7th Common Core 7+

Applications of Percents

Standard: **7.EE.3** Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

Standard: **7.EE.2** Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

Standard: **7.RP.3** Use proportional relationships to solve multistep ratio and percent problems.

This packet belongs to _____

Today we will _____

These are fractions you need to memorize as decimals and percents.

Fraction	Decimal	Percent
$^1/_2$		
$^1/_4$		
$^3/_4$		
$^1/_8$		
$^3/_8$		
$^5/_8$		
$^7/_8$		
$^1/_5$		
$^2/_5$		
$^3/_5$		
$^4/_5$		
$^1/_3$		
$^2/_3$		
$^1/_6$		
$^5/_6$		
$^1/_9$		
$^2/_9$		
$^4/_9$		
$^5/_9$		
$^7/_9$		
$^8/_9$		

6-1 *Fractions, Decimals, and Percents*

To change a percent to a fraction:

- drop the percent symbol;
- write the percent as the numerator;
- write 100 as the denominator;
- simplify.

$45\% = \frac{45}{100} = \frac{9}{20}$

Write each percent as a fraction in simplest form.

1. 37% _____ **2.** 80% _____ **3.** 4% _____ **4.** 75% _____

5. ½% _____ **6.** .03% _____ **7.** $\frac{3}{8}$% _____ **8.** $\frac{4}{9}$% _____

9. 230% _____ **10.** 195% _____ **11.** .009% _____ **12.** 139% _____

To change a percent to a decimal:

- drop the % symbol;
- move the decimal point two places to the left.

$54\% = 54. = 0.54$

Write each percent as a decimal.

9. 33% _____ **10.** 15% _____ **11.** 97% _____ **12.** 20% _____

13. ½% _____ **14.** .07% _____ **15.** $\frac{3}{8}$% _____ **16.** $\frac{4}{9}$% _____

17. 230% _____ **18.** 195% _____ **19.** .009% _____ **20.** 139% _____

1. About 48 out of every 100 people in the United States owned a cell phone in 2001. In Italy, the rate was 864 for every 1,000 people. How many more people in Italy owned cell phones? Write your answer as a percent.

2. In a survey, 46% of men said that they spend fewer than 5 hours shopping for gifts for holidays. Write this percent as a fraction in simplest form and as a decimal.

3. When asked about their favorite Thanksgiving leftover, $\frac{1}{20}$ of the people said vegetables and $\frac{7}{100}$ said mashed potatoes. Which food was more popular and by what percent?

4. A group aged 18–29 was asked if they have enough time to do what they want, and 59% said they do not. How many people in this age group feel they *do* have enough time to do what they want? Write your answer as a percent, decimal, and fraction.

Homework.
Write each percent as a fraction in simplest form. SHOW WORK!

1. $\frac{2}{3}$% _____ **2.** .04% _____ **3.** $\frac{2}{5}$% _____ **4.** $\frac{1}{8}$% _____

5. 350% _____ **6.** 275% _____ **7.** .017% _____ **8.** **162**$\frac{2}{3}$% _____

Write each percent as a decimal. SHOW WORK!

9. ½% _____ **10.** .07% _____ **11.** $\frac{3}{8}$% _____ **12.** $\frac{4}{9}$% _____

13. 230% _____ **14.** 195% _____ **15.** .009% _____ **16.** 139% _____

Solve the percent word problems. SHOW WORK!

17. During a flu epidemic at one school, 24 out of 345 kids were absent. At another school, .072 of the kids were absent. Which school had more kids absent and by what percent?

18. Learwood asked the 7th graders what their favorite desert was over a 3 week period. $\frac{2}{23}$ said it was chocolate cake, $\frac{3}{19}$ said it was pumpkin pie and .0612 said they favored apple crisp. Which desert was more popular and by what percent? If there are 600 students at Learwood, approximately how many favored chocolate cake and apple crisp?

19. Christina and Julia were running for mayor in a small town. Christina received 38% of the votes. Julia received four thousand, sixty votes. How many votes did Christina get?

