Math PATHWAYS & PITFALLS

Professional Development Handout

What Is in This Handout?

- Professional Development Tasks
- Student Pages for the lesson: Decimals Are Fractions Too
- Teaching Guide for the lesson: Decimals Are Fractions Too
- Clipboard Prompts

Note: The contents of this handout are excerpted from *Math Pathways & Pitfalls Lessons and Teaching Manual* (Second Ed.) by Barnett-Clarke, Ramírez, Coggins, Salguero, Franco, and Rosenfeld. https://mpp.WestEd.org

How Is It Used?

This handout contains professional development tasks that accompany the Video for Teachers, available in the Online Digital Resource Library. Together these tools provide an introduction to *Math Pathways & Pitfalls.*

The tasks in the handout are ideal for group collaboration among colleagues, perhaps with a coach or facilitator. Alternatively, they may be used along with the video for individual study and reflection.

Tasks 1–3

Watch the Video for Teachers section called *Lesson In Action*. When prompted, complete each of the first three Professional Development Tasks using the Student Pages, Teaching Guide, and Clipboard Prompts included in this handout.

Task 4

Watch the Video for Teachers section called *Frequently Asked Questions.*

Complete Professional Development Task 4.

Note: The videos created prior to publication of the *Math Pathways & Pitfalls* books, resulting in some small differences between the videos and the book contents.

Professional Development Tasks

Purpose

To increase understanding of the purpose, time frame, and process of *MPP* lessons

Materials

- ❍ Video for Teachers, in the Online Digital Resource Library
- ❍ Professional Development Handout for each participant
- ❍ *Discussion Builders* poster
- ❍ Monitor

Preparation

- ❍ Print the Professional Development Handout. Prepare a stapled packet of the handout for each participant.
- ❍ Set up the monitor.
- ❍ Post the *Discussion Builders* poster.

Time Frame

30 minutes per task; all four tasks may be completed during one session or spread over two to four sessions

PROFESSIONAL DEVELOPMENT TASK 1

Review the student pages for the featured lesson provided in the Professional Development Handout.

View *Lesson in Action Professional Development: Task 1.*

Complete the following reflective activities individually or with colleagues. Each participant should have a copy of the Professional Development Handout. This task will take about 30 minutes.

Lesson at a Glance and Lesson Foundation

Read the Lesson at a Glance and the Lesson Foundation sections of the teaching guide for the lesson in the handout.

- ✱ About how much time is allotted for the core lesson on Day 1? on Day 2? What are the goals for the lesson? What materials are suggested?
- ✱ Highlight ideas in the Mathematical Insights & Teaching Tips section that you found interesting or helpful. Why did you choose these ideas?
- ✱ Highlight ideas from the Mathematical Discussion Support section and English Learner Access section that might be particularly important for your students. Why did you choose these ideas?

Core Lesson: Opener

Look at the *MPP* Lesson Roadmap excerpt to the right. The first part of a lesson is called the Opener. Read through the student pages and the teaching guide for this part of the lesson, thinking about the goals for this lesson.

***MPP* Lesson Roadmap**

CORE LESSON: DAY 1

Opener
- *Discussion Builders*
- Purpose
- Math Words
- Starter Problem

Discussion
- Student Thinking
- Things to Remember
- Reflection

CORE LESSON: DAY 2

Review and Practice
- Review Day 1 Lesson
- Our Turn
- My Turn

MINI LESSONS: 2–3 DAYS LATER

Assess and Reinforce
- Multiple Choice Mini Lesson
- Writing Task Mini Lesson

Discussion Builders

Each lesson begins by reviewing the *Discussion Builders* posted in the front of the room. Read through the sentence stems on the poster.

- What did you notice about the way the *Discussion Builders* were introduced on the video?
- Which *Discussion Builders* do you think students will be most likely to adopt easily?
- How might you encourage students to expand their use of different *Discussion Builders* over time?
- About how much time is allotted for this activity in each lesson?

Purpose

Each lesson continues by reading the purpose.

- Why might it be helpful to project an image of Student Page 1 on a screen?
- How does reading the purpose of the lesson set the stage for purposeful and intentional learning?

Math Words

The Math Words on Student Page 1 are used in sentences to contextualize vocabulary. Notice that only about 5 minutes are allowed for this part of the lesson to help keep the lesson within the 45-minute time frame.

- How are these sentences similar to or different from definitions?
- Why might it benefit students to repeat the words aloud or silently?
- Why is it helpful for students to see the words in writing?
- On the video, how was the use of oral and written mathematical language encouraged and reinforced during the discussion?

