THE SCHOOL DISTRICT OF PHILADELPHIA

Learning Guide - ELA and Math

FIFTH GRADE

TABLE OF CONTENTS

CLICK ON LINKS BELOW TO ACCESS RESOURCES

ENGLISH LANGUAGE ARTS (ELA)

- Vocabulary
- Student Choice Board
- Student Answer Sheets

This section contains a list of skills that the students will be working on while reading and completing the tasks. Targeted vocabulary words have been identified. There are links to videos to provide students with the necessary background knowledge. There is a Student Choice Board in which students will select to complete 3 out of the 9 activities. Student answer sheets are provided for students to show their work.

- Text to use for Student Choice Board activities

This section provides a copy of the text to use for Shared Reading while in school and Student Choice Board activities while in school or at home (see Section1).

- Sample student replies

This section contains possible student replies for each activity from the Choice Board. This can be used to check the student's work.

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CLICK ON LINKS BELOW TO ACCESS RESOURCES

MATH

All topics include student sheets and answer keys

English Language Arts (ELA)

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Grade: 5 Subject: English Language Arts

Topic: *The Great Migration* by Jacob Lawrence

Access the text HERE.

What Your Student is Learning:

Your student will read the fictional text, *The Great Migration*. While working with this text, your student will practice the following skills:

- Finding the main idea (theme) and supporting details in the text to describe setting
- Building their vocabulary knowledge in context
- Writing a summary of their reading that states and supports a theme
- Compare and contrast text to gain a deeper understanding of the theme
- Establish a situation and write to narrate

Background and Context for Parents and Guardians:

- In this unit, students read about the relationship between individuals and historical events.
- They will learn how authors use descriptive details to identify the main ideas and key details in the text.
- They will be asked to cite evidence (details) to describe a story's setting.
- They will be asked to think about how an author describes information within a text.
- They will also learn to use context clues to build their vocabulary around this topic.

Ways to support your student:

- Word Study- Review the vocabulary words listed below with your child. Practice using these words when talking about the text.

exodus	momentous	adversity
ravaged	barren	agents
confined	migration	industries

- Introduce the text by reading the title *The Great Migration*, and looking at the pictures.
- Discuss what makes the story a legend or folktale (a cultural story passed on through generations).
- Read the text aloud with your child.

- After reading, ask questions about the text. These questions could include:
  - What did you think the text was mostly about?
  - What do you think the author wanted you to know about the topic? That is an interesting point. What made you think that?
  - What clues in the story tell you about the setting?
  - What is the main difference between where the characters live?
  - What challenges (problems) do the characters experience?

- What geographic locations are mentioned in the story?

Online Resources for Students:

Video:
The Great Migration: Background knowledge on the artist and the paintings.
https://www.youtube.com/watch?v=t4IgvB5cV5E

Power Library: is the online portal to all that Pennsylvania libraries offer. This is the place to find 24/7 access to newspapers, magazines, journals, historical documents and photos, online databases, and eBooks. Research a subject. Learn about your family history. Locate a title. Explore career options. It's all here at POWER Library.

Link: https://sites.google.com/philasd.org/sdppowerlibrary/home

Building Background Knowledge: This article explains and provides support on why background knowledge is key to student's being able to read with comprehension.

Link: https://www.readingrockets.org/article/building-background-knowledge

NOTE: There is a parent/guardian-friendly answer key at the end of this packet that you can use to help your student.

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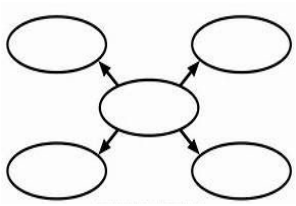
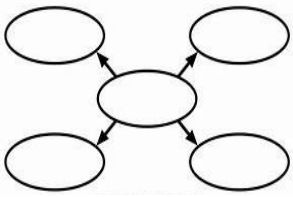
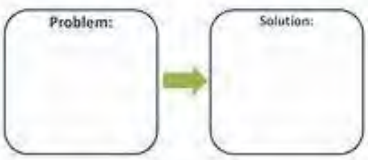
Tic-Tac-Toe Choice Board 1: *The Great Migration*

Directions: Read the book *The Great Migration*. Choose **4** activities from the choice board below. You should complete at least one task from each **row.**

Row 1	**Activity 1** Skim and scan at the pages of *The Great Migration* Pay attention to the pictures and the section headings. Write: ● 3 things that stood out to you ● 3 questions you have about the book. ● A prediction about the book.	**Activity 2** Look at the images in the text *The Great Migration* and choose 2 that show the setting of the story List: ● 3 things you notice as you look at the images. ● 3 things you wonder about the images.	**Activity 3** Word Study: Read the Vocabulary Chart 1. Find the sentence where the author uses each word. 2. Choose two of the words. 3. Write a sentence with each word you chose
Row 2	**Activity 4** Read pages 1- 22 (*Early arrival was not easy.*) of *The Great Migration* Complete a description web organizer to tells why people were leaving the south. 	**Activity 5** Read pages 2 (*And the migrants kept coming.*) - end of *The Great Migration.* Complete a details web organizer explaining the impact of migration had on people. 	**Activity 6** Reread the poem Migration by Walter Dean Myers (at the end of the book). Identify lines from the poem and which image goes with it. Explain your thinking. Complete a t-chart graphic organizer for the section. Line from Poem | Image and Supporting Details | | | |
Row 3	**Activity 7** Read aloud *The Great Migration* to someone. Complete a Problem/Solution graphic organizer. 	**Activity 8** Think about the story events in order. Retell the story to someone at home. Use the plot summary graphic organizer to help you share the story. 	**Activity 9** Journal Writing: *The Great Migration* is a story of African-Americans who left their homes in the south to work in factories in the north. Pick your favorite painting from the book. Write an analysis on how the author uses the painting to tell the story of migration.

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Task 1: Preview the Text

Skim and scan the pages of *The Great Migration.*

Pay attention to the pictures and the section headings.

Write 3 things that stood out to you as you looked through the book:
1.
2.
3.
Write 3 questions you have about the book:
1.
2.
3.
Think Ahead: Write your prediction about the book:

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Task 2: Preview the Text

Starting with the cover, look at the images in *The Great Migration.* Complete a 3-2-1 chart.

Write 3 things that you noticed while looking at the cover picture:
•
•
•
Write 2 questions you have about the picture:
•
•
Deep Read of an Image: Look at the picture details. Write 1 complete sentence about the picture clues that tell what type of story you are reading.
•

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Task 3: Preview the Text

Word Study: Practice reading the story vocabulary. Choose two words from each column. Write a complete sentence with each word you chose. Refer back to the text to check for meaning.

Word 1:
Sentence:

Word 2:
Sentence:

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Word 3:
Sentence:

Word 4:
Sentence:

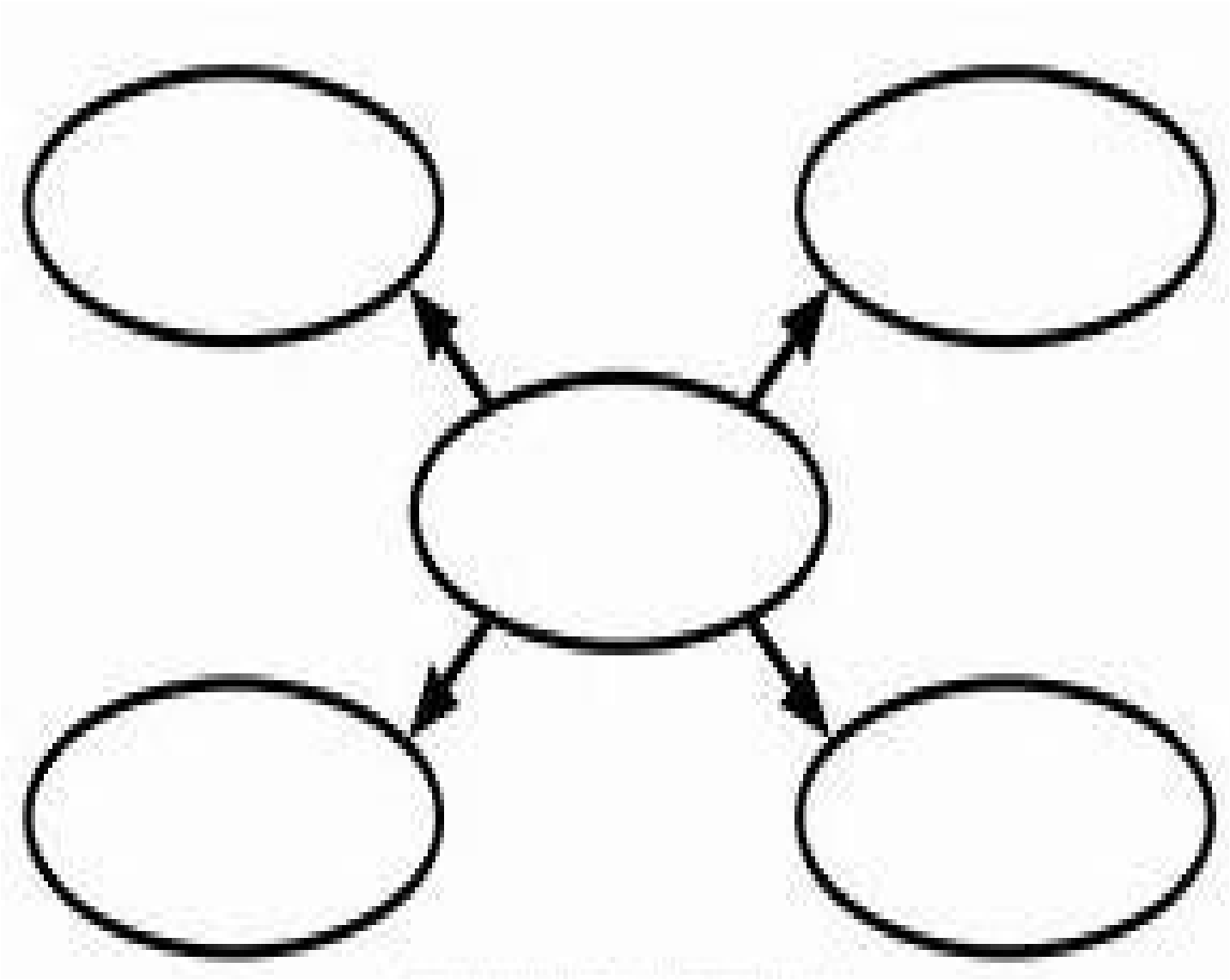
Word 5:
Sentence:

Word 6:
Sentence:

Task 4: Engage with the Text

Read pages 1-22 (*Early arrival was not easy*.) of *The Great Migration.*

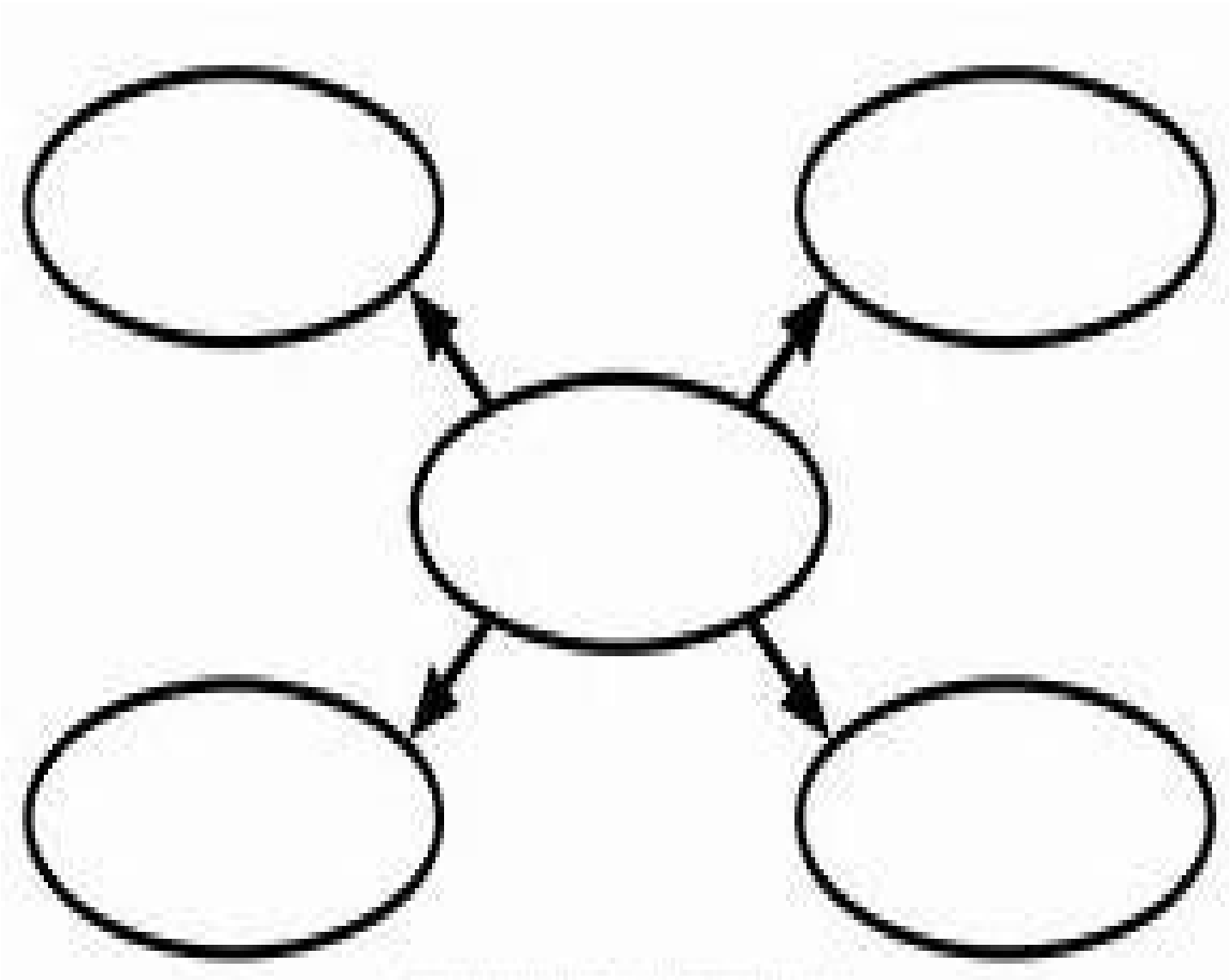
Complete a description web organizer to tells why people were leaving the south.



Task 5: Engage with the Text

Read pages 2 (*And the migrants kept coming.*) - end of *The Great Migration.*

Complete a details web organizer explaining the impact of migration had on people.



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Task 6: Engage with the Text

Reread the poem Migration by Walter Dean Myers (at the end of the book). Identify lines from the poem and which image goes with it. Explain your thinking.

Complete a t-chart graphic organizer for the section.

Line from Poem	Image and Supporting Details
Example: *"A stirring at the ticket counter"*	Image 12: *Railroad stations were so crowded with migrants that guards were called in to keep order.* Stirring means to cause excitement. There were so many people who were so excited. Railroad stations needed hep at the ticket counters.

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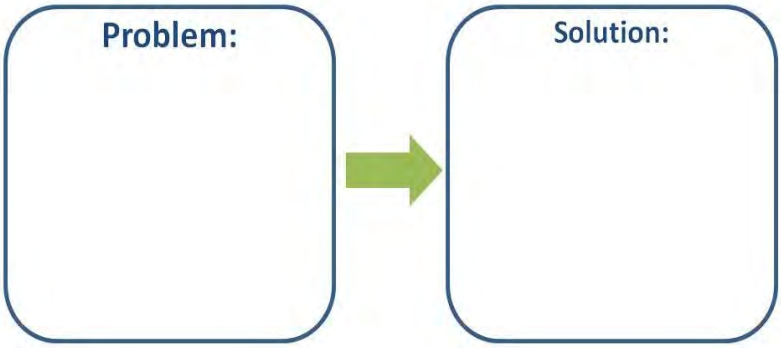
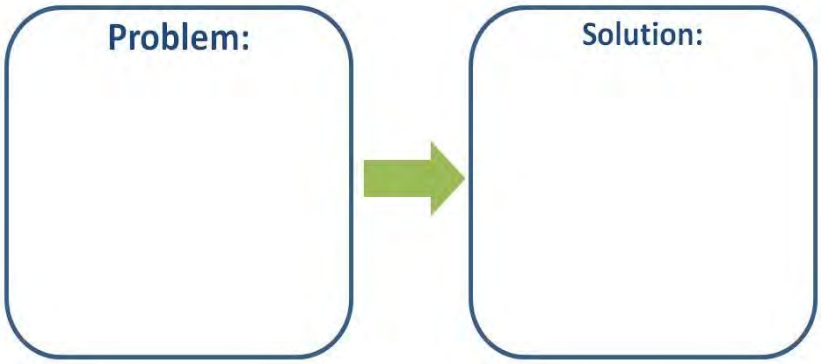
Task 7: Problem/ Solution Analysis

Reread the story aloud. Think about the how the setting presents problems for characters. As you read, make predictions and brainstorm solutions.

Using information from the Main Idea and Details Web graphic organizers, complete the Problem and Solution chart.





Task 8: Plot Summary

NAME: _____ DATE: _____

Plot Summary

Title:

Author:

How does the story begin?

What is the big problem the characters have?

How do the characters try to solve the problem?

How does the story end?

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Task 9: Journal Writing

The Great Migration is a story of African-Americans who left their homes in the south to work in factories in the north. Pick your favorite painting from the book. Write an analysis on how the author uses the painting to tell the story of migration. Cite evidence from the text.