Today we will _____

There are many ways to find the percent of a number.

One way is to use a proportion.

$$\frac{part}{total} = \frac{\%}{100}$$

Use the proportion above to find 20% of 65.

You can also use an equation.

Change the % to a decimal and multiply.

Use an equation to find 20% of 65

Find the percent of each number.

1. 25% of 56 **2.** 10% of 110 **3.** 5% of 150 **4.** 90% of 180

5. 125% of 48 **6.** 225% of 88 **7.** 2% of 350 **8.** 285% of 200

9. 150% of 125 **10.** 46% of 235 **11.** 78% of 410 **12.** 0.5% of 64

Solve the percent word problems.

13. The student population at Learwood Middle School is 52% female. If there are 600 students at Learwood, how many are males?

14. There are 298 students in the seventh grade. If 35% of them ride the bus to school, how many students rid the bus to school?

15. A metal bar weighs 8.15 ounces. About 93% of the bar is silver. Approximately how many ounces of silver are in the bar. Round to nearest tenth.

16. A half-cup of pancake mix has 5% of the total daily allowance of cholesterol. The total daily allowance of cholesterol is 300 mg. How much cholesterol does a half-cup of pancake mix have?

17. Carey needs $45 to buy her mother a birthday present. She has saved 22% of the amount so far. How much more does she need?

Homework.
Find the percent of each number. Round to nearest tenth if needed. SHOW WORK!

1. 67% of 131 **2.** 19% of 73 **3.** 7% of 129 **4.** 1.1% of 67

5. 128% of 75 **6.** 227% of 183 **7.** 159% of 271 **8.** 271% of 159

Solve the percent word problems using an equation or a proportion. SHOW WORK!

9. The largest frog in the world is the goliath, found in West Africa. This type of frog can grow to be 12 inches long. The smallest frog in the world is about 4% as long as the goliath. What is the approximate length of the goliath frog?

10. Two girls are selling lemonade and pizza at a garage sale. Kerry made $32.50 selling pizza and Julie made $19.25 selling lemonade. Kerry's parents said she had to pay them back 60% of whatever she made to help them pay for the pizza. Julie's parents said she could keep 85% of what she made selling lemonade. How much profit did each girl make?

11. Mr. Jakes left $68,000 to his family when he died. He left $16\frac{2}{3}$% to his nephew and the rest to his cousin. How much money did his cousin receive?

12. Michael had a sore throat and his doctor estimated that he had 156,000 strep bacteria in his throat. By the time he got his medicine, he had 250% more bacteria! How many bacteria did he have then?

Percent Change

Today we will: _____

There are many applications of percents that involve an increase or a decrease.

Applications that involve a decrease	**Applications that involve an increase**

We will use the following proportion as one way to solve percent increase/decrease problems.

$$\frac{amount\ change}{original\ amount} = \frac{percent\ change}{100}$$

Compare and contrast this proportion to the percent equation.

Determine whether the percent of change is an *increase* or a *decrease*.

1. Original amount: **15**
   New amount: **36**

   _____

2. Original amount: **29**
   New amount: **13**

   _____

3. Original amount: **42**
   New amount: **30**

   _____

4. Original amount: **37**
   New amount: **51**

   _____

********Don't let the words increase and decrease confuse you. You will always subtract the two numbers. NEVER ADD!********

Find the percent of increase.

5. Original amount: **85**
New amount: **100**

6. Original amount: **23**
New amount: **30**

7. Original amount: **8**
New amount: **16**

8. Original amount: **15**
New amount: **27**

Find the percent of decrease.

9. Original amount: **10**
New amount: **4**

10. Original amount: **97**
New amount: **75**

11. Original amount: **50**
New amount: **38**

12. Original amount: **28**
New amount: **12**

Determine if the percent of change will be an increase or a decrease and then find the percent of change.

13. Olivia read 25 books last summer. This summer she read a total of 40 books.

14. This year there are 234 seventh graders. Last year there were 250 seventh graders.

15. Petitis garden center sold 132 plants this weekend. Last weekend they sold 115 plants.

16. Ralph hit 32 balls in the batting cage last week. This week he hit 28.

17. Roderick went to the store 215 times in January, 312 in February and 65 times in March. What is the percent decrease from January to March?

