Engaging student pages accompany each lesson within
*ORIGO Stepping Stones*. In the Student Journal for this
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Exploring Equivalent Fractions with Tenths and Hundredths

Look at these pies.
How has each pie been divided?

Write fractions to complete these equivalence statements.

\[
\frac{1}{2} \text{ is equivalent to } \underline{\hphantom{0}} \quad \underline{\hphantom{0}} \text{ is equivalent to } \frac{3}{5}
\]

This square is one whole.
What fraction of the square is shaded?

What other fraction describes the area that is shaded?

How could you change the picture so that it shows \(\frac{3}{5}\) shaded?

How many tenths do you need to shade?

How could you change the picture to show hundredths?

Step Up 1. Each square is one whole. Draw lines and shade parts to show the first fraction. Then draw extra lines to help you identify the equivalent fraction in tenths.

a. \(\frac{1}{5} = \underline{\hphantom{0}} \quad \frac{5}{10} = \underline{\hphantom{0}}
\]

b. \(\frac{5}{5} = \underline{\hphantom{0}}
\]

c. \(\frac{4}{5} = \underline{\hphantom{0}}
\]
2. Each square is one whole. Draw lines and shade parts to show the first fraction. Then draw extra lines to help you identify the equivalent fraction.

\[
\begin{align*}
\text{a. } & \quad \frac{4}{5} = \frac{10}{100} \\
\text{b. } & \quad \frac{1}{4} = \frac{25}{100} \\
\text{c. } & \quad \frac{7}{10} = \frac{70}{100}
\end{align*}
\]

3. Complete the diagrams to show the equivalent fractions.

\[
\begin{align*}
\text{a. } & \quad \frac{1}{2} \times \_ = \frac{20}{100} \\
\text{b. } & \quad \frac{4}{10} \times \_ = \frac{20}{100} \\
\text{c. } & \quad \frac{2}{5} \times \_ = \frac{20}{100} \\
\text{d. } & \quad \frac{3}{4} \times \_ = \frac{30}{100} \\
\text{e. } & \quad \frac{12}{10} \times \_ = \frac{120}{100} \\
\text{f. } & \quad \frac{6}{5} \times \_ = \frac{60}{100} \\
\text{g. } & \quad \frac{6}{4} \times \_ = \frac{60}{100} \\
\text{h. } & \quad \frac{10}{10} \times \_ = \frac{100}{100}
\end{align*}
\]

Step Ahead

Complete each sequence to show equivalent fractions.

\[
\begin{align*}
\text{a. } & \quad \frac{6}{10} = \frac{60}{60} = \frac{100}{100} \\
\text{b. } & \quad \frac{6}{10} = \frac{60}{60} = \frac{100}{100} \\
\text{c. } & \quad \frac{1}{5} = \frac{10}{10} = \frac{25}{25} = \frac{100}{100} \\
\text{d. } & \quad \frac{3}{4} = \frac{2}{8} = \frac{10}{10} = \frac{100}{100}
\end{align*}
\]
II.2 Introducing Decimal Fractions

Look at this picture.

Each square is one whole.
What amount is shaded?

What are the different ways you can write this number without using words?

When fractions have a denominator that is 10, 100, 1000 and so on, they can easily be written in a place-value chart.

A number such as $2 \frac{4}{10}$ can be written like this.

The red dot is called a decimal point. The decimal point is a mark that identifies the ones place.

Where have you seen numbers written with a decimal point?

Look at the expanders below.

How would you say the number that each expander shows?

A decimal fraction is a fraction that is written with no denominator visible. The position of a digit after the decimal point tells what the invisible denominator is.

How do these numbers relate to mixed numbers and common fractions?

Why do you need to show the decimal point when the expander is completely closed?
I. Each square is one whole. Read the fraction name and shade the squares to match. Write the decimal fraction on the open expander.

a. two and five-tenths

b. one and seven-tenths

c. one and three-tenths

d. two and six-tenths

2. Read the fraction name. Write the amount as a common fraction or mixed number. Then write the matching decimal fraction on the expander.

a. four and two-tenths

b. sixty-three tenths

c. five and eight-tenths

d. one and seven-tenths

e. two and six-tenths

Step Ahead

Read the clues. Write the numeral on the expander to match.

a. I am greater than three and less than four. The digit in my tenths place is less than the digit in my ones place.

b. I am less than five and greater than one. The digit in my ones place is twice the value of the digit in my tenths place.
II.3 Locating and Comparing Tenths

Look at the number line below. The distance between each whole number is one whole.