Starter Problem

The Starter Problem is often not difficult. However, the underlying mathematical ideas are complex. If students do not make sense of the problem conceptually, their solution is very likely to have a pitfall. The Starter Problem motivates inquiry into the mathematical meaning of the problem, in part by eliciting pitfalls.

- What are possible pitfalls for the Starter Problem in the lesson shown on the video? Why might they occur?

- What mathematical concepts are foundational to understanding the meaning of the Starter Problem in this lesson? How would understanding these ideas help students make sense of their solution and avoid pitfalls?
- In the video, students solved the Starter Problem individually. What is the rationale given for the approach? About how much time is suggested for working on the Starter Problem?
- Students are asked to share their thinking, rather than their solutions, during the discussion that follows the Starter Problem. Students share their own solutions to problems after they have had an opportunity to self-correct their pitfalls and establish a conceptual foundation. Why might this strategy help lower the level of risk, broaden participation, and equalize the playing field for students?

PROFESSIONAL DEVELOPMENT TASK 2

View *Lesson in Action Professional Development: Task 2*.

Complete the following reflective activities individually or with colleagues. Each participant should have a copy of the Professional Development Handout. This task will take about 30 minutes.

Core Lesson: Discussion

Look at the *MPP* Lesson Roadmap excerpt to the right. The Discussion part of an *MPP* lesson is when students collaboratively develop their mathematical understandings. Read through the student pages and the teaching guide for this part of the lesson in the handout.

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CORE LESSON: DAY 1

Opener
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- Math Words
- Starter Problem

Discussion
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- Things to Remember
- Reflection

CORE LESSON: DAY 2

Review and Practice
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- My Turn

MINI LESSONS: 2–3 DAYS LATER

Assess and Reinforce
- Multiple Choice Mini Lesson
- Writing Task Mini Lesson

Student Thinking: OK

During this part of the lesson, students carefully analyze and discuss the thinking and drawing of a fictional student whose work is marked OK. This student's work conveys a pathway of thinking that is mathematically rich and packed with opportunities for learning. Students first work independently, then work in pairs, and finally participate in a whole-class discussion.

- What was the teacher's role during this part of the lesson in the video?
- How do students benefit from individually analyzing a fictional student's thinking before talking with a partner?
- Why is it helpful to present the thinking of the fictional student in text rather than just orally? What are the particular benefits for students who are English learners?
- While students are talking in pairs, what kinds of things might the teacher take note of when listening in on students' conversations? How might these notes be helpful during the whole-class discussion?
- What are the benefits and drawbacks of carefully unpacking the thinking and drawing of a fictional student before focusing on students' own solutions? Are there benefits for teachers?
- Why will it be important for students to generate and share their own solution methods later in the lesson?

Student Thinking: Pitfall

Next, students analyze the work of a fictional student whose work is marked Pitfall. Again, they work independently, then in pairs, and finally participate in a whole-class discussion. They are asked to figure out why a solution doesn't make sense or explain why it is a pitfall.

- What did students in the video have to say about the pitfall? How might explaining why something is a pitfall motivate students to be more mindful of their own thinking?
- Why is it important for students to explain why a solution doesn't make sense? How does this reinforce the meaning of a mathematical idea?
- Reread the specific prompts provided in the teaching guide for the Student Thinking OK and Pitfall parts of the lesson. Make a list of follow-up prompts a teacher might ask to probe student thinking further. Consider enacting this part of the lesson with a colleague to practice using follow-up questions to deepen conceptual understanding.

Things to Remember and Reflection

To close the Discussion part of the lesson, students generate a list of Things to Remember and participate in a Reflection of the discussion process.

- Reread the teaching guide for these parts of the lesson. How much time is suggested for the two activities? What support is provided to the teacher? How do students benefit from this part of the lesson?

PROFESSIONAL DEVELOPMENT TASK 3

View *Lesson in Action Professional Development: Task 3*.

Complete the following reflective activities individually or with colleagues. Each participant should have a copy of the Professional Development Handout. This task will take about 30 minutes.

Core Lesson: Review and Practice

Look at the *MPP* Lesson Roadmap excerpt to the right. The second day of the lesson provides students opportunities to review the previous day's discussion and to practice by solving additional problems in the Our Turn and My Turn parts of the lesson. Read through the student pages and the teaching guide for this part of the lesson in the handout.

- What is the purpose of these parts of the lesson? About how much time is spent on each part?
- How did the teacher in the video handle the review of Day 1?

