

ACT Study Guide

190+ High-Yield Terms & Concepts for the Enhanced ACT

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How to Use This Guide

The ACT is a college admissions test scored on a 1-36 scale. On the current 'Enhanced ACT' the composite is the rounded average of your English, Math and Reading section scores; Science is optional on most National test administrations, and Writing is optional and chosen by colleges. This guide organizes the high-yield terms and concepts tested across every score area, plus the exam overview, a final review, and a test-day strategy. Work through the sections in order - English and Math reward concept fluency, and Reading is a skills section you build with practice.

Exam Overview: The Enhanced ACT

The ACT is a college admissions test scored on a 1-36 scale. The 'Enhanced ACT' - online national administrations since December 2023, with the enhanced blueprint online from April 2025 and on paper from September 2025 - kept the content areas but cut roughly 44 questions and 70 minutes from the old test. The core sections are English (50 questions / 35 minutes), Math (45 / 50), and Reading (36 / 40). Science (40 / 40) is now OPTIONAL on the National test - you choose whether to take it (on State and District tests, the decision can belong to the district or contract). Writing (one essay / 40 minutes) is also optional and is chosen by individual colleges.

Scoring: each section is scored 1-36. The COMPOSITE is the rounded average of your English, Math, and Reading section scores (the 'EMR' composite) - on every administration since September 2025. If you take Science, your Science score is still reported on the 1-36 scale and you receive a STEM score (rounded average of Math and Science). If you take Writing, you receive an ELA score (rounded average of English, Reading, and Writing). Colleges see the section scores and the composite; there is no penalty for wrong answers, so you should answer every question and guess rather than leave anything blank.

Format facts that change strategy: on the Enhanced ACT, Math has FOUR answer choices (not five) and so do English, Reading, and Science. The test is digital-first on national dates - you read passages and answer on screen with flagging, highlighting, and a calculator built in for Math. Paper testing is still offered and uses the same blueprint. Total core testing time is about 125 minutes (English + Math + Reading, no breaks counted); with optional Science and Writing it is about 205 minutes of testing across the longest administrations.

Your ordering decision matters: if Science is optional on your test, you choose whether to sit through it. Many colleges want or accept a Science score for STEM programs; others use only EMR. Check the score-use policies of your target colleges before deciding, and take the section if any college on your list wants it - you cannot add it after test day.

Section 1: English (Grammar, Usage & Rhetoric) (26 Concepts)

50 questions / 35 minutes. Usage-and-mechanics plus rhetorical skills - the best answer is both grammatical AND clearest.

#	Term	Key Facts	ACT Tip	Example
1	Subject-Verb Agreement	The verb must match its subject in number and person: singular subjects take singular verbs, plural take plural. Ignore phrases that come between them (prepositional phrases, clauses).	Cross out the interrupting phrase and match the verb to the REAL subject. '-s' on the verb = singular; no '-s' = plural.	The box of books (is/are) heavy -> 'box' is the subject -> 'is'.
2	Pronoun-Antecedent Agreement	A pronoun must agree with its antecedent (the noun it replaces) in number, gender, and person. 'Each,' 'everyone,' 'anybody' are singular.	Words ending in -one, -body, or -thing are SINGULAR. 'The students brought their books' but 'Everyone brought his or her book' (or rewrite).	Each of the girls brought (her/their) own lunch -> 'her'.
3	Pronoun Case: Subject vs Object	Subject pronouns (I, he, she, we, they, who) act; object pronouns (me, him, her, us, them, whom) receive. Use subject case after 'than' and before 'and' when the pronoun is part of the subject.	Test by removing the other noun: 'John and (I/me) went' -> 'I went' works -> 'I'.	Between you and (I/me) -> 'me' (object of preposition).
4	Verb Tense Consistency	Verbs within a sentence or paragraph should be in consistent tenses unless the time actually shifts.		

ACT passages
often test a tense
shift in the
middle of a
sentence.

Match the tense
to the time
markers:
'yesterday' =
past, 'now' =
present,
'tomorrow' =

future. Only
change tense
when the time
changes.

'She runs every
day and (ran/run)
every morning
last week' ->
'ran' (last week is
past).

