

SKILL #03

CODE: OP.2

OPERATIONS WITH RATIONAL NUMBERS

Core Concept

Rational numbers are numbers that can be written as a fraction or a decimal — basically, anything that can be expressed as a part of a whole. Working with them means knowing how to add, subtract, multiply, and divide fractions and decimals correctly.

Fractions

$\frac{2}{3} \quad -\frac{2}{5}$

Addition and subtraction
need common denominators

same denominator
just add / subtract the numerators

- * $\frac{1}{5} + \frac{2}{5} = \frac{3}{5}$
- * $\frac{13}{9} - \frac{14}{9} = -\frac{1}{9}$

different denominator
Find a common denominator first

list the multiples:
3: 3, 6, 9, 12, 15...
4: 4, 8, 12, 16...
new denominator is 12

$\frac{2 \times 4}{3 \times 4} + \frac{1 \times 3}{4 \times 3} = \frac{8}{12} + \frac{3}{12} = \frac{11}{12}$

Multiplication

- Multiply top \times top, and bottom \times bottom
- Simplify if needed

- * $\frac{3}{4} \times \frac{2}{4} = \frac{6}{16} \rightarrow \frac{3 \times 2}{2 \times 4} = \frac{3}{8}$ ✓
simplest form ↗
- * $\frac{4}{7} \times (-\frac{2}{3}) = \frac{8}{21}$

Division (keep, change, flip)
Flip the second fraction and multiply

- * $\frac{5}{7} \div \frac{2}{3} \rightarrow \frac{5}{7} \times \frac{3}{2} = \frac{15}{14}$
- * $\frac{3}{10} \div \frac{2}{3} \rightarrow \frac{3}{10} \div \frac{5}{3} \rightarrow \frac{3}{10} \times \frac{3}{5} = \frac{9}{50}$

Decimals

-0.05 1.2 12.5

Addition and subtraction

- Line up decimal points vertically.
- Add zeros if needed, then add or subtract normally-

$$12.45 + 3.7 \rightarrow \begin{array}{r} 12.45 \\ + 03.70 \\ \hline 16.15 \end{array}$$

$$15.6 - 3.25 \rightarrow \begin{array}{r} 15.6 \\ - 03.25 \\ \hline 12.35 \end{array}$$

Multiplication

- Multiply as whole numbers
- Count decimal places in both numbers
- place decimal point in answer

$$2.15 \times 3.4 \rightarrow \begin{array}{r} 2.15 \\ \times 3.4 \\ \hline 1860 \\ + 6450 \\ \hline 7.310 \end{array} \rightarrow 2 \text{ digits after the decimal point}$$

answer should have 3 digits after the decimal point

Division

Move decimal point in divisor to make it a whole number, and do the same in the dividend.

$4.8 \div 0.12$, we need to move the decimal point 2 places

$$\rightarrow 480 \div 12$$

$$\begin{array}{r} 40 \\ 12 \overline{)480} \\ -48 \\ \hline 0 \end{array}$$

Additional Resources

Video Tutorial -->



Fractions



Decimals

Extra worksheet -->



Games -->