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- Things to Remember
- Reflection

CORE LESSON: DAY 2

Review and Practice
- Review Day 1 Lesson
- Our Turn
- My Turn

MINI LESSONS: 2–3 DAYS LATER

Assess and Reinforce
- Multiple Choice Mini Lesson
- Writing Task Mini Lesson

- Solve the problems in the Our Turn and My Turn sections. Which problems extend students' thinking beyond the Starter Problem? In what ways are they different or more difficult?
- What is the benefit for students to begin working in pairs for the Our Turn part? Why is it important for students to solve and then share their solutions for each problem in the Our Turn part of the lesson? How is the My Turn part of the lesson handled differently?
- Find the Clipboard Prompts in your book or in the handout. How will these be helpful during the discussion of the Our Turn problems?

Mini Lessons: Assess and Reinforce

The mini lessons are completed 2 or 3 days after the core lesson. They each take approximately half of a class period and may be presented on the same day or on different days. Read through the student pages and the teaching guide for the mini lessons in the handout.

- How does the Multiple Choice Mini Lesson format help students be more metacognitive and aware of pitfalls in their own thinking?
- How does discussing the choices prepare students for achievement testing?
- Notice the sequence of the Writing Task Mini Lesson: read the problem, brainstorm, write together on the board, and write an explanation on the student's own page. How will this sequence be helpful to English learners and students who have difficulty reading, writing, or using mathematical language?

***MPP* Lesson Roadmap**

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PROFESSIONAL DEVELOPMENT TASK 4

View the *Frequently Asked Questions* part of the video.

Read the questions and answers below.

Reflect individually or work with a partner to generate or find answers to additional questions that you may have. This task will take about 30 minutes.

Frequently Asked Questions

How much time do I need to teach one lesson?

Each core lesson is designed to take approximately two 45-minute class periods. These class periods correspond to Day 1 and Day 2 of the lesson. Each mini lesson takes about 20–25 minutes.

How soon after the core lesson do I teach the mini lessons?

It is a good idea to teach the Multiple Choice Mini Lesson a day or two after the core lesson. The Writing Task Mini Lesson can be taught a day or two after the first mini lesson is complete. This timing allows students time to revisit the concepts in the core lesson in a different context.

What if the Starter Problem or lesson is too hard for my students?

These lessons have been used effectively to introduce new concepts and to reinforce concepts. If the concept is new, anticipate that the Starter Problem may be especially challenging for a lot of students. If students are having difficulty, resist the urge to explain how to do the problem or give an on-the-spot lesson. Instead, ask students to think about what the problem means and to draw or write down anything that might help them understand it so that they can participate in the discussion that follows.

When the lesson is particularly difficult and the students are having trouble contributing to the discussion, focus more attention on the meaning of the problem rather than the solution to the problem. For example, carefully walk through the OK statement and drawing, asking questions about the details of what the fictional student said and did. You may need to provide additional examples similar to the Starter Problem and collaboratively work through them, making sure to focus on the meaning of the problem before tackling the solution.

What if my students don't talk?

In the beginning, students may be reluctant to speak, especially if they have made a pitfall. Reinforce the use of the *Discussion Builders,* and revisit the idea that this is a class endeavor with the goal of getting rid of pitfalls together. This makes it easier for students to share their thinking to help the class reach its goal. Some teachers have shown the Video for Students a second or third time to their students to reinforce how to talk with a neighbor and how to ask questions of each other, in pairs and in the whole-class discussions. The video shows students how even reluctant speakers can make a contribution to the class.

Is there time to let everyone share ideas at the board?

Notice that there are prompts in the teaching guide that require you to ask students to talk to a neighbor. It is in these pairs that all students will get an opportunity to think out loud with someone. When you do call a student to the board, everyone else's job is to ask questions about or comment on that student's idea. This helps keep the discussion focused and prevents it from jumping around from idea to idea.

What if my students don't feel confident using mathematical terms or speaking in English?

There are multiple opportunities for students to engage in the lessons, and each lesson includes a variety of risk structures. Over time, with the use of partner talk, whole-class talk, and *Discussion Builders,* students begin to increase both their ability in academic English and their willingness to use it publicly.

Why does the Student Thinking section of the lessons include drawings so frequently?

One purpose of the lessons is to help students visualize mathematical ideas. Diagrams are important to mathematical thinking and learning because they can help students unpack the meaning of each part of a problem and make sense of the solution. Our lessons provide students with visual models and diagrams and often encourage students to generate their own. These visual models provide fertile ground for discussing and analyzing abstract mathematical ideas.

Additional Professional Development Suggestions

MPP Research and Rationale

We suggest making it a priority to read *Math Pathways & Pitfalls: Linking Research, Standards, and Practice* on pages 1–19. This section shares the vision and rationale for *MPP* and presents research findings on the impact of *MPP.* It also includes suggestions for adapting *MPP* to different situations and needs. A lot of information is presented, so it may be helpful to break it into parts. Also, look through the research papers cited in this section to find readings that could be used for study groups or individual reflection. We encourage you to check our website for additional resources: mpp.WestEd.org.

