ACT Math formulas and practice

SHARP

18 selected formula groups with conditions, worked examples and eight practice problems. Learn when a formula fits before using it.

Lines, rates and exponents

For each problem, identify the quantities, choose a relationship and check the units. These selected formulas are a starting reference, not a complete ACT Math curriculum or a frequency ranking.

1. Slope

$m = (y_2 - y_1) / (x_2 - x_1)$

Use the same point first in both differences. A vertical line has undefined slope.

Example. Through (1, 7) and (5, -1): m = (-1 - 7)/(5 - 1) = -2.

2. A line through a point

$y - y_1 = m(x - x_1)$

For a nonvertical line, substitute a known point and its slope. y = mx + b uses the y-intercept b.

Example. Slope 3 through (2, 5): y - 5 = 3(x - 2), so y = 3x - 1.

3. Midpoint and distance

Midpoint: $((x_1 + x_2)/2, (y_1 + y_2)/2)$
Distance: $\sqrt{((x_2 - x_1)^2 + (y_2 - y_1)^2)}$

Average coordinates for a midpoint; use the Pythagorean theorem for distance.

Example. From (1, 2) to (7, 10): midpoint (4, 6); distance $\sqrt{(36 + 64)} = 10$.

4. Percent change

New = original × (1 ± r)

Write the rate as a decimal. Successive changes multiply, not add.

Example. A $60 price rises 20%, then falls 20%: 60(1.2)(0.8) = $57.60.

5. Constant rate

Distance = rate × time

Match units before multiplying. For an average speed, divide total distance by total time.

Example. At 48 miles/hour for 45 minutes: 48 × (45/60) = 36 miles.

6. Exponent rules

$a^m a^n = a^{m+n}$; $(a^m)^n = a^{mn}$; $a^{-n} = 1/a^n$

These forms apply to integer exponents where defined; a must be nonzero for negative exponents.

Example. $2^3 \times 2^4 = 2^7 = 128$. The exponents add when the bases match.

Algebra, sequences and averages

7. Quadratic solutions

$x = (-b \pm \sqrt{(b^2 - 4ac)}) / (2a)$

First write $ax^2 + bx + c = 0$ with $a \neq 0$. Discriminant $b^2 - 4ac$: positive gives two real roots, zero gives one, negative gives none.

Example. $x^2 - 5x + 6 = 0$ gives $(5 \pm \sqrt{1})/2$, so $x = 2$ or 3.

8. Vertex of a quadratic

x at vertex $= -b/(2a)$; $y = a(x - h)^2 + k$

For $ax^2 + bx + c$, find the vertex's x then substitute for y. Vertex form has vertex (h, k).

Example. $y = 2(x - 3)^2 + 5$ has vertex $(3, 5)$ and minimum value 5.

9. Arithmetic sequence

$a_n = a_1 + (n - 1)d$

Use this when each step adds the same difference d. There are $n - 1$ steps from the first term.

Example. First term 7, difference 4: $a_6 = 7 + 5(4) = 27$.

10. Geometric sequence

$a_n = a_1 r^{n-1}$

Use this when each step multiplies by the same ratio r.

Example. First term 3, ratio 2: $a_5 = 3 \times 2^4 = 48$.

11. Exponential growth or decay

Value after t periods $=$ initial $\times (1 \pm r)^t$

Match t to the period for the rate. The rate is a decimal; a 5% loss uses 0.95.

Example. An illustrative 200-unit quantity grows 5% per period for 2 periods: $200(1.05)^2 = 220.5$.

12. Mean and a missing value

Mean $=$ sum / count; sum $=$ mean $\times$ count

Count every value, including repeats. For weighted groups, combine sums and counts.

Example. Four scores average 18. Their sum is 72. If three total 51, the fourth is 21.

A formula is useful only after you have matched it to the problem. Write down what each symbol means before substituting numbers.

Geometry, trigonometry and probability

13. Area and volume

Rectangle $A = lw$; triangle $A = bh/2$
Prism $V = (\text{base area})h$; cylinder $V = \pi r^2 h$

Triangle height is perpendicular to its base. Cylinder h is the perpendicular height. Area uses square units; volume uses cubic units.