What fraction is the orange arrow pointing to? How do you know?

Write it as a common fraction and as a mixed number.

What fraction is the green arrow pointing to?
Can you write it as a common fraction and as a mixed number? Why?
What would it look like on an expander?

Think about how you compare 267 and 305 to work out which number is greater.
Which place do you look at first?

Think about the fractions indicated by the arrows on the number line above.
What do they look like as decimal fractions?
Which is greater?
How can you tell by looking at their places?

Step Up

1. On this number line, the distance between each whole number is one whole. Write the decimal fraction that is shown by each arrow.
Use the masses of these fruit and vegetables to answer the questions on this page.

2. In each pair below, loop the box of fruit or vegetables that is heavier.
   
   a. apples or onions  
   b. oranges or potatoes  
   c. apples or avocados  
   d. carrots or grapes

3. Write the masses. Then write < or > to make the sentence true.
   
   a. avocados __________ potatoes ________
   b. onions _________ grapes _________
   c. oranges _________ apples _________
   d. avocados _________ onions _________

Step Ahead

Write the masses of the fruit and vegetables in order from least to greatest. Then draw a line to connect each mass to its approximate position on the number line.

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Each large square represents one whole.

How many columns are in the shaded square? What fraction of one whole does each column show?

Shade the first four columns of the other red square. What is the total shaded now? Start from the bottom and shade five small squares in the next column. How much is shaded now? What number is now shown by the shaded parts?

How many hundredths are in one whole? How do you know?

Step Up

1. Each large square represents one whole. Write the missing numbers to describe the shaded part of each large square.

   a. 3 tenths plus 2 hundredths
   
   b. ___ tenths plus ___ hundredths
   
   c. ___ tenths plus ___ hundredths
   
   d. ___ tenths ___ hundredths
   
   e. ___ tenths ___ hundredths

   32 hundredths
2. Shade each picture to match the description. Then write **how much more** needs to be shaded to make one whole.

- **a.** 2 tenths plus 4 hundredths
- **b.** 4 tenths plus 9 hundredths
- **c.** 9 tenths plus 5 hundredths
- **d.** 0 tenths plus 3 hundredths
- **e.** 6 tenths plus 0 hundredths
- **f.** 4 tenths plus 15 hundredths

**Step Ahead**

Draw lines to match the numbers. Some numbers do not have a match.
2. Complete the missing parts. Each large square is one whole.

Step Ahead
Read the clues. Write a matching numeral on the expander.

a. I am greater than five and less than seven. I have more in the tenths place than in the hundredths place. I have more in the ones place than in the tenths place.

b. I am less than nine and greater than four. The digit in the tenths place is a multiple of 3. The digit in the hundredths place is greater than the digit in the ones place.

c. 85

b. 100

a. 100

Which expander helps you to read the number? Why?
Which digit is in the tenths place? ... hundredths place?

Look at this place-value chart.
What do you notice about the places on either side of the ones place?
Write one and seventy-six hundredths on the chart.

Step Up
I. Each large square is one whole. Colour the squares to show the number. Then write the number on the expanders and as a mixed number.
2. Complete the missing parts. Each large square is one whole.

a. I am greater than five and less than seven. I have more in the tenths place than in the hundredths place. I have more in the ones place than in the tenths place.

b. I am less than nine and greater than four. The digit in the tenths place is a multiple of 3. The digit in the hundredths place is greater than the digit in the ones place.

Step Ahead
Read the clues. Write a matching numeral on the expander.

- a. I am greater than five and less than seven. I have more in the tenths place than in the hundredths place. I have more in the ones place than in the tenths place.
- b. I am less than nine and greater than four. The digit in the tenths place is a multiple of 3. The digit in the hundredths place is greater than the digit in the ones place.
II.6 Writing Hundredths as Decimal Fractions (with Teens and Zeros)

Each large square represents one whole.
How much has been shaded?
Write the amount on each expander below.

Which of these labels matches each expander above? How do you know?

What numbers are shaded below? How will you write each number on the expander?