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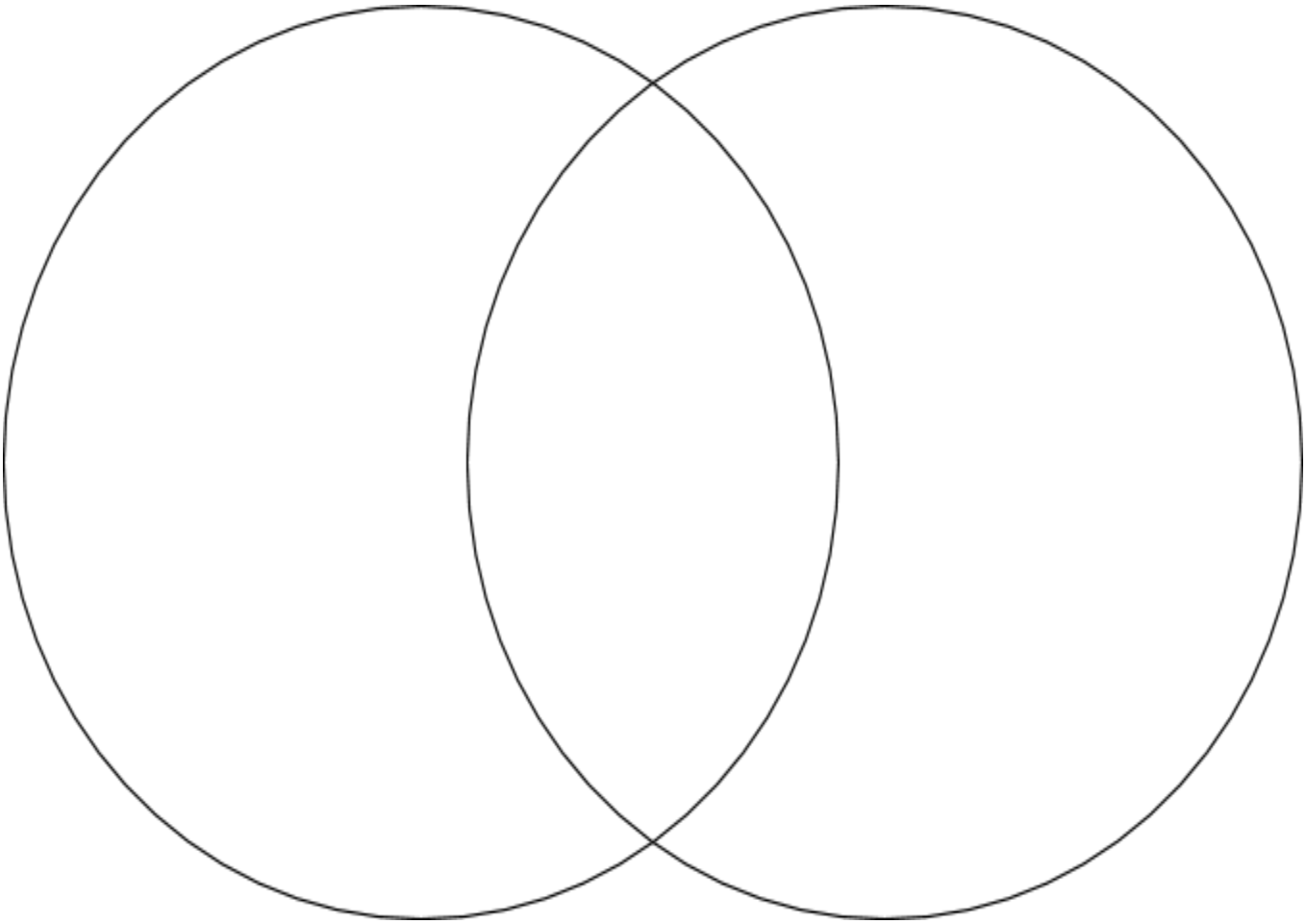
Task 10:

Extend the Learning

Explore: We are learning that stories can be told from different points of view. Reread the story *The Great Migration* and the poem Migration by Walter Dean Myers. Use a Venn Diagram graphic organizer to compare and contrast how each author describes the migration. Write how they are different and alike. Share what you learned with someone at home.

Different **Alike** **Different**



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Task 1: Preview the Text

Skim and scan the pages of *The Great Migration.*

Pay attention to the pictures and the section headings.

Write 3 things that stood out to you as you looked through the book:
1. The pictures look like paintings. They have numbers on the corners.
2. The pictures show people's lives. There are people moving (#40).
3. The people in paintings 54 and 55 look sad.
Write 3 questions you have about the book:
1. Who made the paintings?
2. What story did the painter want to tell?
3. What does the poem have to do with the story?
Think Ahead: Write your prediction about the book:
I predict this book is about people moving from their homes.

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Task 2: Preview the Text

Starting with the cover, look at the images in *The Great Migration.* Complete a 3-2-1 chart.

Write 3 things that you noticed while looking at the cover picture:
• The picture shows railroad tracks.
• There are big nails sticking out.
• The painter only uses blue, brown, yellow and black.
Write 2 questions you have about the picture:
• Where are we going?
• What happens on the train tracks?
Deep Read of an Image: Look at the picture details. Write 1 complete sentence about the picture clues that tell what type of story you are reading.
• I think this story will include
some type of journey. Trains are
used to travel.

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Task 3: Preview the Text

Word Study: Practice reading the story vocabulary. Choose two words from each column. Write a complete sentence with each word you chose. Refer back to the text to check for meaning.

Word 1:	ravaged
Sentence:	The heavy rain storm ravaged our community garden.

Word 2:	confined
Sentence:	My dog was confined to the kitchen because he had an accident on the rug.

Word 3:	barren
Sentence:	The trees have no leaves, they are barren in the winter.

Word 4:	migration
Sentence:	Birds in migration fly south for the winter.

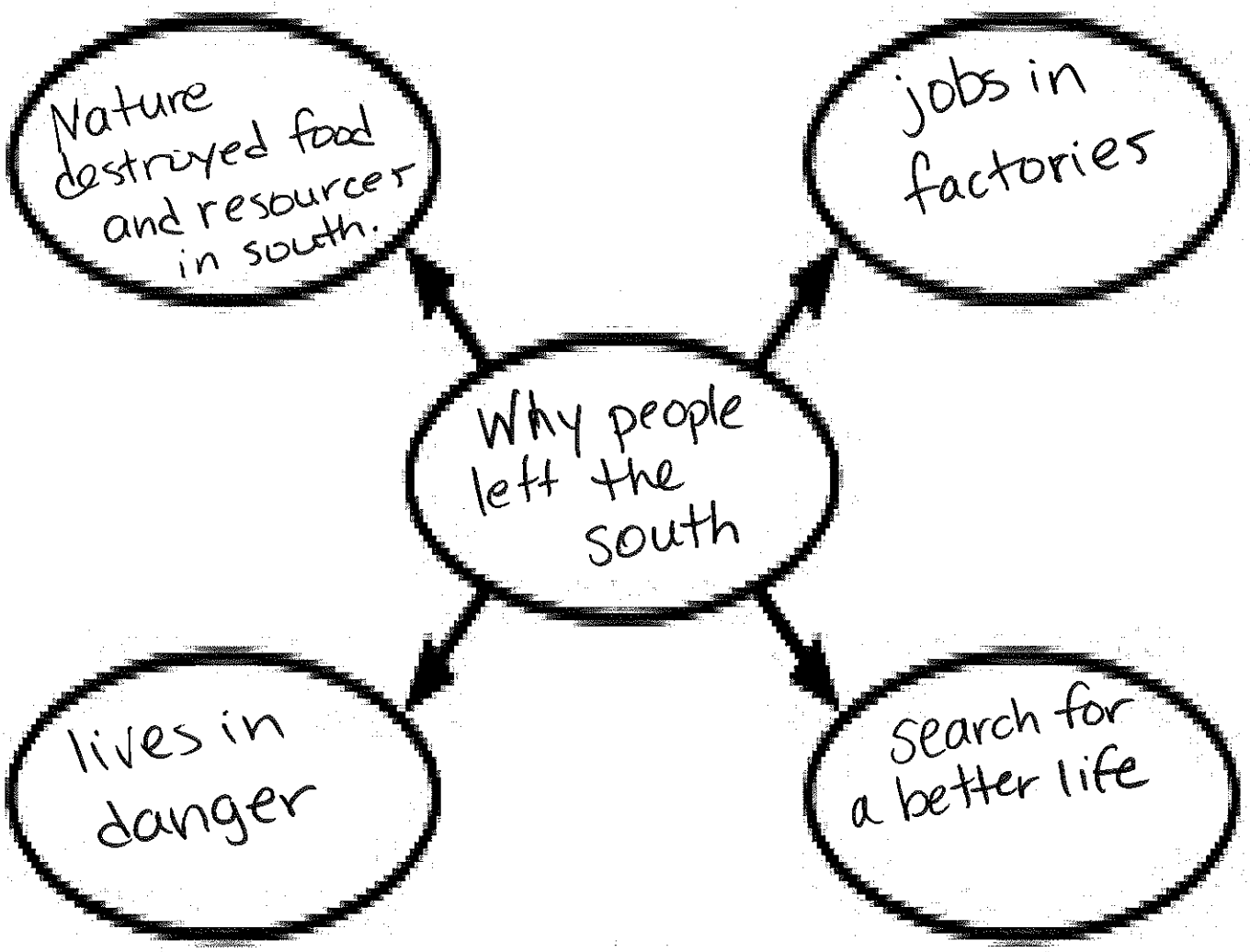
Word 5:	agents
Sentence:	The ticket agents sold many tickets for the trains headed north.

Word 6:	industries
Sentence:	Factories and industries needed workers in the northern cities.

Task 4: Engage with the Text

Read pages 1-22 (*Early arrival was not easy.*) of *The Great Migration.*

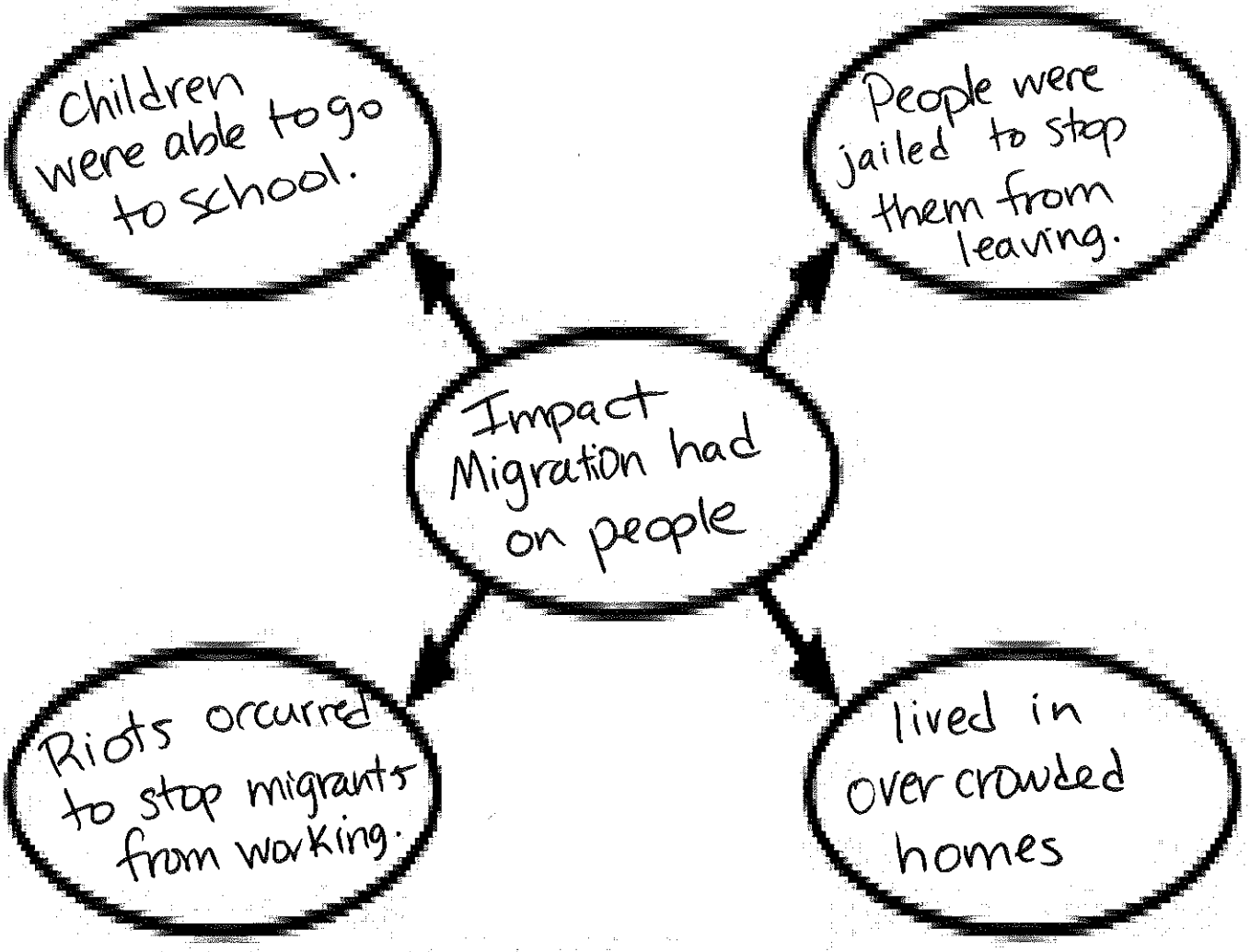
Complete a description web organizer to tells why people were leaving the south.



Task 5: Engage with the Text

Read pages 2 (*And the migrants kept coming.*) - end of *The Great Migration.*

Complete a details web organizer explaining the impact of migration had on people.



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Task 6: Engage with the Text

Reread the poem Migration by Walter Dean Myers (at the end of the book). Identify lines from the poem and which image goes with it. Explain your thinking.

Complete a t-chart graphic organizer for the section.

Line from Poem	Image and Supporting Details
Example: *"A stirring at the ticket counter"*	Image 12: *Railroad stations were so crowded with migrants that guards were called in to keep order.* Stirring means to cause excitement. There were so many people who were so excited. Railroad stations needed hep at the ticket counters.
"These tickets to Chicago/Detroit/New York are heavy."	Image 36: Image reflects the city of Chicago. People went from openspaces (farms) to busy cities.
"As heavy as the memory of a church built"	Image 54: People at the church. The people in the images look sad. It goes with the word heavy.
"So many back cracking, heart breaking days"	Image 24 – Children laboring in the farms. The work was not easy.

Task 7: Problem/ Solution Analysis

Reread the story aloud. Think about the how the setting presents problems for characters. As you read, make predictions and brainstorm solutions.

Using information from the Main Idea and Details Web graphic organizers, complete the Problem and Solution chart.

Problem:
Southern land owners did not have workers.

Solution:
They tried to keep people from leaving the south.

Problem:
There was no justice in the courts for African-Americans in the south.

Solution:
They left and migrated north.

Task 8: Plot Summary

Plot Summary

Title: The Great Migration

Author: Jacob Lawrence

How does the story begin?

The story begins with Jacob Lawrence explaining why thir topic means so much to him.

What is the big problem the characters have?

The biggest problem is the lack of resources in the south. Also African-Americans were treated unfairly.

How do the characters try to solve the problem?

African-Americans left the south for better jobs, housing and education.

How does the story end?

African-Americans suffered challenges in the north but they still continue to grow and triumph.

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Task 9: Journal Writing

The Great Migration is a story of African-Americans who left their homes in the south to work in factories in the north. Pick your favorite painting from the book. Write an analysis on how the author uses the painting to tell the story of migration. Cite evidence from the text.

Jacob Lawrence painted 60 images that tell the story of the Great Migration of African-Americans leaving the south for better opportunities in the north. The sixty images were put in order by what happened telling the story. The reader can tell the images are of people but Jacob Lawrence does not give them facial features (eyes, nose, etc.) so that everyone can see themselves in the images. Jacob Lawrence uses the color green over and over. Green is the color of hope, of things growing. He is telling us that even though it's hard people are growing.

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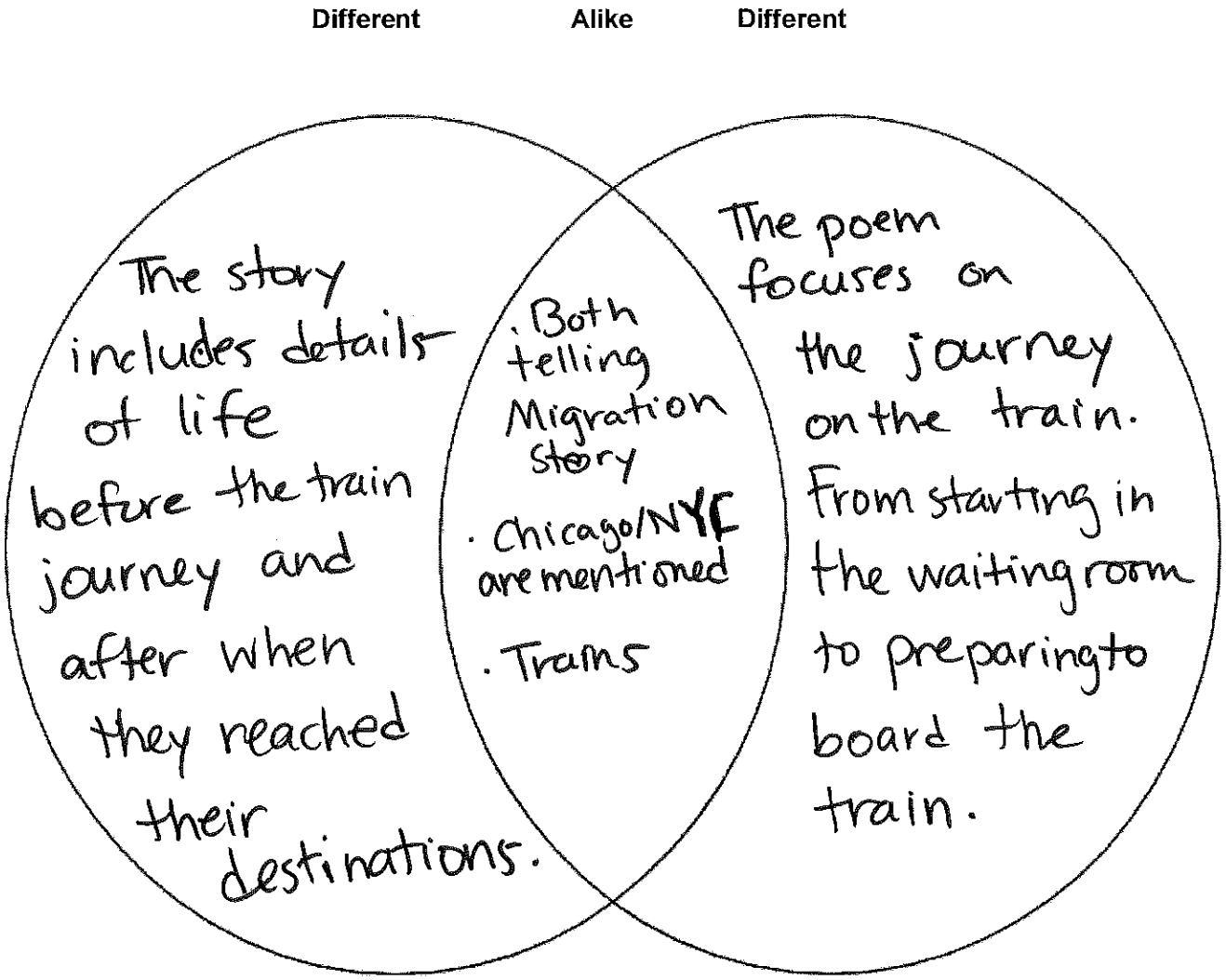
Task 10:

Extend the Learning

Explore: We are learning that stories can be told from different points of view. Reread the story *The Great Migration* and the poem Migration by Walter Dean Myers. Use a Venn Diagram graphic organizer to compare and contrast how each author describes the migration. Write how they are different and alike. Share what you learned with someone at home.



