

# Ratios & Proportions Cheat Sheet

Everything you need to know about ratios, proportions, rates, and scaling. Essential for problem solving across math topics.

## Ratio Notation

**Three ways:** a:b, a/b, or "a to b"

**Meaning:** For every a of one thing, there are b of another

**Simplify:** Divide both parts by the GCF

**Example:** 12:8 = 3:2 (divide both by 4)

## Equivalent Ratios

**Rule:** Multiply or divide both parts by the same number

**Example:** 2:3 = 4:6 = 6:9 = 10:15

**To find:** What is 2:5 equivalent to with 20 total?

**Solution:** 2 + 5 = 7 parts, 20/7 is not whole, so try: multiply by 4 to get 8:20

## Proportions & Cross Multiply

**Proportion:** Two equal ratios:  $a/b = c/d$

**Cross multiply:**  $a \times d = b \times c$

**Solve for x:** If  $3/5 = x/20$ , then  $3 \times 20 = 5 \times x$ , so  $60 = 5x$ ,  $x = 12$

## Unit Rate

**Definition:** Amount per 1 unit

**Find it:** Divide the first quantity by the second

**Example:** \$15 for 3 items = \$5 per item

**Speed:** 120 miles in 2 hours = 60 mph

## Scale Factor & Percent

**Scale factor:** The multiplier between two similar figures

**Example:** Scale 1:50 means 1 cm = 50 cm real

**Percent:** A ratio to 100.  $25\% = 25/100 = 1/4$

**Find %:**  $(\text{Part} / \text{Whole}) \times 100$

## Direct & Inverse Proportion

**Direct:** As one increases, the other increases at the same rate

**Formula:**  $y = kx$  (k is the constant)

**Inverse:** As one increases, the other decreases

**Formula:**  $y = k/x$  (product  $xy$  is constant)

**Always check:** does your answer make sense? If you double one quantity in a direct proportion, the other should double too.