Homework

State whether each change represents an increase or decrease.

1. from 10 to 15
2. from 16 to 12
3. from 8 to 14

Find each percent increase or decrease to the nearest percent.

4. from 2 to 5
5. from 10 to 6
6. from 12 to 18

7. from 7 to 11
8. from 3 to 9
9. from 12 to 5

10. World Toys buys bikes for $38 and sells them for $95. What is the percent of increase in the price?

11. Jack bought a stereo on sale for $231. The original price was $385. What was the percent increase in the price?

12. Julie's average in math for the first quarter was 75. Her second quarter average was 81. What was her percent increase?

Discounts, Tips and Taxes

Today we will: _____

Typically when we think of discounts, we think of something being on sale. That means that a discount involves a decrease. Let's look at 2 ways to find a decrease or discount.

Example: You are buying a pair of jeans at _____. The jeans cost $56. They are on sale for 25% off. What is the cost of the jeans after the discount?

Method 1 Using the percent change equation	Method 2 Using an equation

As you can see, both methods work. You will most likely use one or the other but you should be familiar with both ways.

Typically when we think of taxes, we think of something extra we pay. That means that a tax is an increase. Let's look at 2 ways to find an increase or tax.

Example: You found on the previous page that the $56 jeans on the previous page on sale for 25% off end up costing you $42 before tax. There is also more than one way to find a tax.

The sales tax rate in Lorain county is currently 6.5%. What will the jeans cost you with tax? Always round to the nearest penny.

Method 1 Using the percent change equation	Method 2 Using an equation

Tips are another application of percents. A tip is an increase in what you pay. You can calculate a tip the same way as a tax. Most people tip around 15% if they are pleased with the service that they receive.

Example: You and your friends go to Applebees and decide that the waiter was excellent and want to tip him 15%. The bill for your food arrives and is $73.50. What is the total cost of the bill with the 15% tip?

Method 1 Using the percent change equation	Method 2 Using an equation

Practice

1. The Kerwoods went out to eat at Chiles. If there bill was $58.65 and the sales tax is 6.5%, what was their final bill?

2. Ms. Acton spent $205.60 at Target. If the sales tax is 6%, what was her final bill?

3. Macys is having a one-day 35% off special. If Sara bought $124.50 worth of items, what would the final bill total after applying the discount of 35%?

4. Ms. Harper purchased a new computer for $1,150 at the Apple Store. If sales tax is 7.5%, what was the total of her purchase?

5. Mark and his three friends ate out at Applebee's. Their bill totaled $52.35. If they left the server a 20% tip, how much would each person pay splitting the bill evenly?

6. Vicky made some purchases at the Sunflower Market. She bought strawberries for $3.50, carrots for $2.25 and a bouquet of flowers for $9.95. If sales tax is 5%, what will Maria pay altogether?

7. Aimee is decorating her new house. She found a table at Pier One for $425. If the table is 25% off, and she pays 6.75% in tax, what will it cost?

Homework

1. Mrs. Margul paid $125 to have her hair colored and cut. If she tips her hairdresser 15%, what is her total bill?

2. The Andersons went to dinner at the Olive Garden. If their dinner cost $42.95 and they left a 12% tip for their server, how much did they pay altogether?

3. Justin and his friend Dan went to the movies. If they each bought popcorn for $4.25 and a soda for $2.25, what was their total bill after adding 5.5% sales tax?

4. Best Buy was having a 20% off sale on all flat screen TVs. What would the sale price of a $850 TV be?

5. The Richards family bought some new camping gear at Gander Mountain that totaled $318.50. If they receive a 30% discount and the tax rate is 6%, what is their total bill?

6. Rachel wanted to buy a ring that was on sale for 30% off. The ring originally sold for $128. She also had a coupon that got her an additional 20% after the sale. The sales tax where Rachel lives is 6%. What is the total cost of the ring with the two discounts and the tax?

