

Chapter 6: Ratio and Percent

Lesson 1 – Ratios

Learning Goals: Identify and model ratios to describe situations.

Question:



Irina has a set of nesting dolls.

- Write three ratios to describe the nesting dolls. Explain what each ratio compares.
- Describe another doll that you could add to the set so that the ratio 4:2 would describe the dolls. Model this ratio using counters. Sketch your model.

Answer:

- For example,
4 : 1 compares the number of dolls with blue to the number of dolls with no blue;
1 : 4 compares the number of dolls with no blue to the number of dolls with blue;
1 : 5 compares the doll with no blue to all the dolls.
- For example, I could add another doll with no blue on it and then there would be 4 dolls with blue compared to 2 with no blue.



At-Home Help

A ratio is a comparison of numbers or quantities that are measured in the same units. The ratio that compares a to b is read “ a to b ” and is written $a : b$.

For example,



The ratio of stars to squares is 2 : 1. The ratio of squares to stars is 1 : 2. These are part-to-part ratios. The ratio of stars to all the shapes is 2 : 3. The ratio of squares to all the shapes is 1 : 3. These are part-to-whole ratios.

Lesson 2 - Equivalent Ratios

Learning Goals: Use equivalent ratios to solve problems.

Question:

The ratio of the number of boys to the total number of students is 3:5 in three Grade 6 classes. Solve the following problems about the three classes. Explain your thinking.

- If there are 18 boys in Class 6A, how many students are in the class?
- If there are 20 students in Class 6B, how many boys are in the class?
- If there are 10 girls in Class 6C, how many boys are in the class?

Answer:

- For example, I used 3 red counters to represent the boys in the class. I knew that 5 represented the total students in the class, so there are $5 - 3 = 2$ girls for every 3 boys. I used 2 blue counters to represent the girls. Then I put out groups of 3 red and 2 blue counters until there were 18 red counters to represent the 18 boys. There were 30 counters altogether, so there are 30 students in the class.
- For example, I know there are 3 boys in each group of 5 students. 20 students is 4 groups of 5. There must be 4 groups of 3 boys. That is 12 boys, so there are 12 boys in the class.
- For example, the ratio of girls to the whole class must be 2:5 since there are 2 girls for each 5 students. If there are 10 girls, that is 5 groups of 2, so there must be 5 groups of 5, or 25 students in the whole class, and 5 groups of 3, or 15, boys.

At-Home Help

Equivalent ratios are ratios that describe the same comparison.

For example, this diagram shows that 5:10 is equivalent to 1:2.



There are 5 circles and 10 squares. The ratio of circles to squares is 5:10. There is 1 circle for every 2 squares. The ratio of circles to squares can also be written as 1:2. So 5:10 is equivalent to 1:2, or $5:10 = 1:2$.

Lesson 3 – Percents

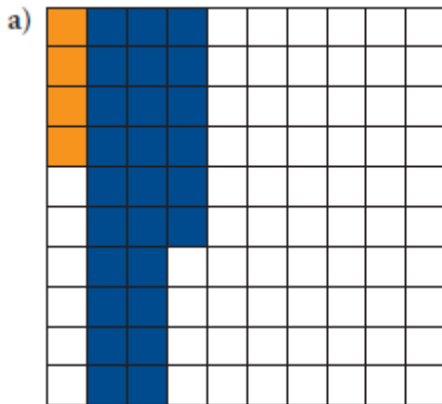
Learning Goals: Represent and describe parts of a whole using percents.

Question:

In 2006, about 4 of every 100 Aboriginal people in Canada were Inuit. About 26% were Métis.

- a) Show each value on a hundredths grid.
- b) About how many times as many Aboriginal people were Métis than Inuit? How do you know?
- c) What percent of Aboriginal people were neither Inuit nor Métis? How do you know?

Answer:



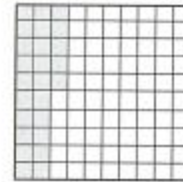
- b) About six times as many; for example, I know that $6 \times 4 = 24$, and 26 is close to 24.
- c) 70% were neither Inuit nor Métis since 70 squares are left when you colour 4 + 26 squares on the hundredths grid.

