

Grade 7 - Multistep Problems with Rational Numbers - Lesson

Common Core 7.EE.B.3 · maths-pdf.fr/en/

A multistep problem uses several operations on positive and negative rational numbers, which may appear as fractions, decimals, and percents. Convert them to one form, plan the steps, and compute one step at a time. Finally, estimate with rounded numbers to check that the answer is reasonable.

Grade 7 · Common Core State Standards: **7.EE.B.3**

Key facts

- Fractions, decimals, and percents are different names for the same numbers.
- Convert to one form before you combine numbers.
- Break the problem into steps and write the expression for each step.
- Round only at the end; round money to the nearest cent.
- Estimate with friendly numbers to check reasonableness.

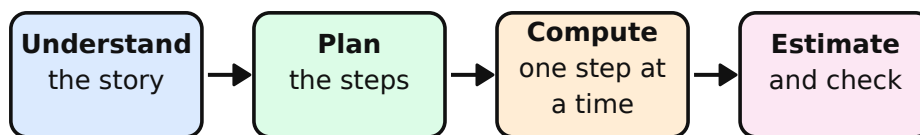
How do you solve a problem that mixes fractions, decimals and percents?

Choose one form for all the numbers, usually decimals, and then compute. Switch forms freely, because $\frac{3}{4}$, 0.75, and 75% name the same number.

Fraction	Decimal	Percent
$\frac{1}{2}$	0.5	50%
$\frac{3}{4}$	0.75	75%
$\frac{3}{8}$	0.375	37.5%
$\frac{1}{5}$	0.2	20%

The same number can be written as a fraction, a decimal, or a percent.

What is a good plan for a multistep problem?

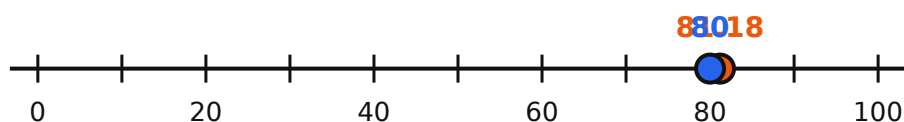


A plan keeps multistep work organized.

1. Read the problem and underline the question.
2. List the quantities and the signs of any gains or losses.
3. Break the problem into steps and write an expression for each step.
4. Compute, keeping fractions or decimals exact until the end.
5. Estimate with friendly numbers to check the answer.

Reasonableness

An answer is **reasonable** when it is close to an estimate made with rounded or compatible numbers. 19.8×4.1 is about $20 \times 4 = 80$.



The exact answer 81.18 is close to the estimate 80, so it is reasonable.

How do you work with a budget?

Parts of a whole can be given as fractions or percents. If a \$2,400 budget sends 30% to rent and $\frac{1}{6}$ to food, then rent is $0.30 \times 2400 = 720$ and food is $2400 \div 6 = 400$. Add the parts and subtract from the whole to find what remains.

Budget	\$2,400	
rent 30%	\$720	rest
Food 1/6	\$400	rest

Each part of a budget is a fraction or percent of the same whole.

Example. A gift card has \$50. Sofia buys 3 shirts at \$11.95 each and pays 8% tax. Shirts: $3 \times 11.95 = 35.85$. Tax: $0.08 \times 35.85 = 2.868$, so the total is \$38.72 after rounding to the nearest cent. Remaining: $50 - 38.72 = 11.28$.

Round only at the very end, and round money to the nearest cent. When a problem mentions overtime, such as 1.5 times the hourly pay, multiply the rate by 1.5 first and then by the extra hours.

Questions about multistep problems with rational numbers

How do I convert a fraction to a percent?

Divide the numerator by the denominator to get a decimal, then multiply by 100. For $\frac{3}{8}$, $3 \div 8 = 0.375$, so it is 37.5%.

When should I round in a multistep problem?

Round at the end, not in the middle. Early rounding can make the final answer slightly wrong. Round money to the nearest cent.

How do I check that an answer is reasonable?

Round the numbers to friendly values, compute mentally, and compare. If the exact answer is close to the estimate, it is reasonable.

How do I handle gains and losses together?

Write gains as positive numbers and losses as negative numbers, then add them in order. Keep track of the sign at every step.

Which form should I use, fractions or decimals?

Use whichever makes the arithmetic easier. Decimals are easiest for money; fractions are best when a decimal repeats.