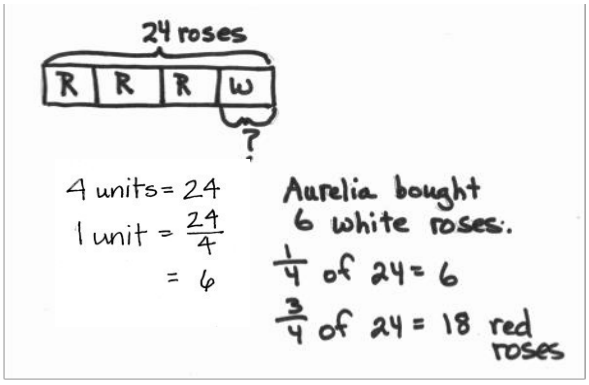
S: Multiply 3 and 7 to get 21. → We could add 7 + 7 +7. → We could put 3 of the 1 fifths together. That would be 21.

T: What is $\frac{3}{5}$ of 35?

S: 21.

Problem 2

Aurelia buys 2 dozen roses. Of these roses, $\frac{3}{4}$ are red, and the rest are white. How many white roses did she buy?



T: What do you know about this problem? Turn and share with your partner.

S: I know the whole is 2 dozen, which is 24. → $\frac{3}{4}$ are red roses, and $\frac{1}{4}$ are white roses. The total is 24 roses. → The information in the problem is about red roses, but the question is about the other part—the white roses.

T: Discuss with your partner how you'll solve this problem.

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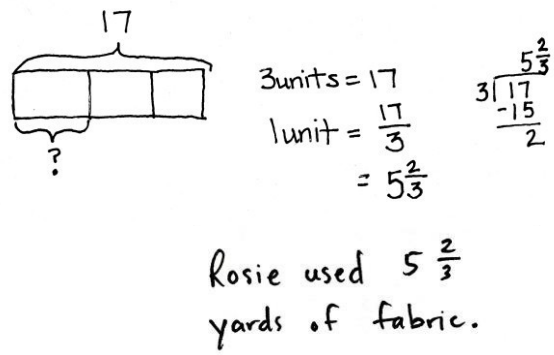
S: We can first find the total red roses and then subtract from 24 to get the white roses. → Since I know $\frac{1}{4}$ of the whole is white roses, I can find $\frac{1}{4}$ of 24 to find the white roses. That's faster.

T: Work with a partner to draw a tape diagram and solve.

S: (Work.)

T: Answer the question for this problem.

S: She bought 6 white roses.



Problem 3

Rosie had 17 yards of fabric. She used one-third of it to make a quilt. How many yards of fabric did Rosie use for the quilt?

T: What can you draw? Turn and share with your partner.

T: Compare this problem to the others we've done today.

S: The answer is not a whole number. → The quotient is not a whole number. → We were still looking for fractional parts, but the answer isn't a whole number.

T: We can draw a bar that shows 17 and divide it into thirds. How do we find the value of one unit?

S: Divide 17 by 3.

T: How much fabric is one-third of 17 yards?

S: $\frac{17}{3}$ yards. → $5\frac{2}{3}$ yards.

T How would you find 2 thirds of 17?

S: Double $5\frac{2}{3}$. → Multiply $5\frac{2}{3}$ times 2. →

Subtract $5\frac{2}{3}$ from 17.

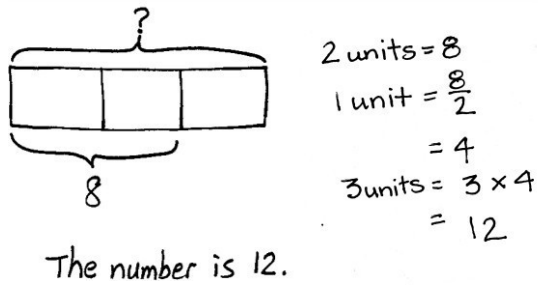
Repeat this sequence with $\frac{2}{5}$ of 11, if necessary.

Problem 4

$\frac{2}{3}$ of a number is 8. What is the number?