Lesson Study Groups

An excellent way to learn from colleagues while teaching *MPP* lessons is meeting with fellow teachers once or twice monthly to plan new lessons and debrief *MPP* lessons previously taught. Consider meeting with teachers at the same grade level so that you can teach the same lessons. The Lesson Foundation and Discussion sections of the teaching guide for each lesson are excellent resources for study groups. To become more familiar with the mathematics and to practice questioning techniques, enact the lesson with colleagues in pairs or small groups. Study group leaders or coaches will find many ways to adapt the teaching guides for professional learning.

Decimals Are Fractions Too

NAME:

Math PATHWAYS & PITFALLS

Purpose

To find equivalent decimals for fraction amounts

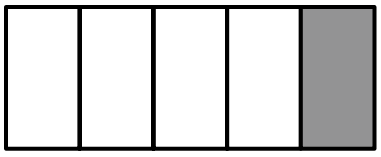
Math Words

decimal amounts	Decimal amounts may be in ten**th**s, hundred**th**s, thousand**th**s, ten thousand**th**s, and so on.
decimal point	Whole numbers are to the left of a decimal point and parts of a whole are to the right.

Starter Problem

$\frac{1}{5}$ of this rectangle is shaded.

What decimal amount is shaded?

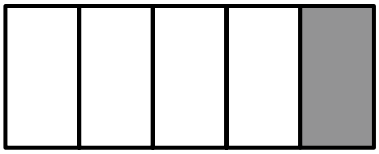


NAME:

Starter Problem

$\frac{1}{5}$ of this rectangle is shaded.

What decimal amount is shaded?

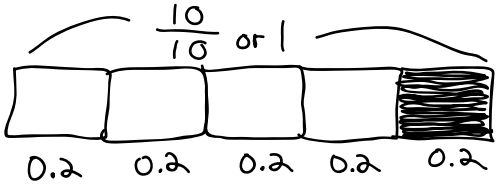


Student Thinking

Lee

I needed a decimal, so I called the whole rectangle 10 tenths. There are 10 tenths in all, so each of the 5 parts has 2 tenths. I could have called the rectangle 100 hundredths or 1,000 thousandths, too.

OK



$\frac{1}{5} = 0.2$

Maria

How easy. $\frac{1}{5}$ is the same as point 15. You just put a decimal point in front!

Pitfall

$\frac{1}{5} = .15$

Things to Remember

* .....

.....

* .....

.....

STOP

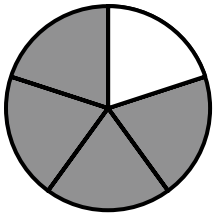
Decimals Are Fractions Too

NAME:

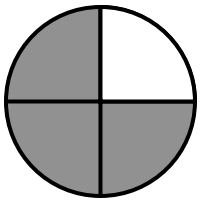
Our Turn

Write a decimal name for the shaded amount.

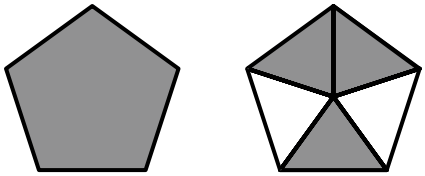
1. $\frac{4}{5}$ = _____ (Write the answer in tenths.)



2. $\frac{3}{4}$ = _____ (Write the answer in hundredths.)



3. $1\frac{3}{5}$ = _____ (Write the answer in tenths.)

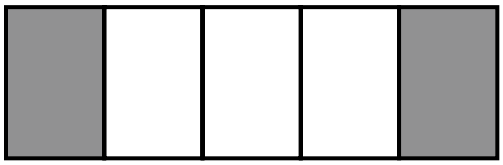


NAME:

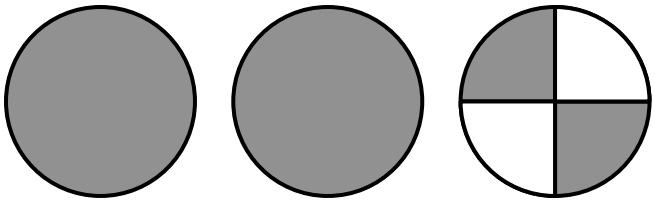
My Turn

Write a decimal name for the shaded amount.

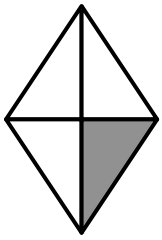
1. $\frac{2}{5}$ = _____ (Write the answer in tenths.)



2. $2\frac{1}{2}$ = _____ (Write the answer in hundredths.)