5	Parallel Structure	Items in a list or pair must use the same grammatical form: all nouns, all gerunds, all infinitive phrases, etc. Watch for 'and', 'or', 'not only...but also'.	Every item after a colon or in a list must match. If one item begins with 'ing', they all should.	She likes reading, hiking, and (to swim/swimming) -> 'swimming'.
6	Comma Rules	Commas separate items in a list, join two independent clauses with a coordinating conjunction (and, but, or, so), set off nonessential info, follow an intro phrase, and separate adjectives.	Comma + conjunction = two full sentences joined. No comma needed between subject and verb - ever.	'After dinner, we walked to the park.' 'The tall, dark building' (two adjectives).
7	Semicolons & Colons	A semicolon joins two related independent clauses without a conjunction. A colon introduces a list, explanation, or quote after a complete sentence.	Semicolon = period-lite (both sides must be full sentences). Colon = 'here comes the list'.	'The plan was simple: work hard, sleep well, repeat.' 'She won; nobody was surprised.'
8	Apostrophes: Possession & Contraction	Apostrophes show possession (singular: 's; plural ending in s: s') and contractions (don't, it's). Do not use them for plurals.	'Its' = possessive (no apostrophe); 'it's' = it is. That trick settles most apostrophe questions.	'The dog wagged its tail.' 'It's raining.' 'The students' books.'
9	Commonly Confused Words	Their/there/they're, your/you're, its/it's, whose/who's, affect/effect, then/than, to/too/two, lose/loose, principal/principle		

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Learn the 6 pairs ACT repeats: their/there/they're , its/it's, your/you're, whose/who's, affect/effect, then/than.	'Affect' is a verb (to influence); 'effect' is usually a noun (a result).
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10	Run-On Sentences & Comma Splices	A run-on joins two sentences with no punctuation; a comma splice joins them with only a comma. Fix by adding a period, semicolon, or comma + conjunction.	Two full sentences need a period, semicolon, or comma + FANBOYS. A comma alone is always wrong.	'It rained, we stayed inside' -> comma splice; fix: 'It rained, so we stayed inside.'
11	Sentence Fragments	A fragment is a piece of a sentence punctuated as a sentence: missing a subject, missing a verb, or starting with a subordinator ('because', 'although', 'when') with no main clause.	Every complete sentence has a subject AND a verb and can stand alone. 'Because he was late' is a fragment.	Fragment: 'Although she tried hard.' Fixed: 'Although she tried hard, she missed the deadline.'
12	Modifiers & Dangling Modifiers	A modifier must clearly attach to the word it describes. A dangling modifier has nothing to modify ('Walking home, the rain started').	The subject right after the comma must be the thing being described. 'Walking home, I felt the rain start.'	Dangling: 'Running late, the bus was missed.' Fixed: 'Running late, she missed the bus.'
13	Comparisons	Compare like to like: 'as...as' for equality, 'than' for inequality, and -er/-est for short adjectives (bigger) vs 'more' for long ones.	Delete the extra words to test: 'Her grades are higher than (his grades/him)' -> 'his' (compare grades to grades).	'The car is faster than any other car in its class.'
14	Redundancy & Wordiness	Delete words that repeat an idea ('repeat again', 'at this point in time' = now). The ACT routinely asks for the most concise correct phrasing.	The shortest grammatically correct answer that keeps the meaning is usually right. Cut double subjects ('The book it was').	'She returned the book back' -> 'She returned the book.'

