



Representing Ratios and Percents

Independent Practice

Directions: Cut out the ratio cards, percent cards, and percent bars below and paste them next to matching problem situation.

Problem 1:

<p>6 players on a basketball team were boys and 4 players were girls. What is the ratio of boys to the total number of players? What is the percent of boys on the basketball team?</p>	Ratio Card	Percent Card
	Percent Bar	

Problem 2:

<p>There are 3 types of fruit in a basket. 5 were apples, 12 were bananas, and 15 were oranges. What is the ratio of bananas to the total pieces of fruit? What percent of the fruit is bananas?</p>	Ratio Card	Percent Card
	Percent Bar	

Problem 3:

<p>Jeremy emptied his pocket and had 3 quarters, 6 pennies, 2 dimes, and 5 nickels. What is the ratio of quarters and nickels to the total number of coins? What percent of coins are quarters and nickels?</p>	Ratio Card	Percent Card
	Percent Bar	



Name _____ Date _____

Debriefing Questions

1. How are a percent and a ratio related?
2. Why are percents useful?
3. If a percent is a part of the whole, what is the "whole?"

Ratio Cards:

$\frac{3}{8}$	$\frac{3}{5}$	$\frac{1}{2}$
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Percent Card:

60%	50%	37.5%
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Percent Bars:

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RATIOS AND PERCENTS



The student is expected to represent ratios and percents with concrete models, fractions, and decimals.



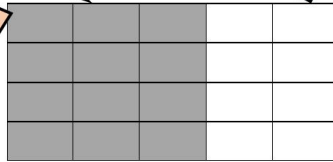
TELL ME MORE...

A **ratio** represents a relationship between of two numbers and is used to describe comparisons. Ratios can be part-to-whole, comparing the parts of a whole to the whole itself, or part-to-part, comparing different parts of the same whole. Ratios are often represented in fraction form in simplest terms, but can also be shown as a decimal.

In the model, the ratio of shaded boxes to the number of boxes in the whole model is $\frac{12}{20}$ or $\frac{3}{5}$ or 0.6.

The ratio of non-shaded boxes to the number of boxes in the whole model is $\frac{2}{5}$ or 0.4, which is equivalent to 40%.

The percent of shaded boxes out of the total number of boxes is 60% which is equivalent to the part-to-whole ratio $\frac{3}{5}$.



A part-to-part ratio of non-shaded to shaded boxes is $\frac{8}{12} = \frac{3}{4} = 0.75$. Part-to-part ratios are represented with fractions or decimals.

Part-to-whole ratios can also be shown in percent form. If the whole is divided into 100 equal-sized pieces, a **percent** is number of those 100 pieces representing the part of the whole. The whole amount in a percent is 100%, representing all of something.

- This means a percent is a ratio of a part out of 100.
- A percent that is larger than 100% represents a ratio larger than 1 whole.
- A percent between 0 and 100% represents a ratio that is between 0 and 1 whole.
- Percents have a fraction and decimal equivalent form.



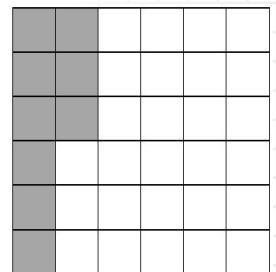
EXAMPLES

EXAMPLE 1: The shaded area on the grid represents the part of a rectangular garden that is planted with tomato plants. Each small square in the garden has the same dimensions. Determine the ratio of the area planted with tomatoes to the area of the entire garden and the percent of the garden that is planted with tomatoes. Use a model to support your solution.

STEP 1 Determine the number of squares that make up the whole garden area.

- The grid has 6 squares across and 6 squares down.

The whole area is 36 square units.



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STEP 2 Determine the number of squares that make up the tomato section.

There are 9 square units of tomatoes.

STEP 3 Write the ratio of tomato area to total area.

$$\frac{\text{Tomato Area}}{\text{Total Area}} = \frac{9}{36} = \frac{9 \div 9}{36 \div 9} = \frac{1}{4}$$

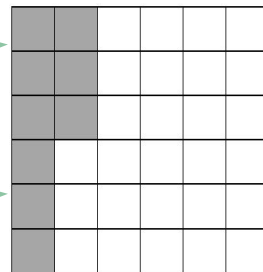
The portion of the garden used for tomatoes is $\frac{1}{4}$.

STEP 4 Write the ratio of tomato area to total area as a percent.

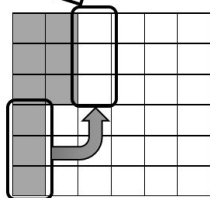
$$\frac{1 \times 25}{4 \times 25} = \frac{25}{100} = 25\%$$

The tomato area (shaded region) is 9 squares.