3. $\frac{1}{4}$ = _____ (Write the answer in hundredths.)



Decimals Are Fractions Too

NAME:

Multiple Choice Mini Lesson

Fill in the circle next to the decimal that names the shaded part of each picture.

1. 

○ 0.4 ○ 4.1 ○ .41 ○ 0.8

2. 

○ 0.14 ○ 0.25 ○ 0.2 ○ 2.5

STUDENT PAGE 5

Decimals Are Fractions Too

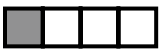
NAME:

Multiple Choice Mini Lesson

Fill in the circle next to the decimal that names the shaded part of each picture.

1. 

○ 0.4 ○ 4.1 ○ .41 ○ 0.8

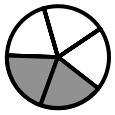
2. 

○ 0.14 ○ 0.25 ○ 0.2 ○ 2.5

NAME:

Writing Task Mini Lesson

$\frac{2}{5}$ of the circle is shaded. Write two decimals for the shaded amount. Explain how you know both ways are correct.



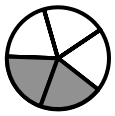
_____ and _____

Decimals Are Fractions Too STUDENT PAGE 6

NAME:

Writing Task Mini Lesson

$\frac{2}{5}$ of the circle is shaded. Write two decimals for the shaded amount. Explain how you know both ways are correct.



_____ and _____

Decimals Are Fractions Too

Lesson at a Glance

Prior Learning Needed

- Understand the concept of unit or whole related to fractions
- Find equivalencies among fractions, whole numbers, and mixed numbers

Lesson Preparation

- Study Lesson Foundation
- Review Teaching Guide and Student Pages
- Prepare stapled packet of Student Pages 1–4 for each student
- Copy and cut in half Student Pages 5 and 6
- Post *Discussion Builders* poster

Mathematical goals

- Find an equivalent decimal for fractions and mixed numbers
- Understand the decimal forms of 1

Mathematical language and reasoning goals

- Learn how to determine decimal amounts using area and set models
- Make sense of decimal amounts

LESSON ROADMAP

CORE LESSON: DAY 1	GROUPING	TIME
Opener		
Discussion Builders		
Purpose		
Math Words		
Starter Problem		
Discussion		
Student Thinking		
Things to Remember		
Reflection		
CORE LESSON: DAY 2		
Review and Practice		
Review Day 1 Lesson		
Our Turn		
My Turn		
MINI LESSONS: 2–3 DAYS LATER		
Assess and Reinforce		
Multiple Choice Mini Lesson		
Writing Task Mini Lesson		

MATERIALS

- ❍ *Discussion Builders* poster
- ❍ Projector (optional)
- ❍ Student Page 1
- ❍ Student Page 2
- ❍ Teaching Guide
- ❍ Fraction pieces (suggested)

- ❍ Clipboard Prompts, page 39
- ❍ Student Page 2 (completed day 1)
- ❍ Student Pages 3 and 4
- ❍ Teaching Guide
- ❍ Fraction pieces (suggested)

- ❍ Student Pages 5 and 6
- ❍ Teaching Guide
- ❍ Fraction pieces for fourths or fifths, paper rectangles (suggested)

Lesson Foundation

LESSON SNAPSHOT

Starter Problem

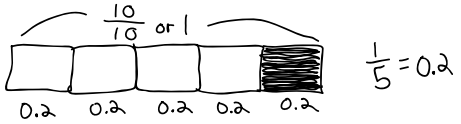
$\frac{1}{5}$ of this rectangle is shaded.
What decimal amount is shaded?

Student Thinking

Lee

I needed a decimal, so I called the whole rectangle 10 tenths. There are 10 tenths in all, so each of the 5 parts has 2 tenths. I could have called the rectangle 100 hundredths or 1,000 thousandths, too.

OK



Maria

How easy. $\frac{1}{5}$ is the same as point 15. You just put a decimal point in front!

Pitfall

$\frac{1}{5} = .15$

MATHEMATICAL INSIGHTS & TEACHING TIPS

Using Reasoning to Convert Fractions to Decimals

Lee realized that decimal numbers can be written as tenths, hundredths, thousandths, and other denominators that are powers of ten. He used reasoning to find an equivalent decimal in tenths for 1/5. First, he thought about the whole, or 1, as 10 tenths. He then thought about how many tenths would fit in each of the 5 fifths the rectangle was divided into. He discovered that 1/5 is equal to 2 tenths and wrote 0.2. If he renamed the whole as 100 hundredths and it was divided into 5 parts, then each part would be 20 hundredths, or 0.20. Likewise, if the whole was 1,000 thousandths, 1/5 would be 200 thousandths, or 0.200.

