Amplify Math
INDIANA

Grade 6

UNIT 3 | INDIANA LESSON 9A

Benchmark Fractions, Decimals and Percentages

FEATURING Amps POWERED BY desmos

Benchmark Fractions, Decimals, and Percentages

Let's describe parts of a whole in different ways.

Focus

Goals

1. Use reasoning to determine equivalent values of benchmark fractions, decimals, and percents.
2. **Language Goal:** Explain how to use benchmark fractions, decimals, and percentages to determine other benchmark values. **(Speaking and Listening)**

Coherence

Today

Students build their comfort and familiarity with commonly used values of fractions, decimals, and percentages. They are first asked to make connections between the forms in an area context on a 100 grid, supporting both a numeric and geometric understanding of the relationship between fractions, decimals, and percentages. As they play a game searching for equivalent forms of the representations, they further develop their fluency with these important values.

Previously

In Lessons 8–9, students developed an understanding of percentages as rates per 100 and used double number lines to represent percentages.

Coming Soon

In Lessons 11–12, students will generalize processes for determining an unknown part or an unknown whole in a percentage problem.

Rigor

- Students build **fluency** computing equivalent values of benchmark fractions, decimals, and percentages.

Standards

Addressing

6.NS.5
Know commonly used fractions (halves, thirds, fourths, fifths, eighths, tenths) and their decimal and percent equivalents. Convert between any two representations (fractions, decimals, percents) of positive rational numbers without the use of a calculator.

Pacing Guide

Suggested Total Lesson Time ~**45 min**

Warm-up	Activity 1	Summary	Exit Ticket
15 min	20 min	5 min	5 min
Pairs	Pairs	Whole Class	Independent
MP7	MP8, MP1		
6.NS.5	6.NS.5		6.NS.5

Amps powered by desmos | **Activity and Presentation Slides**

For a digitally interactive experience of this lesson, log in to Amplify Math at learning.amplify.com.

Practice

Independent

Materials

- Exit Ticket
- Additional Practice
- Activity 1 PDF, *Equivalent Parts of a Whole Bingo*
- Activity 1 PDF, *100 Grids*
- Anchor Chart PDF, *Benchmark Fractions, Decimals, and Percentages*
- a collection of small objects to mark bingo cards.

Math Language Development

Review words

- *percent*
- *percentage*

Amps | **Featured Activity**

Activity 1

Instant Feedback

As students reason about equivalent values, they get instant feedback that compares their value with the correct value.

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Building Math Identity and Community

Connecting to Mathematical Practices

Students may feel anxious about not working quickly enough to keep up a certain pace during the bingo game **(MP1)**. Encourage students to check with a partner to see whether their partner found different equivalent values from their own set of values.

Modifications to Pacing

You may want to consider these additional modifications if you are short on time.

- In the **Warm-up**, Problem 2 may be omitted.
- In **Activity 1**, you can modify the goal to be "four in a row," to decrease the length of the time needed to complete the game.

Pairs | 15 min

Warm-up One Picture, A Thousand Words?

MP7
6.NS.5

Students analyze a picture of shaded spaces on a 100 grid to describe parts of a whole in different ways.

Name: ..... Date: ..... Period: .....

Unit 3 | Indiana Lesson 9A

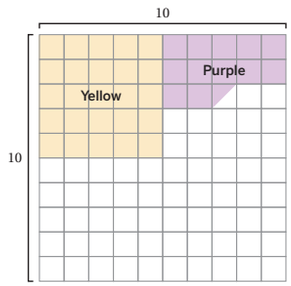
Benchmark Fractions, Decimals, and Percentages

Let's describe parts of a whole in different ways.

Warm-up One Picture, A Thousand Words?

Elena looked at the picture and thought, "25% of the picture is shaded yellow." Diego looked at the picture and thought, "The area shaded purple is half the size of the area shaded yellow."

1. How many other unique ways can you find to describe this picture?



Sample Responses:

- Less than half of the picture is shaded.
- $\frac{3}{8}$ of the picture is shaded.
- $37\frac{1}{2}$ small squares are shaded.
- $\frac{37.5}{100}$ of the picture is shaded.
- 37.5% of the picture is shaded.
- $\frac{67.5}{100}$ of the picture is not shaded.
- 67.5% of the picture is not shaded.
- 0.675 of the picture is not shaded.
- $\frac{1}{4}$ of the picture is shaded yellow.
- $\frac{25}{100}$ of the picture is shaded yellow.
- 25% of the picture is shaded yellow.
- 0.125 of the picture is shaded purple.
- $\frac{1}{8}$ of the picture is shaded purple.
- $\frac{12.5}{100}$ of the picture is shaded purple.
- 12.5% of the picture is shaded purple.
- 0.125 of the picture is shaded yellow.

