Math formula sheet

Percentages, coordinates, geometry and spread

A compact selection, not a complete course formula list. The meaning of a symbol is local to its card. Use consistent length units before calculating areas or distances.

Percentage of a whole

$$a = \frac{p}{100}W$$

p is the percentage coefficient, W is the whole and a is the part. For 25%, enter $p = 25$, not 0.25.

Relative percent change

$$\Delta p = \frac{V_1 - V_0}{V_0} \times 100\%$$

Use the starting value $V_0 > 0$ as the baseline. V_1 is the final value. A zero baseline is undefined; percentage points are a different comparison.

Slope through two points

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

The points are (x_1, y_1) and (x_2, y_2). Require $x_2 \neq x_1$; a vertical line has undefined slope. Keep subtraction order consistent.

Area of a circle

$$A = \pi r^2$$

r is the radius, not the diameter. A uses square units. With diameter d, first use $r = d/2$. Retain π until the final rounding.

Pythagorean theorem

$$a^2 + b^2 = c^2$$

For a right triangle, a and b are its legs and c is the hypotenuse opposite the right angle. This relationship does not apply to every triangle.

Sample standard deviation

$$s = \sqrt{\frac{\sum_{j=1}^{n}(x_j - \bar{x})^2}{n - 1}}$$

x_j are observations, $\bar{x}$ is their mean and $n \geq 2$ is the count. For the entire population, use denominator n and population mean instead.

Worked example / Find a slope and check its sign

Find the slope through $(2, 3)$ and $(8, 15)$. Use the same point order for the horizontal and vertical changes.

1. Subtract the first coordinates from the second coordinates.

$$\Delta x = 8 - 2 = 6, \quad \Delta y = 15 - 3 = 12$$

2. Divide the vertical change by the nonzero horizontal change.

$$m = \frac{12}{6} = 2$$

3. Check that the slope reproduces the vertical change.

$$m\Delta x = 2 \times 6 = 12 = \Delta y$$

Both coordinates increase, so a positive slope makes sense. Swapping both points preserves the slope; swapping only one subtraction changes it incorrectly.

Source checks & next step

OpenStax: percentages / OpenStax: slope / OpenStax: geometry / OpenStax: sample and population spread

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