Step Up 1. Complete the missing parts.

a. 

b. 

two and five hundredths
2. Read the number name. Then write the number on the expander.

   a. two and fourteen hundredths
      [Diagram: hundreds, tenths, hundredths]
   b. six and two hundredths
      [Diagram: ones, tenths, hundredths]
   c. ninety-four hundredths
      [Diagram: ones, tenths, hundredths]
   d. four and twenty hundredths
      [Diagram: ones, tenths, hundredths]

3. Write each number in words.

   a. 3.19
      [ ]
   b. 9.40
      [ ]
   c. 7.06
      [ ]
   d. 12.15
      [ ]

4. Write the matching decimal fraction and mixed number.

   a. six and seventeen hundredths
      [Diagram: ones, tenths, hundredths]
   b. six and seventy hundredths
      [Diagram: ones, tenths, hundredths]
   c. six and seven hundredths
      [Diagram: ones, tenths, hundredths]

**Step Ahead**

Loop the numerals that are the same as 705 hundredths.

- 0.705
- 7 5/10
- 7.05
- 7 5/100
- 0.75
Six students had a throwing competition using a ball made of scrunched paper. They measured the distance of their throws in metres and fractions of a metre. This table shows the results.

<table>
<thead>
<tr>
<th>Student</th>
<th>Anna</th>
<th>Cole</th>
<th>Peta</th>
<th>Franco</th>
<th>Sumi</th>
<th>Amos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance (m)</td>
<td>2.21</td>
<td>1.84</td>
<td>3.49</td>
<td>1.22</td>
<td>4.10</td>
<td>3.13</td>
</tr>
</tbody>
</table>

Mark the length of Peta’s throw on this number line. How did you work out the position?

When I said each number name aloud it was really easy to work it out. I looked at the value of the digit in the ones place first.

Was Sumi’s throw longer or shorter than Peta’s? How did you work it out?

Which student threw the greatest distance? How do you know?
Mark and label all the throws on the number line.

Step Up
Five students had a throwing competition. They played three rounds. Use this data to help you answer the questions on page 261.
1. Write the greatest distance that each student threw.

<table>
<thead>
<tr>
<th></th>
<th>Blake</th>
<th>Lela</th>
<th>Kayla</th>
<th>Carter</th>
<th>Luis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round 1</td>
<td>________ m</td>
<td>________ m</td>
<td>________ m</td>
<td>________ m</td>
<td>________ m</td>
</tr>
</tbody>
</table>

2. Write the distance of these students' throws for Round 2 and Round 3. Then write < or > to make each statement true.

<table>
<thead>
<tr>
<th></th>
<th>Round 2</th>
<th>Round 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blake</td>
<td>________ m</td>
<td>________ m</td>
</tr>
<tr>
<td>Lela</td>
<td>________ m</td>
<td>________ m</td>
</tr>
<tr>
<td>Kayla</td>
<td>________ m</td>
<td>________ m</td>
</tr>
<tr>
<td>Carter</td>
<td>________ m</td>
<td>________ m</td>
</tr>
<tr>
<td>Luis</td>
<td>________ m</td>
<td>________ m</td>
</tr>
</tbody>
</table>

3. Write the names of the students from shortest throw to longest throw for each round. Write the distance below each name.

<table>
<thead>
<tr>
<th></th>
<th>Round 1</th>
<th>Round 2</th>
<th>Round 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blake</td>
<td>________ m</td>
<td>________ m</td>
<td>________ m</td>
</tr>
<tr>
<td>Lela</td>
<td>________ m</td>
<td>________ m</td>
<td>________ m</td>
</tr>
<tr>
<td>Kayla</td>
<td>________ m</td>
<td>________ m</td>
<td>________ m</td>
</tr>
<tr>
<td>Carter</td>
<td>________ m</td>
<td>________ m</td>
<td>________ m</td>
</tr>
<tr>
<td>Luis</td>
<td>________ m</td>
<td>________ m</td>
<td>________ m</td>
</tr>
</tbody>
</table>

Step Ahead

a. Use 0, 1, and 2 to write four different decimal fractions. Use each digit once in each numeral.

b. Loop the least number in blue.

c. Loop the greatest number in red.
1. How much heavier is the typical Clydesdale horse than each of these?
   a. zebra kg
   b. horse kg
   c. donkey kg
   d. Shetland pony kg

2. What is the difference in mass between these animals?
   a. zebra and donkey kg
   b. donkey and horse kg

3. How much lighter is the typical Shetland pony than each of these?
   a. zebra kg
   b. horse kg
   c. donkey kg

4. Complete these.
   a. The and the together weigh less than the .
   b. The is lighter than the Shetland pony and the .