15	Transitions & Logical Flow	Transition words signal logic: however/nevertheless (contrast), moreover/further more (add), therefore/thus (result), for example (illustrate), in conclusion (summarize).	The transition must match the logical relationship. 'However' after a supporting sentence is a red flag; 'For example' after a claim with no example is needed.	'The plan is costly. (However/Therefore), it will pay for itself' -> 'However' (contrast).
16	Main Idea & Topic Sentences	A paragraph's topic sentence states its main idea; everything else supports it. ACT asks you to add, move, or choose a topic sentence.	The topic sentence must cover ALL details in the paragraph - if a detail doesn't fit, that option is wrong.	A paragraph about rising costs, falling sales, and layoffs needs a topic like 'The company faced a difficult year.'
17	Organization & Paragraph Order	Paragraphs should flow logically: general to specific, chronological, or cause to effect. The ACT may ask which sentence should start a paragraph or where a paragraph belongs.	Look for the first sentence that introduces the topic; the next paragraph should develop it. Repetition of a key word signals the intended order.	A paragraph describing the process of making bread fits after the paragraph explaining why flour matters.
18	Supporting Details & Relevance	Every sentence in a paragraph should support the topic. Irrelevant sentences ('off-topic' details) should be deleted.	If a sentence talks about something the rest of the paragraph never mentions, it is probably an 'irrelevant' answer - delete it.	In a paragraph about the ozone layer, a sentence about the price of sunscreen is off-topic.
19	Precision & Diction	Choose the most exact word for the context. Formal essays avoid slang and overly casual language; technical topics		

need precise
terms.

ACT chooses
between
near-synonyms -
pick the one
matching the
tone and exact
meaning
(denotation beats

vibe).

'The report was (skimpy/brief)'
-> 'brief' in a formal context.

20	Idiom & Preposition Choice	Some verb-preposition pairs are fixed idioms: 'agree
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with' (a person),
'agree to' (a
plan), 'different
from', 'capable
of', 'interested in'.

If a preposition
looks odd, test it
in your head with
a known phrase;

ACT prefers
standard idioms.

'She is interested
(in/on/about)
history' -> 'in'.

21	Who vs Whom	'Who' is a subject (who did the action); 'whom' is an object (whom the action was done to). In casual speech whom is fading, but ACT still tests it.	Answer with he/him: 'Who called?' -> 'He called' -> who. 'Whom did you see?' -> 'I saw him' -> whom.	'The teacher (who/whom) we respect' -> 'we respect him' -> 'whom'.
22	Sentence Function: Adding & Deleting	The ACT asks what adding or deleting a sentence does: adds support, provides contrast, introduces a new idea, or is irrelevant. Know the sentence's job in context.	Read the sentence BEFORE and AFTER the target. The correct answer names the relationship those neighbors reveal.	A sentence giving an example of a claim belongs right after the claim is stated.
23	Style & Tone Consistency	The passage has a consistent voice (formal, conversational, technical). The ACT asks you to match a sentence to that voice.	Match the passage's register - a casual 'stuff' usually clashes with an academic passage.	In a formal passage, 'the results were (amazing/impressive)' -> 'impressive'.
24	Placement of Sentences	Some questions ask where a sentence best fits ('where should the underlined sentence be moved?'). The best spot is where it connects to both neighbors.	The moved sentence should follow the sentence that introduces its idea and precede the sentence it logically leads to.	A sentence explaining 'this method' fits right after a sentence that mentions the method by name.
25	Compound Subjects & Agreement	Subjects joined by 'and' take a plural verb ('Tom and Jerry are...'). With 'either/or' and 'neither/nor', the verb matches the subject NEAREST to it.	'And' = plural; 'or/nor' = match the nearest subject - that proximity rule is the entire test.	Neither the coach nor the players (was/were) ready -> 'were' (players is nearest).

26	Sentence Combining & Coordination	Two short sentences combine with a coordinating conjunction (and, but, or, so, yet), a subordinator (because, although, when), or a semicolon. The ACT asks which option best joins them.	The right join preserves the logical relationship AND makes one grammatical sentence - a comma alone is never enough.	'She was tired. She finished the race' -> 'Although she was tired, she finished the race.'
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Section 2: Math - Algebra (22 Concepts)

Roughly 22-24% of ACT Math. One-variable equations, inequalities, systems, quadratics, and word-problem translation.

