SOFTWARE & TECH

Math Formulas For The Act

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Mastering the ACT Math Section: Essential Formulas for a Top Score

The ACT Math section can be a daunting challenge for many students. With 60 questions to answer in 60 minutes, you need not only speed and accuracy but also a solid command of key mathematical concepts. While the ACT is known for testing critical thinking and problem-solving skills more than rote memorization, having a firm grasp of essential **math formulas for the ACT**is non-negotiable. Memorizing these formulas saves precious time, reduces anxiety, and allows you to focus on applying concepts rather than struggling to recall them.

This guide provides a comprehensive breakdown of the most critical formulas you need to know, organized by topic. Whether you are just beginning your prep or looking for a last-minute refresher, mastering these formulas will give you a significant advantage on test day.

Why Formulas Matter on the ACT

The ACT Math section covers six major content areas: Pre-Algebra, Elementary Algebra, Intermediate Algebra, Coordinate Geometry, Plane Geometry, and Trigonometry. Unlike some standardized tests, the ACT does not provide a formula sheet. This means you must commit the essential equations to memory. However, simply memorizing a list of formulas is not enough. You must understand how and when to apply them. The most successful test-takers are those who can recognize a question type and immediately recall the appropriate formula to solve it efficiently. This fluency comes from active practice, not passive reading.

Below, we have categorized the most important **math formulas for the ACT**to help you structure your study sessions effectively. Focus on understanding the logic behind each formula, and then test your recall with practice problems.

Essential Algebra and Pre-Algebra Formulas

Algebra forms the backbone of the ACT Math section. You can expect to see a significant number of questions centered around linear equations, inequalities, and basic functions. These foundational **math formulas for the ACT** are your first line of defense.

Linear Equations and Slope

The slope of a line is a fundamental concept. You will use it to find the rate of change, determine if lines are parallel or perpendicular, and write equations.

- Slope Formula: Given two points (x •, y •) and (x ,, y ,), slope m = (y , - y •) / (x , - x •).
- Slope-Intercept Form: y = mx + b, where m is the slope and b is the y-intercept.
- Point-Slope Form: y - y • = m(x - x •), where m is the slope and (x •, y •) is a point on the line.
- Parallel Lines: Have equal slopes (m • = m ,).
- Perpendicular Lines: Have slopes that are negative reciprocals (m • * m , = -1).

Systems of Equations

You will often need to find the point where two lines intersect. You can solve these using substitution or elimination. Remember that a system can have one solution (intersecting lines), no solution (parallel lines), or infinitely many

solutions (coincident lines).

Exponents and Radicals

Understanding how to manipulate exponents is crucial for algebra and advanced math questions. These rules are among the most frequently applied **math formulas for the ACT**.

- Product Rule: xa * xb = xa+b
- Quotient Rule: xa / xb = xa-b
- Power Rule: (xa)b = xa*b
- Negative Exponent: x-a = 1 / xa
- Zero Exponent: x0 = 1 (for x "` 0)
- Fractional Exponent: xa/b = b" (xa)

The Quadratic Formula

This is arguably one of the most important **math formulas for the ACT**. You will use it to find the roots (solutions) of a quadratic equation in the form $ax^2 + bx + c = 0$.

$x = [-b \pm " (b^2 - 4ac)] / 2a$

The expression under the radical, $b^2 - 4ac$, is called the **discriminant**. It tells you the nature of the roots:

- If $b^2 - 4ac > 0$, there are two distinct real roots.
- If $b^2 - 4ac = 0$, there is exactly one real root (a double root).
- If $b^2 - 4ac$

Coordinate Geometry: Shapes on a Grid

Coordinate geometry questions combine algebraic concepts with geometric figures. You will need to understand how to calculate distances, midpoints, and the equations of basic shapes.

Distance and Midpoint Formulas

Given two points (x •, y •) and (x ,, y ,):

- Distance Formula: d = " [(x , - x •)² + (y , - y •)²]. This is essentially the Pythagorean theorem applied to a coordinate plane.
- Midpoint Formula: M = [(x • + x ,)/2, (y • + y ,)/2]. This finds the point exactly halfway between two points.

Equation of a Circle

The standard form of a circle's equation is a high-yield formula. The ACT often tests your ability to identify the center and radius from an equation or vice versa.