2. Write one way in which a classmate described the picture differently from your own descriptions.

Answers may vary.

Log in to Amplify Math to complete this lesson online.

1 Launch

Activate prior knowledge by asking, "How does a 100 grid relate to percentages?"

2 Monitor

Help students get started by asking, "If there are 100 small squares in the picture, how much is each small square worth, as a percent? How can you determine the percent for any area on a 100 grid?"

Look for points of confusion:

- **Thinking that you cannot have half of a percent.** Ask, "How many small squares are shaded purple? Is it possible to have a part of a part?"

Look for productive strategies:

- Using more than one numerical representation — a decimal, fraction, or percent — to describe the same region.
- Describing the area shaded purple as $\frac{1}{8}$ of the whole picture.
- Describing the area shaded purple as 12.5% of the whole because it is half of 25%. **(MP7)**

3 Connect

Display the picture from the Warm-up.

Have students share reasoning that makes the connection between fractions and percentages in the picture explicit.

Highlight how students can use the relationships between fractions to help reason about relationships between percentages. For example, if students know that $\frac{1}{8}$ is half of $\frac{1}{4}$, they could reason that $\frac{1}{8}$ is equivalent to 12.5%, as this is half of 25%.

Ask:

- "What percent can you associate with $\frac{4}{8}$?"
- "What percent can you associate with $\frac{3}{8}$?"
- "What decimal can you associate with $\frac{3}{8}$?"

Differentiated Support

Accessibility: *Vary Demands to Optimize Challenge*

Have students set a goal to write two more unique statements. If they meet the goal, then they can challenge themselves to write more.

Power-up

To power up students' ability to reason about using benchmarks to find fractional amounts of a number, ask students to:

1. Partition the grid from the Warm-up into fourths and give the number of small squares in each fourth.
2. Cut each of the fourths in half, and give the number of small squares in each half of a fourth.

Use: Before the Activity 1.

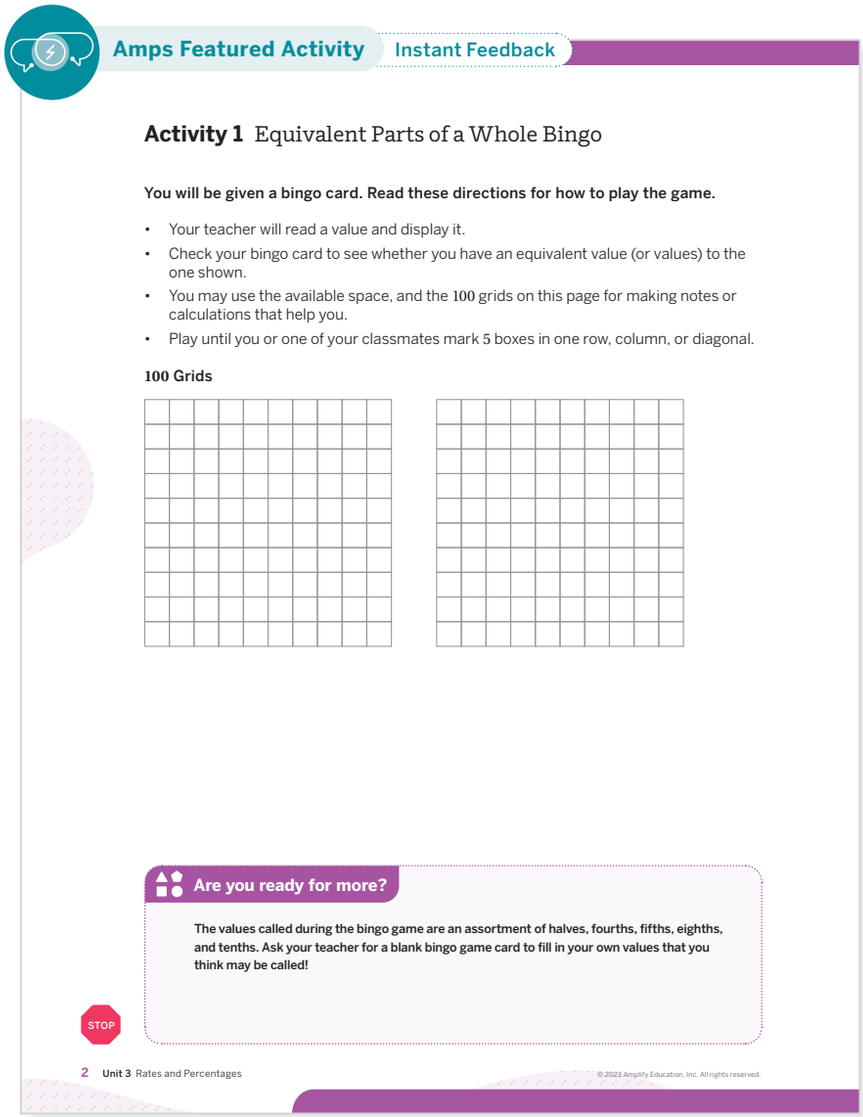
Informed by: Lesson 9, Practice Problem 6

