

GED Mathematical Reasoning

Every topic on one sheet: the idea, the moves, the usual mistake, and one drill. The real test is undefined questions in undefined minutes. You need 145 to pass, on a 100–200 scale. Practice every topic free at score145.com.

01 Signed Numbers & Absolute Value

Negative signs are a bookkeeping problem, not a math problem. Rewrite before you compute.

THE MOVES

- Subtracting a negative becomes addition: $-8 - (-3) = -8 + 3 = -5$.
- Adding a negative becomes subtraction: $5 + (-7) = -2$.
- Two negatives multiplied or divided give a positive; one negative gives a negative.
- Absolute value is distance from zero, so it is never negative.

THE USUAL MISTAKE

Rushing the double negative and answering -11 instead of -5 .

TRY ONE

Rewrite every double-sign expression on its own line before computing. Never do that step in your head.

02 Fractions & Decimals

Adding and multiplying fractions follow completely different rules. Mixing them up is the most common fraction error.

THE MOVES

- Add or subtract: find a common denominator, then add only the numerators.
- Multiply: straight across, top $\times$ top and bottom $\times$ bottom. 'Of' always means multiply.
- Divide: flip the SECOND fraction and multiply.
- Compare sizes: convert everything to decimals first.

THE USUAL MISTAKE

Adding the denominators. $2/3 + 1/4$ is never $3/7$.

TRY ONE

Memorize as decimals: $1/2=.5$, $1/3\approx.33$, $1/4=.25$, $1/5=.2$, $1/8=.125$, $3/8=.375$, $5/8=.625$, $3/4=.75$.

03 Percents & Percent Change

Three moves cover nearly every percent question. Identify which one you are facing before touching numbers.

THE MOVES

- Percent of a number: convert to a decimal and multiply.
- Percent change: divide the change by the ORIGINAL amount.
- Discount: multiply by what's left. 25% off means $\times 0.75$. Tax: $\times 1.08$ for 8%.
- Build mentally from 10%: half it for 5%, double it for 20%.

THE USUAL MISTAKE

Dividing percent change by the new number instead of the original. The word 'from' points to your denominator.

TRY ONE

Practice tips and discounts on real receipts until 10/5/15/20% are automatic.

04 Ratios, Rates & Proportions

Find the value of ONE unit or one share first, then scale up.

THE MOVES

- Rates: divide to get cost per one, then multiply by the quantity you need.
- Part-to-part ratios: ADD the parts to get total shares. A 3:5 ratio has 8 shares.
- Maps and scale: set up a proportion with matching units, then cross-multiply.

THE USUAL MISTAKE

Reading a 3:5 ratio as 3 out of 5 rather than 3 out of 8.

TRY ONE

Compare unit prices on two package sizes at the store. That is exactly the tested skill.

05 Exponents, Roots & Scientific Notation

Exponent rules are about what happens to the exponents, not the bases.

THE MOVES

- Multiplying same bases ADDS exponents; dividing SUBTRACTS them.
- A power raised to a power MULTIPLIES exponents. Anything to the zero power is 1.
- Scientific notation: one nonzero digit in front. Moving the decimal right gives a negative exponent.
- Know perfect squares through 25^2 on sight.

THE USUAL MISTAKE

Multiplying the bases too. $2^3 \times 2^2$ is 2^5 , not 4^5 .

TRY ONE

Write out 2^1 through 2^{10} and the squares of 1–20 from memory, twice this week.

06 Area & Perimeter

You get a formula sheet on test day. The skill is choosing the right formula and labeling the figure.

THE MOVES

- Perimeter is the distance around; area is the space inside. Baseboard is perimeter, flooring is area.
- Triangle area = $\frac{1}{2}bh$. The $\frac{1}{2}$ is the most-forgotten symbol on the test.
- Circle: area = πr^2 , circumference = πd . Check whether you were given radius or diameter.
- Trapezoid: average the parallel sides, then multiply by height.

THE USUAL MISTAKE

Squaring the diameter instead of the radius, and dropping the $\frac{1}{2}$ on triangles.

TRY ONE

Redraw every figure and write the given numbers directly on it before computing. Check units: area is squared.

07 Volume & Surface Area

Volume is always the area of the base times the height. Get the base right and the rest follows.

THE MOVES

- Rectangular prism: length $\times$ width $\times$ height.
- Cylinder: $\pi r^2 h$. Square the radius BEFORE multiplying by height.
- Surface area adds up the outside faces. A cube has 6 identical squares.
- Volume uses cubic units; surface area uses square units.

THE USUAL MISTAKE

Confusing volume with surface area, or forgetting to square the radius.

TRY ONE

For every solid you meet, say out loud what the base is and what its area formula is.

08 Right Triangles & Pythagorean Theorem

$a^2 + b^2 = c^2$, where c is always the side across from the right angle.

THE MOVES

- Legs are a and b ; the hypotenuse is c and is always the longest side.
- To find a leg, rearrange: $b^2 = c^2 - a^2$.
- Learn the common triples: 3-4-5, 5-12-13, 8-15-17, 7-24-25, and all their multiples.
- Diagonals of rectangles and leaning ladders are right-triangle problems in disguise.

THE USUAL MISTAKE

Adding the legs directly. 6 and 8 give a hypotenuse of 10, not 14.

TRY ONE

Memorize the four common triples. They appear constantly and let you skip the arithmetic.