Step Ahead
Look at these balance pictures.
Draw tigers on the left side to make this balance picture true.

This table shows data about some adult bears.
How many kilograms heavier is the largest grizzly bear than the largest of each of the other bears? How do you know?
How many kilograms lighter is the smallest sun bear than the smallest of each of the other bears? How did you work out the answers?

What is the difference in the masses of these bears?

largest sun bear and largest sloth bear

smallest panda bear and smallest grizzly bear

### Step Up
Use this bar graph to answer Questions 1 to 4 on page 263.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Typical Masses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zebra</td>
<td>227 kg</td>
</tr>
<tr>
<td>Horse</td>
<td>482 kg</td>
</tr>
<tr>
<td>Shetland pony</td>
<td>198 kg</td>
</tr>
<tr>
<td>Donkey</td>
<td>271 kg</td>
</tr>
<tr>
<td>Clydesdale horse</td>
<td>726 kg</td>
</tr>
</tbody>
</table>

Bear | Mass (kg)
-----|----------------|
Black bear | 60–300
Giant panda | 75–130
Grizzly bear | 360–680
Sloth bear | 80–140
Polar bear | 400–600
Sun bear | 27–65
1. How much heavier is the typical Clydesdale horse than each of these?
   a. zebra ______ kg
   b. horse ______ kg
   c. donkey ______ kg
   d. Shetland pony ______ kg

2. What is the difference in mass between these animals?
   a. zebra and donkey ______ kg
   b. donkey and horse ______ kg

3. How much lighter is the typical Shetland pony than each of these?
   a. zebra ______ kg
   b. horse ______ kg
   c. donkey ______ kg

4. Complete these.
   a. The ______ and the ______ together weigh less than the ______.
   b. The ______ is lighter than the Shetland pony and the ______ together.

Step Ahead

Look at these balance pictures.

Draw tigers on the left side to make this balance picture true.
11.9 Solving Word Problems Involving Mass

What are some things that weigh about the same as this bag of sugar?

Look at this mass piece. What does g mean? How many of these mass pieces will balance one kilogram? How do you know?

How many of these mass pieces will balance one kilogram? How did you work it out?

Complete this sentence. _____ kilogram has the same mass as _____ grams.

What fraction of a kilogram does balance? How do you know?

What fraction of a kilogram does balance? How do you know?

How could you figure out the fraction of a kilogram that will balance?

How can you prove your answer is correct?

Step Up 1. Look at these four different mass pieces.

a. Colour the mass piece that is one-half of a kilogram.

b. Draw a ✓ on the mass piece that is one-quarter of a kilogram.

c. Draw an ✗ on the mass piece that is one-tenth of a kilogram.
2. Color the mass pieces you would need to make one kilogram.

   a. 
      
      b. 
      
      c. 
      
      d. 

3. Write how many \( \frac{1}{50} \) pieces would be needed to balance these mass pieces.

   a. 
      
      b. 
      
      c. 
      
      d. 

4. Draw combinations of two or more different mass pieces that make these totals.

   a. one kilogram

   b. one-half of a kilogram

Step Ahead

Write addition sentences to show four different ways you can make one kilogram with these mass pieces.
11.10 Revising Litres and Introducing Millilitres

What do you know about this pan balance picture?
How many grams are in the box on the right?

Complete this sentence to describe the picture.

One kilogram divided equally between 2 is _______ g each.

What would the balance picture look like for this sentence?

One kilogram divided equally among 5 is _______ g each.

What balance picture would show tenths of a kilogram on the left? How do you know?

Step Up

1. Write the mass in kilograms on each package.

a. 1000 grams of flour is the same as _______ kg

b. 500 grams of butter is the same as _______ kg
2. Draw a line to match each mass piece to the correct label.