Example. A triangle with base 8 cm and height 3 cm has area 12 cm^2. A cylinder with r = 2 cm, h = 5 cm has volume 20π cm^3.

14. Right triangles

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

Only for a right triangle; c is the hypotenuse. A 45-45-90 triangle has sides x, x, $x\sqrt{2}$; a 30-60-90 triangle has x, $x\sqrt{3}$, 2x opposite those angles.

Example. Legs 9 and 12 give $c = \sqrt{(81 + 144)} = 15$.

15. Circle measurements

$C = 2\pi r$; $A = \pi r^2$
Arc length $= (\theta/360°)2\pi r$

The arc formula here uses a central angle θ in degrees. Radius is half the diameter.

Example. Radius 6, central angle 120°: arc $= (120/360)(12\pi) = 4\pi$.

16. Right-triangle trigonometry

$\sin\theta = \text{opposite/hypotenuse}$
$\cos\theta = \text{adjacent/hypotenuse}$; $\tan\theta = \text{opposite/adjacent}$

Stand at the named acute angle before labeling sides. Use the calculator's angle mode that matches the question.

Example. Opposite 5, adjacent 12, hypotenuse 13: $\sin\theta = 5/13$ and $\tan\theta = 5/12$.

17. Similar figures

Length factor $k \rightarrow$ area factor $k^2 \rightarrow$ volume factor k^3

Use the corresponding-length scale factor between similar figures, not an added amount.

Example. Doubling every side of a similar triangle multiplies its area by 4. An area of 7 becomes 28.

18. Probability

P(A) = favorable outcomes / total equally likely outcomes
P(A and B) = P(A)P(B), if independent

Count only equally likely outcomes. For sequential events, multiply the first probability by the probability of the second after the first occurs. Without replacement, count what remains.

Example. Two independent fair coin tosses: P(two heads) = (1/2)(1/2) = 1/4.

Try it with the guide closed

These are original short-answer teaching exercises, not official ACT questions or a timed section. Show your setup before calculating. Check the explanations after you have attempted all eight.

1. Find the slope through (-2, 6) and (4, -3).

2. An $80 jacket is discounted 25%, then 10% off the reduced price. What is its final price?

3. Solve $2x^2 - 7x + 3 = 0$.

4. A sequence starts at 5 and adds 3 each step. What is its eighth term?

5. Five values have a mean of 14. Four values total 53. Find the fifth.

6. A circle has radius 9 cm. Find the length of an arc with central angle 80°.

7. In a right triangle, the side opposite acute angle θ is 8 and the hypotenuse is 17. Find cos θ.

8. A bag has 3 red and 2 blue counters. Two are drawn uniformly at random without replacement. What is the probability both are red?

Answers and next steps

1. -3/2

(-3 - 6)/(4 - (-2)) = -9/6 = -3/2. Reversing the point order in only one difference flips the sign.

2. $54

80(0.75)(0.90) = 54. The second discount applies to $60, not $80.

3. x = 3 or 1/2

(2x - 1)(x - 3) = 0. Alternatively, (7 ± √25)/4 gives the same roots.

4. 26

5 + (8 - 1)3 = 26. Eight terms have seven steps.

5. 17

The total is 5 × 14 = 70; 70 - 53 = 17.

6. 4π cm

(80/360)(2π × 9) = 4π. This asks for length, not sector area.

7. 15/17

The adjacent leg is $\sqrt{(17^2 - 8^2)} = 15$. Cosine uses adjacent/hypotenuse, not 8/17.

8. 3/10

(3/5)(2/4) = 3/10. The second fraction changes because one red counter has been removed.

What to practice next

If you selected the wrong relationship, revisit its conditions. If your setup was right, check signs, units and arithmetic. Try a new problem before deciding the skill is secure.

Using this guide

The ACT does not provide a general Math formula sheet. ACT says basic formulas are assumed, while recall of complex formulas is not required. This guide is for studying before the test. Use a permitted calculator and practice with your actual testing interface.

- ACT: Math test description
- ACT: design framework, February 2026, printed pp. 49 and 68
- ACT: calculator policy

Formula methods cross-checked against Sharp's ACT lessons; examples and exercises are original. Sources checked November 5, 2026. This is an independent Sharp resource, not an ACT publication.