Pairs | 20 min

Activity 1 Equivalent Parts of a Whole Bingo

MP8, MP1
6.NS.5

Students play a game of bingo identifying equivalent values to build fluency with benchmark fractions, decimals, and percentages.



Amps Featured Activity Instant Feedback

Activity 1 Equivalent Parts of a Whole Bingo

You will be given a bingo card. Read these directions for how to play the game.

- Your teacher will read a value and display it.
- Check your bingo card to see whether you have an equivalent value (or values) to the one shown.
- You may use the available space, and the 100 grids on this page for making notes or calculations that help you.
- Play until you or one of your classmates mark 5 boxes in one row, column, or diagonal.

100 Grids

Are you ready for more?

The values called during the bingo game are an assortment of halves, fourths, fifths, eighths, and tenths. Ask your teacher for a blank bingo game card to fill in your own values that you think may be called!

STOP

2 Unit 3 Rates and Percentages

1 Launch

Distribute bingo cards from the Activity 1 PDF, *Equivalent Parts of a Whole Bingo*. Read the directions and then tell students you will display all the values that have been called, so they do not need to feel rushed each time a new value is shown. Provide access to the Activity 1 PDF, *100 Grids*.

2 Monitor

Help students get started by having them write down any equivalent values they already know in the empty space on their page.

Look for points of confusion:

- **Thinking there is only one value to mark for each value shown.** Have students look carefully over their entire bingo card to check for multiple equivalent values.

Look for productive strategies:

- Noticing that equivalent decimal and percent values can be checked for by looking for similar arrangements of digits. **(MP8)**

3 Connect

Have students share examples of how knowing one benchmark fraction, decimal, or percent can help them determine another value more efficiently.

Display the Anchor Chart PDF, *Benchmark Fractions, Decimals, and Percents*, to the class. Say, "This chart shows some benchmark values. Which are missing? Where should they go?" Then complete the Anchor Chart together with the students.

Highlight that some less-common benchmark values, such as $\frac{5}{8}$, can be decomposed into more common benchmark values. $\frac{5}{8}$ can be thought of as being composed of $\frac{4}{8}$ and $\frac{1}{8}$, which can help with reasoning about the percent or decimal value of $\frac{5}{8}$.

Ask, "Which benchmark value do you think is the most common? Which is the least common?"

Differentiated Support

Accessibility: *Optimize Access to Tools*

Provide access to Activity 1 PDF, *100 Grids*. This will ensure that using visual representations for decimals and percents are available to all students.

Accessibility: *Guide Processing and Visualization*

Encourage students to write the equivalent values next to each other in their bingo boxes. These can then serve as a reference for other related equivalent values.

Math Language Development

MLR8: Discussion Supports

During the Connect, as students share their methods for converting from decimals to percents and vice versa, revoice their ideas in the form of a question using appropriate mathematical language or language from the context. For example:

If a student says . . .	Revoice their ideas by asking . . .
I moved the decimal point over two places.	By moving the decimal point, did you multiply or divide by 100?