09 Mean, Median & Data Displays

Four measures, four different questions. Identify which one is being asked.

THE MOVES

- Mean: add everything, divide by the count.
- Median: SORT first, then take the middle. Even count means average the two middle values.
- Mode is most frequent; range is largest minus smallest.
- For 'what score do I need' problems, compute the required TOTAL first.

THE USUAL MISTAKE

Finding the median without sorting the list.

TRY ONE

Take six numbers, compute all four measures, then change one to an extreme value and watch the mean move while the median barely does.

10 Probability & Counting

Probability is favorable outcomes over TOTAL outcomes.

THE MOVES

- Count the total carefully; it includes every possibility, not just the other category.
- 'Or' between outcomes adds; 'and' across events multiplies.
- For combinations of choices, multiply the options at each step.
- If an item is not replaced, both the favorable count and the total drop.

THE USUAL MISTAKE

Writing 4 red / 6 blue as $\frac{4}{6}$ instead of $\frac{4}{10}$.

TRY ONE

Simplify every probability to lowest terms, since answer choices usually appear reduced.

11 Simplifying Expressions

Clear the parentheses, then gather what matches.

THE MOVES

- Distribute to EVERY term inside the parentheses, including the negative one.
- A minus sign in front of parentheses flips both terms inside.
- Combine only like terms: $6x$ and $5x$ combine; $11x$ and -12 never do.
- Multiplying variables: $x \times x = x^2$, not $2x$.

THE USUAL MISTAKE

Distributing to the first term only and forgetting the second.

TRY ONE

Check your work by substituting $x = 2$ into both the original and your simplified version. They must match.

12 Linear Equations

Peel operations off the variable in reverse order, doing the same thing to both sides.

THE MOVES

- Undo addition and subtraction first, then multiplication and division.
- With variables on both sides, move them to one side first.
- Word problems: subtract the flat fee, THEN divide by the per-unit rate.
- Always substitute your answer back to check.

THE USUAL MISTAKE

Dividing before clearing the added or subtracted term.

TRY ONE

Check every answer by substitution. It costs ten seconds and catches nearly every error.

13 Inequalities

Solve exactly like an equation, with one exception.

THE MOVES

- Isolate the variable using the same steps as an equation.
- FLIP the inequality sign when you multiply or divide by a negative. That is the only difference.
- $\leq$ and $\geq$ include the endpoint; $<$ and $>$ do not.
- Real-world 'at most' problems usually round DOWN, since you cannot buy part of an item.

THE USUAL MISTAKE

Flipping the sign when you only added or subtracted a negative. The flip applies to multiplying and dividing only.

TRY ONE

Test your answer with one number that should work and one that should not.

14 Systems of Equations

Two equations, two unknowns. Eliminate one variable to solve for the other.

THE MOVES

- Add or subtract the equations so one variable cancels.
- Or substitute: solve one equation for a variable, then plug it into the other.
- Ticket and mixture problems: let one quantity be x and write the other as $(\text{total} - x)$.
- Find both values, then check them in BOTH original equations.

THE USUAL MISTAKE

Solving for one variable and forgetting the question asked for the other.

TRY ONE

Circle what the question actually asks before you start solving.

15 Quadratics & Factoring

Factoring means finding two numbers that multiply and add to the right values.

THE MOVES

- For $x^2 + bx + c$, find two numbers that MULTIPLY to c and ADD to b .
- Set each factor equal to zero to get the solutions. Quadratics usually have two.
- Watch the signs: $(x - 3)(x - 4)$ expands to $x^2 - 7x + 12$.
- To evaluate, square first, then multiply, then add.

THE USUAL MISTAKE

Getting the signs backward when factoring.

TRY ONE

Multiply your factors back out every time to confirm you get the original expression.

16 Function Notation

$f(x)$ is a machine: put a number in, get a number out.

THE MOVES

- $f(4)$ means replace every x with 4, then compute.
- Follow order of operations: exponents before multiplication.
- To find the input from a given output, set the expression equal to that output and solve.
- $f(x)$ is just another name for y .

THE USUAL MISTAKE

Reading $f(4)$ as f times 4.

TRY ONE

Build a small input-output table for one function so the machine idea becomes concrete.

17 Slope & Linear Graphs

Everything reduces to $y = mx + b$.

THE MOVES

- m is slope, b is the y -intercept where the line crosses the vertical axis.
- Slope = rise over run = $(y_2 - y_1) \div (x_2 - x_1)$. Keep both points in the same order.
- In word problems, the per-unit rate is the slope and the flat fee is the intercept.
- Positive slope rises, negative falls, zero is flat.

THE USUAL MISTAKE

Flipping the slope fraction into run over rise.

TRY ONE

Sketch $y = 2x + 1$ and $y = -2x + 1$ together so the effect of the sign becomes visual.

18 Writing Equations from Words

Translate phrase by phrase, watching the order carefully.

THE MOVES

- 'Less than' reverses the order: '7 less than $3n$ ' is $3n - 7$, not $7 - 3n$.
- 'Of' means multiply; 'is' means equals.
- Starting amount plus rate times time is the most common structure.
- Define your variable in writing before you build the equation.

THE USUAL MISTAKE

Reversing subtraction and division phrases.

TRY ONE

Write the sentence in words, then replace each phrase with symbols one piece at a time.