

Grade 7 · Percent Problems: Tax, Tips, Markups and Discounts · Lesson

Common Core 7.RP.A.3 · mathovore.fr

A percent problem with money finds a percent of an original amount, then adds it (tax, tip, markup) or subtracts it (discount). Write the percent as a decimal and multiply, or multiply by 1 plus or minus the rate. Commission is a percent of sales, and simple interest is $I = Prt$.

Grade 7 Common Core: 7.RP.A.3

Key facts:

- Tax, tips and markups increase an amount: multiply by $1+r$. Discounts decrease it: multiply by $1-r$.
- The percent is taken of the original amount, which is 100%.
- Two successive discounts multiply, so 20% off and then 10% off equals 28% off, not 30%.
- Commission equals the rate times sales, and simple interest is $I = Prt$ with r written as a decimal.
- Follow the order of the story and round money to the nearest cent at the end.

How do you find sales tax and tips?

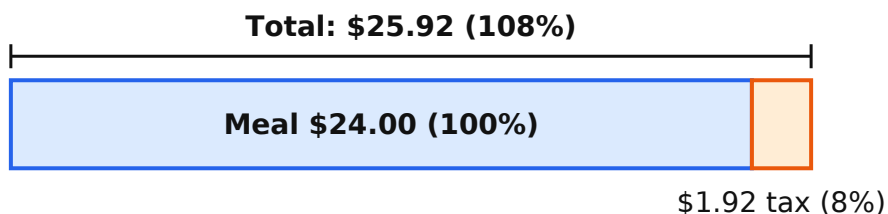
Sales tax and tips are a percent of an amount. Find that percent of the amount, then add it. For a \$24.00 meal with 8% sales tax, the tax is $0.08 \times 24 = 1.92$ and the total is $24 + 1.92 = 25.92$ dollars. A shortcut gives the total in one step: multiply by 1.08.

Percent increase and decrease

To increase an amount by $r\%$, multiply by $1 + \frac{r}{100}$. To decrease it by $r\%$, multiply by $1 - \frac{r}{100}$. The percent is always taken of the **original** amount, which is 100%.

Situation	Change	Multiplier
8% sales tax	increase 8%	1.08
20% tip	increase 20%	1.20
35% markup	increase 35%	1.35

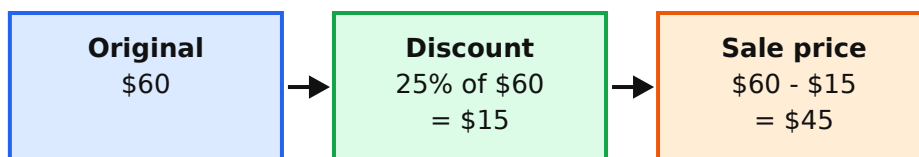
Situation	Change	Multiplier
25% discount	decrease 25%	0.75



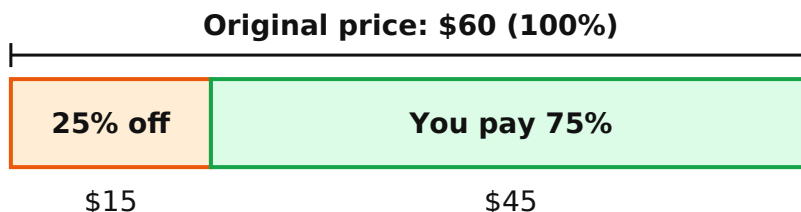
An 8% tax adds \$1.92 to a \$24.00 meal, so the total is 108% of the meal price.

How do markups and discounts work?

A store buys an item at a wholesale price and adds a **markup** to set the selling price. If a shop pays \$40 for a skateboard deck and marks it up 35%, the markup is $0.35 \times 40 = 14$ and the selling price is $40 + 14 = 54$ dollars. A **discount** (or markdown) lowers a price. A \$60 jacket that is 25% off saves $0.25 \times 60 = 15$ dollars, so it sells for \$45.



A 25% discount takes \$15 off a \$60 jacket.