MATH

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Grade: 5 **Subject:** Math (from enVision Mathematics, Common Core, 2020, Grade 5)

Topic: Review What You Know!
What Your Student is Learning: Adding, Subtracting, & Multiply Fractions
Background and Context for Parents: *How can sums and differences of fractions and mixed numbers be estimated? What are common procedures for adding and subtracting fractions? What does it mean to multiply fractions?* These are some of the questions your student should be talking about over the following topics. In 4th grade, students added and subtracted with like denominators. These lessons are aimed at extending that to add and subtract with unlike denominators. The next two pages support underlying skills needed, such as comparing fractions and finding equivalent fractions.
Ways to support your student: Work through the next two pages with your child. Ask questions along the way that support understanding, such as, How did you get your answer? Does that always work? What strategy did you use? Can you explain what you did? Can you draw a picture or a model to show your thinking? Do you see a pattern? How would you explain what you know right now? Does your answer make sense?
Online Resources for Students: For any areas that may need extra support, there are many videos that can provide extra examples explains. Google "Khan Academy + _____", such as "Khan Academy common denominator" https://www.khanacademy.org/math/arithmetic/fraction-arithmetic/arith-review-common-denominators/v/finding-common-denominators https://www.khanacademy.org/math/arithmetic/fraction-arithmetic/arith-review-comparing-fractions/v/comparing-fractions https://www.khanacademy.org/math/arithmetic/arith-review-multiply-divide/arith-review-multi-digit-mult/v/multiplication-6-multiple-digit-numbers

Name _____

Review What You Know

Vocabulary

Choose the best term from the box. Write it on the blank.

- denominator
- numerator
- fraction
- unit fraction
- mixed number

1. A _____ has a whole number part and a fraction part.
2. A _____ represents the number of equal parts in one whole.
3. A _____ has a numerator of 1.
4. A symbol used to name one or more parts of a whole or a set, or a location on the number line, is a _____.

Compare Fractions

Compare. Write >, <, or = for each ◯.

5. $\frac{1}{5}$ ◯ $\frac{1}{15}$
6. $\frac{17}{10}$ ◯ $\frac{17}{5}$
7. $\frac{5}{25}$ ◯ $\frac{2}{5}$
8. $\frac{12}{27}$ ◯ $\frac{6}{9}$
9. $\frac{11}{16}$ ◯ $\frac{2}{8}$
10. $\frac{2}{7}$ ◯ $\frac{1}{5}$

11. Liam bought $\frac{5}{8}$ pound of cherries. Harrison bought more cherries than Liam. Which could be the amount of cherries that Harrison bought?

    Ⓐ $\frac{1}{2}$ pound Ⓑ $\frac{2}{5}$ pound Ⓒ $\frac{2}{3}$ pound Ⓓ $\frac{3}{5}$ pound

12. Jamie has read $\frac{1}{4}$ of a book. Raul has read $\frac{3}{4}$ of the same book. Who is closer to reading the whole book? Explain.

Equivalent Fractions

Write a fraction equivalent to each fraction.

13. $\frac{6}{18}$
14. $\frac{12}{22}$
15. $\frac{15}{25}$
16. $\frac{8}{26}$
17. $\frac{14}{35}$
18. $\frac{4}{18}$
19. $\frac{1}{7}$
20. $\frac{4}{11}$

Review What You Know

Vocabulary

Choose the best term from the box. Write it on the blank.

- benchmark fractions
- mixed number
- equivalent fractions
- multiple
- factor

1. To estimate the sum of two or more fractions, replace the addends with _____.
2. You can find _____ by multiplying both the numerator and the denominator of a fraction by the same nonzero number.
3. A _____ of a number is a product of the number and any nonzero whole number.

Multiply and Divide

Find each product or quotient.

4. 108×2
5. $270 \div 30$
6. 243×20
7. $288 \div 24$
8. 456×11
9. $432 \div 24$

Name _____

Review What You Know

Vocabulary

Choose the best term from the box. Write it on the blank.

- denominator
- numerator
- fraction
- unit fraction
- mixed number

1. A mixed number has a whole number part and a fraction part.
2. A denominator represents the number of equal parts in one whole.
3. A unit fraction has a numerator of 1.
4. A symbol used to name one or more parts of a whole or a set, or a location on the number line, is a fraction.

Compare Fractions

Compare. Write >, <, or = for each.

5. $\frac{1}{5} > \frac{1}{15}$
6. $\frac{17}{10} < \frac{17}{5}$
7. $\frac{5}{25} < \frac{2}{5}$
8. $\frac{12}{27} < \frac{6}{9}$
9. $\frac{11}{16} > \frac{2}{8}$
10. $\frac{2}{7} > \frac{1}{5}$

11. Liam bought $\frac{5}{8}$ pound of cherries. Harrison bought more cherries than Liam. Which could be the amount of cherries that Harrison bought?

Ⓐ $\frac{1}{2}$ pound Ⓑ $\frac{2}{5}$ pound ● $\frac{2}{3}$ pound Ⓓ $\frac{3}{5}$ pound

12. Jamie has read $\frac{1}{4}$ of a book. Raul has read $\frac{3}{4}$ of the same book. Who is closer to reading the whole book? Explain.

Raul is closer to reading the whole book. The denominator 4 means 4 equal parts. Jamie has read 1 part; Raul has read 3 parts. So Raul has read more and is closer to finishing the whole book.

Equivalent Fractions

Write a fraction equivalent to each fraction. Sample answers are given.

13. $\frac{6}{18}$ $\frac{1}{3}$
14. $\frac{12}{22}$ $\frac{6}{11}$
15. $\frac{15}{25}$ $\frac{30}{50}$
16. $\frac{8}{26}$ $\frac{4}{13}$
17. $\frac{14}{35}$ $\frac{2}{5}$
18. $\frac{4}{18}$ $\frac{2}{9}$
19. $\frac{1}{7}$ $\frac{3}{21}$
20. $\frac{4}{11}$ $\frac{40}{110}$

Review What You Know

Vocabulary

Choose the best term from the box. Write it on the blank.

- benchmark fractions
- mixed number
- equivalent fractions
- multiple
- factor

1. To estimate the sum of two or more fractions, replace the addends with benchmark fractions.
2. You can find equivalent fractions by multiplying both the numerator and the denominator of a fraction by the same nonzero number.
3. A multiple of a number is a product of the number and any nonzero whole number.

Multiply and Divide

Find each product or quotient.

4. 108×2 216
5. $270 \div 30$ 9
6. 243×20 4,860
7. $288 \div 24$ 12
8. 456×11 5,016
9. $432 \div 24$ 18

Fraction Sums and Differences

Find each answer.

10. $\frac{5}{9} + \frac{8}{9}$ $\frac{13}{9}$ or $1\frac{4}{9}$
11. $2\frac{2}{3} + 5\frac{1}{2}$ $8\frac{1}{6}$
12. $\frac{11}{12} - \frac{2}{3}$ $\frac{3}{12}$ or $\frac{1}{4}$
13. $6\frac{7}{10} - 2\frac{3}{5}$ $4\frac{1}{10}$
14. At the library, Herb spent $\frac{1}{6}$ hour looking for a book, $\frac{1}{4}$ hour reading, and $\frac{1}{2}$ hour doing research on the computer. How many hours did Herb spend at the library?
    $\frac{11}{12}$ hour

Common Denominators

15. Explain how you can find a common denominator for $\frac{3}{5}$ and $\frac{5}{8}$. Sample answer: List the multiples of each denominator. 5: 5, 10, 15, 20, 25, 30, 35, 40, and so on. 8: 8, 16, 24, 32, 40, and so on. Since 40 is a common multiple, it can be used as a denominator to rename both fractions.

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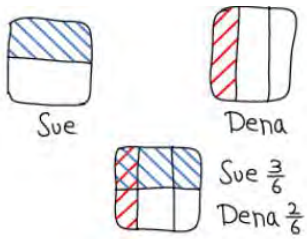
Grade: 5 **Subject: Math** Goes with Pages: 6-12

Topic: Common Denominators

What Your Student is Learning: Finding common denominators for fractions with unlike denominators

Background and Context for Parents: Fractions with unlike denominators can be represented using equivalent fractions with like denominators.

For example, Sue wants ½ of a rectangular pan of corn break. Dena wants ⅓ of the same pan of cornbread. How should you cut the corn break so that each girl gets the size portion she wants?



Students are encouraged to use models such as rectangles to visualize their fractions.

Students learn two ways to find common denominators, as shown below.

One Way

Multiply the denominators to find a common denominator: $3 \times 6 = 18$.

Write equivalent fractions with denominators of 18.

$$\frac{2}{3} = \frac{2 \times 6}{3 \times 6} = \frac{12}{18} \qquad \frac{5}{6} = \frac{5 \times 3}{6 \times 3} = \frac{15}{18}$$

So, $\frac{12}{18}$ and $\frac{15}{18}$ is one way to rename $\frac{2}{3}$ and $\frac{5}{6}$ with a common denominator.

Another Way

Use the fact that one denominator is a multiple of the other.

You know that 6 is a multiple of 3.

$$\frac{2}{3} = \frac{2 \times 2}{3 \times 2} = \frac{4}{6}$$

So, $\frac{4}{6}$ and $\frac{5}{6}$ is another way to rename $\frac{2}{3}$ and $\frac{5}{6}$ with a common denominator.

Ways to support your student: Write these fraction pairs on a sheet of paper: $\frac{2}{7}, \frac{3}{4}$ $\frac{2}{5}, \frac{7}{10}$ Have your child find equivalent fractions with like denominators, showing their solution and their steps.

Online Resources for Students: **https://www.youtube.com/watch?v=7DE1nxuUD-g**
https://www.khanacademy.org/math/arithmetic/fraction-arithmetic/arith-review-common-denominators/v/finding-common-denominators

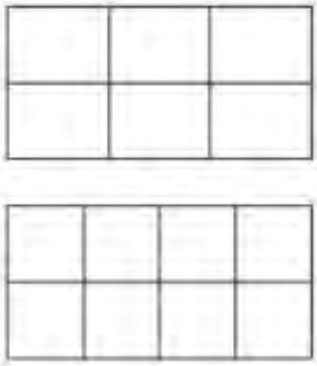
THE SCHOOL DISTRICT OF PHILADELPHIA

Name _____

Build Mathematical Literacy
7-2

Read the problem below. Then answer the questions to help you understand the problem.

Nelda baked two kinds of pasta in pans. Each pan was the same size. She sliced one pan of pasta into 6 equal pieces. She sliced the other pan into 8 equal pieces. How can the pans of pasta now be sliced so that both pans have the same-sized pieces? Draw on the pictures to show your work. If Nelda has served 6 pieces from one pan so far, what fraction of one pan has she served?



1. How many equal pieces of pasta does Nelda create in the first pan? In the second pan?

2. What fraction of the pan is one piece of pasta in the first pan? What fraction of the pan is one piece of pasta in the second pan?

3. What do you need to find to determine how to slice the pasta so the pans have the same size pieces?

4. How many pieces will each pan have after she cuts them all the same size?

5. For the second question, does it matter which pan Nelda serves the 6 pieces from? Explain.

Additional Practice 7-2
Find Common Denominators

Another Look!

Rename $\frac{4}{10}$ and $\frac{3}{8}$ using a common denominator.

Remember: A multiple is a product of the number and any nonzero whole number.

Step 1

Find a common denominator for $\frac{4}{10}$ and $\frac{3}{8}$.

List multiples of the denominators 10 and 8. Then look for a common multiple.

10: 10, 20, 30, 40
8: 8, 16, 24, 32, 40

The number 40 can be used as the common denominator.

Step 2

Rename $\frac{4}{10}$ and $\frac{3}{8}$ using 40 as the common denominator.

Multiply the numerator and denominator by the same nonzero number.

$\frac{4}{10}$ $\frac{4 \times 4}{10 \times 4} = \frac{16}{40}$ $\frac{3}{8}$ $\frac{3 \times 5}{8 \times 5} = \frac{15}{40}$

So, $\frac{16}{40}$ and $\frac{15}{40}$ is one way to rename $\frac{4}{10}$ and $\frac{3}{8}$ using a common denominator.

In **1–9**, find a common denominator for each pair of fractions. Then write equivalent fractions with the common denominator.

1. $\frac{1}{3}$ and $\frac{4}{9}$

$\frac{1}{3}$ Multiples of the denominator:

$\frac{4}{9}$ Multiples of the denominator:

Common Denominator:

Rename $\frac{1}{3}$:

Rename $\frac{4}{9}$:

Rename. $\frac{1 \times}{3 \times} = \frac{\quad}{\quad}$ $\frac{4 \times}{9 \times} = \frac{\quad}{\quad}$

2. $\frac{3}{4}$ and $\frac{2}{5}$

3. $\frac{4}{7}$ and $\frac{2}{3}$

4. $\frac{1}{2}$ and $\frac{7}{11}$

5. $\frac{5}{12}$ and $\frac{3}{5}$

6. $\frac{5}{4}$ and $\frac{11}{16}$

7. $\frac{6}{7}$ and $\frac{1}{5}$

8. $\frac{9}{15}$ and $\frac{4}{9}$

9. $\frac{5}{6}$ and $\frac{8}{21}$

10. On the Dell River, a boat will pass the Colby drawbridge and then the Wave drawbridge. Rename each of the two drawbridge opening times. There are 60 minutes in an hour, so use 60 as a common denominator. Then, rename each opening time using another common denominator. Explain how you found your answers.

Dell River Drawbridge Openings

Bridge Name	Time of Opening
Asher Cross	On the hour
[illegible]	[illegible]
Rainbow	On the $\frac{2}{3}$ hour
Red Bank	On the $\frac{1}{4}$ hour
Wave	On the $\frac{1}{6}$ hour

11. Higher Order Thinking Phil baked two kinds of pies. Each pie pan was the same size. He served $\frac{1}{2}$ of the blueberry pie. He served $\frac{1}{4}$ of the apple pie. If each pie had 8 pieces to start, what fraction in eighths of the apple pie did he serve? How many more pieces of the blueberry pie than the apple pie did he serve?

12. Look for Relationships Shelly is trying to improve her running time for a track race. She ran the first race in 43.13 seconds. Her time was 43.1 seconds in the second race and 43.07 seconds in the third race. If this pattern continues, what will Shelly's time be in the fourth race?

13. Alicia measured $\frac{1}{4}$ yard of the Blue Diamonds fabric and $\frac{5}{6}$ yard of the Yellow Bonnets fabric to make a quilt. Rename each length of fabric. Use the number of inches in a yard as a common denominator.
HINT: 1 yard = 3 feet; 1 foot = 12 inches

Assessment Practice

14. Choose all the numbers that could be common denominators for $\frac{2}{3}$ and $\frac{7}{9}$.

- ☐ 6
- ☐ 9
- ☐ 18
- ☐ 27
- ☐ 30

15. Choose all the numbers that could be common denominators for $\frac{1}{9}$ and $\frac{1}{2}$.

- ☐ 11
- ☐ 16
- ☐ 18
- ☐ 36
- ☐ 45

ANSWER KEY

Name _____

Build Mathematical Literacy
7-2

Read the problem below. Then answer the questions to help you understand the problem.

Nelda baked two kinds of pasta in pans. Each pan was the same size. She sliced one pan of pasta into 6 equal pieces. She sliced the other pan into 8 equal pieces. How can the pans of pasta now be sliced so that both pans have the same-sized pieces? Draw on the pictures to show your work. If Nelda has served 6 pieces from one pan so far, what fraction of one pan has she served?

1. How many equal pieces of pasta does Nelda create in the first pan? In the second pan?

   6 pieces; 8 pieces

2. What fraction of the pan is one piece of pasta in the first pan? What fraction of the pan is one piece of pasta in the second pan?

   $\frac{1}{6}, \frac{1}{8}$

3. What do you need to find to determine how to slice the pasta so the pans have the same size pieces?

   Sample answer: The common denominator of 6 and 8

4. How many pieces will each pan have after she cuts them all the same size?

   24

5. For the second question, does it matter which pan Nelda serves the 6 pieces from? Explain.

   No; Sample answer: The pans will have identical-sized slices, so the answer will be the same for either pan.

Name

Additional Practice 7-2
Find Common Denominators

Another Look!

Rename $\frac{4}{10}$ and $\frac{3}{8}$ using a common denominator.

Remember: A multiple is a product of the number and any nonzero whole number.

Step 1

Find a common denominator for $\frac{4}{10}$ and $\frac{3}{8}$.

List multiples of the denominators 10 and 8. Then look for a common multiple.

10: 10, 20, 30, 40
8: 8, 16, 24, 32, 40

The number 40 can be used as the common denominator.

Step 2

Rename $\frac{4}{10}$ and $\frac{3}{8}$ using 40 as the common denominator.

Multiply the numerator and denominator by the same nonzero number.

$\frac{4}{10}$ $\frac{4 \times 4}{10 \times 4} = \frac{16}{40}$ $\frac{3}{8}$ $\frac{3 \times 5}{8 \times 5} = \frac{15}{40}$

So, $\frac{16}{40}$ and $\frac{15}{40}$ is one way to rename $\frac{4}{10}$ and $\frac{3}{8}$ using a common denominator.

In 1–9, find a common denominator for each pair of fractions. Then write equivalent fractions with the common denominator.

Sample answers are given.

1. $\frac{1}{3}$ and $\frac{4}{9}$

$\frac{1}{3}$ Multiples of the denominator: 3, 6, 9, 12, 15, 18 Rename $\frac{1}{3}$: $\frac{6}{18}$

$\frac{4}{9}$ Multiples of the denominator: 9, 18 Rename $\frac{4}{9}$: $\frac{8}{18}$

Common Denominator: 18 Rename. $\frac{1 \times 6}{3 \times 6} = \frac{6}{18}$ $\frac{4 \times 2}{9 \times 2} = \frac{8}{18}$

2. $\frac{3}{4}$ and $\frac{2}{5}$
20; $\frac{15}{20}$, $\frac{8}{20}$

3. $\frac{4}{7}$ and $\frac{2}{3}$
21; $\frac{12}{21}$, $\frac{14}{21}$

4. $\frac{1}{2}$ and $\frac{7}{11}$
22; $\frac{11}{22}$, $\frac{14}{22}$

5. $\frac{5}{12}$ and $\frac{3}{5}$
60; $\frac{25}{60}$, $\frac{36}{60}$

6. $\frac{5}{4}$ and $\frac{11}{16}$
16; $\frac{20}{16}$, $\frac{11}{16}$

7. $\frac{6}{7}$ and $\frac{1}{5}$
35; $\frac{30}{35}$, $\frac{7}{35}$

8. $\frac{9}{15}$ and $\frac{4}{9}$
45; $\frac{27}{45}$, $\frac{20}{45}$

9. $\frac{5}{6}$ and $\frac{8}{21}$
42; $\frac{35}{42}$, $\frac{16}{42}$

10. On the Dell River, a boat will pass the Colby drawbridge and then the Wave drawbridge. Rename each of the two drawbridge opening times. There are 60 minutes in an hour, so use 60 as a common denominator. Then, rename each opening time using another common denominator. Explain how you found your answers.

