



Arithmetic

Fraction

Adding Fractions

$$\frac{a}{b} + \frac{c}{d} = \frac{a \times d}{b \times d} + \frac{c \times b}{d \times b} = \frac{a \times d + c \times b}{b \times d}$$

$$\frac{2}{3} + \frac{3}{4} =$$

Subtracting Fractions

$$\frac{a}{b} - \frac{c}{d} = \frac{a \times d}{b \times d} - \frac{c \times b}{d \times b} = \frac{a \times d - c \times b}{b \times d}$$

$$\frac{1+y}{y} - \frac{x-1}{x} =$$

Multiplying/Dividing Fractions

Cancel any common factors from the denominators and the numerators and then multiply.

$$\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d}$$

$$\frac{5}{6} \times \frac{3}{10} =$$

$$\frac{a}{c} = \frac{a}{b} \times \frac{d}{c}$$

$$\frac{5}{8} = \frac{5}{3} \times \frac{3}{4}$$

Fractions to Decimals

$$\frac{1}{2} = 0.5$$

$$\frac{1}{3} = 0.\bar{3}$$

$$\frac{2}{3} = 0.\bar{6}$$

$$\frac{1}{4} = 0.25$$

$$\frac{3}{4} = 0.75$$

$$\frac{1}{5} = 0.2$$

$$\frac{2}{5} = 0.4$$

$$\frac{3}{5} = 0.6$$

$$\frac{4}{5} = 0.8$$

$$\frac{1}{10} = 0.1$$

$$\frac{1}{20} = 0.05$$

$$\frac{1}{25} = 0.04$$

$$\frac{1}{6} = 0.1\bar{6}$$

$$\frac{5}{6} = 0.8\bar{3}$$

$$\frac{1}{8} = 0.125$$

$$\frac{3}{8} = 0.375$$

$$\frac{5}{8} = 0.625$$

$$\frac{7}{8} = 0.875$$

Mixed Fractions/Decimals

Convert decimals into fractions, and then calculate.

$$0.33 \times \frac{2}{11} \div 0.6 =$$

$$\frac{52}{35} \times \frac{9}{65} \div \frac{3}{14} \times \frac{125}{16} =$$

Multiplying/Dividing Large and Small Numbers

Express the numbers using scientific notation. Then calculate.

$$\frac{0.0004}{0.008} \times 500 =$$

Power of Numbers

$$2^2 = 4$$

$$2^3 = 8$$

$$2^4 = 16$$

$$2^5 = 32$$

$$2^6 = 64$$

$$2^7 = 128$$

$$2^8 = 256$$

$$11^2 = 121$$

$$12^2 = 144$$

$$13^2 = 169$$

$$14^2 = 196$$

$$15^2 = 225$$

$$16^2 = 256$$

$$17^2 = 289$$

$$3^3 = 27$$

$$3^4 = 81$$

$$4^3 = 64$$

$$4^4 = 256$$

$$5^3 = 125$$

Exponent

1. Convert fractions into exponents.
2. Recognize numbers that are powers or squares of other numbers. Rewrite those numbers in exponential form.
3. Break original bases into common bases.
4. Combine common bases using exponent rules.

$$\frac{10^4 \times 2^{-12}}{5^5} \times 128 =$$

Factoring exponents

$$\frac{8^{-3} + 16^{-2} + 32^{-1}}{4^{-3}} =$$

Radicals

Simplifying

Move perfect square numbers out of the root. Always work with radicals in their simplest form like with fractions.

$$\sqrt{180} - \sqrt{20} =$$

Moving radicals from denominator to numerator

Case 1: Multiply both the numerator and the denominator by radical in denominator.

$$\frac{\sqrt{20}}{\sqrt{6}} =$$

Case 2: Use the algebraic rule $(a + b)(a - b) = a^2 - b^2$.

$$\frac{1}{\sqrt{5} - \sqrt{3}} - \frac{1}{2 + \sqrt{3}} + \frac{1}{\sqrt{5} - 2} =$$

Effective Adding

Adding consecutive numbers

Formula approach

$$1 + 2 + 3 + \dots + (n - 1) + n = \frac{n(n + 1)}{2}$$

$$k + (k + 1) + \dots + (n - 1) + n = \frac{(k + n)(n - k + 1)}{2}$$

$$20 + 21 + \dots + 35 + 36 =$$

$$3 + 6 + 9 + \dots + 27 =$$

$$4 + 7 + 10 + \dots + 28 =$$