Mark up, mark down and commissions

Today we will: _____

Sometimes you might see a problem like this…

A sweater is marked down 25% off the original price. The original price was $22.50. What is the sale price of the sweater before sales tax?

Here the words "*marked down*" are being used in place of "*discounted*". If we treat them the same, all we have to do is one of the methods we learned before.

Work…

Another possibility is where you are told that an item is marked down and then you are given the new price like this…

A shirt is marked down 60% of the original price. The sale price is $12. What was the original price?

Work…

There might also be problems that include the word "commission". Think of a commission as a percent of a sale. Lots of people including realtors and salespeople work on commission. That means they get a salary, usually very modest, and a percent of the things that they sell.

Try this one…

A salesperson set a goal to earn $3,000 in July. She receives a base salary of $600 per month plus a 6% commission for all sales in that month. How much merchandise does she have to sell to meet her goal?

Practice

1. A golf shop pays its wholesaler $40 for a certain club, and then sells it for $75. What is the markup rate?

2. A computer software retailer used a markup rate of 40%. Find the selling price of a computer game that cost the retailer $25.

3. Duke's photography pays $9 for a 5x7 photograph. If the photograph is sold for $15, what is the percent of markup based on cost?

4. The sale price of an American Girl doll is $85 after a 20% markdown. What was the selling price of the doll before it was on sale?

5. Phillip sells electronics and works on a commission basis. If his commission is 4%, and he sells $15,000 worth of electronics, what are his earnings?

6. Dominic got a job painting house numbers on curbs. He received a 40% commission for the total amount he charged. If he collected $180 for paining numbers on 30 curbs, what was his commission?

7. A salesperson set a goal to earn $2,500 in March. He receives a base salary of $500 per month plus a 5% commission for all sales in that month. How much merchandise does he have to sell to meet his goal?

Homework

1. A bike shop pays its wholesaler $72 for a certain bike, and then sells it for $108. What is the markup rate?

2. A shoe retailer used a markup rate of 35%. Find the selling price of a pair of shoes that cost the retailer $45.

3. Suzy's Cupcakes pays $.12 for a cupcake. If she sells the cupcake for $.75, what is the percent of markup based on cost?

4. A car dealer pays $18,750 for a Toyota Carolla but marks it up 3%. How much does the dealer charge the customer? How much profit does the car dealer make?

5. A real estate agent sold a house and received a commission of $2,007.50 which represents 5 ½% of the selling price. How much did the house sell for?

6. Student council sold $125 worth of candy at Friday night's football game. If they receive a commission of $22.50, what percent commission did they receive?

7. Find the final price for an item that cost $18, marked up by 20% and then, was marked down 33%, and subsequently marked up 10% and finally marked down by 50% for clearance.

8. Harold owns a lemonade stand. He can make 7 glasses of lemonade with 12 lemons and 2 cups of sugar. He buys 24 lemons for $12 and 16 cups of sugar from $8. Since his sister is helping him, Harold needs to pay 10¢ for each glass of lemonade he sells. If Harold's goal is to make a profit of 50¢ each glass, what is his markup rate and selling price?

Simple Interest

Today we will: _____

When you put money into a bank account, you may receive simple interest for loaning the bank your money.

$$\text{Interest} = \text{Principal} \bullet \text{Rate} \bullet \text{Time}$$
$$I = p \bullet r \bullet t$$

Find each missing value.

1. $p = \$400$, $r = 5\%$, $t = 3$ years

2. $p = \$15{,}000$, $r = 6\%$, $t = 2$ years

3. $I = \$350$, $r = 7\%$, $t = 2$ years

4. $I = \$168$, $p = \$1{,}400$, $t = 4$ years

5. $I = \$57$, $p = \$380$, $t = 5$ years

6. $p = \$4{,}800$, $r = 6\%$, $t = 2$ years

7. A deposit of $7,500 earns $3,900 over a period of 8 years. What is the simple interest rate?

8. You deposit $4,500 in an account that earns 6% simple interest. How much will be in your account after 5 years?

9. Mrs. Friendly invested a sum of money at 6% per year, and 3 times as much at 4% per year. How much did she invest at each rate if her annual interest was $144?