$\frac{45}{60}$ and $\frac{10}{60}$; $\frac{3 \times 15}{4 \times 15} = \frac{45}{60}$; $\frac{1 \times 10}{6 \times 10} = \frac{10}{60}$

Sample answer: $\frac{9}{12}$ and $\frac{2}{12}$; $\frac{3 \times 3}{4 \times 3} = \frac{9}{12}$; $\frac{1 \times 2}{6 \times 2} = \frac{2}{12}$

Dell River Drawbridge Openings

Bridge Name	Time of Opening
Asher Cross	On the hour
Colby	On the $\frac{3}{4}$ hour
Rainbow	On the $\frac{2}{3}$ hour
Red Bank	On the $\frac{1}{4}$ hour
Wave	On the $\frac{1}{6}$ hour

11. Higher Order Thinking Phil baked two kinds of pies. Each pie pan was the same size. He served $\frac{1}{2}$ of the blueberry pie. He served $\frac{1}{4}$ of the apple pie. If each pie had 8 pieces to start, what fraction in eighths of the apple pie did he serve? How many more pieces of the blueberry pie than the apple pie did he serve?

$\frac{2}{8}$; 2 more pieces

12. Look for Relationships Shelly is trying to improve her running time for a track race. She ran the first race in 43.13 seconds. Her time was 43.1 seconds in the second race and 43.07 seconds in the third race. If this pattern continues, what will Shelly's time be in the fourth race?

43.04 seconds

13. Alicia measured $\frac{1}{4}$ yard of the Blue Diamonds fabric and $\frac{5}{6}$ yard of the Yellow Bonnets fabric to make a quilt. Rename each length of fabric. Use the number of inches in a yard as a common denominator.

HINT: 1 yard = 3 feet; 1 foot = 12 inches

Blue Diamonds, $\frac{9}{36}$ yd; Yellow Bonnets, $\frac{30}{36}$ yd

Assessment Practice

14. Choose all the numbers that could be common denominators for $\frac{2}{3}$ and $\frac{7}{9}$.

- [ ] 6
- [x] 9
- [x] 18
- [x] 27
- [ ] 30

15. Choose all the numbers that could be common denominators for $\frac{1}{9}$ and $\frac{1}{2}$.

- [ ] 11
- [ ] 16
- [x] 18
- [x] 36
- [ ] 45

THE SCHOOL DISTRICT OF PHILADELPHIA

Topic: Adding & Subtracting Fractions with Unlike Denominators

What Your Student is Learning: Adding & subtracting fractions with unlike denominators using equivalent fractions with a a common denominator

Background and Context for Parents: This is mostly new information for your child. They have had practice adding and subtracting fractions with like denominators, as well as finding common denominators, which leads up to this lesson.

Fractions with unlike denominators can be added or subtracted by replacing them with equivalent fractions that have common denominators, which they learned how to find in the previous lesson. Your child is learning how to replace given fractions with equivalent fractions with like denominators. To add $\frac{1}{2}$ and $\frac{1}{3}$, for example, first rename $\frac{1}{2}$ as $\frac{3}{6}$, and $\frac{1}{3}$ as $\frac{2}{6}$, and then add the numerators 3 and 2. The sum of $\frac{1}{2}$ and $\frac{1}{3}$ is $\frac{5}{6}$.

Students can first use fraction strips to further their understanding of equivalent fractions and common denominators, either drawing on paper, using cut outs of provided fraction strips, or using online fraction strips.

$$\begin{array}{r} \frac{1}{2} = \frac{3}{6} \\ +\ \frac{1}{3} = \frac{2}{6} \\ \hline \frac{5}{6} \end{array}$$

After using models, students learn to add and subtract without the use of a mode by finding a common denominator using the least common multiple, generating equivalent fractions, and adding or subtracting the numerators.

To subtract, write each fraction using 30 as the denominator.

$$\begin{array}{r} \frac{9}{10} = \frac{27}{30} \\ -\ \frac{13}{15} = \frac{26}{30} \\ \hline \frac{1}{30} \end{array}$$

Ways to support your student:

- Review some of the vocabulary terms with your child, like common denominator, least common multiple, equivalent fraction, benchmark fraction, etc. Have them explain these terms to you in their own language.
- Play the following game with your child in which the players add or fractions

Step 1: Make a set of fraction cards with one fraction shown on each card. Use fractions with numerators 1 through 5 and denominators 2 through 6.
Step 2: Player 1 turns over two cards and finds the sum of the two fractions shown. Then Player 2 turns over two cards and finds the sum of those two fractions. The player whose fractions have the greater sum wins.
Extension: While playing, turn over two cards and find an estimate of the sum of the fractions. Ask your child to explain how he or she used number sense to estimate.
Extension: Play the game again, but this time with subtraction. Add in more numbers.
Ask questions to support understand: Is their answer reasonable? How do you know?

Online Resources for Students: https://tinyurl.com/h4953c9

1

$\frac{1}{2}$	$\frac{1}{2}$

$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$

$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$

$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$

Name _____

Additional Practice 7-3

Add Fractions with Unlike Denominators

Another Look!

Find $\frac{1}{6} + \frac{5}{8}$.

Remember: A multiple is a product of the number and any nonzero whole number.

Step 1

List multiples of the denominators.

Look for a multiple that is the same in both lists. Choose the least one.

6: 6, 12, 18, 24, 30, 36, 42, 48
8: 8, 16, 24, 32, 40, 48

24 and 48 are common multiples of 6 and 8. 24 is the lesser of the two.

Step 2

Write equivalent fractions using the common multiple as the denominator.

$$\frac{1}{6} \quad \frac{1 \times 4}{6 \times 4} = \frac{4}{24}$$

$$\frac{5}{8} \quad \frac{5 \times 3}{8 \times 3} = \frac{15}{24}$$

Step 3

Add the fractions to find the total number of twenty-fourths.

$$\frac{4}{24} + \frac{15}{24} =$$

$$\frac{4 + 15}{24} = \frac{19}{24}$$

So, $\frac{1}{6} + \frac{5}{8} = \frac{19}{24}$.

In **1–4**, find each sum.

1. $\frac{1}{2} + \frac{1}{6}$

Least multiple that is the same: ____

Add using renamed fractions:

____ + ____ = ____ or $\frac{\square}{\square}$

2. $\frac{1}{9} + \frac{5}{6}$

Least multiple that is the same: ____

Add using renamed fractions:

____ + ____ = ____

3. $\frac{4}{5} + \frac{1}{15}$

Least multiple that is the same: ____

Add using renamed fractions:

____ + ____ = ____

4. $\frac{2}{8} + \frac{1}{2}$

Least multiple that is the same: ____

Add using renamed fractions:

____ + ____ = ____ or $\frac{\square}{\square}$

5. Model with Math Before school, Janine spends $\frac{1}{10}$ hour making the bed, $\frac{1}{5}$ hour getting dressed, and $\frac{1}{2}$ hour eating breakfast. What fraction of an hour does she spend doing these activities? Complete the drawing of fraction strips to show the solution.

6. enVision® STEM Hair color is an inherited trait. In Marci's family, her mother has brown hair. Her father has blond hair. The family has 6 children in all. Of the 6 children, $\frac{1}{3}$ of them have blond hair, $\frac{1}{6}$ of them have red hair, and $\frac{1}{2}$ of them have brown hair. What fraction of the children have red or brown hair?

7. Abdul bought a loaf of bread for $1.59 and a package of cheese for $2.69. How much did Abdul spend? Complete the diagram below.

8. Higher Order Thinking Robert wants to walk one mile for exercise each day. He made a table to show the distance from his home to each of four different places. What is the total distance from home to the store and back home, and from home to the library and back home? If Robert walks this total distance, will he walk one mile? Explain how you found your answer.

DATA

Walking Distances from Home to Each Place

Place	Distance
Bank	$\frac{1}{5}$ mile
Library	$\frac{1}{10}$ mile
Park	$\frac{1}{2}$ mile
Store	$\frac{1}{4}$ mile

Assessment Practice

9. Which equations are true when $\frac{2}{3}$ is placed in the box?

- ☐ $\frac{1}{3} + \frac{1}{3} = \square$
- ☐ $\frac{1}{6} + \frac{1}{6} = \square$
- ☐ $\square + \frac{6}{9} = \frac{4}{3}$
- ☐ $\frac{2}{5} + \square = \frac{14}{15}$

10. Which equations are true when $\frac{4}{5}$ is placed in the box?

- ☐ $\frac{1}{5} + \square = 1$
- ☐ $\frac{1}{2} + \frac{3}{10} = \square$
- ☐ $\frac{7}{10} + \frac{1}{10} = \square$
- ☐ $\square + \frac{1}{15} = \frac{14}{15}$

Name _____

Additional Practice 7-4

Subtract Fractions with Unlike Denominators

Another Look!

Beth wants to exercise for $\frac{4}{5}$ hour. So far, she has exercised for $\frac{2}{3}$ hour. What fraction of an hour does she have left to exercise?

Step 1

Find a common multiple.

Multiples of 5:
5, 10, 15, 20

Multiples of 3:
3, 6, 9, 12, 15

Since 15 is a multiple of both 5 and 3, use 15 as a common denominator.

Step 2

Write equivalent fractions.

$$\frac{4}{5} \times \frac{3}{3} = \frac{12}{15}$$
$$\frac{4}{5} = \frac{12}{15}$$

$$\frac{2}{3} \times \frac{5}{5} = \frac{10}{15}$$
$$\frac{2}{3} = \frac{10}{15}$$

Step 3

Subtract the numerators.

$$\frac{12}{15} - \frac{10}{15} = \frac{2}{15}$$

Beth has $\frac{2}{15}$ hour left.

In **1–8**, find each difference.

1. $\frac{1}{3} = \frac{\square}{6}$
$-\frac{1}{6} = \frac{\square}{6}$
$\frac{\square}{\square}$

2. $\frac{2}{3} = \frac{\square}{12}$
$-\frac{5}{12} = \frac{\square}{12}$

3. $\frac{3}{5} = \frac{\square}{15}$
$-\frac{1}{3} = \frac{\square}{15}$

4. $\frac{2}{9} = \frac{\square}{72}$
$-\frac{1}{8} = \frac{\square}{72}$

5. $\frac{3}{4}$
$-\frac{2}{5}$

6. $\frac{4}{3}$
$-\frac{2}{5}$

7. $\frac{8}{8}$
$-\frac{4}{9}$

8. $\frac{17}{18}$
$-\frac{2}{3}$

Use the table for **9** and **10**. The trail around Mirror Lake in Yosemite National Park is 5 miles long.

DATA

Hiker	Fraction of Trail Hiked
Andrea	$\frac{2}{5}$
Jon	$\frac{1}{2}$
Collie	$\frac{4}{5}$

9. What fraction describes how much more of the trail Jon hiked than Andrea hiked?

10. What fraction describes how much more of the trail Callie hiked than Jon hiked?

11. **Critique Reasoning** Amy said that the perimeter of the triangle below is less than 10 yards. Do you agree with her? Why or why not?

12. Eva had $\frac{7}{8}$ gallon of paint. Her brother Ivan used $\frac{1}{4}$ gallon to paint his model boat. Eva needs at least $\frac{1}{2}$ gallon to paint her bookshelf. Did Ivan leave her enough paint? Write an equation and fill in the bar diagram to solve.

13. Paul's dad made a turkey pot pie for dinner on Wednesday. The family ate $\frac{4}{8}$ of the pie. On Thursday after school, Paul ate $\frac{2}{16}$ of the pie for a snack. What fraction of the pie remained?

14. **Higher Order Thinking** Write a real-world problem in which you would subtract fractions with unlike denominators. Then, solve your problem.

Assessment Practice

15. Choose the correct numbers from the box below to complete the subtraction sentence that follows.

$\frac{1}{2}$	$\frac{5}{14}$	$\frac{3}{7}$	$\frac{1}{7}$	$\frac{1}{14}$

$\square - \frac{3}{7} = \square$

16. Choose the correct numbers from the box below to complete the subtraction sentence that follows.

$\frac{3}{20}$	$\frac{3}{5}$	$\frac{1}{20}$	$\frac{4}{5}$	$\frac{7}{9}$

$\square - \frac{3}{4} = \square$

Name

Additional Practice 7-3

Add Fractions with Unlike Denominators

Another Look!

Find $\frac{1}{6}+\frac{5}{8}$.

Remember: A multiple is a product of the number and any nonzero whole number.

Step 1

List multiples of the denominators.

Look for a multiple that is the same in both lists. Choose the least one.

6: 6, 12, 18, 24, 30, 36, 42, 48
8: 8, 16, 24, 32, 40, 48

24 and 48 are common multiples of 6 and 8. 24 is the lesser of the two.

Step 2

Write equivalent fractions using the common multiple as the denominator.

$\frac{1}{6}$ $\frac{1\times4}{6\times4}=\frac{4}{24}$

$\frac{5}{8}$ $\frac{5\times3}{8\times3}=\frac{15}{24}$

Step 3

Add the fractions to find the total number of twenty-fourths.

$\frac{4}{24}+\frac{15}{24}=$

$\frac{4+15}{24}=\frac{19}{24}$

So, $\frac{1}{6}+\frac{5}{8}=\frac{19}{24}$.

In 1–4, find each sum.

1. $\frac{1}{2}+\frac{1}{6}$

Least multiple that is the same: 6

Add using renamed fractions:

$\frac{3}{6}+\frac{1}{6}=\frac{4}{6}$ or $\frac{2}{3}$

2. $\frac{1}{9}+\frac{5}{6}$

Least multiple that is the same: 18

Add using renamed fractions:

$\frac{2}{18}+\frac{15}{18}=\frac{17}{18}$

3. $\frac{4}{5}+\frac{1}{15}$

Least multiple that is the same: 15

Add using renamed fractions:

$\frac{12}{15}+\frac{1}{15}=\frac{13}{15}$

4. $\frac{2}{8}+\frac{1}{2}$

Least multiple that is the same: 8

Add using renamed fractions:

$\frac{2}{8}+\frac{4}{8}=\frac{6}{8}$ or $\frac{3}{4}$

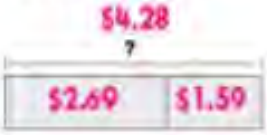
5. Model with Math Before school, Janine spends $\frac{1}{10}$ hour making the bed, $\frac{1}{5}$ hour getting dressed, and $\frac{1}{2}$ hour eating breakfast. What fraction of an hour does she spend doing these activities? Complete the drawing of fraction strips to show the solution.

$\frac{4}{5}$ hour; $\frac{8}{10} = \frac{4}{5}$

6. enVision® STEM Hair color is an inherited trait. In Marci's family, her mother has brown hair. Her father has blond hair. The family has 6 children in all. Of the 6 children, $\frac{1}{3}$ of them have blond hair, $\frac{1}{6}$ of them have red hair, and $\frac{1}{2}$ of them have brown hair. What fraction of the children have red or brown hair?

$\frac{2}{3}$ of the children

7. Abdul bought a loaf of bread for $1.59 and a package of cheese for $2.69. How much did Abdul spend? Complete the diagram below.



8. Higher Order Thinking Robert wants to walk one mile for exercise each day. He made a table to show the distance from his home to each of four different places. What is the total distance from home to the store and back home, and from home to the library and back home? If Robert walks this total distance, will he walk one mile? Explain how you found your answer.

$\frac{7}{10}$ mile; No. Sample answer: $\frac{1}{5} + \frac{1}{5} = \frac{2}{5}$; $\frac{1}{10} + \frac{1}{10} = \frac{2}{10}$; $\frac{2}{4} + \frac{2}{10} = \frac{10}{20} + \frac{4}{20} = \frac{14}{20} = \frac{7}{10}$ mile; $\frac{7}{10} < 1$

Walking Distances from Home to Each Place

Place	Distance
Bank	$\frac{1}{5}$ mile
Library	$\frac{1}{10}$ mile
Park	$\frac{1}{2}$ mile
Store	$\frac{1}{4}$ mile

Assessment Practice

9. Which equations are true when $\frac{2}{3}$ is placed in the box?

- ■ $\frac{1}{3} + \frac{1}{3} = \square$
- ☐ $\frac{1}{6} + \frac{1}{6} = \square$
- ■ $\square + \frac{6}{9} = \frac{4}{3}$
- ☐ $\frac{2}{5} + \square = \frac{14}{15}$

10. Which equations are true when $\frac{4}{5}$ is placed in the box?

- ■ $\frac{1}{5} + \square = 1$
- ■ $\frac{1}{2} + \frac{3}{10} = \square$
- ■ $\frac{7}{10} + \frac{1}{10} = \square$
- ☐ $\square + \frac{1}{15} = \frac{14}{15}$

Name

Additional Practice 7-4

Subtract Fractions with Unlike Denominators

Another Look!

Beth wants to exercise for $\frac{4}{5}$ hour. So far, she has exercised for $\frac{2}{3}$ hour. What fraction of an hour does she have left to exercise?

Step 1

Find a common multiple.

Multiples of 5:
5, 10, 15, 20

Multiples of 3:
3, 6, 9, 12, 15

Since 15 is a multiple of both 5 and 3, use 15 as a common denominator.

Step 2

Write equivalent fractions.

$\frac{4}{5} \times \frac{3}{3} = \frac{12}{15}$

$\frac{4}{5} = \frac{12}{15}$

$\frac{2}{3} \times \frac{5}{5} = \frac{10}{15}$

$\frac{2}{3} = \frac{10}{15}$

Step 3

Subtract the numerators.

$\frac{12}{15} - \frac{10}{15} = \frac{2}{15}$

Beth has $\frac{2}{15}$ hour left.

In 1–8, find each difference.

1. $\frac{1}{3} = \frac{2}{6}$
   $-\frac{1}{6} = \frac{1}{6}$
   $\frac{1}{6}$

2. $\frac{2}{3} = \frac{8}{12}$
   $-\frac{5}{12} = \frac{5}{12}$
   $\frac{3}{12}$ or $\frac{1}{4}$

3. $\frac{3}{5} = \frac{9}{15}$
   $-\frac{1}{3} = \frac{5}{15}$
   $\frac{4}{15}$

4. $\frac{2}{9} = \frac{16}{72}$
   $-\frac{1}{8} = \frac{9}{72}$
   $\frac{7}{72}$

5. $\frac{3}{4}$
   $-\frac{2}{5}$
   $\frac{7}{20}$

6. $\frac{4}{3}$
   $-\frac{2}{5}$
   $\frac{14}{15}$

7. $\frac{8}{8}$
   $-\frac{4}{9}$
   $\frac{5}{9}$

8. $\frac{17}{18}$
   $-\frac{2}{3}$
   $\frac{5}{18}$

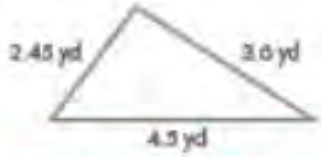
Use the table for 9 and 10. The trail around Mirror Lake in Yosemite National Park is 5 miles long.