$(x - h)^2 + (y - k)^2 = r^2$

Here, (h, k) is the center of the circle, and r is the radius. Be careful with signs; if you see $(x + 3)^2$, the *h*coordinate of the center is -3.

Plane Geometry: The Core of the Section

Plane geometry can account for a significant portion of your score. Knowing the properties of triangles, circles, and quadrilaterals is essential. These **math formulas for the ACT** are some of the most commonly tested.

Triangles

Triangles are the most important shape in ACT geometry. Understanding their properties is key.

- Area of a Triangle: A = (1/2) * base * height. The height must be perpendicular to the base.
- Sum of Interior Angles: A + B + C = 180°.
- Pythagorean Theorem: In a right triangle, $a^2 + b^2 = c^2$, where c is the hypotenuse.
- Special Right Triangles: These are frequently tested to save you from using the Pythagorean theorem.

  30-60-90 Triangle: Sides are in the ratio x : x" 3 : 2x.
- 45-45-90 Triangle: Sides are in the ratio x : x : x" 2.

Circles

You will need to know how to calculate everything related to a circle.

- Area: A = < +
- Circumference: C = 2< " ÷" 2 Ò Àd (where d is the diameter).
- Arc Length: For a central angle ;, †–â FVprees), length = (;,ó3c ’ ¢ #Àr.
- Area of a Sector: For a central angle ;, †–â FVprees), area = (;,ó3c ’ ¢ Àr².

Quadrilaterals

Knowing the area formulas for different four-sided figures is crucial.

- Rectangle: Area = length * width.
- Square: Area = side².
- Parallelogram: Area = base * height. (Height is perpendicular to the base).
- Trapezoid: Area = (1/2) * (base • + base ,) * height.

Volume and Surface Area

The ACT will test your ability to calculate the volume of common 3D shapes.

- Rectangular Prism: V = length * width * height.
- Cube: V = side³.
- Cylinder: V = < +&,à
- Cone: V = (1/3)< +&,à
- Sphere: V = (4/3)< +2à

Trigonometry: The Final Frontier

The ACT includes a small but important trigonometry component, typically 3-4 questions. You do not need to be a trigonometry expert, but you must know the basics.

Basic Trigonometric Ratios (SOH CAH TOA)

These are used to relate the angles of a right triangle to the lengths of its sides.

- Sine (sin): sin(;,’ Ò ÷ ÷6—FR ò ‡— ÷FVàuse
- Cosine (cos): cos(;,’ Ò F¦ 6VçB ò ‡— ÷FVàuse
- Tangent (tan): tan(;,’ Ò ÷ ÷6—FR ò F¦ 6Vç@

Reciprocal Identities

The ACT may test these, so it is good to be familiar with them.

- Cosecant (csc): csc(;,’ Ò ò 6–âf¸) = Hypotenuse / Opposite
- Secant (sec): sec(;,’ Ò ò 6÷2f¸) = Hypotenuse / Adjacent

- Cotangent (cot): cot(;,’ Ò ò F â*ƒ* ¸) = Adjacent / Opposite

Key Trigonometric Values

You should memorize the sine, cosine, and tangent values for common angles (0°, 30°, 45°, 60°, 90°). A unit circle or a simple table is extremely helpful. Knowing these values allows you to solve many trigonometry problems without a calculator.

The Law of Sines

This formula is useful for non-right triangles. It relates the sides of a triangle to the sines of its angles.

sin(A)/a = sin(B)/b = sin(C)/c

Note: The ACT provides this formula in the test booklet, but you should know how to use it.

How to Effectively Memorize These Formulas

Creating a list of **math formulas for the ACT**is only the first step. To truly internalize them, you need a strategic approach to memorization.

1. Understand, Don't Just Memorize: A formula like the quadratic formula is much easier to remember when you understand that it finds the x-intercepts of a parabola. Connect the formula to its visual representation.
2. Use Active Recall: Instead of just reading the list repeatedly, close your book and try to write down all the formulas from memory. Check your work and repeat the process until you can list them all without errors.
3. Create Mnemonic Devices: Use memory tricks. For example, "SOH CAH TOA" is a classic mnemonic for sine, cosine, and tangent. You can create your own for the slope formula or special right triangles.

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