T: How is this problem different from the ones we just solved?

S: In the first problem, we knew the total and wanted to find a part of it. In this one, we know how much 2 thirds is but not the whole. → Last time, they told us the whole and asked us about a part. This time, they told us about a part and asked us to find the whole.



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T: Draw a bar to represent the whole. What kind of units will we need to divide the whole into?

S: (Draw.) Thirds.

T: (Draw the bar divided into thirds.) What else do we know? Turn and tell your partner.

S: We know that 2 thirds is the same as 8, so it means we can label 2 of the units with a bracket and 8. → The units are thirds. We know about 2 of them. They are equal to 8 together. We don't know what the whole bar is worth, so we have to put a question mark there.

T: (Draw to show the labeling.) Label your bars.

S: (Label the bars.)

T: How can knowing what 2 units are worth help us find the whole?

S: Since we know that 2 units = 8, we can divide to find that 1 unit is equal to 4.

T: (Write 1 unit = 8 ÷ 2 = 4.) Let's record 4 inside each unit. (Show the recording.)

S: (Record the 4 inside each unit.)

T: Can we find the whole now?

S: Yes. We can add 4 + 4 + 4 = 12. → We can multiply 3 times 4, which is equal to 12.

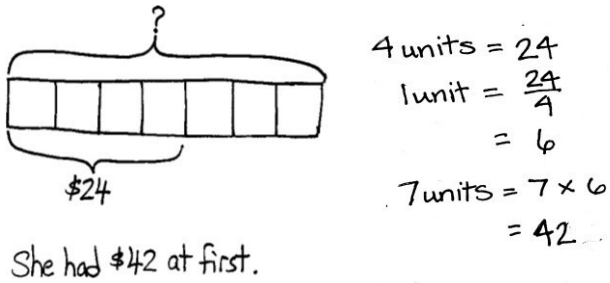
T: (Write 3 units = 3 × 4 = 12.) Answer the question for this problem.

S: The number is 12.

T: Let's think about it and check to see if it makes sense. (Write $\frac{2}{3}$ of 12 = 8.) Work independently on your personal white board, and solve to find what 2 thirds of 12 is.

Problem 5

Tiffany spent $\frac{4}{7}$ of her money on a teddy bear. If the teddy bear cost $24, how much money did she have at first?



T: Which problem that we've worked on today is most similar to this one?

S: This one is just like Problem 4. We have information about a part, and we have to find the whole.

T: What can you draw? Turn and share with your partner.

S: We can draw a bar for all of the money. We can show what the teddy bear costs. It costs $24, and it's $\frac{4}{7}$ of her total money. We can put a question mark over the whole bar.

T: Do we have enough information to find the value of 1 unit?

S: Yes.

T: How much is one unit?

S: 4 units = $24, so 1 unit = $6.

T: How will we find the amount of money she had at first?

S: Multiply $6 by 7.

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T: Say the multiplication sentence, starting with 7.

S: 7 × \$6 = \$42.

T: Answer the question in this problem.

S: Tiffany had \$42 at first.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.

Student Debrief (10 minutes)

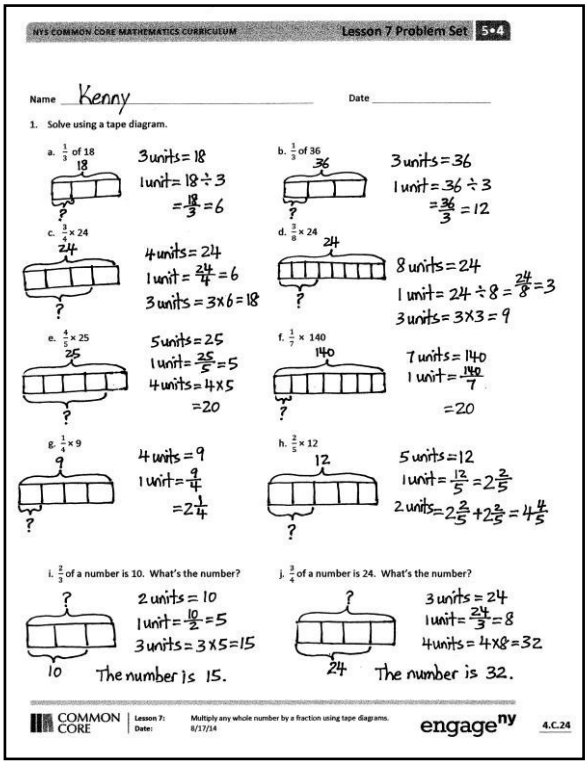
Lesson Objective: Multiply any whole number by a fraction using tape diagrams.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set and process the lesson.