Pitfall Maria conveniently (and incorrectly) used the digits in the fraction to make 1/5 into .15 instead of the correct equivalent of 0.2.

Reasoning could also be used to prove that if 1/5 is 2 tenths (0.2), then 2/5 would be twice as much, or 4 tenths (0.4). Students could also divide each fifth of the rectangle into 2 equal parts to make 10 tenths.

Lesson Foundation (continued)

MATHEMATICAL INSIGHTS & TEACHING TIPS (CONTINUED)

Lee's picture shows that he divided 1 whole (1.0, or 10 tenths) into 5 parts and shaded 1 part to get 2 tenths. A common procedure for converting a fraction to a decimal number is to divide 1 (or 1.0 or 10 tenths) by 5 to get 0.2. Yet this method makes little sense to most students unless they have had earlier experiences making sense of such problems. When you divide 1 by 5, it is equivalent to dividing 10 tenths or 100 hundredths by 5.

Many Ways to Write Decimal Amounts

Decimal ideas and symbols are deceptively complicated. For example, the whole unit can be thought of as 10 tenths, 100 hundredths, 1,000 thousandths, and so on. There are also infinite names for a decimal amount. For example, 1/5 is equivalent to 0.2 as well as 0.20, 0.200, 0.2000, and so on. Students need to know that 1 can be written as 1.0 and read as 1 and 0 tenths as well as 10 tenths, and 1.00 can be read as 1 and 0 hundredths as well as 100 hundredths. These different forms are useful at different times when calculating.

Relating a Decimal Amount to a Fraction

Maria tried to convert the fraction to a decimal by simply writing the digits and a decimal point. So, 1/5 became .15. If she had a clear understanding of how to rename the whole in different ways using fifths, tenths, or hundredths, she could use number sense to check if her answer was reasonable. If her answer was correct and each of the 5 parts were 15 hundredths, then all 5 parts should add up to 1; instead, they add up to 75 hundredths. In beginning lessons, the part/whole model is often used to build number sense. 1 is often referred to as 1 whole or 1 unit instead of just 1.

MATHEMATICAL DISCUSSION SUPPORT

Ask students questions that prompt them to explain why they can use different symbols or words for the same numbers. Write the following examples on the board: one tenth, 1/10, 1 tenth, 0.1, and .1. Ask students to read each example aloud. Ask why these examples are read in the same way.

Model and discuss the use of phrases such as "out of," "divided into," "divided by," and "shared by." This will help develop students' use of mathematical language while they are developing an understanding of fractions and decimals.

Core Lesson
Day 1

Opener

Review *Discussion Builders*

Read the poster. **Suggest** a section to focus on today:
Presenting Alternative Ideas, Expanding on Others' Ideas, or *Posing Additional Questions.*

Purpose

Distribute stapled packets of Student Pages 1–4. **Project** an image of page 1 (optional).

Call on a student to read the purpose.

Math Words

Point to and say the first math words. **Ask** students to repeat them aloud or silently.

Read the sentence containing the words.

Give an example using objects or drawings.

Repeat for the other math words.

Starter Problem

Read the Starter Problem. **Call on** a student to restate it in their own words.

Think about what the Starter Problem means. WAIT
Try to use what you understand to solve the problem on your own.

STUDENT PAGE 1

Purpose
To find equivalent decimals for fraction amounts

Math Words

decimal amounts	Decimal amounts may be in ten**th**s, hundred**th**s, thousand**th**s, ten thousand**th**s, and so on.
decimal point	Whole numbers are to the left of a decimal point and parts of a whole are to the right.

Starter Problem

$\frac{1}{5}$ of this rectangle is shaded.
What decimal amount is shaded?

I'll walk around and write notes about things we need to discuss. Look out for pitfalls! WAIT

Look at your work. It's easy to have a pitfall in this type of problem. You might also have made a pitfall if your answer has the digits 1 and 5.

Don't worry. Next we'll discuss how two imaginary students solved this problem. One has a pitfall! You may keep your solution private, but bring up your ideas in the discussion.

Core Lesson
Day 1
(continued)

Discussion

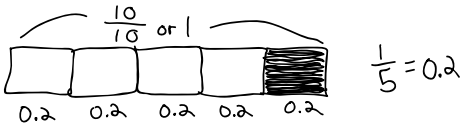
Student Thinking

STUDENT PAGE 2

Lee

I needed a decimal, so I called the whole rectangle 10 tenths. There are 10 tenths in all, so each of the 5 parts has 2 tenths. I could have called the rectangle 100 hundredths or 1,000 thousandths, too.

OK



Ask students to refer to page 2. **Read** the statement marked OK.

Explain that this statement is about the same problem students worked on earlier.