#	Term	Key Facts	ACT Tip	Example
1	Solving Linear Equations	Do the same operation to both sides until the variable is alone. Undo addition/subtraction first, then multiplication/division. Clear fractions by multiplying through by the denominator.	Check by plugging the answer back in - it is faster than redoing the algebra.	$3(x - 2) = 15$ $\rightarrow 3x - 6 = 15$ $\rightarrow 3x = 21$ $\rightarrow x = 7$.
2	Solving Linear Inequalities	Solve like an equation, but FLIP the inequality sign when you multiply or divide both sides by a negative number.	The flip on negative multiplication is THE trap. Graph the solution on a number line with an open circle for $<$ and $>$; and closed for $\leq$ and $\geq$.	$-2x \geq 8$ $\rightarrow x \leq -4$ (flipped).
3	Systems of Equations	Two equations, two unknowns. Solve by substitution (replace one variable) or elimination (add/subtract to cancel a variable).	When coefficients match ($x + y$ and $x - y$), elimination is fastest. Otherwise solve for one variable first.	$x + y = 10$, $x - y = 4$ $\rightarrow$ add: $2x = 14$ $\rightarrow x = 7$, $y = 3$.
4	FOIL & Multiplying Polynomials	Expand $(a+b)(c+d) = ac + ad + bc + bd$ (First, Outer, Inner, Last). Larger polynomials distribute term by term.	FOIL is multiply-everything-in-order. Keep signs straight - a negative times a negative is positive.	$(x + 3)(x - 4) =$ $x^2 - 4x + 3x - 12 =$ $x^2 - x - 12$.
5	Factoring Quadratics	To factor $x^2 + bx + c$, find two numbers that multiply to c and		

add to b. Factor
out a GCF first
when present.

If you cannot
factor, use the
quadratic
formula. The

ACT allows factoring by asking for solutions, not the factors.

$$x^2 - 5x + 6 = (x - 2)(x - 3).$$

Solutions: $x = 2, 3$.

6	Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ for $ax^2 + bx + c = 0$. The discriminant $b^2 - 4ac$ tells how many real roots: >0 = two, =0 = one, <0 = none (real).	Memorize the formula in pieces: numerator -b, then $\pm \sqrt{b^2 - 4ac}$, all over 2a.	$x^2 - 4x - 5 = 0$ > a=1, b=-4, c=-5 > x = $\frac{4 \pm \sqrt{16+20}}{2}$ > x = 5 or -1.
7	Completing the Square (Vertex Form)	Rewrite $x^2 + bx + c$ as $(x + b/2)^2 + (c - (b/2)^2)$ to find the vertex $(-b/2, y)$. Vertex form: $y = a(x - h)^2 + k$ with vertex (h, k) .	The vertex x-coordinate is always $-b/(2a)$ - use it without completing the square when the ACT asks for the vertex.	$y = x^2 + 6x + 8$ > h = -3, k = 8 > -9 = -1 > vertex (-3, -1).
8	Absolute Value Equations & Inequalities	Absolute value $(\text{abs}(x))$ = distance from zero. $\text{abs}(x) = a$ means $x = a$ or $x = -a$. $\text{abs}(x) < a$ means $-a < x < a$; $\text{abs}(x) > a$ means $x < -a$ or $x > a$.	Split into two cases for equations; for inequalities, '<,' becomes an AND (between), '>,' becomes an OR (outside).	$\text{abs}(x - 2) = 7$ > x = 9 or x = -5. $\text{abs}(x) < 3$ > -3 < x < 3.
9	Word Problems: Translating to Equations	Break the sentence into pieces: 'is' = =, 'of' = multiply, 'more than' = +, 'less than' = -, 'per' = divide, 'a number' = x. Build the equation BEFORE solving.	Define the variable with a label ('let x = the smaller number'), then write one equation per sentence.	'The sum of a number and 8 is 20' > $x + 8 = 20$ > x = 12.
10	Ratios & Proportions	A ratio compares parts. A proportion is two equal ratios ($a/b = c/d$); solve with cross-multiplication ($a \times d = b \times c$).	Set up both sides with the SAME units in the same position. Keep total = sum of parts in mind.	If 3 apples cost \$1.20, 7 apples cost? $3/1.20 = 7/x$ > $3x = 8.40$ > x = \$2.80.
11	Percent Change	Percent change = $(\text{new} - \text{original}) / \text{original} \times 100\%$. The change is		

relative to the
ORIGINAL, not
the new value.

Sequential
percent changes
do NOT add. A
20% increase

then a 20%
decrease is a net
LOSS.

\$100 up 20% =
\$120, down 20%
= \$96. Net: -4%.