Any combination of the questions below may be used to lead the discussion.

- What pattern relationships did you notice between Problems 1(a) and 1(b)? (The whole of 36 is twice as much as the whole of 18. 1 third of 36 is twice as much as 1 third of 18. 12 is twice as much as 6.)
- What pattern did you notice between Problems 1(c) and 1(d)? (The wholes are the same. The fraction of 3 eighths is half of 3 fourths. That is why the answer of 9 is also half of 18.)
- Look at Problems 1(e) and 1(f). We knowthat 4 fifths and 1 seventh aren't equal, so how did we get the same answer?


NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 7 Problem Set 5•4

Name Kenny Date

1. Solve using a tape diagram.

a. $\frac{1}{3}$ of 18
3 units = 18
1 unit = 18 ÷ 3 = $\frac{18}{3}$ = 6

b. $\frac{1}{3}$ of 36
3 units = 36
1 unit = 36 ÷ 3 = $\frac{36}{3}$ = 12

c. $\frac{3}{4}$ × 24
4 units = 24
1 unit = $\frac{24}{4}$ = 6
3 units = 3 × 6 = 18

d. $\frac{3}{8}$ × 24
8 units = 24
1 unit = 24 ÷ 8 = $\frac{24}{8}$ = 3
3 units = 3 × 3 = 9

e. $\frac{4}{5}$ × 25
5 units = 25
1 unit = $\frac{25}{5}$ = 5
4 units = 4 × 5 = 20

f. $\frac{1}{7}$ × 140
7 units = 140
1 unit = $\frac{140}{7}$ = 20

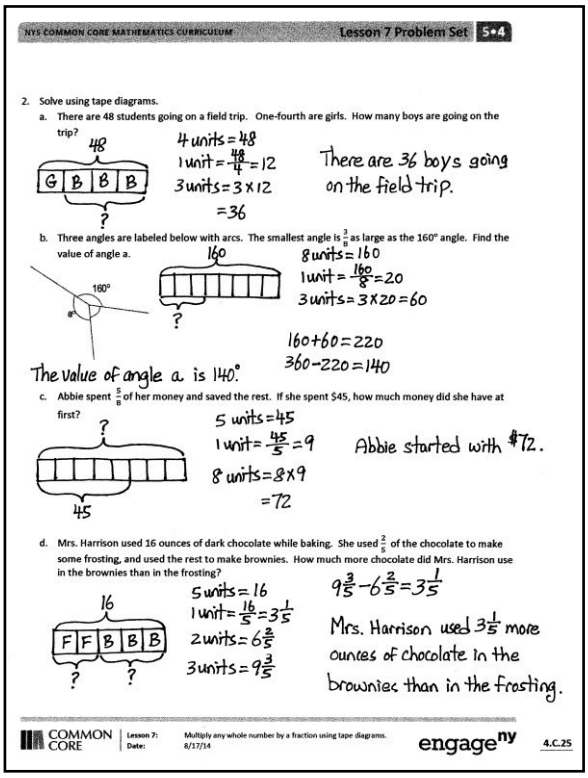
g. $\frac{1}{4}$ × 9
4 units = 9
1 unit = $\frac{9}{4}$ = $2\frac{1}{4}$

h. $\frac{2}{5}$ × 12
5 units = 12
1 unit = $\frac{12}{5}$ = $2\frac{2}{5}$
2 units = $2\frac{2}{5}$ + $2\frac{2}{5}$ = $4\frac{4}{5}$

i. $\frac{2}{3}$ of a number is 10. What's the number?
2 units = 10
1 unit = $\frac{10}{2}$ = 5
3 units = 3 × 5 = 15
The number is 15.

j. $\frac{3}{4}$ of a number is 24. What's the number?
3 units = 24
1 unit = $\frac{24}{3}$ = 8
4 units = 4 × 8 = 32
The number is 32.

