# SAT Math Formula Sheet

## Linear equations and systems

| | |
|---|---|
| Slope-intercept | $y = mx + b$ |
| Point-slope | $y - y_1 = m(x - x_1)$ |
| Example intersection | $y = 2x + 1; y = x + 4$ |

For the example, set the expressions equal: x = 3 and y = 7.
A solution must work in both equations.

## Quadratic equations

| | |
|---|---|
| Standard form | $ax^2 + bx + c = 0$ |
| Discriminant | $D = b^2 - 4ac$ |
| Quadratic formula | $x = (-b \pm \text{sqrt}(D)) / (2a)$ |
| Axis of symmetry | $x = -b/(2a)$ |

a is nonzero. For real coefficients, D < 0 means no real roots. sqrt(D) means square root.

## Exponential models

| | |
|---|---|
| General form | $y = a \times b^t$ |
| Growth | $b = 1 + r$ |
| Decay | $b = 1 - r$ |
| Example: 10% growth | $y = 40 \times 1.1^t$ |

a is the initial value, t counts equal periods, and r is a per-period rate as a decimal. Use 0 < r < 1 for decay.

## Ratios and unit rates

| | |
|---|---|
| Unit rate | rate = amount / quantity |
| Example | $12 ÷ 3 kg = $4 per kg |
| Proportional relation | $y = kx$ |

Name the units and keep the ratios in the same order.
k is the rate per one unit of x.

## Center and spread

| | |
|---|---|
| Mean | sum / count |
| Median | middle of the ordered data |
| Range | maximum − minimum |

For an even count, the median is the mean of the two middle values.
Example: 1, 4, 7, 8 has median 5.5.

## Basic probability

| | |
|---|---|
| Equally likely outcomes | P(A) = favorable / total |
| Complement | P(not A) = 1 − P(A) |
| Example: fair die | P(even) = 3/6 = ½ |

The favorable count comes from the group named in the question.

## Right triangle trigonometry

| | |
|---|---|
| Sine | sin(angle) = opposite / hypotenuse |
| Cosine | cos(angle) = adjacent / hypotenuse |
| Tangent | tan(angle) = opposite / adjacent |
| Side lengths | $a^2 + b^2 = c^2$ |

Choose the acute angle before naming the legs. In the side rule, c is the hypotenuse.

## Circles

| | |
|---|---|
| Circumference | $C = 2\pi r = \pi d$ |
| Area | $A = \pi r^2$ |

The radius r runs from center to edge.
Diameter d = 2r.
Circumference uses length units; area uses square units.