![Image with match options and mass pieces]

3. Write the mass pieces from Question 2 that you would use for these.

   a. Two different pieces that total 1 kg
   
   b. Four pieces that total 1 kg
   
   c. The same two pieces that total \( \frac{1}{2} \) kg
   
   d. The same two pieces that total \( \frac{1}{4} \) kg
   
   e. The same two pieces that total 1 \( \frac{1}{2} \) kg

Step Ahead: Four bakers equally share these ingredients.

![Image with flour and butter containers]

   a. How much flour is in each share? _______ g
   
   b. How much butter is in each share? _______ g
II.11 Using Relative Position to Work with Kilograms

Look at these tins of fruit.

Which masses can you show on this number line? How do you know?

Mark and label $1\frac{1}{4}$ kg on the number line. Which tins balance this amount?

Mark and label $\frac{1}{2}$ kg on the number line. What is the total of $\frac{1}{2}$ kg and $1\frac{1}{4}$ kg?

Which tins can you use to show the total?

Step Up

I. Write the missing numbers on the line below. Then draw lines to show where each mass falls on the line.
2. a. What is the total mass of the tins of pears? _____ g
   
b. What is the difference in mass between the two tins of plums? _____ g
   
c. If you had each tin of apples, how much more would you need to make two kilograms? _____ g
   
d. How much heavier is the mixed fruit than the largest tin of pears? _____ g

3. Draw lines to show where each mass is on the scales.

   a. 5 1/2 kg
   
   b. 4 9/10 kg
   
   c. 4 1/2 kg
   
   d. 4 kg
   
   e. 3 3/4 kg
   
   f. 1/4 kg
   
   g. 3/4 kg
   
   h. 1 1/2 kg
   
   i. 7/10 kg
   
   j. 2 1/4 kg

Step Ahead

Look at the tins of fruit in Question 1. Draw and label other tins on the left side of these scales to make the balance picture true.
### Step Ahead

1. Work out and write the mass for each object.

2. Work out the total mass. Record your thinking.

3. Write the answers to these. Record your thinking.

   a. How much heavier is the encyclopedia than the dictionary?

   b. How much lighter is the novel than the dictionary?

   c. What is the mass of three novels?

   d. What is the mass of two dictionaries?

   e. How many novels would balance one encyclopedia?

   f. How much heavier are three dictionaries than one encyclopedia?

---

### Using a Mental Strategy to Solve Problems Involving Grams

**Which two items balance one-half of a kilogram? How did you work it out?**

I know that the soap and cake mix together make 500g. The cheese slices and the toothpaste are less than that so the total must be lighter than one kilogram.

**How can you work out if the total mass of these four items is heavier than or lighter than one kilogram?**

I started at 125 and counted on 75 to 200 and then another 10 to 210. The difference is 85 g.

**How can you work out the difference between the mass of the cheese slices and the mass of the soap?**

How can you work out how much heavier the toothpaste is than the soap?

Write a number sentence to show your thinking.

---

### Step Up

1. Record the mass of each book. Then use the numbers to answer Questions 2 and 3 on page 270.

   **a.** Encyclopedia _______ g

   **b.** Dictionary _______ g

   **c.** Novel _______ g
2. Work out the total mass. Record your thinking.

a. Encyclopedia and Novel

\[ \underline{\hspace{2cm}} \text{g} \]

b. Dictionary and Novel

\[ \underline{\hspace{2cm}} \text{g} \]

c. All three books

\[ \underline{\hspace{2cm}} \text{g} \]

3. Write the answers to these. Record your thinking.

a. How much heavier is the encyclopedia than the dictionary?

\[ \underline{\hspace{2cm}} \text{g} \]

b. How much lighter is the novel than the dictionary?

\[ \underline{\hspace{2cm}} \text{g} \]

c. What is the mass of three novels?

\[ \underline{\hspace{2cm}} \text{g} \]

d. What is the mass of two dictionaries?

\[ \underline{\hspace{2cm}} \text{g} \]

e. How many novels would balance one encyclopedia?

\[ \underline{\hspace{2cm}} \text{g} \]

f. How much heavier are three dictionaries than one encyclopedia?

\[ \underline{\hspace{2cm}} \text{g} \]

Step Ahead

Work out and write the mass for each object.

- \[ \boxed{750 \text{ g}} \]
- \[ \boxed{\hspace{2cm}} \text{g} \]
- \[ \boxed{\hspace{2cm}} \text{g} \]