COMMON CORE Lesson 7: Multiply any whole number by a fraction using tape diagrams. Date: 8/17/14 engage^ny 4.C.24


NYS COMMON CORE MATHEMATICS CURRICULUM Lesson 7 Problem Set 5•4

2. Solve using tape diagrams.

a. There are 48 students going on a field trip. One-fourth are girls. How many boys are going on the trip?
4 units = 48
1 unit = $\frac{48}{4}$ = 12
3 units = 3 × 12 = 36
There are 36 boys going on the field trip.

b. Three angles are labeled below with arcs. The smallest angle is $\frac{3}{8}$ as large as the 160° angle. Find the value of angle a.
8 units = 160
1 unit = $\frac{160}{8}$ = 20
3 units = 3 × 20 = 60
160 + 60 = 220
360 − 220 = 140
The value of angle a is 140°.

c. Abbie spent $\frac{5}{8}$ of her money and saved the rest. If she spent \$45, how much money did she have at first?
5 units = 45
1 unit = $\frac{45}{5}$ = 9
8 units = 8 × 9 = 72
Abbie started with \$72.

d. Mrs. Harrison used 16 ounces of dark chocolate while baking. She used $\frac{2}{5}$ of the chocolate to make some frosting, and used the rest to make brownies. How much more chocolate did Mrs. Harrison use in the brownies than in the frosting?
5 units = 16
1 unit = $\frac{16}{5}$ = $3\frac{1}{5}$
2 units = $6\frac{2}{5}$
3 units = $9\frac{3}{5}$
$9\frac{3}{5}$ − $6\frac{2}{5}$ = $3\frac{1}{5}$
Mrs. Harrison used $3\frac{1}{5}$ more ounces of chocolate in the brownies than in the frosting.

COMMON CORE Lesson 7: Multiply any whole number by a fraction using tape diagrams. Date: 8/17/14 engage^ny 4.C.25

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- Compare Problems 1(c) and 1(j). How are they similar, and how are they different? (The questions involve the same numbers, but in Problem 1(c), 3 fourths is the unknown quantity, and in Problem 1(j), it is the known quantity. In Problem 1(c), the whole is known, but in Problem 1(j), the whole is unknown.)
- How did you solve for Problem 2(b)? Explain your strategy or solution to apartner.
- There are a couple of different methods to solve Problem 2(c). Find someone who used a different approach from yours, and explain your thinking.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

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Name_____ Date _____

1. Solve using a tape diagram.

a. $\frac{1}{3}$ of 18

b. $\frac{1}{3}$ of 36

c. $\frac{3}{4} \times 24$

d. $\frac{3}{8} \times 24$

e. $\frac{4}{5} \times 25$

f. $\frac{1}{7} \times 140$

g. $\frac{1}{4} \times 9$

h. $\frac{2}{5} \times 12$

i. $\frac{2}{3}$ of a number is 10. What'sthe number?

j. $\frac{3}{4}$ of a number is 24. What's the number?

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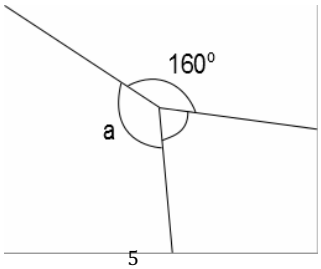
2. Solve using tape diagrams.

   a. There are 48 students going on a field trip. One-fourth are girls. How many boys are going on the trip?

   b. Three angles are labeled below with arcs. The smallest angle is $\frac{3}{8}$ as large as the 160° angle. Find the value of angle a.



   c. Abbie spent $\frac{5}{8}$ of her money and saved the rest. If she spent $45, how much money did she have at first?

   d. Mrs. Harrison used 16 ounces of dark chocolate while baking. She used $\frac{2}{5}$ of the chocolate to make some frosting and used the rest to make brownies. How much more chocolate did Mrs. Harrison use in the brownies than in the frosting?