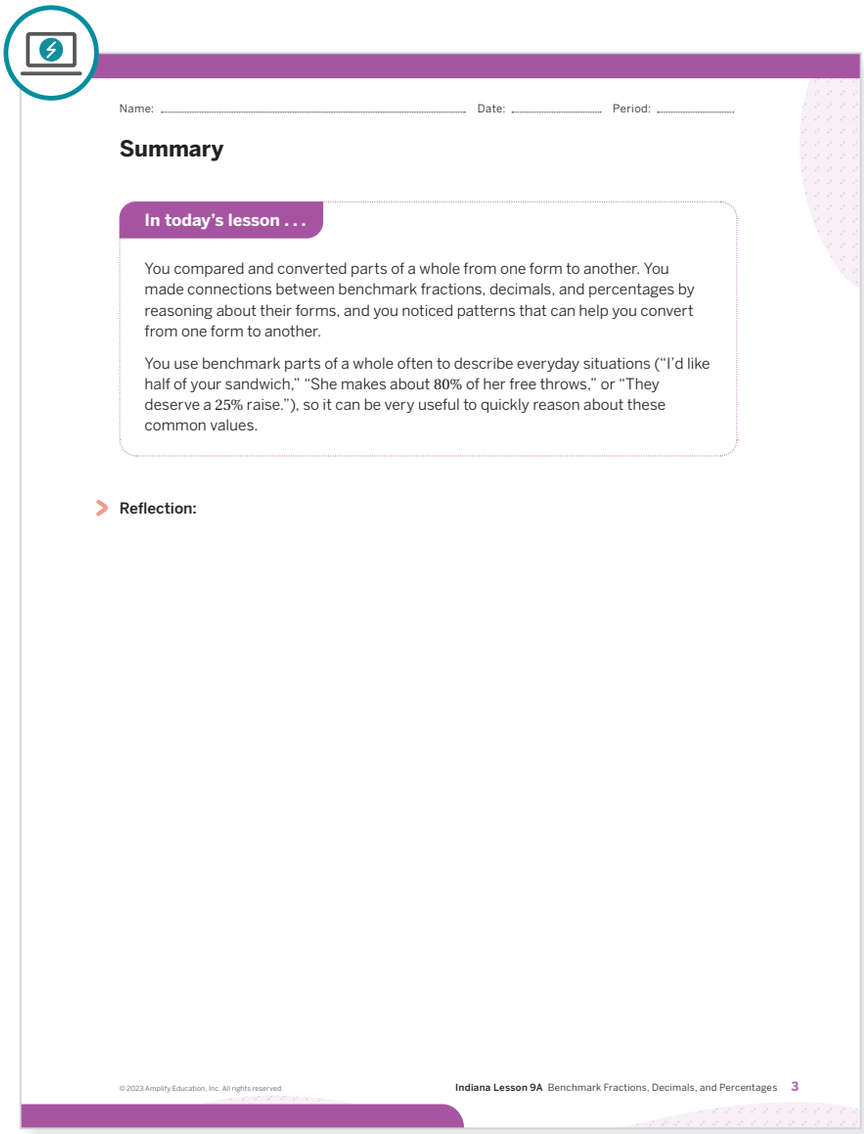
English Language Learners

Model the language of decimal places: tenths, hundredths, thousandths.

Whole Class | 5 min

Summary

Review and synthesize the utility of being able to move fluently between equivalent benchmark fractions, decimals, and percentages.



Name: ..... Date: ..... Period: .....

Summary

In today's lesson . . .

You compared and converted parts of a whole from one form to another. You made connections between benchmark fractions, decimals, and percentages by reasoning about their forms, and you noticed patterns that can help you convert from one form to another.

You use benchmark parts of a whole often to describe everyday situations ("I'd like half of your sandwich," "She makes about 80% of her free throws," or "They deserve a 25% raise."), so it can be very useful to quickly reason about these common values.

Reflection:

Synthesize

Display the completed Anchor Chart PDF, *Benchmark Fractions, Decimals, and Percentages*.

Have students share with a partner where they tend to see each type of representation — fractions, decimals, and percents — typically used. You may want to prompt students by asking whether anyone has ever cooked using a recipe before, and which type of numbers were used.

Highlight that different people can prefer, or be more familiar with, one type of representation over another. It is useful, and can be very helpful when talking about a part of a whole quantity, to be able to move flexibly between the different representations.

