

Calculating Percent Change and Percent Error

Grade 7 math · Lesson · Standards: 7.RP.A.3

Quick answer: Percent change equals the change divided by the original amount, written as a percent: $(\text{new} - \text{old}) \div \text{old} \times 100\%$. A positive result is a percent increase and a negative result is a decrease. Percent error uses the same idea, dividing the absolute error by the actual value.

Standards: 7.RP.A.3 · **Level:** Grade 7

How do you find a percent increase or decrease?

Percent change compares the amount of change with the starting amount. Subtract to get the change, divide by the old value, and write the result as a percent. A positive result is an increase; a negative result is a decrease.

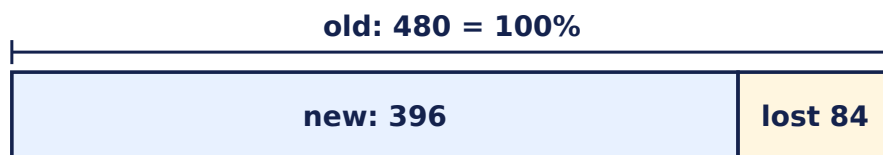
Percent change

$$\text{percent change} = \frac{(\text{new} - \text{old})}{\text{old}} \times 100\%$$

The starting (old) value is always the denominator, even when the quantity goes down.

Worked example

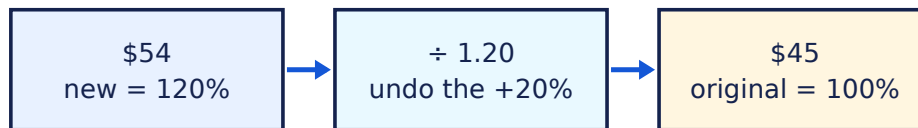
A museum had 480 visitors per day in March and 396 per day in April. Change: $396 - 480 = -84$. Then $84 \div 480 = 0.175$. The visitors decreased by **17.5%**.



The old value 480 is the whole (100%). The drop of 84 is 17.5% of it.

How do you find the original amount?

After an increase of r , the new amount is $100\% + r$ of the original, so divide the new amount by $1 + r$. After a decrease, divide by $1 - r$. If a price is \$54 after a 20% increase, the original is $54 \div 1.20 = \$45$.



Working backward: divide the new amount by the multiplier.

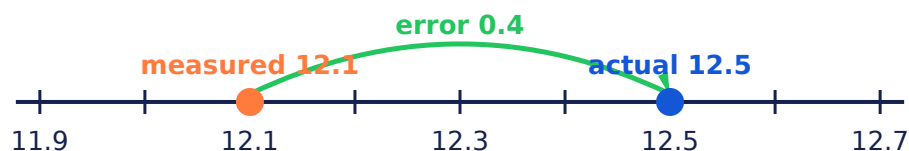
What is percent error?

Percent error tells how far a measurement or estimate is from the true value, compared with that true value.

Percent error

$$\text{percent error} = \frac{(|\text{measured} - \text{actual}|)}{\text{actual}} \times 100\%$$

Use the absolute value, so the error is never negative. Divide by the actual (true) value.



The error 0.4 is compared with the actual value 12.5: $0.4 \div 12.5 = 3.2\%$.

Method: percent change problems

1. Identify the old (or actual) value.
2. Subtract to find the change or error.
3. Divide by the old (or actual) value.
4. Multiply by 100 and label the answer increase, decrease or error.

Common mistake

Dividing by the new value. A drop from 80 to 60 is $20 \div 80 = 25\%$, not $20 \div 60$. And a 25% rise after a 25% drop does not return to the start: $0.75 \times 1.25 = 0.9375$.

Mathbot's tip

Always circle the starting value first. Whatever you circle is the number you divide by.

Key points to remember

- Percent change = $(\text{new} - \text{old}) \div \text{old} \times 100\%$.

- Always divide by the starting amount, even for a decrease.
- To find the original amount, divide the new amount by $1 + r$ (increase) or $1 - r$ (decrease).
- Percent error = $|\text{measured} - \text{actual}| \div \text{actual} \times 100\%$.
- An increase and a decrease of the same percent do not cancel.

Calculating Percent Change and Percent Error: frequently asked questions

How do I calculate percent increase?

Subtract the old value from the new value, divide by the old value, and multiply by 100. A price that rises from \$12 to \$15.60 changes by \$3.60, and $3.60 \div 12 = 30\%$.

Why do we divide by the old value?

Percent change measures the change relative to where you started. The starting amount is the base of the comparison, so it is the denominator.

How do I find the original price after a discount?

Divide the sale price by the remaining percent as a decimal. If a 30% discount leaves \$84, the original is $84 \div 0.70 = \$120$.

What is percent error?

Percent error compares the size of a mistake in a measurement or estimate with the true value. It equals the absolute error divided by the actual value, times 100%.

Why does a 25% increase followed by a 25% decrease not return to the start?

The two percents apply to different amounts. The increase is 25% of the smaller start, while the decrease is 25% of the larger result, so the final amount is 0.9375 of the start.