We can learn a lot about the math by studying what this student did.

Read each sentence silently and look at the drawing. Think about what they mean. WAIT

Now talk with a partner about what each sentence and each part of the drawing means.

Listen in, ask questions, and observe. **Note** potential contributions for the discussion.

Who can come up to explain why Lee wrote "10/10 or 1" above his drawing?

What did he mean when he said each of the 5 parts has 2 tenths in it? Who can show why he wrote 0.2 beneath each part?

How does his drawing show that 1/5 = 0.2? How would you write 0.2 as a fraction? What decimal would be equal to 2/5? How can you prove it?

Talk to your neighbor about what Lee meant when he said, "I could have called the rectangle 100 hundredths or 1,000 thousandths." WAIT

How many hundredths are in 1 whole? How many thousandths?

If he used 100 hundredths to name the whole, how many hundredths would be equal to 1/5? How would we find a decimal in thousandths for 1/5?

Call on students to state things to remember about solving problems like this.

Start a Things to Remember list on the board.

MORE DAY 1

Core Lesson
Day 1
(continued)

Discussion

Student Thinking, continued

STUDENT PAGE 2

Maria

How easy. $\frac{1}{5}$ is the same as point 15. You just put a decimal point in front!

$\frac{1}{5} = .15$

Pitfall

Read the statement marked Pitfall. **Remind** students that this is a common pitfall.

Maria made a pitfall when she wrote down the same digits that were in the fraction and put a decimal point in front. Talk with your neighbor about why her answer doesn't make sense. WAIT **Who would like to read Maria's answer using decimal terms? Explain why her answer doesn't make sense.**

Draw a circle on the board. **Divide** it into fourths and shade 1/4. **Write** on the board: 1/4, 0.14, 2/5, and 0.25. **Ask** students to talk with a neighbor about which fraction and which decimal tell how much of the circle is shaded. **Ask** students to look out for pitfalls. **Call on** students to show why their answer makes sense.

Things to Remember

Call on students to **add** to the Things to Remember list on the board. **Read** the list.

Help students summarize and record two important Things to Remember.

Things to Remember List (sample)

1. Think about a whole as 10 tenths (1.0), 100 hundredths (1.00), or 1,000 thousandths (1.000).
2. Think about how many tenths, hundredths, or thousandths are in each fractional part.

Reflection

Ask students to reflect on the discussion process using one of the sample prompts.

Reflection Prompts (sample)

- Name a *Discussion Builder* that we used today. How did it help the discussion?
- What *Discussion Builder* could we use next time to make the discussion even better?
- What did someone do or say today that helped you understand the math?

Core Lesson Day 2

Review and Practice

Review

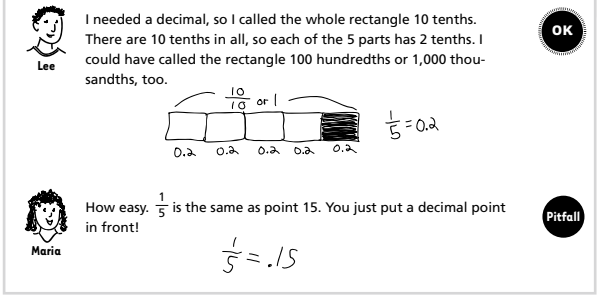
Ask students to review page 2 to jog their memory.

Read the statement marked OK. **Call on** a student to explain how the problem was solved.

Read the statement marked Pitfall. **Call on** a student to explain why it is incorrect.

Call on two or three students to read an item on their Things to Remember list.

STUDENT PAGE 2



Our Turn

Ask students to refer to page 3.

Use the procedure below and the Clipboard Prompts to discuss students' solutions. **Discuss** the problems one at a time.

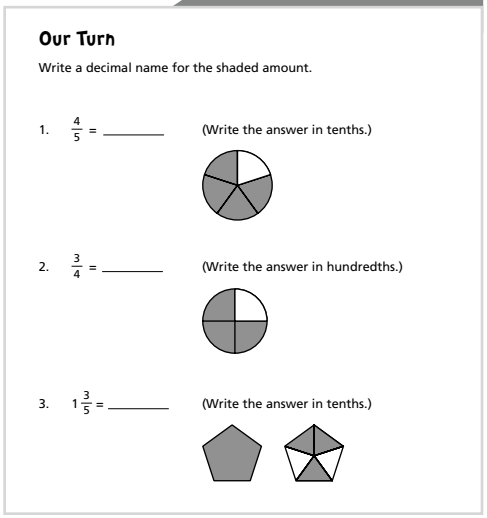
Read the problem.

Ask students to work with a neighbor to solve it.

Discuss one or two students' solutions.