Ask:

- "Can benchmark fractions, decimals, or percents be used to find other, non-benchmark fractions, decimals, or percents? If yes, how so?"
- "Are there any fractions, decimals, or percents that you did *not* see today, but that you would consider a common value? Why?"

Reflect

After synthesizing the concepts of the lesson, allow students a few moments for reflection. Encourage them to record any notes in the *Reflection* space provided in the Student Edition. To help them engage in meaningful reflection, consider asking:

- "What does it mean for a fraction, decimal, or percentage to be a *benchmark*?"

Independent | 5 min

Exit Ticket

6.NS.5

Students demonstrate their understanding by converting benchmark values to other, equivalent forms.

Printable

Name: ..... Date: ..... Period: .....

Exit Ticket 3.9A

Convert each value to the indicated equivalent values. Explain or show your thinking.

a 70%

Decimal:

0.7

Sample response:
I divided 70 by 100.

Fraction:

$\frac{7}{10}$

Sample response:
I rewrote the decimal 0.7 as $\frac{7}{10}$.

b 0.125

Percent:

12.5%

Sample response:
I multiplied 0.125 by 100.

Fraction:

$\frac{1}{8}$

Sample response:
I knew that 12.5% was half of 25%, and $\frac{1}{8}$ is half of $\frac{1}{4}$.

c $\frac{3}{5}$

Decimal:

0.6

Sample response:
I know that $\frac{1}{5}$ is 0.2, so I multiplied 0.2 by 3.

Percent:

60%

Sample response:
I multiplied the decimal 0.6 by 100.

Self-Assess

1	2	3
I don't really get it	I'm starting to get it	I got it

a I can use the relationships between benchmark fractions, decimals, and percentages to reason about their equivalent values.

1 2 3

b I can convert between any two representations of benchmark parts of a whole without using a calculator.

1 2 3

Success looks like . . .

1. **Goal:** Using reasoning to determine equivalent values of benchmark fractions, decimals, and percents.
   - Determining an appropriate equivalent value for each benchmark part of a whole given.
2. **Language Goal:** Explaining how to use benchmark fractions, decimals, and percents to determine other benchmark values. **(Speaking and Listening)**
   - Providing an explanation for how they know the two values are equivalent.

Suggested next steps

- If students represent 0.125 as 125%, consider:
  - » Reviewing the value, compared to the whole, of the purple shaded area from the Warm-up.
  - » Asking, "Is 0.125 greater or less than one whole? What amount represents one whole as a percent?"
- If students represent 70% as $\frac{70}{100}$, consider:
  - » Noting that this is an equivalent value, but that it is not expressed as a benchmark.
  - » Asking, "Can you simplify $\frac{70}{100}$ so that the denominator is a half, fourth, eighth, fifth, or tenth?"

Professional Learning

This professional learning moment is designed to be completed independently or collaboratively with your fellow mathematics educators. Prompts are provided so that you can reflect on this lesson before moving on to the next lesson.

Points to Ponder . . .

- What worked and didn't work today? Which students' ideas were you able to highlight during Activity 1?
- In this lesson, students were expected to move fluently between fractions, decimals, and percents. How did that build on the earlier work students did with percentages? What might you change for the next time you teach this lesson?

Practice

Independent

Name: _____ Date: _____ Period: _____

1. Complete the blank spaces in each row of the table with the missing equivalent values.

	Decimal	Fraction	Percent
a	0.8	$\frac{4}{5}$	80%
b	0.75	$\frac{3}{4}$	75%
c	1	$\frac{2}{2}$	100%
d	0.875	$\frac{7}{8}$	87.5%

2. Complete each statement in the way that makes the most sense to you.

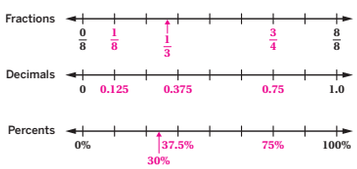
a. If $\frac{1}{8}$ is equivalent to 0.125, then $\frac{1}{4}$ must be equivalent to 0.25 because . . .
Sample response: 0.25 is double 0.125.

b. If $\frac{4}{5}$ is equivalent to 80%, then $\frac{2}{5}$ must be equivalent to 40% because . . .
Sample response: 40% is half of 80%.

c. If $\frac{3}{8}$ is equivalent to 0.375, then $\frac{3}{4}$ must be equivalent to 0.75 because . . .
Sample response: 0.75 is double 0.375.