12	Distance = Rate x Time	$d = rt$. Rearrange: time = distance/rate, rate = distance/time. Keep units consistent (convert minutes to hours).	Average speed for a trip = total distance / total time - never the simple average of two speeds.	120 miles at 60 mph = 2 hours. 60 miles at 30 mph + 60 at 60 mph = 3 hours total -> 40 mph average.
13	Average (Mean) & Sum	Average = sum / count. If you know the average and the count, sum = average x count.	Use the sum trick: 'average of 5 numbers is 12' means the sum is 60 - then add/subtract one value and recompute.	Scores 80, 85, 90, 85: sum 340, count 4 -> 85.
14	Work Problems	If a person finishes a job in N hours, their rate is $1/N$ per hour. Working together, ADD the rates: $1/N + 1/M$.	Combined time = $1 / (1/N + 1/M)$. Straight-up reciprocal addition; do not average the times.	A 4-hr worker and a 6-hr worker: $1/4 + 1/6$ = $5/12$ -> $12/5$ = 2.4 hours.
15	Arithmetic Sequences	An arithmetic sequence adds a constant difference d each step: $a_n = a_1 + (n - 1)d$. Find d by subtracting consecutive terms.	To find the 20th term: start at the first term and add d nineteen times - or use the formula directly.	Sequence 3, 7, 11, 15, ... -> d = 4 -> $a_{10} =$ $3 + 9(4) = 39$.
16	Geometric Sequences	A geometric sequence multiplies by a constant ratio r each step: $a_n =$ $a_1 \times r^{(n-1)}$.	Find r by dividing consecutive terms (term 2 / term 1). Watch for negative ratios and fractions.	2, 6, 18, 54, ... -> r = 3 -> $a_5 = 2 \times 3^4 =$ 162.
17	Exponent Rules	$x^a \times x^b =$ $x^{(a+b)}$; $x^a /$ $x^b = x^{(a-b)}$; $(x^a)^b = x^{(ab)}$; $x^0 = 1$; $x^{(-a)} =$ $1/x^a$; $x^{(1/2)} =$ $\sqrt{x}$.	Add exponents when multiplying same bases, subtract when dividing, multiply when raising a power to a power.	$x^3 \times x^5 = x^8$. $(x^2)^3 = x^6$. $x^0 = 1$.

18	Roots & Radicals	$\sqrt{ab} = \sqrt{a} \times \sqrt{b}$; $\sqrt{a/b} = \sqrt{a}/\sqrt{b}$. Simplify by factoring out perfect squares.	Rationalize a denominator when asked: multiply top and bottom by the radical.	$\sqrt{50} = \sqrt{25 \times 2} = 5\sqrt{2}$. $1/\sqrt{2} = \sqrt{2}/2$.
19	Function Notation	$f(x)$ means 'plug x into the rule'. $f(3)$ evaluates the function at $x = 3$. $f(g(x))$ nests rules.	Work from the inside out for composition: find $g(2)$ first, then plug that into f .	$f(x) = 2x + 1$: $f(3) = 7$. $f(g(2))$ with $g(x) = x^2$: $g(2) = 4$, $f(4) = 9$.
20	Direct & Inverse Variation	Direct: $y = kx$ (y grows with x ; ratio y/x is constant). Inverse: $y = k/x$ (y shrinks as x grows; product xy is constant).	Set up the proportion from the relationship words: 'varies directly' -& 'varies inversely' -& 'same-side ratios'; 'inversely' -& flip one ratio.	y varies inversely with x , $y = 12$ when $x = 4$ -& $k = 48$ -& when $x = 6$, $y = 8$.
21	Literal Equations	Solve for a specific variable by treating the others as numbers: isolate the target letter with inverse operations, exactly like a normal equation.	The ACT asks you to solve a formula for y or r - same moves, more letters. Keep the target letter alone on one side.	$A = l w$ -& $l = A / w$. $y = mx + b$ -& $x = (y - b) / m$.
22	Mixture & Coin Problems	Total value = count $\times$ value per item. For mixtures, amount $\times$ concentration = amount of the active ingredient. Set two equations: one for count/amount, one for value.	Build the two equations with consistent units and solve by substitution - the standard ACT mixture move.	12 coins of nickels (5c) and dimes (10c) worth 95c: $n + d = 12$, $5n + 10d = 95$ -& 5 nickels, 7 dimes.