Homework

1. How much interest does a $10,000 investment earn at 5.6% over 18 years?

2. Susan borrows $8650 to buy a used car and is charged 4.5% interest. If the term of her borrowing is 5 years, how much interest does she pay in total?

3. If Sheila paid $797.50 in interest on a 5 year loan of $5,800. What was the interest rate?

4. Jas invests $7500 in a 21 month CD which pays simple interest. The interest rate is 4.5% per year. What is the total value of his CD after 21 months?

5. Will has a $2,000 credit card balance on a card with a 21% interest rate. Noelle has a $5,000 credit card balance on a card with a 13% interest rate. Noelle asked Will "Why is my interest charge this month so much higher than yours if your interest rate is so much higher than mine?" Explain.

6. Henry invests $5000 in a mutual fund with an annual interest rate of 7.5%. He also has a 4-year, $10,000 loan at 3.75%. When will the amount of interest earned on the mutual fund be equal to the amount of interest paid on the loan?

7. Mr. Money invested a sum of money at 5.5% per year, and twice as much at 3.35% per year. How much did he invest at each rate if his annual interest was $244?

Percent error

Today we will: _____

Formula: $$\frac{Experimental - Theoretical}{Theoretical} \times 100$$

Experimental = Values obtained from the lab.

Theoretical = Values obtained from some authority -> book, table, list, official, etc.

(+) A positive percent error indicates your experimental values are _____ than the theoretical values.

(-) A negative percent error indicates your experimental values are _____ than the theoretical values.

Determine the percentage error in the following problems. Show all your work!

1. Experimental Value: 1.24 g
   Theoretical Value: 1.30 g

2. At a track meet, you time a friend running 100 m in 12.00 seconds. The officials time her at 11.67 seconds. What is your percentage error?

3. A standard 20 g mass is used to check the accuracy of a laboratory balance. The balance indicates a mass of 19.81 g when a standard mass is measured. What is the percent error of this measurement?

4. In 1.000 hour, as measured by a very accurate chronometer, a wristwatch measured an elapsed time of 1 hour and 12 seconds. What is the percent error in the time measured by the wristwatch?

5. The mass of a certain chemical was determined by a very precise balance to be 1.4200 g. The same mass of a chemical was measured on a less precise balance and found to be 1.43 g. What is the percent error for the less precise balance?

Homework

1. A student estimated a mass to be 250 grams, but upon carefully measuring it, found the actual mass to be 240 grams. What is the percent error?

2. A student measured the temperature of boiling water and got an experimental reading of 97.5 degrees Celsius. What is the percent error?

3. An experimental measurement was taken of 10.4 ml and the actual measurement was 9.7 ml. What is the percent error?

4. Clyde Clumsy was directed to weigh a 500 g mass on the balance. After diligently goofing off for ten minutes, he quickly weighed the object and reported 458 g. What is the percent error?

5. As the result of experimental work, a student finds the density of a liquid to be 0.1369 g/cm^3. The known density of that liquid is 0.1478 g/cm^3. What is the percent error of this student's work?

6. The theoretical yield in a particular chemical reaction is 0.1062 g. The actual yield obtained by a chemist in an experiment is 0.0098 g. Calculate the percent error for this experiment.

7. After heating a 10.00 g sample of potassium chlorate, a student obtains an amount of oxygen calculated to be 3.90 g. Theoretically, there should be 3.92 g of oxygen in this amount of potassium chlorate. What is the percent error in this experiment?

8. An object with a pre-weighed mass of exactly (and correctly) 0.54 g is given to 2 students. One student obtains a weight of 0.59 g for the object, while another says the weight is 0.49 g. Which of the students, if either has the greater percent error?

9. A student's calculation was found to have a 35.5% error, and his experimental measurement was 15.6 cm. What are the two possible values for the actual measurement?