Hiker	Fraction of Trail Hiked
Andrea	$\frac{2}{5}$
Jon	$\frac{1}{2}$
Callie	$\frac{4}{5}$

9. What fraction describes how much more of the trail Jon hiked than Andrea hiked? $\frac{1}{10}$

10. What fraction describes how much more of the trail Callie hiked than Jon hiked? $\frac{3}{10}$

11. Critique Reasoning Amy said that the perimeter of the triangle below is less than 10 yards. Do you agree with her? Why or why not?



No; Sample answer: The sum of the whole numbers is 9 and the sum of the decimals is greater than 1. So, the perimeter has to be more than 10 yards.

12. Eva had $\frac{7}{8}$ gallon of paint. Her brother Ivan used $\frac{1}{4}$ gallon to paint his model boat. Eva needs at least $\frac{1}{2}$ gallon to paint her bookshelf. Did Ivan leave her enough paint? Write an equation and fill in the bar diagram to solve.

Yes. $\frac{7}{8} - \frac{1}{4} = \frac{5}{8}$; $\frac{5}{8} > \frac{1}{2}$

13. Paul's dad made a turkey pot pie for dinner on Wednesday. The family ate $\frac{4}{8}$ of the pie. On Thursday after school, Paul ate $\frac{2}{16}$ of the pie for a snack. What fraction of the pie remained?

$\frac{3}{8}$ of the pie

14. Higher Order Thinking Write a real-world problem in which you would subtract fractions with unlike denominators. Then, solve your problem.

Sample answer: Recipe 1 calls for $\frac{2}{3}$ cup of flour. Recipe 2 calls for $\frac{1}{2}$ cup of flour. How much more flour is needed for recipe 1?; $\frac{1}{6}$ cup

Assessment Practice

15. Choose the correct numbers from the box below to complete the subtraction sentence that follows.

$\frac{1}{2}$	$\frac{5}{14}$	$\frac{3}{7}$	$\frac{1}{7}$	$\frac{1}{14}$

$\frac{1}{2} - \frac{3}{7} = \frac{1}{14}$

16. Choose the correct numbers from the box below to complete the subtraction sentence that follows.

$\frac{3}{20}$	$\frac{3}{5}$	$\frac{1}{20}$	$\frac{4}{5}$	$\frac{7}{9}$

$\frac{4}{5} - \frac{3}{4} = \frac{1}{20}$

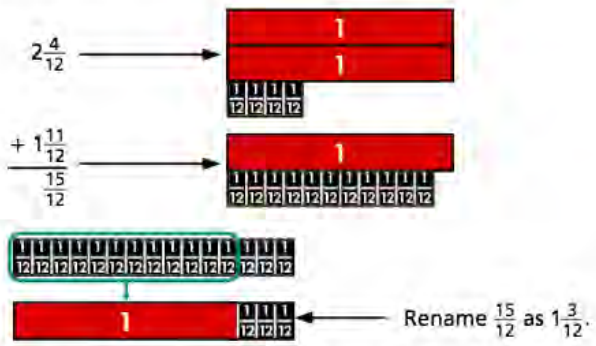
Topic: Adding & Subtracting Mixed Numbers

What Your Student is Learning: Adding and subtracting mixed numbers is an extension of adding and subtracting fractions.

Background and Context for Parents: Students begin with using models, such as fraction strips, to develop the conceptual understanding of adding mixed numbers by combining fraction strips, starting with the fraction parts. This can include those requiring regrouping.

Find $2\frac{1}{3} + 1\frac{11}{12}$.

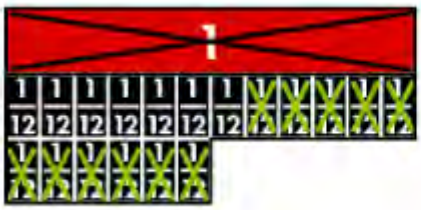
Step 1: Rename the fractional parts as equivalent fractions with a like denominator. Add the fractions.



Step 2: Add the whole-number parts. Then add the sum of the fractional parts.

$2\frac{1}{3} + 1\frac{11}{12} = 4\frac{3}{12}$ or $4\frac{1}{4}$

Similarly, students develop understanding of subtracting mixed numbesr by representing the first fraction with fraction strips and then taking away fraction strips representing the second one.



$$2\frac{1}{2} - 1\frac{11}{12} = 2\frac{6}{12} - 1\frac{11}{12}$$
$$= 1\frac{18}{12} - 1\frac{11}{12}$$
$$= \frac{7}{12}$$

Eventually, students are able to add and subtract mixed numbers without models.

Ways to support your student:

- Write these problems on a piece of paper. $3\frac{2}{3} + 1\frac{2}{3}$ and $4\frac{2}{4} + 2\frac{3}{4}$. Work with your child

to show each mixed number in the first problems using fraction strips. Have them complete the second problem on their own.

- Ask your child to explain how adding mixed numbers is like adding fractions and whole numbers.
- See if your child can teach you how to model an addition or subtraction problem using fraction strips. (Fraction strips are very helpful so your child can physically exchange parts for wholes and wholes for parts). Because they won't always have fraction strips, they might practice drawing the strips to model the problem.
- For the practice problems, be selective in which problems to give since there are a ton of problems. Also, while the directions say for 1-12 to use fraction strips, if your child demonstrates how to use them, they do not need to use them for all problems.

Online Resources for Students: https://toytheater.com/fraction-strips/

Fraction Strips

1

$\frac{1}{2}$	$\frac{1}{2}$

$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$

$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$	$\frac{1}{5}$

$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$	$\frac{1}{10}$

$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{12}$

Name _____

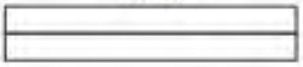
Reteach to Build Understanding
7-7

Vocabulary

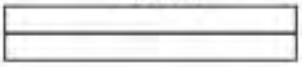
1. **Fraction strips** are models that show the relative sizes of fractions compared to 1 whole.

   Divide the bottom fraction strip to show the fractional part named.

   Thirds

   Fourths

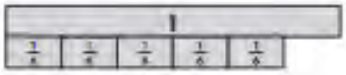
2. Draw a model to add $2\frac{1}{3} + 1\frac{5}{6}$.

   Model each number using fraction strips. Rename $2\frac{1}{3}$ as $2\frac{\square}{6}$.

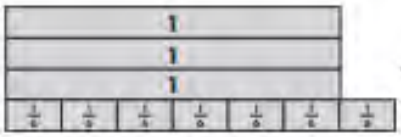
   $2\frac{2}{6}$

   $1\frac{5}{6}$

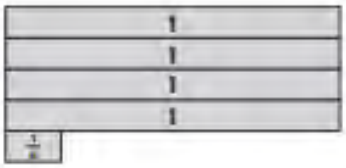
   

3. Add the whole numbers.
   Add the fractions.

   Rename fractions as a whole number, if possible.

   $\frac{6}{6} =$ _____

   Write the sum. _____

   So, $2\frac{1}{3} + 1\frac{5}{6} =$ _____.

4. Antonio walks $2\frac{7}{12}$ miles on Saturday afternoon. He walks another $3\frac{1}{4}$ miles on Sunday afternoon. How many miles did he walk in all? Use fraction strips to help you.

On the Back!

5. Use fraction strips to find $2\frac{3}{4} + 4\frac{3}{8}$.

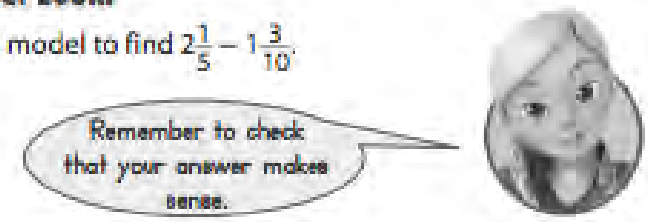
Name _____

Additional Practice 7-9

Use Models to Subtract Mixed Numbers

Another Look!

Draw a model to find $2\frac{1}{5} - 1\frac{3}{10}$.



Step 1

Rename the fractions with a common denominator. Use the common denominator to model the number you are subtracting from, $2\frac{1}{5}$ or $2\frac{2}{10}$.

Step 2

Rename $2\frac{2}{10}$ as $1\frac{12}{10}$. Cross out one whole and $\frac{3}{10}$ to show subtracting $1\frac{3}{10}$.

Write the parts of the model that are left as a fraction or mixed number.

So, $2\frac{1}{5} - 1\frac{3}{10} = \frac{9}{10}$.

In **1–12**, find each difference.

1. $6\frac{1}{4} - 3\frac{5}{8}$

2. $4 - 1\frac{1}{2}$

3. $5\frac{1}{3} - 3\frac{1}{6}$

4. $7\frac{2}{5} - 4\frac{7}{10}$

5. $12\frac{3}{4} - 11\frac{7}{8}$

6. $9\frac{3}{10} - 2\frac{2}{5}$

7. $8\frac{1}{4} - 2\frac{5}{12}$

8. $12\frac{1}{3} - 5\frac{4}{6}$

9. $9\frac{1}{2} - 6\frac{9}{10}$

10. $3\frac{4}{5} - 1\frac{4}{10}$

11. $7\frac{1}{4} - 3\frac{5}{8}$

12. $10\frac{1}{3} - 7\frac{5}{9}$

13. Use the model to find the difference.
$3\frac{1}{5} - 1\frac{4}{5}$

14. Micah's rain gauge showed that $9\frac{1}{2}$ centimeters of rain fell last month. This month, the rain gauge measured $10\frac{3}{10}$ centimeters. How many more centimeters of rain fell this month?

15. Higher Order Thinking Suppose you are finding $8\frac{3}{10} - 6\frac{4}{5}$. Do you need to rename $8\frac{3}{10}$? If so, explain how you rename it to subtract. Then find the difference.

16. Critique Reasoning Danny said 12.309 rounded to the nearest tenth is 12.4. Is Danny correct? Explain.

17. enVision® STEM Fossils show that insects were much larger around 300 million years ago than they are today. The table at the right shows some of the wing lengths found in fossils. How much longer was the wing length of the dragonfly than the wing length of the fly?

DATA

Insect	Wing Length
Dragonfly	19.5 cm
Grasshopper	16.7 cm
Fly	9.85 cm

Assessment Practice

18. What is the missing fraction in the following equation?

$1\frac{1}{2} - \square = \frac{3}{4}$

19. What is the missing number in the following equation?

$15\frac{3}{\square} - 13\frac{7}{8} = 1\frac{7}{8}$

Name _____

Reteach to Build Understanding
7-7

Vocabulary

1. **Fraction strips** are models that show the relative sizes of fractions compared to 1 whole.

   Divide the bottom fraction strip to show the fractional part named.

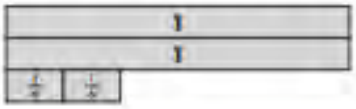
   Thirds

   Fourths

2. Draw a model to add $2\frac{1}{3} + 1\frac{5}{6}$.

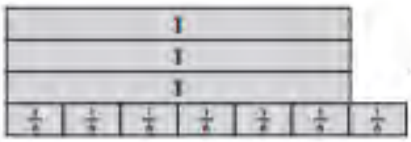
   Model each number using fraction strips. Rename $2\frac{1}{3}$ as $2\frac{\boxed{2}}{6}$.

$2\frac{2}{6}$



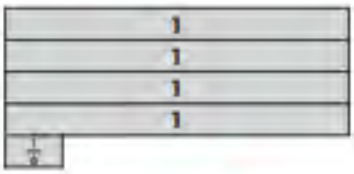
$1\frac{5}{6}$

3. Add the whole numbers.
   Add the fractions.



Rename fractions as a whole number, if possible.

$\frac{6}{6} =$ **1**



So, $2\frac{1}{3} + 1\frac{5}{6} =$ $\mathbf{4\frac{1}{6}}$.

Write the sum. $\mathbf{4\frac{1}{6}}$

4. Antonio walks $2\frac{7}{12}$ miles on Saturday afternoon. He walks another $3\frac{1}{4}$ miles on Sunday afternoon. How many miles did he walk in all? Use fraction strips to help you.

   $5\frac{10}{12}$ or $5\frac{5}{6}$ miles

On the Back!

5. Use fraction strips to find $2\frac{3}{4} + 4\frac{3}{8}$. **$7\frac{1}{8}$**

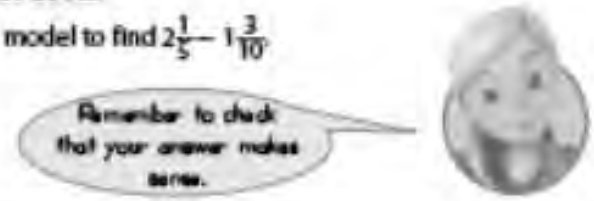
Name

Additional Practice 7-9

Use Models to Subtract Mixed Numbers

Another Look!

Draw a model to find $2\frac{1}{5} - 1\frac{3}{10}$.



Step 1

Rename the fractions with a common denominator. Use the common denominator to model the number you are subtracting from, $2\frac{1}{5}$ or $2\frac{2}{10}$.

Step 2

Rename $2\frac{2}{10}$ as $1\frac{12}{10}$. Cross out one whole and $\frac{3}{10}$ to show subtracting $1\frac{3}{10}$.

Write the parts of the model that are left as a fraction or mixed number.

So, $2\frac{1}{5} - 1\frac{3}{10} = \frac{9}{10}$.

In 1–12, find each difference.

1. $6\frac{1}{4} - 3\frac{5}{8}$ $2\frac{5}{8}$
2. $4 - 1\frac{1}{2}$ $2\frac{1}{2}$
3. $5\frac{1}{3} - 3\frac{1}{6}$ $2\frac{1}{6}$
4. $7\frac{2}{5} - 4\frac{7}{10}$ $2\frac{7}{10}$
5. $12\frac{3}{4} - 11\frac{7}{8}$ $\frac{7}{8}$
6. $9\frac{3}{10} - 2\frac{2}{5}$ $6\frac{9}{10}$
7. $8\frac{1}{4} - 2\frac{5}{12}$ $5\frac{5}{6}$
8. $12\frac{1}{3} - 5\frac{4}{6}$ $6\frac{2}{3}$
9. $9\frac{1}{2} - 6\frac{9}{10}$ $2\frac{6}{10}$ or $2\frac{3}{5}$
10. $3\frac{4}{5} - 1\frac{4}{10}$ $2\frac{2}{5}$
11. $7\frac{1}{4} - 3\frac{5}{8}$ $3\frac{5}{8}$
12. $10\frac{1}{3} - 7\frac{5}{9}$ $2\frac{7}{9}$

13. Use the model to find the difference.
$3\frac{1}{5} - 1\frac{4}{5}$ $1\frac{2}{5}$

14. Micah's rain gauge showed that $9\frac{1}{2}$ centimeters of rain fell last month. This month, the rain gauge measured $10\frac{3}{10}$ centimeters. How many more centimeters of rain fell this month?
$\frac{8}{10}$ or $\frac{4}{5}$ cm

15. Higher Order Thinking Suppose you are finding $8\frac{3}{10} - 6\frac{4}{5}$. Do you need to rename $8\frac{3}{10}$? If so, explain how you rename it to subtract. Then find the difference.
Yes; Sample answer: Rename $\frac{4}{5}$ as $\frac{8}{10}$. $\frac{3}{10} < \frac{8}{10}$, so rename 1 whole from $8\frac{3}{10}$ as $\frac{10}{10}$. So $8\frac{3}{10} = 7\frac{13}{10}$. $7\frac{13}{10} - 6\frac{8}{10} = 1\frac{5}{10}$ or $1\frac{1}{2}$

16. Critique Reasoning Danny said 12.309 rounded to the nearest tenth is 12.4. Is Danny correct? Explain.
No; To round to the nearest tenth, look at the digit in the hundredths place. Because 0 < 5, do not change the digit in the tenths place. 12.309 rounded to the nearest tenth is 12.3.

17. enVision® STEM Fossils show that insects were much larger around 300 million years ago than they are today. The table at the right shows some of the wing lengths found in fossils. How much longer was the wing length of the dragonfly than the wing length of the fly?
9.65 cm

Insect	Wing Length
Dragonfly	19.5 cm
Grasshopper	16.7 cm
Fly	9.85 cm

Assessment Practice

18. What is the missing fraction in the following equation?
$1\frac{1}{2} - \frac{3}{4} = \frac{3}{4}$

19. What is the missing number in the following equation?
$15\frac{3}{4} - 13\frac{7}{8} = 1\frac{7}{8}$

THE SCHOOL DISTRICT OF PHILADELPHIA

Topic: Multiplying Fractions and Whole Numbers

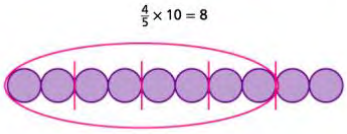
What Your Student is Learning: How to multiply fractions and whole numbers

Background and Context for Parents: These lessons are a review from 4th grade, but your child will need a solid understanding of multiplying whole numbers and fractions to multiplying fractions by fractions. They also did not have to "simplify" the fraction or write them as mixed numbers, which they need to do now.

On page 33, they use models and repeated addition to multiply a fraction by a whole number. Help your child connect to their understanding of multiplication as it applies to whole numbers:

- Multiplication is repeated addition (6 x ¼ = ¼ + ¼ + ¼…)
- Multiplication is groups of things (6 x ¼ is 6 groups of ¼)

$$6 \times \frac{2}{3} = \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3}$$
$$= \frac{12}{3} = 4$$



On page 34, we start to think about mutliplying by a fraction as finding a fractional part of something. Conceptually, multiplying a whole number by a fraction is very different, since the number of groups is a fraction.

Ways to support your student:

- Talk about cookies! We typically represent fractions with three models: number lines, area models, and sets of objects. Tell your child you have 12 cookies. How would they find out how many ¼ of those 12 cookies are.
- Help your child think about the denominator as telling them how many equal parts to break the total into, and the numerator telling them how many of those equal parts they need.
- Encourage your child to use models to make sense of the math problem, and ask them what their model represents.
- Ask your child to convince you how $\frac{4}{9} \times 6$ and $6 \times \frac{4}{9}$ are related.

Online Resources for Students: https://www.khanacademy.org/math/cc-fifth-grade-math/5th-multiply-fractions/imp-multiplying-fractions-and-whole-numbers/v/concept-fraction-whole-number-product

Name _____

Enrichment
8-3

Multiplying Fractions and Whole Numbers

1. Brittany is making trays of fudge. Her recipe calls for $\frac{2}{3}$ cup of walnuts for each batch of fudge. How many cups of walnuts does she need to make 27 batches of fudge?

2. Gerard's baby brother spends $\frac{7}{8}$ of his day sleeping. How many hours does his baby brother sleep?

3. Sandra received 15 $20 bills for her birthday. She spent $\frac{3}{5}$ and saved $\frac{2}{5}$. How much did Sandra spend? How much did she save?