Section 3: Math - Geometry (19 Concepts)

Roughly 22-24% of ACT Math. Triangle rules, circles, volume, and coordinate formulas - know them cold.

#	Term	Key Facts	ACT Tip	Example
1	Angle Types & Relationships	Complementary angles sum to 90; supplementary to 180. Vertical angles are equal; angles around a point sum to 360. A straight line is 180.	Any time two lines cross, the opposite (vertical) angles match and the adjacent ones add to 180.	Two angles on a straight line are 70 and x -> $x = 110$.
2	Parallel Lines & Transversals	A line cutting parallel lines creates equal corresponding angles, equal alternate interior angles, and supplementary same-side (consecutive) interior angles.	Spot the Z shape (alternate interior) and the F shape (corresponding) - equal angles live there.	With parallel lines, an angle of 50 degrees corresponds to an angle of 50 on the other line.
3	Triangles: Angle Sum & Inequality	Interior angles sum to 180; an exterior angle equals the sum of the two remote interior angles. Any side is shorter than the sum of the other two and longer than their difference.	If two angles are given, the third is 180 minus both. The largest side faces the largest angle.	Angles 50 and 70 -> third angle 60. Sides 4 and 7 -> third side between 3 and 11.
4	Pythagorean Theorem	$a^2 + b^2 = c^2$ for right triangles, with c the hypotenuse (opposite the right angle).	Learn the triples: 3-4-5, 5-12-13, 8-15-17 and their multiples (6-8-10, 9-12-15) to skip the math.	Legs 6 and 8 -> hypotenuse 10 (a 3-4-5 multiple).
5	Special Right Triangles	45-45-90: legs equal, hypotenuse = leg $\times \sqrt{2}$. 30-60-90: short leg a , hypotenuse $2a$,		

long leg a x
 $\sqrt{3}$.

These ratios
appear
constantly.
Memorize: 45
-> $1-\sqrt{2}$;
30-60-90 ->
 $1-\sqrt{3}-2$.

A 30-60-90 with
short leg 4 has
hypotenuse 8
and long leg 4
 $\sqrt{3}$.

6	Triangle Similarity	Similar triangles have equal angles and proportional sides. AA (two equal angles) proves similarity. Corresponding sides scale by the same factor.	Set up the proportion with corresponding sides in the same position, then cross-multiply.	A 3-4-5 triangle scaled by 2 is a 6-8-10 triangle - all angles preserved.
7	Triangle Congruence	Congruent triangles are identical in size and shape. Proof shortcuts: SSS, SAS, ASA, AAS, HL (right triangles).	The ACT rarely asks for formal proofs - it asks which condition guarantees identical triangles.	Two triangles with two equal sides and the included angle equal (SAS) are congruent.
8	Area Formulas	Rectangle: $l \times w$. Square: s^2 . Triangle: $(1/2) b h$. Parallelogram: $b h$. Trapezoid: $(1/2)(b_1 + b_2) h$. Rhombus: $(1/2)(d_1 \times d_2)$.	The height is ALWAYS perpendicular to the base - never the slanted side.	Trapezoid with bases 5 and 9 and height 4: $(1/2)(14)(4) = 28$.
9	Circles: Circumference & Area	Circumference = $2 \pi r = \pi d$. Area = πr^2 . A diameter is twice the radius. π is about 3.14 (use the exact π in answers).	If given the diameter, halve it BEFORE using an r-based formula. Leave answers in terms of π when the choices are in π .	Radius 5: area = 25 π , circumference = 10 π .
10	Circles: Arcs & Sectors	Arc length = $(\text{central angle} / 360) \times \text{circumference}$. Sector area = $(\text{central angle} / 360) \times \text{area}$. A full circle is 360 degrees (2 π radians).	Both are fractions of the circle: $\text{angle}/360$ times the whole. Convert the central angle correctly.	A 60-degree arc of a circle with radius 6: $(60/360) \times 2 \pi \times 6 = 2 \pi$.
11	Circles: Tangents & Inscribed Angles	A tangent line touches the circle at exactly one point and is perpendicular to the radius there. An inscribed angle is half its		

intercepted arc; a central angle equals its arc.