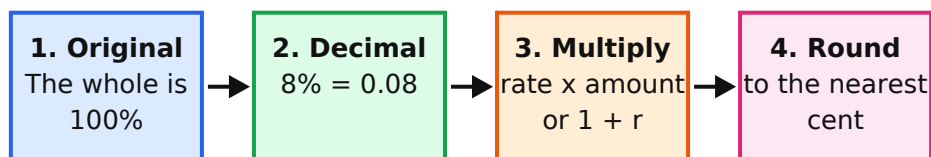
The sale price is 75% of the original price: $0.75 \times 60 = 45$.

Two discounts do not add. A 20% discount followed by a 10% discount multiplies: $0.80 \times 0.90 = 0.72$, so the item costs 72% of its price, a 28% discount, not 30%.

What is the method for multistep percent problems?

1. Name the original amount. It is 100%.
2. Write each percent as a decimal, such as $6\% = 0.06$.
3. Multiply the rate by the amount, or use the multiplier $1+r$ or $1-r$.
4. Follow the order of the story, for example discount first and tax second.
5. Round money to the nearest cent.

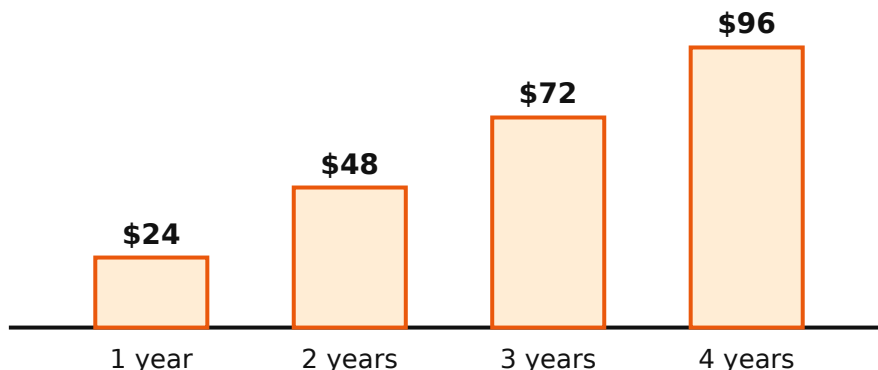
Worked example. Sneakers cost \$80, are 25% off, and then 6% sales tax is added. Sale price: $80 \times 0.75 = 60$. Tax: $60 \times 0.06 = 3.60$. Total: $60 + 3.60 = 63.60$ dollars.



A four-step plan for percent problems with money.

How do commission, fees and simple interest work?

Commission is a percent of sales. Sofia earns 6% on \$2,500 of sales, so she makes $0.06 \times 2500 = 150$ dollars. A fee based on a percent works the same way. **Simple interest** uses $I = Prt$, where P is the principal (starting amount), r is the yearly rate as a decimal, and t is the time in years. For \$800 at 3% for 4 years, $I = 800 \times 0.03 \times 4 = 96$ dollars. The interest is \$24 every year, so it grows in equal steps.



Simple interest adds the same \$24 every year: \$800 at 3% earns \$96 in 4 years.

Percent Problems: Tax, Tips, Markups and Discounts: frequently asked questions

How do you calculate sales tax?

Change the tax rate to a decimal and multiply by the price. A 7% tax on \$28 is $0.07 \times 28 = 1.96$, so the total is \$29.96. You can also multiply the price by 1.07 to get the total directly.

Is 20% off and then 10% off the same as 30% off?

No. The second discount applies to the reduced price. On a \$100 item, 20% off gives \$80, and 10% off \$80 gives \$72, which is a 28% discount.

What is the difference between a markup and a discount?

A markup raises a price: a store adds it to the amount it paid. A discount lowers a price: a store subtracts it from the regular price. Both are a percent of the original amount.

How do you find the original price from a sale price?

Find what percent of the original the sale price is, then divide. If a 30% discount leaves \$21, then \$21 is 70% of the original, so the original is $21 \div 0.70 = 30$ dollars.

What does each letter in $I = Prt$ mean?

The letter I is the interest earned, P is the principal (the starting amount), r is the annual interest rate written as a decimal, and t is the time in years. Simple interest is always figured on the original principal.