4. Douglas is making catnip mice to sell at the crafts fair. Each catnip mouse calls for $\frac{5}{6}$ ounce of catnip. How many ounces of catnip does he need to make 96 catnip mice?

5. Wendy spent $\frac{3}{8}$ of the last two days practicing for an ice-skating competition. How many hours did she spend practicing?

6. Louis earned $256 helping his mother paint a house. He spent $\frac{11}{16}$ of it on a computer program. How much did Louis spend on the program?

7. The Cupcake Café's recipe for cheesecake calls for $\frac{2}{3}$ cup of cream cheese. How many cups of cream cheese does the café use to make 63 cheesecakes?

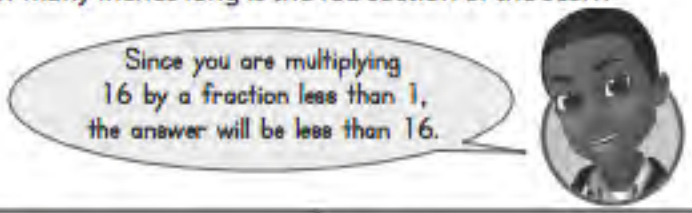
Name _____

Additional Practice 8-3

Multiply Fractions and Whole Numbers

Another Look!

Lorena has a 16-inch long scarf, and $\frac{2}{3}$ of its length is red. How many inches long is the red section of the scarf?



Step 1	Step 2	Step 3
Multiply. $\frac{2}{3} \times 16 = \frac{2 \times 16}{3} = \frac{32}{3}$	Rewrite as a mixed number. $\frac{32}{3} = 10\frac{2}{3}$	Answer the question. The red section of the scarf is $10\frac{2}{3}$ inches long.

Leveled Practice In **1–16**, find each product. Write each product as a mixed number.

1. $26 \times \frac{3}{4} = \frac{\square \times \square}{\square} = \frac{\square}{\square} = \square\frac{\square}{\square}$

2. $9 \times \frac{7}{10} = \frac{\square \times \square}{\square} = \frac{\square}{\square} = \square\frac{\square}{\square}$

3. $\frac{2}{5} \times 32 = \frac{\square \times \square}{\square} = \frac{\square}{\square} = \square\frac{\square}{\square}$

4. $\frac{1}{8} \times 400 = \frac{\square \times \square}{\square} = \frac{\square}{\square} = \square$

5. $15 \times \frac{4}{5}$

6. $\frac{3}{11} \times 66$

7. $45 \times \frac{3}{8}$

8. $\frac{3}{10} \times 12$

9. $55 \times \frac{2}{5}$

10. $\frac{5}{6} \times 40$

11. $\frac{7}{9} \times 54$

12. $600 \times \frac{5}{12}$

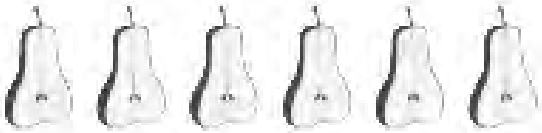
13. $\frac{2}{3} \times 21$

14. $500 \times \frac{3}{5}$

15. $72 \times \frac{5}{8}$

16. $\frac{2}{9} \times 35$

12. Look at the picture. Write and solve an equation to model the picture. Show your answer as a multiplication equation with $\frac{1}{2}$ as a factor.



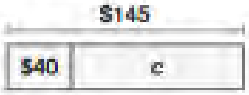
13. Higher Order Thinking Explain how you would find $45 \times \frac{7}{9}$ mentally.

14. Construct Arguments Do you think the difference $2.99 - 0.01$ is greater than 3 or less than 3? Explain.

15. Yara saved $440. She spent $\frac{3}{4}$ of it on a tablet. How much money did Yara spend on the tablet?

16. Write a multiplication expression that shows 10^5.

17. Algebra Tina had $145. She spent $40 on fruit at the farmer's market. Solve the equation $40 + c = 145$ to find the amount Tina has left.



18. Hippos spend most of their day in water. How many hours a day does a hippo spend in water?

Hippos spend about $\frac{2}{3}$ of their day in water.

Assessment Practice

19. Select all equations that would be made true with the number 34.

- ☐ $\square \times \frac{1}{2} = 17$
- ☐ $51 \times \frac{2}{3} = \square$
- ☐ $\square \times \frac{3}{8} = 12$
- ☐ $300 \times \frac{1}{9} = \square$

20. Select all equations that would be made true with the fraction $\frac{2}{9}$.

- ☐ $81 \times \square = 18$
- ☐ $900 \times \square = 200$
- ☐ $72 \times \square = 16$
- ☐ $450 \times \square = 100$

Name _____

Enrichment
8-3

Multiplying Fractions and Whole Numbers

1. Brittany is making trays of fudge. Her recipe calls for $\frac{2}{3}$ cup of walnuts for each batch of fudge. How many cups of walnuts does she need to make 27 batches of fudge?

   18 cups

2. Gerard's baby brother spends $\frac{7}{8}$ of his day sleeping. How many hours does his baby brother sleep?

   21 hours

3. Sandra received 15 $20 bills for her birthday. She spent $\frac{3}{5}$ and saved $\frac{2}{5}$. How much did Sandra spend? How much did she save?

   She spent $180; she saved $120.

4. Douglas is making catnip mice to sell at the crafts fair. Each catnip mouse calls for $\frac{5}{6}$ ounce of catnip. How many ounces of catnip does he need to make 96 catnip mice?

   80 ounces

5. Wendy spent $\frac{3}{8}$ of the last two days practicing for an ice-skating competition. How many hours did she spend practicing?

   18 hours

6. Louis earned $256 helping his mother paint a house. He spent $\frac{11}{16}$ of it on a computer program. How much did Louis spend on the program?

   He spent $176.

7. The Cupcake Café's recipe for cheesecake calls for $\frac{2}{3}$ cup of cream cheese. How many cups of cream cheese does the café use to make 63 cheesecakes?

   42 cups

Name

Additional Practice 8-3
Multiply Fractions and Whole Numbers

Another Look!

Lorena has a 16-inch long scarf, and $\frac{2}{3}$ of its length is red. How many inches long is the red section of the scarf?

Since you are multiplying 16 by a fraction less than 1, the answer will be less than 16.

Step 1	Step 2	Step 3
Multiply. $\frac{2}{3} \times 16 = \frac{2 \times 16}{3} = \frac{32}{3}$	Rewrite as a mixed number. $\frac{32}{3} = 10\frac{2}{3}$	Answer the question. The red section of the scarf is $10\frac{2}{3}$ inches long.

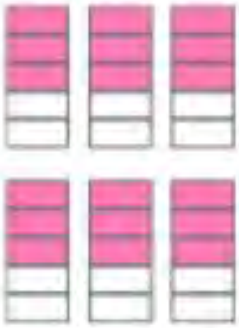
Leveled Practice In 1–16, find each product. Write each product as a mixed number.

1. $26 \times \frac{3}{4} = \frac{26 \times 3}{4} = \frac{78}{4} = 19\frac{1}{2}$
2. $9 \times \frac{7}{10} = \frac{9 \times 7}{10} = \frac{63}{10} = 6\frac{3}{10}$
3. $\frac{2}{5} \times 32 = \frac{2 \times 32}{5} = \frac{64}{5} = 12\frac{4}{5}$
4. $\frac{1}{8} \times 400 = \frac{1 \times 400}{8} = \frac{400}{8} = 50$
5. $15 \times \frac{4}{5}$ 12
6. $\frac{3}{11} \times 66$ 18
7. $45 \times \frac{3}{8}$ $16\frac{7}{8}$
8. $\frac{3}{10} \times 12$ $3\frac{3}{5}$
9. $55 \times \frac{2}{5}$ 22
10. $\frac{5}{6} \times 40$ $33\frac{1}{3}$
11. $\frac{7}{9} \times 54$ 42
12. $600 \times \frac{5}{12}$ 250
13. $\frac{2}{3} \times 21$ 14
14. $500 \times \frac{3}{5}$ 300
15. $72 \times \frac{5}{8}$ 45
16. $\frac{2}{9} \times 35$ $7\frac{7}{9}$

17. Find $6 \times \frac{3}{5}$. Use the model at the right to find the product.

Sample answer:

$6 \times \frac{3}{5} = \frac{3}{5} + \frac{3}{5} + \frac{3}{5} + \frac{3}{5} + \frac{3}{5} + \frac{3}{5} = \frac{18}{5} = 3\frac{3}{5}$



18. What mixed number represents the part of the model you did **NOT** shade for Exercise 17?

$2\frac{2}{5}$

19. Without multiplying, tell which is greater: 0.75×81 or 0.9×81. Explain.

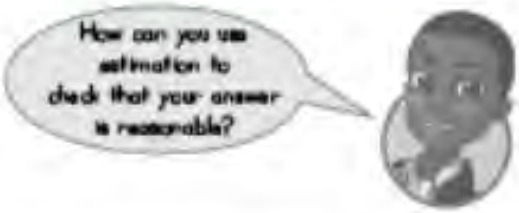
0.9×81 is greater; Sample answer: $0.9 > 0.75$, so $0.9 \times 81 > 0.75 \times 81$.

20. Use Structure Without multiplying, tell which is greater: $\frac{4}{5} \times 45$ or $\frac{2}{3} \times 45$. Explain.

$\frac{4}{5} \times 45$ is greater; Sample answer: $\frac{4}{5}$ is greater than $\frac{2}{3}$, so $\frac{4}{5} \times 45 > \frac{2}{3} \times 45$.

21. Higher Order Thinking The school library has 2,469 books. Two-thirds of the books are paperbacks. How many books are paperbacks?

1,646 books are paperbacks.



22. The table shows the amount of apple sauce made from one apple of each size. Patrice has 17 medium apples and 23 large apples. What is the total amount of applesauce that she can make with these apples?

$25\frac{3}{4}$ cups

Apple Size	Amount of Applesauce
Small	$\frac{1}{3}$ cup
Medium	$\frac{1}{2}$ cup
Large	$\frac{3}{4}$ cup

Assessment Practice

23. Select all that are true.

- ☐ $\frac{4}{9} \times 3 = \frac{4}{27}$
- ■ $72 \times \frac{4}{9} = 32$
- ☐ $14 \times \frac{2}{7} = \frac{1}{49}$
- ■ $15 \times \frac{3}{5} = 9$

24. Select all that are true.

- ☐ $6 \times \frac{3}{5} = \frac{1}{10}$
- ☐ $\frac{7}{8} \times 13 = \frac{7}{104}$
- ■ $\frac{7}{8} \times 28 = 24\frac{1}{2}$
- ■ $56 \times \frac{5}{9} = 31\frac{1}{9}$

THE SCHOOL DISTRICT OF PHILADELPHIA

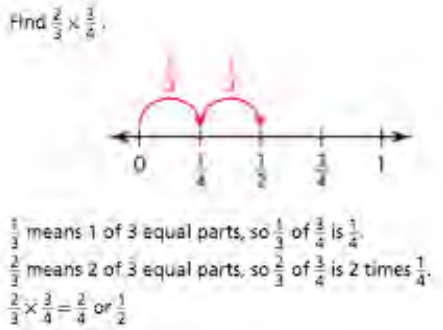
Grade: 5 **Subject: Math** Goes with Pages: 39- 53

Topic: Multiplying Two Fractions

What Your Student is Learning: How to mutiply two fractions and extending it to mixed numbers

Background and Context for Parents: After thinking and practicing multiplying whole numbers and fractions, students move to applying the same meaning to multiplying a fraction by a fraction. Your child may have assumed that multiplying numbers always makes them larger, and dividing always makes a number smaller. He or she may be surprised at first that multiplying a number by a fraction less than 1 gives a product that is less than the original number, not more. Your student will also need to understand that ⅓ of a number means ⅓ times that number and is a way of expressing multiplication.

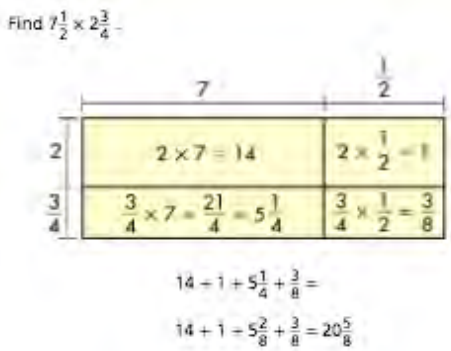
On page 41, they think about multiplying two fractions using models, such as a number line or an area model. Using an area model also helps develop understanding of finding the area of a rectangle wth fractional side lengths, and multiplying mixed numbers with partial products.

Number Line Model	*Area Model*
	 $\frac{1}{3}$ of the rows is shaded yellow. $\frac{1}{4}$ of the columns is shaded red. 1 out of 12 parts is shaded orange. $\frac{1}{3} \times \frac{1}{4} = \frac{1 \times 1}{3 \times 4} = \frac{1}{12}$

On page 42, After using models, they learn to multiply two fractions symbolically. To find the product of two fractions, multiply the numerators and then multiply the denominators.

$$\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd} \qquad \frac{3}{4} \times \frac{5}{6} = \frac{3 \times 5}{4 \times 6} = \frac{15}{24}$$

Students should see the connection between this and what they have been previously doing. The entire unit is multiplying, just working with different numbers. On page 44, they extend their knowledge of multiplying fractions to mixed numbers in two different ways.



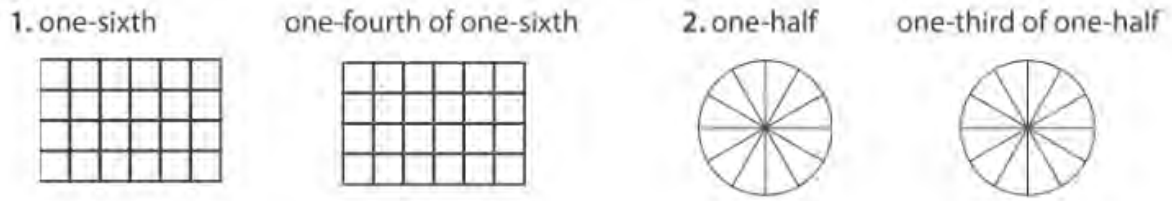
They can:

- use a model with partial products, as shown in the model (Students are familiar with area models using partial products. In the same way they can break apart 23 x 34 into a 20 + 3 dimension and a 30 + 4 dimension, we can break mixed numbers apart into whole and fraction dimentions)
- Change each mixed number to an improper fraction

$$7\frac{1}{2} \times 2\frac{3}{4} = \frac{15}{2} \times \frac{11}{4} = \frac{165}{8} = 20\frac{5}{8}$$

Ways to support your student:

- Make dinner or dessert a math lesson. There was ¼ of a pan of lasagna left. Tom ate ⅓ of this amount. What fraction of a whole pan of lasagna did he eat? Have your child demonstrate how to solve the problem and explain their reasoning.
- Have your child draw you an area model representing a fraction multiplication, and then create a story problem to go with the model.
- Each of the figures below represents the number 1 divided into fractional parts. Ask your child to shade a part of each figure on the left to represent the fraction above it. In the figure on the right, ask your child to shade only a part of the area he or she shaded before, so as to represent the fract of a fraction above it. Ask your child to use the figures to describe how the shading changed from the left to the right figure. Have him or her write a new fraction for the figure on the right.



- If your child is having trouble starting with a problem, encourage them to use a model to solve the problem by asking questions like, “What model could you use to solve this problem?” (Area model) “How many rows would you need?” “How many

columns?""What part represents the product in the area model?"

- Pull out an old family recipe or look one up on your phone (preferably one with fractions or mixed numbers :)). Ask your child what would be needed if you doubled the recipe? Tripled? What about 2 ½ times the amount? Let your child lead the talk.

Online Resources for Students:

- https://www.mathplayground.com/fractions_mult.html
- https://www.splashlearn.com/multiplying-fractions-games-for-5th-graders
- https://www.khanacademy.org/math/arithmetic/fraction-arithmetic/arith-review-mult-mixed-num/v/multiplying-mixed-numbers

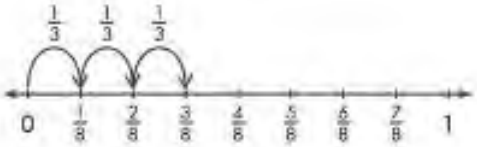
Name _____

Enrichment
8-4

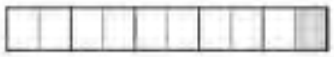
Product Matching

Draw a line to match each multiplication to a model.
Then use the model to find the product.

1. $\frac{1}{2} \times \frac{1}{5} =$ _____

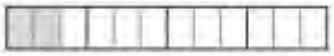


2. $\frac{2}{3} \times \frac{1}{4} =$ _____



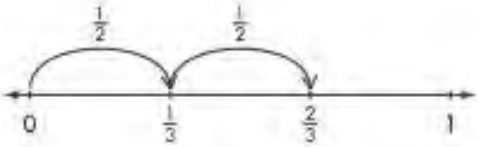
3. $\frac{2}{5} \times \frac{1}{3} =$ _____

4. $\frac{2}{3} \times \frac{3}{8} =$ _____



5. $\frac{3}{4} \times \frac{2}{3} =$ _____

6. $\frac{1}{2} \times \frac{2}{3} =$ _____



THE SCHOOL DISTRICT OF PHILADELPHIA

Name _____

Practice Video Tools Games

Additional Practice 8-5

Multiply Two Fractions

Another Look!

Find $\frac{3}{4} \times \frac{2}{3}$.

You can multiply the numerators and denominators to find the product.

Step 1

Multiply the numerators, and then multiply the denominators.

$\frac{3 \times 2}{4 \times 3} = \frac{6}{12} = \frac{1}{2}$

Step 2

Check that the answer is reasonable.

Since $\frac{1}{2}$ is less than 1, the answer is reasonable.

Leveled Practice In **1–24**, find each product.