Radius to a tangent = 90 degrees - the most-tested circle fact. An inscribed angle subtending a diameter is 90.

An inscribed angle intercepting a 120-degree arc measures 60.

12	Volume: Prisms & Cylinders	Rectangular prism: $l \times w \times h$. General prism: base area $\times$ height. Cylinder: $\pi r^2 h$.	Volume is always area-of-base $\times$ height (for prisms/cylinders); read which dimension is 'height' carefully.	Cylinder with radius 3 and height 10: $\pi \times 9 \times 10 = 90 \pi$.
13	Volume: Cones, Pyramids & Spheres	Cone: $(1/3) \pi r^2 h$. Pyramid: $(1/3) \times$ base area $\times$ h. Sphere: $(4/3) \pi r^3$.	Every 'pointy' solid (cone, pyramid) is $1/3$ of its cylinder/prism counterpart. Sphere uses $4/3$ - memorize it.	Sphere radius 3: $(4/3) \pi \times 27 = 36 \pi$.
14	Surface Area	Surface area is the sum of the areas of ALL faces. Rectangular prism: $2(lw + lh + wh)$. Cylinder: $2 \pi r^2 + 2 \pi r h$. Sphere: $4 \pi r^2$.	Count every face: for a cylinder you have two circles plus the side (unrolled = rectangle).	Cylinder radius 2, height 5: $2(4 \pi) + 2 \pi \times 2 \times 5 = 8 \pi + 20 \pi = 28 \pi$.
15	Coordinate Geometry: Distance & Midpoint	Distance = $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ (Pythagorean formula). Midpoint = $((x_1 + x_2)/2, (y_1 + y_2)/2)$.	The midpoint is just the AVERAGE of the coordinates. Distance is the hypotenuse of the rise/run triangle.	Midpoint of (2,4) and (6,8) is (4,6). Distance from (1,1) to (4,5) is $\sqrt{9+16} = 5$.
16	Coordinate Geometry: Slope	Slope = rise / run = $(y_2 - y_1)/(x_2 - x_1)$. Positive slopes rise left to right; negative fall. Horizontal = 0; vertical = undefined.	Keep the subtraction order consistent ($x_2 - x_1$) in the same direction as $y_2 - y_1$ to avoid sign errors.	Line through (1,2) and (4,8): slope = $(8-2)/(4-1) = 2$.
17	Lines: Parallel & Perpendicular	Parallel lines have EQUAL slopes. Perpendicular lines have slopes that are NEGATIVE RECIPROCAL (product = -1).	Flip the fraction and change the sign for perpendicular. A horizontal line is perpendicular to a vertical one.	Slope 2/3: parallel = 2/3; perpendicular = -3/2.
18	Transformations	Translation slides (add to coordinates). Reflection flips		

over a line
(x-axis: $y \rightarrow -y$;
y-axis: $x \rightarrow -x$). Rotation
turns around a
point (90, 180,
270).

Reflecting over
the x-axis flips
the y-coordinate
sign; over the

y-axis flips the
x-coordinate
sign.

Point (3,4)
reflected over
x-axis $\rightarrow$
(3,-4); translated

$\leftarrow (1, -4)$.

19	Composite Figures	Find the area of an odd shape by splitting it into known figures (rectangles, triangles, circles), computing each, then adding - or subtracting an empty region.	Draw the split and label EVERY dimension before computing. Missing dimensions usually come from what the drawing implies.	An L-shaped room: 10×10 square plus 4×6 rectangle = $100 + 24 = 124$.
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Section 4: Math - Functions & Coordinate Plane (16 Concepts)

Roughly 12-14% of ACT Math. Features, graphing, transformations, and modeling.