Answer Key
1. 0.8
2. 0.75
3. 1.6

STUDENT PAGE 3



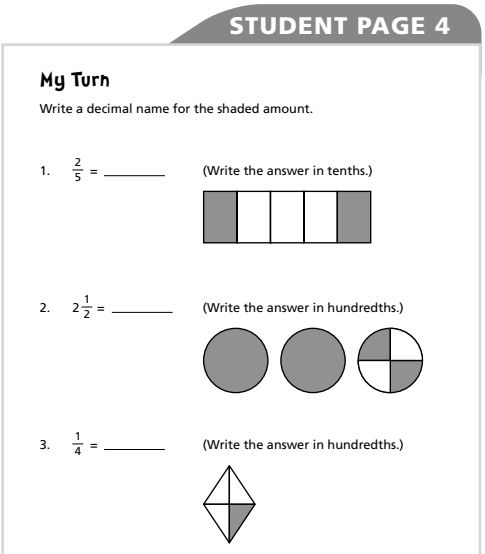
My Turn

Ask students to solve the problems on page 4. **Remind** them to watch out for pitfalls!

After allowing time to work, **read** the answers. **Have** students use pens to mark and revise their papers.

Answer Key
1. 0.4
2. 2.50
3. 0.25

STUDENT PAGE 4



Mini Lessons
(2–3 Days Later)

Assess and Reinforce

Multiple Choice Mini Lesson

Distribute Student Page 5.

Problem 1

Please read problem 1.
Talk with your neighbor about which choices don't make sense. WAIT
How could you use reasoning to know that 0.8 is the correct choice?

Some students may not realize they can easily create tenths by cutting each fifth into 2 parts (1 tenth each) in their imagination or on paper.

STUDENT PAGE 5

Multiple Choice Mini Lesson

Fill in the circle next to the decimal that names the shaded part of each picture.

1. 

○ 0.4 ○ 4.1 ○ .41 ● 0.8

2. 

○ 0.14 ● 0.25 ○ 0.2 ○ 2.5

Problem 2

Read the problem and find the correct choice. WAIT
Which response is correct? Explain why.
Who can draw a picture or diagram to show why the correct answer is 0.25? Explain.

Writing Task Mini Lesson

Distribute Student Page 6.

Ask a student to read the task. **Call on** students to respond with their ideas.

Jot the ideas on the board.

Write an explanation together using their ideas. **Read** it aloud.

Ask students to write an explanation on their page.

STUDENT PAGE 6

Writing Task Mini Lesson

$\frac{2}{5}$ of the circle is shaded. Write two decimals for the shaded amount. Explain how you know both ways are correct.

 _____ and _____

Sample Explanation: The whole circle could be called 10 tenths. Each section of 1 fifth would equal 2 tenths, so 2 fifths would be twice as much, or 4 tenths. That's 0.4. But, if the whole is called 100 hundredths, 1,000 thousandths, and so on, each part would have lots of tiny parts. For hundredths, each fifth would be 20 hundredths, so 2/5 is 0.40.

English Learner Access

Mathematical Discussion Support

Invite students to use drawings or materials such as folded paper rectangles or fraction pieces for fifths and tenths to help them describe their ideas.

Ask students to explain what "2 fifths" means. Then ask them to explain how fifths are related to tenths.

Clipboard Prompts

Effective instructional dialogue digs deep into one student's thinking or one idea at a time. To unfold understanding, begin with a broader question and then follow up with probes for more detail. Use the first set of prompts below to focus students' attention on what the problem means. Use the second set of questions to delve into students' solutions. Finally, use the third set of prompts to invite reflection and ask for other approaches.

1 Understanding the Problem

- ☐ Who can explain what this problem means—not how to solve it? What does it mean?
- ☐ How do you read this (point to a word, phrase, number, symbol, or equation)? What does it mean?
- ☐ Could someone show us how to use a drawing or materials to show what it means? Please explain _____. Please label _____. How does this help us understand?
- ☐ Do you think the answer will be greater or less than _____? Maybe you're not sure yet, but what do you think …?

2 Understanding the Solution Process

- ☐ Who would like to show us how they solved the problem?
- ☐ Please say more. Could you help us understand why you _____? What does _____ mean? Why does it make sense to _____? How is this different from _____?
- ☐ Some of you seem to have questions about this idea. Who has a question? What is confusing?
- ☐ Can someone else help us clarify this idea? Who has another way to help us understand it?

3 Reflecting On and Extending the Problem

- ☐ Explain how you know this answer makes sense. How could you check? How can we prove it is correct?
- ☐ Does someone have another approach? Could we use a drawing? Could we use a paper-and-pencil procedure?