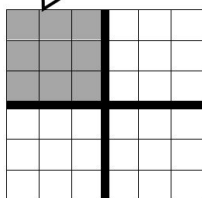
The total area is 36 squares.



Move 3 shaded squares here.



$\frac{1}{4} = 25\%$ of the grid is shaded.



The tomato plants use 25% of the garden area.

EXAMPLE 2: The shaded area on the diagram represents the part of a chocolate bar that Ivy shared with her friends at lunch. Each section of the chocolate bar has the same dimensions. Write a fraction, percent and decimal to show the portion of the chocolate bar that Ivy kept.



STEP 1 Determine the number of sections of the whole chocolate bar and the portion that Ivy kept.

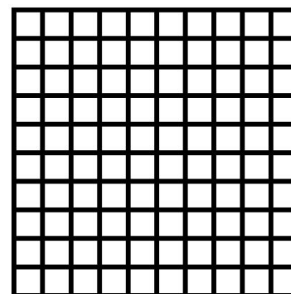
- The model shows 8 squares, so the whole chocolate bar has 8 sections.
- There are 5 shaded sections which Ivy shared with her friends.
- Ivy kept the 3 non-shaded sections.

Ivy kept 3 out of 8 pieces of the bar.

YOU TRY IT!

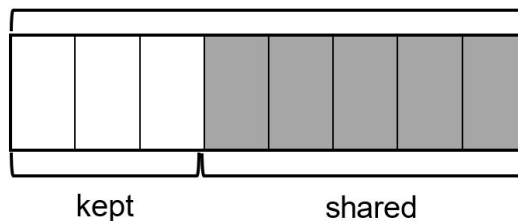
Robin has mowed 45% of the back yard. What percent and decimal represent the portion of the yard that was not mowed?

- Shade the 10×10 grid model to represent 45%.



- $\frac{\text{Yard Not Mowed}}{\text{Total Yard}} = \underline{\hspace{2cm}}$
- Percent of yard not mowed: $\underline{\hspace{2cm}}$
- Decimal representing the portion of the yard that is NOT mowed: $\underline{\hspace{2cm}}$

whole



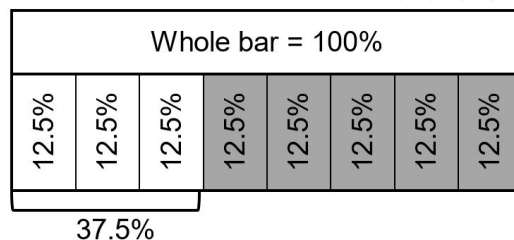
STEP 2 Write the ratio of the number of sections Ivy kept to the number of sections in the whole chocolate bar as a fraction.

- 3 out of 8 can be written with 3 in the numerator (part) and 8 in the denominator (whole).

3/8

STEP 3 Write the ratio as a percent.

- 100% represents the length of the whole chocolate bar which is divided into 8 equal-sized sections.
- $100 \div 8 = 12.5$, so each section is 12.5% of the whole chocolate bar.
- 3 sections of the chocolate bar is 3 times the partial products for this multiplication.
- $12.5 \times 3 = (12 \times 3) + (0.5 \times 3) = 36 + 1.5 = 37.5$



Ivy kept 37.5% of the chocolate bar for herself.

STEP 4 Write the ratio as a decimal.

- A percent is a value out of 100.
- Divide 37.5 by 100 to find its decimal equivalent.
- Dividing by a power of 10 moves the decimal to the left the number of place values represented by the power of 10.

$$\frac{37.5}{100} = 37.5 \div 100$$

$$\frac{37.5}{100} = 0.375$$

Ivy kept 0.375 of the chocolate bar for herself.

EXAMPLE 3: 40 people attended a family reunion. 25 of the people at the reunion are adults. What fraction best represents the ratio of children to adults at the family reunion?

STEP 1 Determine the number of children at the reunion.

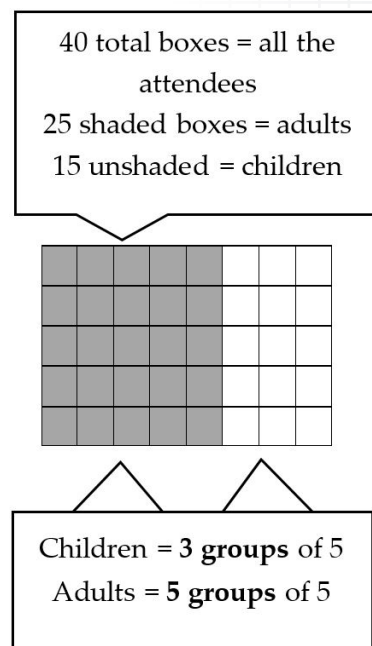
- 40 total people attended the reunion.
- 25 of the people were adults.
- Subtract 25 from 40.