3. Place each of the values in the appropriate place on the number lines. You may use approximate locations where necessary.

$\frac{1}{8}$ 0.375 0.75 75% 30% $\frac{1}{3}$ $\frac{3}{4}$ 0.125 37.5%

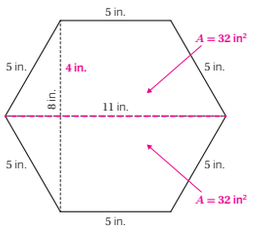


Name: _____ Date: _____ Period: _____

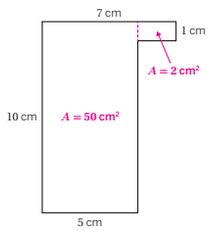
4. Andre paid $13 for 3 books. Diego bought 12 books priced at the same rate. How much did Diego pay for the 12 books? Show or explain your thinking.
$52; Sample response: Diego paid $52 for the 12 books because he bought 4 times as many books as Andre at the same rate. So, 13 • 4 = 52.

Money paid ($)	Number of books
13	3
52	12

5. Determine the area of each figure. Note: Figure may not be drawn to scale.

a.


32 + 32 = 64, $A = 64$ in²

b.


50 + 2 = 52, $A = 52$ cm²

6. Determine whether each product will be *less than*, *greater than*, or *equal to* 40.

a. $\frac{6}{4} \cdot 40$ Greater than 40

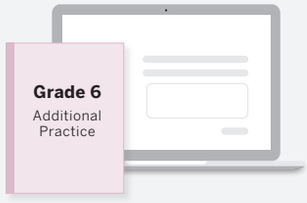
b. $\frac{8}{8} \cdot 40$ Equal to 40

c. $\frac{1}{2} \cdot 40$ Less than 40

Practice Problem Analysis

Type	Problem	Refer to	Standard(s)	DOK
On-lesson	1	Activity 1	6.NS.5	1
	2	Activity 1	6.NS.5	2
	3	Activity 1	6.NS.5	2
Spiral	4	Unit 2 Lesson 16	6.AF.9	2
	5	Unit 1 Lesson 13	6.GM.4	2
Formative	6	Unit 3 Lesson 11	5.C.6	1

Additional Practice Available



For students who need additional practice in this lesson, assign the **Grade 6 Additional Practice**.

My Notes:

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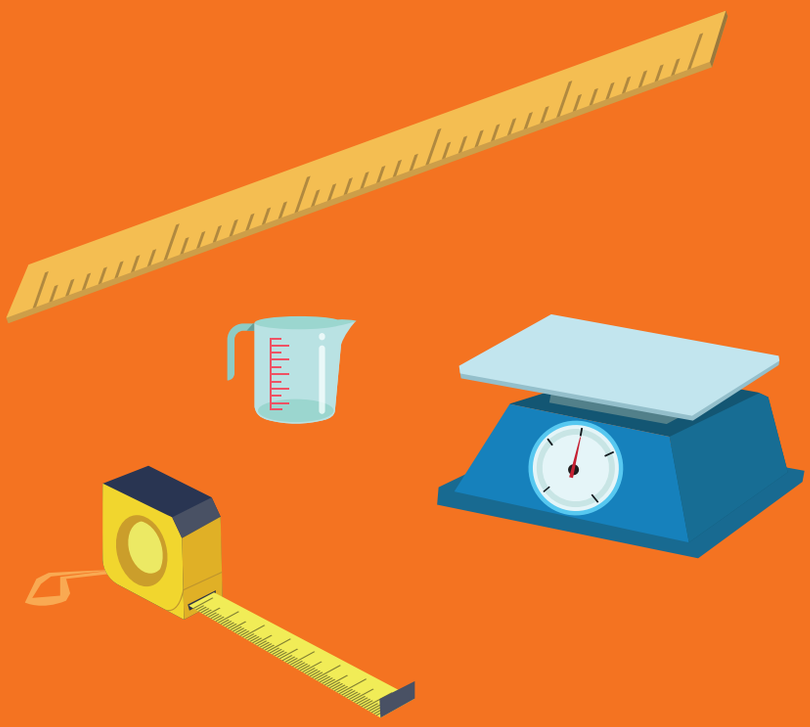
For more information on Amplify Math, visit **indianamath.amplify.com**.



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