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Name_____ Date _____

Solve using a tape diagram.

a. $\frac{3}{5}$ of 30

b. $\frac{3}{5}$ of a number is 30. What's the number?

c. Mrs. Johnson baked 2 dozen cookies. Two-thirds of the cookies were oatmeal. How many oatmeal cookies did Mrs. Johnson bake?

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Name_____ Date _____

1. Solve using a tape diagram.

a. $\frac{1}{4}$ of 24

b. $\frac{1}{4}$ of 48

c. $\frac{2}{3} \times 18$

d. $\frac{2}{6} \times 18$

e. $\frac{3}{7} \times 49$

f. $\frac{3}{10} \times 120$

g. $\frac{1}{3} \times 31$

h. $\frac{2}{5} \times 20$

i. $\frac{1}{4} \times 25$

j. $\frac{3}{4} \times 25$

k. $\frac{3}{4}$ of a number is 27. What'sthe number?

l. $\frac{2}{5}$ of a number is 14. What's the number?

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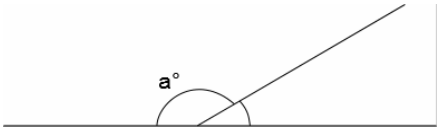
2. Solve using tape diagrams.

   a. A skating rink sold 66 tickets. Of these, $\frac{2}{3}$ were children's tickets, and the rest were adult tickets. What total number of adult tickets were sold?

   b. A straight angle is split into two smaller angles as shown. The smaller angle's measure is $\frac{1}{6}$ that of a straight angle. What is the value of angle a?



   c. Annabel and Eric made 17 ounces of pizza dough. They used $\frac{5}{8}$ of the dough to make a pizza and used the rest to make calzones. What is the difference between the amount of dough they used tomake pizza and the amount of dough they used to make calzones?

   d. The New York Rangers hockey team won $\frac{3}{4}$ of their games last season. If they lost 21 games, how many games did they play in the entire season?

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Analyzing Observation Data

<u>Analyze Observation Data: 3 Key Components</u>
- Analyze observation notes
- Recognize strengths and areas for growth
- Prioritize

Analyze Observation Notes:
Go back to your observation notes.

- Keep the focus of the observation in mind.
- Look for evidence or lack of evidence of the focus.
- Highlight and make notes in another color with that lens.

Recognize Strengths and Areas for Growth and Prioritize:
Go back to your highlights and analysis notes on your observation notes.

What does strong teaching for the focus area look like?

Strengths: Where do I see strong teaching for the focus area? (list)	**Areas for Growth:** Where do I see areas of missed opportunity? (list)	**Prioritize One Area for Growth:** When I think about what matters most for the focus area, which area for growth is most important? (select and make notes)
1.	**1.**	
2.	**2.**	
3.	**3.**	

Other questions to support prioritization:

- Is my mentee focusing the lesson on a high-quality text (or multiple texts)?
- Is my mentee employing questions and tasks, both oral and written, that are text specific and reflect the standards?
- Does my mentee provide ALL students with opportunities to engage in the work of the lesson? (productive engagement) Or does the teacher "get in the way" (by pushing one over the others, by taking away the challenge and not allowing students to struggle, by answering questions for students, etc.)?
- What was the intended outcome and how does it align to what matters most for students to be able to read, understand, and express understanding of complex texts?
- During this lesson, did you gather evidence of student progress toward long-term goals in getting students to read, understand, and express understanding of complex texts?

Module 4 Review

In your team, review the outcomes (p. 2) for Module 4. Share how you anticipate applying what you learned as a mentor.

Exit slip

Use an index card on your table to complete these three stems.

1. *Before I thought…and now I think…*
2. *The most useful thing from today for my own teaching is…*
3. *The most important thing from today for me to remember about working with my mentee is…*