There are 15 children at the reunion.

STEP 2 Write a part-to-part ratio of children to adults as a fraction in lowest terms.

- 15 children
- 25 adults
- $\frac{\text{children}}{\text{adults}} = \frac{15}{25} = \frac{15 \div 5}{25 \div 5} = \frac{3}{5}$

There ratio of children to adults is $\frac{3}{5}$.

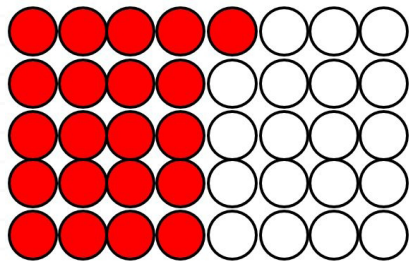




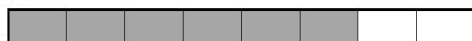
PRACTICE

Use the following information for questions 1-3.

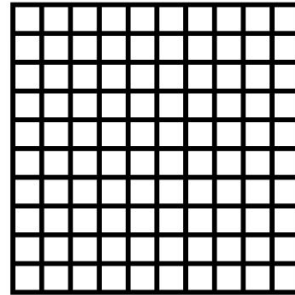
In the model, the shaded circles represent adults surveyed that report being a registered organ donor.



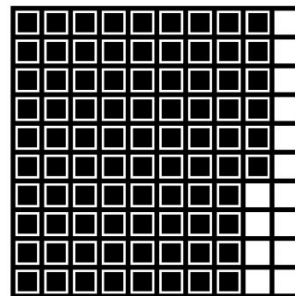
1. What fraction of surveyed adults are registered organ donors?
2. What percent of surveyed adults are registered organ donors?
3. What decimal value represents the portion of surveyed adults who are NOT registered organ donors?
4. The diagram represents a strip of sidewalk being constructed. The shaded boxes represent the percent of the sidewalk that has just been paved with cement. What decimal also represents the value?



5. Mark has completed 1 out of 5 of the levels in his new video game since he started playing yesterday. Use the grid below to represent the percent of the game levels Mark has NOT completed.



6. The shaded area on the grid represents the portion of people surveyed who like chocolate.



What decimal represents the portion of people surveyed who do NOT like chocolate? Record your answer and fill in the bubbles. Be sure to use the correct place value.

					.		
+	0	0	0	0		0	0
-	1	1	1	1		1	1
	2	2	2	2		2	2
	3	3	3	3		3	3
	4	4	4	4		4	4
	5	5	5	5		5	5
	6	6	6	6		6	6
	7	7	7	7		7	7
	8	8	8	8		8	8
	9	9	9	9		9	9

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7. Marsha is reading a novel that contains 440 pages. So far she has read 242 pages in the book. What fraction represents the portion of the book that she has read?

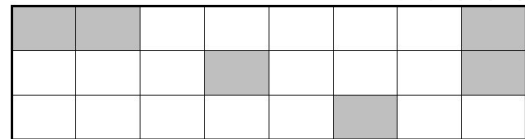
9. Allison has a collection of colored gel pens. Of the 15 pens, 6 are either pink or purple. What decimal can be used to describe the ratio of pink and purple pens to all the gel pens?

F 0.6
G 0.4
H 0.9
J 0.06

8. A farmer owns 25 acres of land, but only 30% of his land is suitable for farming. What fraction can be used to represent the portion of his land that is unavailable for farming?

A $\frac{3}{10}$
B $\frac{5}{14}$
C $\frac{3}{7}$
D $\frac{7}{10}$

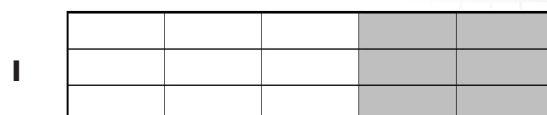
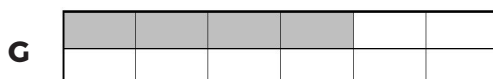
10. The diagram below represents the tasks that Samantha has to complete in order to earn her next scouting badge. The shaded boxes represent the completed tasks.



What percent of the badge requirements has Samantha completed?

A 6%
B $33\frac{1}{3}\%$
C 25%
D 75%

11. A football team won $66\frac{2}{3}\%$ of their games in the season. Which model can be used to express the relationship of wins to the number of games played by using shading to represent games won?



