6/23/2023

Percentages

What is a percentage? "parts of 100"
"per 100"

25% = 25 parts of out 100 = 25/100 = 0.25

In order to convert from a percentage to a decimal, divide the percent value by 100.

4% = 4/100 = 0.04
Vs. 40% = 40/100 = 0.40

Another way to think about this is by moving the decimal two digits to the left.

4% = 00004.0000 = 0.040000

If you have a decimal and want to convert it to a percentage, then

1) Multiply the decimal by 100
2) Moving the decimal place two spaces to the right

0.326 convert to a percentage = 32.6%

Or, you can multiply 0.326 x 100 to get 32.6 and then put the percent sign on it.

To convert to a fraction, write the percentage as the number over 100:

32.6% = 32.6/100 = $\frac{32.6\times10}{100\times10} = \frac{326}{1000}$

Problem solving.

What number is some percent of some other number??
What number is 30% of 150?
What percentage of 50 is 10?
60 is 25% of what number?

Where "is" the equal sign, and "of" is multiplication.

What number is 30% of 150? $x = (30\%)150$

What percentage of 50 is 10? $x(50) = 10$

60 is 25% of what number? $60 = (25\%)x$

Solving:

What number is 30% of 150? $x = (30\%)150 = 0.30(150) = 45$

What percentage of 50 is 10? $x(50) = 10$ divide by 50 $\frac{x(50)}{50} = \frac{10}{50} \rightarrow x = \frac{1}{5} = 0.2 = 20\%$
Divide by the number next to x on both sides. Convert the fraction to a decimal (use your calculator), and then multiply the decimal by 100 to get the percentage.

60 is 25% of what number? $60 = (25\%)x$
Convert the percentage to a decimal. $60 = 0.25(x)$
Divide by the number in front of x on both sides. $\frac{60}{0.25} = x = 240$

For all of these problems, we got nice whole numbers, but depending on how the problem is set up, that may not be the case. Watch out for how the problems tell you to round.

What percentage of 351 is 133?

$$x(351) = 133$$
$$\frac{x(351)}{351} = \frac{133}{351}$$

$$x = \frac{133}{351} = 0.378917 \ldots = 37.8917 \ldots \%$$

Round your answer to the nearest hundredth of a percent.
37.89%

In most cases, percentages are between 0% and 100% (their decimals are between 0 and 1).

Percent increase problems can sometimes involve percentages that are larger than 100%.

If your percent is larger than 100% that is equivalent to multiplying by a number larger than 1.

200% = 200/100 = 2
450% = 450/100 = 4.5

Percent increase and percent decrease problems.

Population growth
Sales tax
Discounts

Sales tax.
Suppose you live in a county with a sales tax rate of 6.5%. You purchase a book listed as $19.99. What is the tax on the book? What is the price you pay at the register?

What is the tax on the book? What number is 6.5% of 19.99? 0.065(19.99) = 1.29|935 = $1.30
What is the price at the register: 19.99 + 1.30 = $21.29

Discount problem:

Suppose you have been eying this amazing blazer in a store, but it costs $200. You find out it's on sale this weekend at a 30% discount and give in to your desire! What is the price of the jacket on sale?

Discount: What number is 30% of $200? 0.30(200)=$60
The net price after the discount: $200 - $60 = $140.

What if there was an extra special sale, deep, deep discount, and you can take another 50% off the previous sale price?

You can't add percentages.

You can't add 30% + 50% to get 80% as the total discount.

Starting from the previous sale value of $140, multiply by the new discount: 0.50(140) = $70.
The new price after the second discount: $140- $70 = $70.

Compare to 80% discount on the original price:

0.8(200)= $160
Final price: $200-$160 = $40. These are not the same, and this method of calculating is not correct.
No discounts can exceed 100% because a 100% discount means the item is FREE.

Population growth example.
A small town in Montana had 60 residents in 2010, and after a decade saw a growth of 250%. What is the new population of the town?

New population: what number is 250% of 60? (250%)(60)=2.5(60)=150
150 new residents.

What is the population in 2020? 60+150=210 people.

There cannot be decimal people. If you are dealing with people, or anything else that is counted, you must round to the nearest whole number.

Watch out for problems where they talk about thousands of people, or millions of people… because then you can use decimals.

Mark-up problems: percent increase problems. Store buys at wholesale and then marks up the price (by a percentage) to pay their employees for reselling it.

Simple Interest problems.

$$I = Prt$$

Rate is given as a rate per year, so time is in years. Principal is the amount borrowed. I is the interest earned/due back at the end.

Suppose you borrow $900 from a friend who is charging 4% simple interest per year. You promise to pay back the money in 2 years. How much interest will you be charged? How much money will you owe at the end of the loan?

P=900, r=4%=0.04, t=2

$$I = 900(0.04)(2) = \$72$$

The amount due back after two years: 900+72=$972

Suppose you borrow $10,000 from a loan shark for 35% interest per year and agree to pay back the money in 3 months. How much interest will you be charged, and how much money will you owe?

$$10{,}000(0.35)\left(\frac{3}{12}\right) = 875 = I$$

The amount we owe at the end of three months is $10,875.

Next time: we will review for Exam #1 (next Friday June 30th). We will talk about the format, and review any material we have covered to date in preparation for the text. BRING YOUR QUESTIONS TO CLASS!!!