At-Home Help

A percent is a part to whole ratio that compares a number to a whole divided into 100 equal parts. For example, $25\% = 25:100$ or $\frac{25}{100}$.

The symbol % is read *percent*.

A hundredths grid can be used to represent 100%.



25 of the 100 squares are grey. So 25% of the grid is grey.

75 of the 100 squares are white. So 75% of the grid is white.

Lesson 4 - Percents as Fractions or Decimals

Learning Goals: Relate percents to equivalent fractions and decimals.

Question:

Bradán coloured more than $\frac{2}{5}$ of a hundredths grid, but less than 0.47 of the grid. About what percent of the grid is covered? How do you know?

Answer:

It could be any percent between 40% and 47%, for example, 45%. I know this because $0.47 = \frac{47}{100}$, which is 47 : 100, or 47%. So the percent has to be less than 47%. Also, I know that $\frac{2}{5}$ means 2 : 5. If I multiply each of the terms in 2 : 5 by 20, I get $2 : 5 = 40 : 100$ and $40 : 100 = 40\%$, so the percent has to be greater than 40%. So the percent has to be a percent between 40% and 47%.

At-Home Help

A percent can be expressed as a fraction and as a decimal.

For example, 25% is the same as $\frac{25}{100}$ or 0.25. It is also the same as $\frac{1}{4}$.

Lesson 6 - Solving Percent Problems

Learning Goals: Estimate and calculate percents to solve problems.

Question:

Estimate or calculate each percent. Show your work.

- a) 50% of the students in a class of 24 students
- b) 10% of the cost of a T-shirt if the whole cost is \$12.99
- c) 25% of a 10 kg bag of sugar

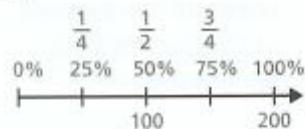
Answer:

- a) 12 students; for example, $50\% = \frac{1}{2}$.
 $\frac{1}{2}$ of 24 = 12.
- b) About \$1.30; for example, \$12.99 is about \$13.
 $10\% = \frac{1}{10}$. $\frac{1}{10}$ of \$1 is 10¢, so I would need 13 dimes.
That's \$1.30.
- c) 2.5 kg; for example, $25\% = \frac{1}{4}$, so I divided by 2 twice. $10 \div 2 = 5$ and $5 \div 2 = 2.5$

At-Home Help

You can use a number line to help you figure out percents.

For example, calculate 25% of 200.



100% is 200.

25% is the same as $\frac{1}{4}$.

Divide 200 by 4 to figure out 25%.

$200 \div 4 = 50$

So 25% of 200 = 50.

Lesson 7 - Communicating about Ratios and Percents

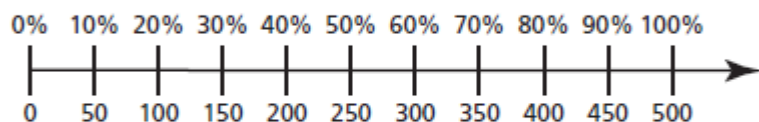
Learning Goals: Use clear language to describe how to solve ratio and percent problems.

Question:

Ananda is putting together a 500-piece jigsaw puzzle. She has already placed 75 pieces. Explain how you know that she has finished about 15% of the puzzle.

Answer:

For example, I could use a number line and mark percents and puzzle pieces on it. I know that 100% matches 500 pieces. If I divide the line into 10 equal parts, each 10% matches 50 pieces since $500 \div 10 = 50$.



75 is halfway between 50 and 100, so the percent is halfway between 10% and 20%. That's 15%.

That makes sense since 10% of 500 is 50 and 5% more is another half of 50, or 25. $50 + 25 = 75$.

At-Home Help

Communication Checklist

- ✓ Did you show all your steps?
- ✓ Did you check your answer?
- ✓ Did you use a diagram to support your explanation?