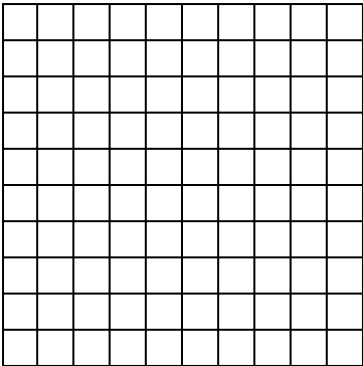
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Performance Task: 6.4E
Rates and Ratios: Jawbreaker Machine

Amir works for a candy company. He is working on a plan for a new type of jawbreaker machine that will be shipped to candy stores. He plans to fill the machine with $\frac{1}{4}$ red jawbreakers, 0.3 blue jawbreakers, $\frac{2}{5}$ green jawbreakers, and 0.05 yellow-speckled jawbreakers. He needs to prepare a visual model as he presents his idea to the rest of his team and plans to shade a 10 by 10 grid to show the ratio for each color in the machine. He also plans to present the amount of jawbreakers of each color needed to fill the machine so the team can project the amount of jawbreakers that must be shipped to each store along with the machine.

- What does Amir’s visual model look like?
- If the machine will hold 960 jawbreakers, how many of each color are needed?

Justify your reasoning.



Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points: _____

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1. What is the ratio of red jawbreakers in the machine?
2. If there are 100 jawbreakers in the machine, what is the equivalent ratio of red jawbreakers?
3. What percent of the jawbreakers in the machine are red?
4. What is the ratio of blue jawbreakers in the machine?
5. If there are 100 jawbreakers in the machine, what is the equivalent ratio of blue jawbreakers?
6. What percent of the jawbreakers in the machine are blue?
7. What is the ratio of green jawbreakers in the machine?
8. If there are 100 jawbreakers in the machine, what is the equivalent ratio of green jawbreakers?
9. What percent of the jawbreakers in the machine are green?

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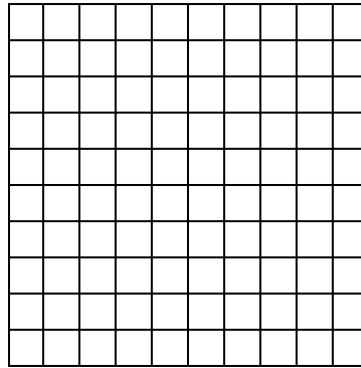
10. What is the ratio of yellow-speckled jawbreakers in the machine?

11. If there are 100 jawbreakers in the machine, what is the equivalent ratio of yellow-speckled jawbreakers?

12. What percent of the jawbreakers in the machine are yellow-speckled?

13. If Amir uses a 10 by 10 grid and shades it according to the percent of each color in the machine:

- What does Amir's visual model look like?
- How many of squares are shaded for each color?



14. If the machine will hold 960 jawbreakers how many of each color will it contain?

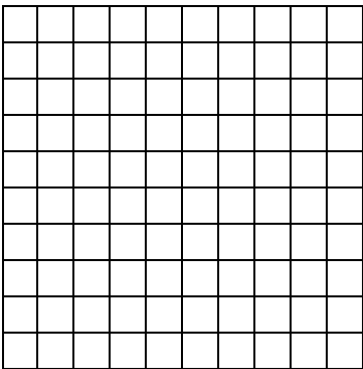


Performance Task: 6.4E
Rates and Ratios: Jawbreaker Machine

Amir works for a candy company. He is working on a plan for a new type of jawbreaker machine that will be shipped to candy stores. He plans to fill the machine with $\frac{1}{4}$ red jawbreakers, 0.3 blue jawbreakers, $\frac{2}{5}$ green jawbreakers, 0.05 yellow-speckled jawbreakers. He needs to prepare a visual model as he presents his idea to the rest of his team and plans to shade a 10 by 10 grid to show the ratio for each color in the machine.

- What does Amir’s visual model look like?

Justify your reasoning.



Procedural	0	1	2
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Performance Task: 6.4E
Rates and Ratios: Jawbreaker Machine

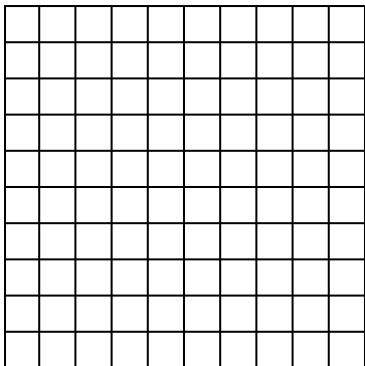
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- What does Amir’s visual model look like?
- If the machine will hold 960 jawbreakers, how many of each color are needed?

Amir’s team wants to add orange jawbreakers and white-mystery jawbreakers to the machine colors. The team suggests cutting the ratios for red, blue, and green in half, keeping the amount of yellow-speckled jawbreakers the same, and making the white-mystery color equal to 0.1 of the machine amount.

- What percent of the machine is each color based on the new team plans?
- How many of each color will be shipped with the machine to fill it?

Justify your reasoning.



Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points: _____

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