1. $\frac{7}{8} \times \frac{2}{3} = \frac{\square \times 2}{8 \times \square} = \frac{\square}{24} = \frac{\square}{\square}$

2. $\frac{3}{4} \times \frac{5}{9} = \frac{\square \times 5}{4 \times \square} = \frac{15}{\square} = \frac{\square}{\square}$

3. $\frac{4}{5} \times \frac{1}{8} = \frac{\square \times 1}{5 \times \square} = \frac{\square}{\square} = \frac{\square}{\square}$

4. $\frac{4}{7} \times \frac{1}{2} = \frac{\square \times \square}{\square \times \square} = \frac{\square}{\square} = \frac{\square}{\square}$

5. $\frac{3}{5} \times \frac{3}{7} = \frac{\square \times \square}{\square \times \square} = \frac{\square}{\square}$

6. $\frac{4}{9} \times \frac{2}{3} = \frac{\square \times \square}{\square \times \square} = \frac{\square}{\square}$

7. $\frac{11}{12} \times \frac{2}{5}$

8. $\frac{2}{3} \times \frac{4}{5}$

9. $\frac{1}{6} \times \frac{2}{3}$

10. $\frac{3}{4}$ of $\frac{1}{2}$

11. $\frac{6}{7} \times \frac{1}{5}$

12. $\frac{2}{3} \times \frac{5}{9}$

13. $\frac{1}{3}$ of $\frac{3}{10}$

14. $\frac{4}{5}$ of $\frac{5}{6}$

15. $\frac{3}{7} \times \frac{2}{7}$

16. $\frac{1}{2}$ of $\frac{2}{3}$

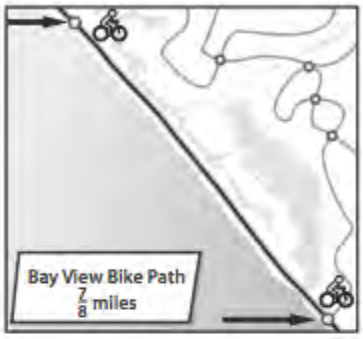
17. $\frac{4}{5} \times \frac{2}{3}$

18. $\frac{3}{10} \times \frac{3}{10}$

25. A full bottle holds $\frac{1}{4}$ gallon of juice. If $\frac{3}{5}$ of the juice has been poured out, how much juice is left in the bottle?

26. Natasha has 3 pounds of apples and $2\frac{1}{2}$ pounds of grapes. If she gives $\frac{1}{3}$ of her apples to Silvie, how many pounds of apples does she have left?

27. Keyshia is riding her bike on Bay View bike path. Keyshia's bike got a flat tire $\frac{2}{3}$ of the way down the path and she had to stop. How far did Keyshia ride?



28. Of the apps on Juan's tablet, $\frac{3}{4}$ are gaming apps, and $\frac{5}{7}$ of the gaming apps are action games. What fraction of the apps on Juan's tablet are action games?

29. **Higher Order Thinking** In Mrs. Hu's classroom, $\frac{4}{5}$ of the students have a dog as a pet. Of the students who have a dog as a pet, $\frac{2}{3}$ also have a cat as a pet. If there are 45 students in her class, how many have both a dog and a cat as pets?

30. Patrick walks $\frac{9}{10}$ mile to the gym. How far has he walked when he has covered $\frac{2}{3}$ of the distance to the gym?

31. **Construct Arguments** Which is greater, $\frac{4}{7} \times \frac{1}{4}$ or $\frac{4}{7} \times \frac{1}{6}$? Explain.

Assessment Practice

32. Choose all the multiplication sentences that have $\frac{5}{6}$ as the missing part.

- ☐ $\square \times \frac{2}{3} = \frac{5}{9}$
- ☐ $\frac{2}{3} \times \square = \frac{7}{9}$
- ☐ $\frac{11}{12} \times \frac{10}{11} = \square$
- ☐ $\square \times \frac{1}{5} = \frac{1}{6}$
- ☐ $\frac{3}{4} \times \square = \frac{5}{8}$

33. Choose all the expressions that have $\frac{8}{15}$ as a product.

- ☐ $\frac{2}{3} \times \frac{4}{5}$
- ☐ $\frac{8}{9} \times \frac{3}{5}$
- ☐ $\frac{3}{15} \times \frac{5}{15}$
- ☐ $\frac{7}{10} \times \frac{1}{5}$
- ☐ $\frac{11}{15} \times \frac{8}{11}$

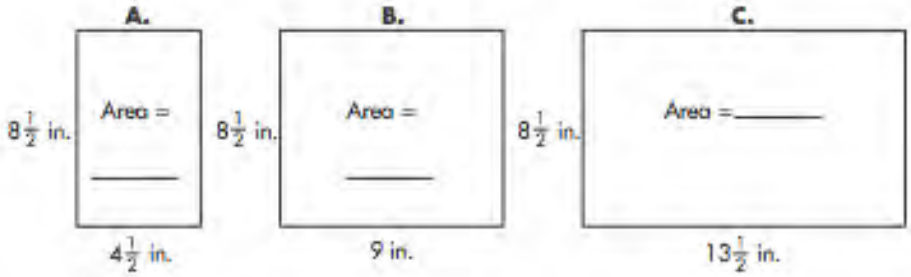
Name _____

Enrichment
8-7

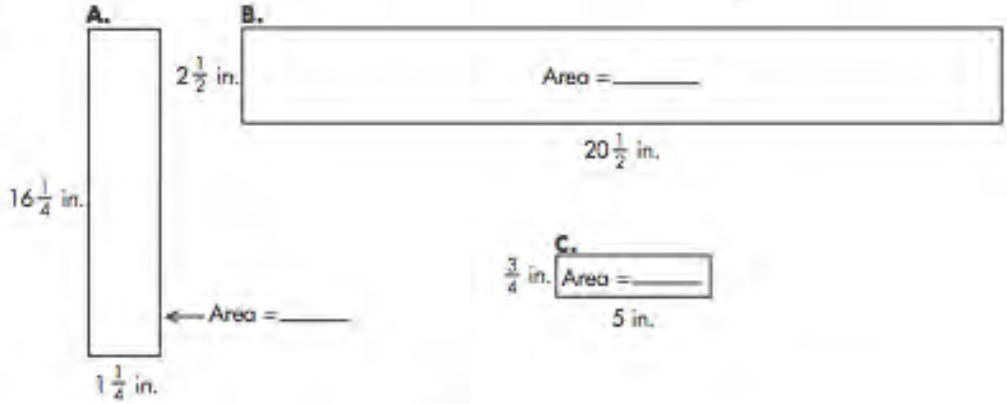
Paper Patterns

The art teacher is measuring paper for various crafts. He must record the length, width, and area (length multiplied by width) for each sheet of paper. Fill in the missing areas for each sheet of paper.

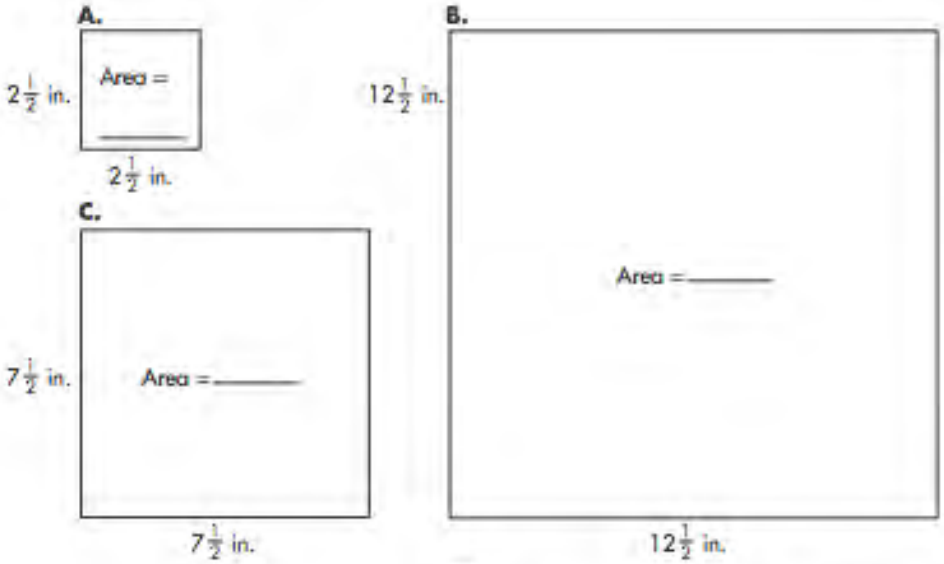
1.



2.



3.



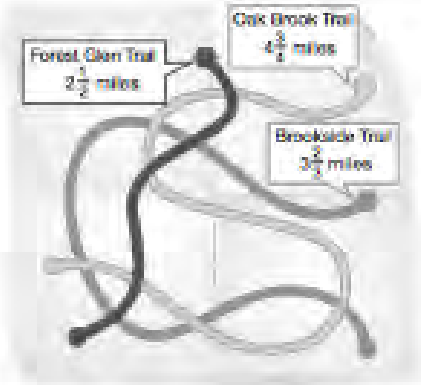
13. How can you use estimation to find $9\frac{1}{2} + 9\frac{1}{2} + 9\frac{1}{2} + 9\frac{1}{2} + 9\frac{1}{2}$?

14. A model of a house is built on a base that measures $7\frac{3}{4}$ in. wide and $9\frac{1}{5}$ in. long. What is the area of the model house's base?

15. Algebra Write a mixed number for t so that $2\frac{3}{4} \times t$ is more than $2\frac{3}{4}$.

16. Vocabulary Give an example of a benchmark fraction and an example of a mixed number.

17. Make Sense and Persevere Leon and Marisol biked the Brookside Trail to the end and back. Then they biked the Forest Glen Trail to the end and back before stopping to eat. How far did they bike before they stopped to eat?



18. The One World Trade Center in New York City is about $3\frac{1}{5}$ times as tall as the Washington Monument in Washington, D.C. The Washington Monument is 555 feet tall. About how tall is the One World Trade Center?

19. Higher Order Thinking Lucie can walk about $3\frac{4}{5}$ miles each hour. About how far can she walk in 2 hours 45 minutes?

Assessment Practice

20. Choose all that are true.

- ☐ $\frac{1}{4} \times 1\frac{7}{8} = \frac{15}{32}$
- ☐ $2\frac{1}{2} \times 2\frac{1}{2} = 5\frac{1}{2}$
- ☐ $3\frac{1}{5} \times 2\frac{1}{4} = 6\frac{2}{5}$
- ☐ $4\frac{1}{2} \times 1\frac{1}{3} = 6$
- ☐ $5\frac{1}{4} \times \frac{1}{2} = 2\frac{5}{8}$

21. Choose all that are true.

- ☐ $4\frac{1}{12} \times \frac{3}{4} = \frac{49}{16}$
- ☐ $8\frac{5}{6} \times 2 = 17\frac{2}{3}$
- ☐ $5\frac{1}{2} \times 5\frac{1}{2} = 30\frac{1}{4}$
- ☐ $9\frac{1}{5} \times \frac{3}{5} = 9\frac{4}{5}$
- ☐ $6\frac{3}{4} \times 3\frac{1}{4} = 19$

5.NF To Multiply or not to multiply?

Task

Some of the problems below can be solved by multiplying $\frac{1}{8} \times \frac{2}{5}$, while others need a different operation. Select the ones that can be solved by multiplying these two numbers. For the remaining, tell what operation is appropriate. In all cases, solve the problem (if possible) and include appropriate units in the answer.

a. Two-fifths of the students in Anya's fifth grade class are girls. One-eighth of the girls wear glasses. What fraction of Anya's class consists of girls who wear glasses?

b. A farm is in the shape of a rectangle $\frac{1}{8}$ of a mile long and $\frac{2}{5}$ of a mile wide. What is the area of the farm?

c. There is $\frac{2}{5}$ of a pizza left. If Jamie eats another $\frac{1}{8}$ of the original whole pizza, what fraction of the original pizza is left over?

d. In Sam's fifth grade class, $\frac{1}{8}$ of the students are boys. Of those boys, $\frac{2}{5}$ have red hair. What fraction of the class is red-haired boys?

e. Only $\frac{1}{20}$ of the guests at the party wore both red and green. If $\frac{1}{8}$ of the guests wore red, what fraction of the guests who wore red also wore green?

f. Alex was planting a garden. He planted $\frac{2}{5}$ of the garden with potatoes and $\frac{1}{8}$ of the garden with lettuce. What fraction of the garden is planted with potatoes or lettuce?

g. At the start of the trip, the gas tank on the car was $\frac{2}{5}$ full. If the trip used $\frac{1}{8}$ of the remaining gas, what fraction of a tank of gas is left at the end of the trip?

h. On Monday, $\frac{1}{8}$ of the students in Mr. Brown's class were absent from school. The nurse told Mr. Brown that $\frac{2}{5}$ of those students who were absent had the flu. What fraction of the absent students had the flu?

i. Of the children at Molly's daycare, $\frac{1}{8}$ are boys and $\frac{2}{5}$ of the boys are under 1 year old. How many boys at the daycare are under one year old?

j. The track at school is $\frac{2}{5}$ of a mile long. If Jason has run $\frac{1}{8}$ of the way around the track, what fraction of a mile has he run?

THE SCHOOL DISTRICT OF PHILADELPHIA

Name _____

Enrichment
8-4

Product Matching

Draw a line to match each multiplication to a model.
Then use the model to find the product.

1. $\frac{1}{2} \times \frac{1}{5} =$ $\frac{1}{10}$

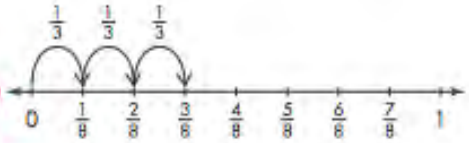
2. $\frac{2}{3} \times \frac{1}{4} =$ $\frac{2}{12}$ or $\frac{1}{6}$

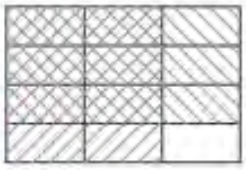
3. $\frac{2}{5} \times \frac{1}{3} =$ $\frac{2}{15}$

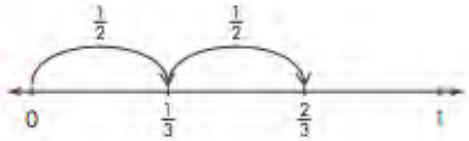
4. $\frac{2}{3} \times \frac{3}{8} =$ $\frac{6}{24}$ or $\frac{2}{8}$ or $\frac{1}{4}$

5. $\frac{3}{4} \times \frac{2}{3} =$ $\frac{6}{12}$ or $\frac{1}{2}$

6. $\frac{1}{2} \times \frac{2}{3} =$ $\frac{2}{6}$ or $\frac{1}{3}$







Name _____

Additional Practice 8-5
Multiply Two Fractions

Another Look!

Find $\frac{3}{4} \times \frac{2}{3}$.

Step 1

Multiply the numerators, and then multiply the denominators.

$\frac{3 \times 2}{4 \times 3} = \frac{6}{12} = \frac{1}{2}$

Step 2

Check that the answer is reasonable.

Since $\frac{1}{2}$ is less than 1, the answer is reasonable.

Leveled Practice In 1–24, find each product.

1. $\frac{7}{8} \times \frac{2}{3} = \frac{7 \times 2}{8 \times 3} = \frac{14}{24} = \frac{7}{12}$
2. $\frac{3}{4} \times \frac{5}{9} = \frac{3 \times 5}{4 \times 9} = \frac{15}{36} = \frac{5}{12}$
3. $\frac{4}{5} \times \frac{1}{8} = \frac{4 \times 1}{5 \times 8} = \frac{4}{40} = \frac{1}{10}$
4. $\frac{4}{7} \times \frac{1}{2} = \frac{4 \times 1}{7 \times 2} = \frac{4}{14} = \frac{2}{7}$
5. $\frac{3}{5} \times \frac{3}{7} = \frac{3 \times 3}{5 \times 7} = \frac{9}{35}$
6. $\frac{4}{9} \times \frac{2}{3} = \frac{4 \times 2}{9 \times 3} = \frac{8}{27}$
7. $\frac{11}{12} \times \frac{2}{5}$ $\frac{11}{30}$
8. $\frac{2}{3} \times \frac{4}{5}$ $\frac{8}{15}$
9. $\frac{1}{6} \times \frac{2}{3}$ $\frac{1}{9}$
10. $\frac{3}{4}$ of $\frac{1}{2}$ $\frac{3}{8}$
11. $\frac{6}{7} \times \frac{1}{5}$ $\frac{6}{35}$
12. $\frac{2}{3} \times \frac{5}{9}$ $\frac{10}{27}$
13. $\frac{1}{3}$ of $\frac{3}{10}$ $\frac{1}{10}$
14. $\frac{4}{5}$ of $\frac{5}{6}$ $\frac{2}{3}$
15. $\frac{3}{7} \times \frac{2}{7}$ $\frac{6}{49}$
16. $\frac{1}{2}$ of $\frac{2}{3}$ $\frac{1}{3}$
17. $\frac{4}{5} \times \frac{2}{3}$ $\frac{8}{15}$
18. $\frac{3}{10} \times \frac{3}{10}$ $\frac{9}{100}$
19. $\left(\frac{1}{2} + \frac{1}{3}\right) \times \frac{8}{9}$ $\frac{20}{27}$
20. $\left(\frac{2}{3} - \frac{1}{6}\right) \times \frac{11}{12}$ $\frac{11}{24}$
21. $\left(\frac{3}{5} + \frac{1}{4}\right) \times \frac{2}{3}$ $\frac{17}{30}$
22. $\frac{7}{8} \times \left(\frac{1}{3} + \frac{1}{3}\right)$ $\frac{7}{12}$
23. $\left(\frac{11}{12} - \frac{5}{6}\right) \times \frac{3}{4}$ $\frac{1}{16}$
24. $\frac{1}{3} \times \left(\frac{9}{10} - \frac{3}{5}\right)$ $\frac{1}{10}$

25. A full bottle holds $\frac{1}{4}$ gallon of juice. If $\frac{3}{5}$ of the juice has been poured out, how much juice is left in the bottle?

$\frac{1}{10}$ gal

26. Natasha has 3 pounds of apples and $2\frac{1}{2}$ pounds of grapes. If she gives $\frac{1}{3}$ of her apples to Silvie, how many pounds of apples does she have left?

2 pounds

27. Keyshia is riding her bike on Bay View bike path. Keyshia's bike got a flat tire $\frac{2}{3}$ of the way down the path and she had to stop. How far did Keyshia ride?

$\frac{7}{12}$ mi

28. Of the apps on Juan's tablet, $\frac{3}{4}$ are gaming apps, and $\frac{5}{7}$ of the gaming apps are action games. What fraction of the apps on Juan's tablet are action games?

$\frac{15}{28}$

29. Higher Order Thinking In Mrs. Hu's classroom, $\frac{4}{5}$ of the students have a dog as a pet. Of the students who have a dog as a pet, $\frac{2}{3}$ also have a cat as a pet. If there are 45 students in her class, how many have both a dog and a cat as pets?

24 students

30. Patrick walks $\frac{9}{10}$ mile to the gym. How far has he walked when he has covered $\frac{2}{3}$ of the distance to the gym?

$\frac{18}{30}$ or $\frac{3}{5}$ mi

31. Construct Arguments Which is greater, $\frac{4}{7} \times \frac{1}{4}$ or $\frac{4}{7} \times \frac{1}{6}$? Explain.

$\frac{4}{7} \times \frac{1}{4}$; Sample explanation: $\frac{1}{4} > \frac{1}{6}$, so $\frac{1}{4}$ of any number is greater than $\frac{1}{6}$ of the same number.

Assessment Practice

32. Choose all the multiplication sentences that have $\frac{5}{6}$ as the missing part.

- [x] $\square \times \frac{2}{3} = \frac{5}{9}$
- [ ] $\frac{2}{3} \times \square = \frac{7}{9}$
- [x] $\frac{11}{12} \times \frac{10}{11} = \square$
- [x] $\square \times \frac{1}{5} = \frac{1}{6}$
- [x] $\frac{3}{4} \times \square = \frac{5}{8}$

33. Choose all the expressions that have $\frac{8}{15}$ as a product.

- [x] $\frac{2}{3} \times \frac{4}{5}$
- [x] $\frac{8}{9} \times \frac{2}{5}$
- [ ] $\frac{3}{15} \times \frac{5}{15}$
- [ ] $\frac{7}{10} \times \frac{1}{5}$
- [x] $\frac{11}{15} \times \frac{8}{11}$

Name _____

Enrichment **8-7**

Paper Patterns

The art teacher is measuring paper for various crafts. He must record the length, width, and area (length multiplied by width) for each sheet of paper. Fill in the missing areas for each sheet of paper.

1.

A. $8\frac{1}{2}$ in. × $4\frac{1}{2}$ in. — Area = $38\frac{1}{4}$ in²

B. $8\frac{1}{2}$ in. × 9 in. — Area = $76\frac{1}{2}$ in²

C. $8\frac{1}{2}$ in. × $13\frac{1}{2}$ in. — Area = $114\frac{3}{4}$ in²

2.

A. $16\frac{1}{4}$ in. × $1\frac{1}{4}$ in. — Area = $20\frac{5}{16}$ in²

B. $2\frac{1}{2}$ in. × $20\frac{1}{2}$ in. — Area = $51\frac{1}{4}$ in²

C. $\frac{3}{4}$ in. × 5 in. — Area = $3\frac{3}{4}$ in²

3.

A. $2\frac{1}{2}$ in. × $2\frac{1}{2}$ in. — Area = $6\frac{1}{4}$ in²

B. $12\frac{1}{2}$ in. × $12\frac{1}{2}$ in. — Area = $156\frac{1}{4}$ in²

C. $7\frac{1}{2}$ in. × $7\frac{1}{2}$ in. — Area = $56\frac{1}{4}$ in²

13. How can you use estimation to find $9\frac{1}{2}+9\frac{1}{2}+9\frac{1}{2}+9\frac{1}{2}+9\frac{1}{2}$? **Sample answer: Multiply $5 \times 10 = 50$**

14. A model of a house is built on a base that measures $7\frac{3}{4}$ in. wide and $9\frac{1}{5}$ in. long. What is the area of the model house's base? **$71\frac{3}{10}$ sq in.**

15. Algebra Write a mixed number for t so that $2\frac{3}{4} \times t$ is more than $2\frac{3}{4}$.
Answers will vary. Any mixed number greater than 1 will work.

16. Vocabulary Give an example of a benchmark fraction and an example of a mixed number.
Sample answer: $\frac{1}{2}$; $3\frac{1}{2}$

17. Make Sense and Persevere Leon and Marisol biked the Brookside Trail to the end and back. Then they biked the Forest Glen Trail to the end and back before stopping to eat. How far did they bike before they stopped to eat?
$12\frac{1}{3}$ miles

18. The One World Trade Center in New York City is about $3\frac{1}{5}$ times as tall as the Washington Monument in Washington, D.C. The Washington Monument is 555 feet tall. About how tall is the One World Trade Center?
1,776 feet

19. Higher Order Thinking Lucie can walk about $3\frac{4}{5}$ miles each hour. About how far can she walk in 2 hours 45 minutes?
$10\frac{9}{20}$ miles

Assessment Practice

20. Choose all that are true.

- [x] $\frac{1}{4} \times 1\frac{7}{8} = \frac{15}{32}$
- [ ] $2\frac{1}{2} \times 2\frac{1}{2} = 5\frac{1}{2}$
- [ ] $3\frac{1}{5} \times 2\frac{1}{4} = 6\frac{2}{5}$
- [x] $4\frac{1}{2} \times 1\frac{1}{3} = 6$
- [x] $5\frac{1}{4} \times \frac{1}{2} = 2\frac{5}{8}$

21. Choose all that are true.

- [x] $4\frac{1}{12} \times \frac{3}{4} = \frac{49}{16}$
- [x] $8\frac{5}{6} \times 2 = 17\frac{2}{3}$
- [x] $5\frac{1}{2} \times 5\frac{1}{2} = 30\frac{1}{4}$
- [ ] $9\frac{1}{5} \times \frac{3}{5} = 9\frac{4}{5}$
- [ ] $6\frac{3}{4} \times 3\frac{1}{4} = 19$

Solution

a.
Multiplication is appropriate and $\frac{2}{40}$ or $\frac{1}{20}$ of the girls in the class wear glasses.

b.
Multiplication is appropriate and the farm has an area of $\frac{2}{40}$ square mile.

c.
This problem cannot be solved by multiplication. Instead we subtract $\frac{1}{8}$ from the $\frac{2}{5}$ that was available to find that $\frac{2}{5} - \frac{1}{8} = \frac{16}{40} - \frac{5}{40} = \frac{11}{40}$ of the pizza is left. The related question involving multiplication would be: "There is $\frac{2}{5}$ of a pizza left. If Jamie ate $\frac{1}{8}$ of that part of the pizza, what fraction of the original whole pizza would he have eaten?"

d.
Multiplication is appropriate and $\frac{2}{40}$ or $\frac{1}{20}$ of the boys have red hair.

f.
This is an addition problem. $\frac{2}{5} + \frac{1}{8} = \frac{21}{40}$ of the garden was planted in potatoes or lettuce.

g.
This problem looks like it could be solved by multiplication but $\frac{2}{5}$ times $\frac{1}{8}$ only gives the fraction of the tank of gas that is used up during the trip. One way to find the fraction of the tank of gas left in the tank, would be to subtract the fraction of the tank that was used during the trip from the fraction at the start of the trip, namely $\frac{2}{5}$ - $\frac{1}{20}$ = $\frac{7}{20}$.

h.
The fraction of the absent students who had the flu was $\frac{2}{5}$, just as the nurse said! Multiplying the two fractions would give what fraction of the whole class had the flu, which is not what the question asked.

i.
The fraction multiplication here would only tell what fraction of the children at the daycare are boys under 1. To find out how many boys that is, one needs to know how many children are at the daycare center. Multiplying $\frac{1}{20}$ times the number of children would tell how many boys are under 1.

j.
Multiplication is appropriate and Jason has run $\frac{2}{40}$ or $\frac{1}{20}$ of a mile.

THE SCHOOL DISTRICT OF PHILADELPHIA

Topic: Multiplication as Scaling

What Your Student is Learning: How to judge the size of a product based on the size of the factors

Background and Context for Parents:
A fraction, mixed number, or whole number is often used a scaling factor. A scaling factor shows by how much another number, which represents size , is increased or decreased.

An Example, "Raden walked 2 miles. Amanda walked ½ that distance." (½ is the scaling factor)
"A photo is 5 inches wide. Its enlargement is 2 times as wide" (2 is the scaling factor)

Students are developing an understanding of how to judge the size of a product (the answer) based on the size of the factors (each number). This is largely conceptual, as they are making a general decision based on what they know about a number. Encourage them to make a decision <u>without doing the math</u>. Then, they can do the math to check their work.

Students need to understand three key points

1. Multiplying a number by a fraction *less than* one results in a product *less than* the given number (Ex: $\frac{3}{4} \times 7 < 7$)
2. Multiplying a number by a fraction *greater than* one results in a product *greater than* the given number (Ex: $1\frac{1}{2} \times 5 > 5$)
3. Multiplying a number by a fraction *equal* to one results in a product *equa*l to the given number (Ex: $\frac{3}{3} \times 5 = 5$)

Ways to support your student:

- Talk to your child about various situations where something stretches or shrinks.
- Write the following fractions on a piece of paper. Have your student order the products from least to greatest without actually multiplying. Have a conversation with them about how they decided the order of the products. After, have them perform the actual multiplication to see if their decisions make sense.
- Ask questions to probe their thinking as they complete the problem sets. When they give explanations, ask them "Why? How do you know? Is that always true?"

$2\frac{1}{2} \times 3\frac{1}{4}$

$\frac{3}{4} \times 3\frac{1}{4}$

$\frac{7}{7} \times 3\frac{1}{4}$

$4 \times 3\frac{1}{4}$

Name _____

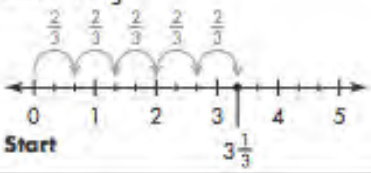
Additional Practice 8-8
Multiplication as Scaling

Another Look!

Theodore and Pam are rolling out modeling clay for an activity in art class. Theodore rolled out his clay until it was 5 inches long. Pam rolled hers $\frac{2}{3}$ times as far. Did Pam roll her clay out less than, more than, or the same as Theodore?

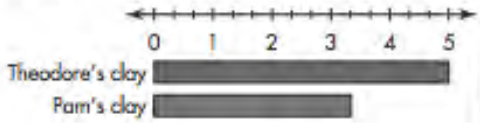
Step 1

Use a number line to find out how far Pam rolled out her clay. The arrows show $5 \times \frac{2}{3}$.



Step 2

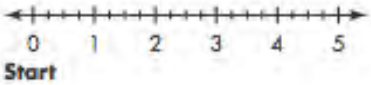
Use a number line to compare the lengths of clay.



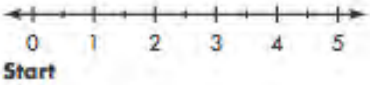
Pam rolled her clay out less than Theodore.

In **1** and **2**, decide which symbol belongs in the box: <, >, or =. Use the number line to help find the answer.

1. $5 \times \frac{3}{4}$ ☐ 5



2. $1\frac{1}{2} \times 3$ ☐ 3



In **3–8**, without multiplying, decide which symbol belongs in the box: <, >, or =.

3. $5\frac{1}{3} \times 2\frac{3}{4}$ ☐ $5\frac{1}{3}$

4. $10\frac{3}{4} \times \frac{2}{2}$ ☐ $10\frac{3}{4}$

5. $\frac{1}{12} \times 1\frac{6}{7}$ ☐ $1\frac{6}{7}$

6. $5\frac{1}{5} \times 5\frac{1}{10}$ ☐ $5\frac{1}{10}$

7. $\frac{1}{4} \times 4\frac{1}{2}$ ☐ $4\frac{1}{2}$

8. $3\frac{9}{10} \times 1\frac{2}{3}$ ☐ $1\frac{2}{3}$

In **9** and **10**, without multiplying, order the following products from least to greatest.

9. $\frac{5}{6} \times 1\frac{8}{9}$ $\quad \frac{5}{6} \times \frac{1}{4}$ $\quad \frac{5}{6} \times 10\frac{1}{12}$ $\quad \frac{5}{6} \times \frac{6}{6}$

10. $\frac{1}{12} \times \frac{1}{4}$ $\quad 3\frac{1}{4} \times \frac{1}{4}$ $\quad 4\frac{1}{3} \times \frac{1}{4}$ $\quad \frac{1}{10} \times \frac{1}{4}$

11. Higher Order Thinking Without multiplying, decide which symbol belongs in the box: <, >, or =. Explain how you decided.

$2\frac{1}{3} \times \frac{1}{8} \square 2\frac{1}{2}$

12. Erin is making fruit salad. For each bowl of fruit salad, she needs $\frac{2}{3}$ cup of strawberries. How many cups of strawberries will she use if she makes 18 bowls of fruit salad?

13. Who spent more time studying by the end of the week? Use the table below that shows the number of hours spent studying.

DATA

	Monday	Tuesday	Wednesday	Thursday	Friday
Mark	$2\frac{1}{6}$	$1\frac{5}{6}$	$3\frac{3}{4}$	$2\frac{1}{8}$	$\frac{5}{6}$
Diane	$2\frac{1}{2}$	$\frac{5}{6}$	$3\frac{2}{3}$	$3\frac{2}{3}$	$\frac{3}{4}$

14. Make up two decimals with an answer close to the given product.

__.__ × __.__ = 5.5

15. Use Structure Put the following products in order from greatest to least, without multiplying.

$3\frac{1}{8} \times \frac{1}{8}$ $\quad \frac{2}{3} \times 3\frac{1}{8}$ $\quad 3\frac{1}{8} \times 3\frac{1}{8}$ $\quad 3\frac{1}{8} \times \frac{4}{4}$

Assessment Practice

16. Write each expression in the correct answer space to show products less than $\frac{2}{3}$ and those greater than $\frac{2}{3}$.

Less than $\frac{2}{3}$	Greater than $\frac{2}{3}$

$\frac{2}{3} \times 1\frac{1}{2}$ $\quad \frac{2}{3} \times \frac{2}{3}$ $\quad \frac{2}{3} \times \frac{1}{2}$ $\quad 2\frac{2}{3} \times \frac{2}{3}$

17. Write each expression in the correct answer space to show products less than $10\frac{1}{2}$ and those greater than $10\frac{1}{2}$.

Less than $10\frac{1}{2}$	Greater than $10\frac{1}{2}$

$1\frac{1}{12} \times 10\frac{1}{2}$ $\quad \frac{1}{12} \times 10\frac{1}{2}$ $\quad 10\frac{1}{3} \times 10\frac{1}{2}$ $\quad 1\frac{1}{9} \times 10\frac{1}{2}$

ANSWER KEY

Name

Additional Practice 8-8
Multiplication as Scaling

Another Look!

Theodore and Pam are rolling out modeling clay for an activity in art class. Theodore rolled out his clay until it was 5 inches long. Pam rolled hers $\frac{2}{3}$ times as far. Did Pam roll her clay out less than, more than, or the same as Theodore?

Step 1

Use a number line to find out how far Pam rolled out her clay. The arrows show $5 \times \frac{2}{3}$.

Step 2

Use a number line to compare the lengths of clay.

Pam rolled her clay out less than Theodore.

In 1 and 2, decide which symbol belongs in the box: <, >, or =. Use the number line to help find the answer.

1. $5 \times \frac{3}{4} < 5$

2. $1\frac{1}{2} \times 3 > 3$

In 3–8, without multiplying, decide which symbol belongs in the box: <, >, or =.

3. $5\frac{1}{3} \times 2\frac{3}{4} > 5\frac{1}{3}$
4. $10\frac{3}{4} \times \frac{2}{2} = 10\frac{3}{4}$
5. $\frac{1}{12} \times 1\frac{6}{7} < 1\frac{6}{7}$
6. $5\frac{1}{5} \times 5\frac{1}{10} > 5\frac{1}{10}$
7. $\frac{1}{4} \times 4\frac{1}{2} < 4\frac{1}{2}$
8. $3\frac{9}{10} \times 1\frac{2}{3} > 1\frac{2}{3}$

In 9 and 10, without multiplying, order the following products from least to greatest.

9. $\frac{5}{6} \times 1\frac{8}{9}$ $\frac{5}{6} \times \frac{1}{4}$ $\frac{5}{6} \times 10\frac{1}{12}$ $\frac{5}{6} \times \frac{6}{6}$ $\frac{5}{6} \times \frac{1}{4}; \frac{5}{6} \times \frac{6}{6}; \frac{5}{6} \times 1\frac{8}{9}; \frac{5}{6} \times 10\frac{1}{12}$

10. $\frac{1}{12} \times \frac{1}{4}$ $3\frac{1}{4} \times \frac{1}{4}$ $4\frac{1}{3} \times \frac{1}{4}$ $\frac{1}{10} \times \frac{1}{4}$ $\frac{1}{12} \times \frac{1}{4}; \frac{1}{10} \times \frac{1}{4}; 3\frac{1}{4} \times \frac{1}{4}; 4\frac{1}{3} \times \frac{1}{4}$

11. Higher Order Thinking Without multiplying, decide which symbol belongs in the box: <, >, or =. Explain how you decided.

$2\frac{1}{3} \times \frac{1}{8} < 2\frac{1}{2}$

Sample explanation: Since $2\frac{1}{3}$ is multiplied by a number less than 1, the product is less than $2\frac{1}{3}$, so it is also less than $2\frac{1}{2}$.

12. Erin is making fruit salad. For each bowl of fruit salad, she needs $\frac{2}{3}$ cup of strawberries. How many cups of strawberries will she use if she makes 18 bowls of fruit salad?

12 cups of strawberries

13. Who spent more time studying by the end of the week? Use the table below that shows the number of hours spent studying.

	Monday	Tuesday	Wednesday	Thursday	Friday
Mark	$2\frac{1}{6}$	$1\frac{5}{6}$	$3\frac{2}{4}$	$2\frac{1}{8}$	$\frac{5}{6}$
Diane	$2\frac{1}{2}$	$\frac{5}{6}$	$3\frac{2}{3}$	$3\frac{2}{3}$	$\frac{3}{4}$

Diane; Mark spent $10\frac{17}{24}$ hours studying and Diane spent $11\frac{5}{12}$ hours studying. Diane spent $\frac{17}{24}$ more hours studying than Mark.

14. Make up two decimals with an answer close to the given product.

__ × __ = 5.5

Sample answer: 3.2 × 1.8 is close to 5.5

15. Use Structure Put the following products in order from greatest to least, without multiplying.

$3\frac{1}{8} \times \frac{1}{8}$ $\frac{2}{3} \times 3\frac{1}{8}$ $3\frac{1}{8} \times 3\frac{1}{8}$ $3\frac{1}{8} \times \frac{4}{4}$

$3\frac{1}{8} \times 3\frac{1}{8}$; $3\frac{1}{8} \times \frac{8}{8}$; $\frac{2}{3} \times 3\frac{1}{8}$; $3\frac{1}{8} \times \frac{1}{8}$

Assessment Practice

16. Write each expression in the correct answer space to show products less than $\frac{2}{3}$ and those greater than $\frac{2}{3}$.

Less than $\frac{2}{3}$	Greater than $\frac{2}{3}$
$\frac{2}{3} \times \frac{1}{2}$; $\frac{2}{3} \times \frac{2}{3}$	$\frac{2}{3} \times 1\frac{1}{2}$; $2\frac{2}{3} \times \frac{2}{3}$

$\frac{2}{3} \times 1\frac{1}{2}$ $\frac{2}{3} \times \frac{2}{3}$ $\frac{2}{3} \times \frac{1}{2}$ $2\frac{2}{3} \times \frac{2}{3}$

17. Write each expression in the correct answer space to show products less than $10\frac{1}{2}$ and those greater than $10\frac{1}{2}$.

Less than $10\frac{1}{2}$	Greater than $10\frac{1}{2}$
$\frac{1}{12} \times 10\frac{1}{2}$	$1\frac{1}{12} \times 10\frac{1}{2}$; $1\frac{1}{9} \times 10\frac{1}{2}$; $10\frac{1}{3} \times 10\frac{1}{2}$

$1\frac{1}{12} \times 10\frac{1}{2}$ $\frac{1}{12} \times 10\frac{1}{2}$ $10\frac{1}{3} \times 10\frac{1}{2}$ $1\frac{1}{9} \times 10\frac{1}{2}$