#	Term	Key Facts	ACT Tip	Example
1	Definition of a Function	A function assigns each input EXACTLY ONE output. The vertical line test: if a vertical line touches the graph more than once, it is not a function.	The ACT asks 'which is NOT a function?' - look for a graph where one x has two y values.	A circle is NOT a function (a vertical line cuts it twice); a parabola opening up IS one.
2	Domain & Range	Domain = all possible x inputs; range = all possible y outputs. Watch for denominators (can't divide by zero) and square roots (inside must be ≥ 0).	For a function with a fraction, set the denominator $\neq 0$. For a square root, set the inside ≥ 0 .	$f(x) = 1/(x - 2)$: domain is all x except 2.
3	Linear Functions ($y = mx + b$)	m = slope, b = y-intercept. The graph is a straight line. To graph, plot the y-intercept then use rise/run.	Read m and b directly from slope-intercept form. Convert standard form $Ax + By = C$ into it first.	$y = 2x - 3$: slope 2, y-intercept (0, -3).
4	Intercepts	x-intercept: where $y = 0$ (the graph crosses the x-axis). y-intercept: where $x = 0$. Set the other variable to zero and solve.	Plug in 0 for the OTHER variable - that is the whole trick.	$y = x^2 - 4$: x-intercepts at $x = -2$ and 2 ; y-intercept at (0, -4).
5	Point-Slope Form	$y - y_1 = m(x - x_1)$ gives a line with slope m through point (x_1, y_1) . Convert to slope-intercept by distributing.	If you know a point and the slope, use point-slope directly and solve for y when asked for $y = mx + b$.	Slope 3 through (1, 4): $y - 4 = 3(x - 1)$ -> $y = 3x + 1$.

6	Quadratic Functions: Vertex	Vertex form $y = a(x - h)^2 + k$ has vertex (h, k) . The vertex is the maximum ($a < 0$) or minimum ($a > 0$).	From standard form, the vertex x is $-b/(2a)$; plug it in for k . 'At what value of x does f reach its minimum?' = $-b/(2a)$.	$y = 2(x - 3)^2 + 5$: vertex $(3, 5)$, minimum 5 since $a > 0$.
7	Quadratics: Roots & Axis of Symmetry	Roots (zeros, x -intercepts) solve $f(x) = 0$. The axis of symmetry is the vertical line $x = -b/(2a)$ midway between the roots.	The axis of symmetry is the average of the two roots. If one root is r_1 , the other is $2(\text{axis}) - r_1$.	Roots 2 and 6 & axis $x = 4$.
8	Graph Transformations	$y = f(x) + k$ shifts up ($k > 0$); $y = f(x - h)$ shifts right ($h > 0$); $y = -f(x)$ flips over the x -axis; $y = f(-x)$ flips over the y -axis; $y = a f(x)$ stretches/shrinks vertically.	Inside the parentheses moves OPPOSITE the sign ($x - 2$ moves right); outside moves with the sign ($+ 3$ up).	$f(x) = x^2$ & $g(x) = (x - 2)^2 + 3$ shifts right 2 and up 3.
9	Exponential Growth & Decay	$y = a(1 + r)^t$ grows; $y = a(1 - r)^t$ decays. a is the starting value, r the rate per period, t the number of periods.	Identify growth vs decay by whether the base is > 1 or < 1 . 'Doubles every 3 years' & base 2 with $t = \text{years}/3$.	Population 1,000 growing 5%/yr: after 5 years & $1000(1.05)^5$.
10	Function Composition	$f(g(x))$ means 'apply g first, then f '. Evaluate from the inside out. $(f \circ g)(x) = f(g(x))$.	On the ACT, compositions usually come with numeric inputs - evaluate $g(\text{number})$ then $f(\text{that})$.	$f(x) = x + 1$, $g(x) = x^2$: $f(g(3)) = f(9) = 10$.
11	Inverse Functions	The inverse f^{-1} swaps inputs and outputs: $f(f^{-1}(x)) = x$. To find it, swap x and y and solve for y . Its graph reflects over $y = x$.	Swap and solve - 'undo' the operations in reverse order.	$f(x) = 2x + 3$ & $y = 2x + 3$ & swap: $x = 2y + 3$ & $y = (x - 3)/2$.

12	Piecewise Functions	A piecewise function uses different rules on different intervals of x . Evaluate by finding which 'piece' contains the input.	Check which interval x falls into FIRST, then use only that rule.	$f(x) = \begin{cases} x^2 & \text{if } x < 0; \\ 2x & \text{if } x \geq 0 \end{cases}$; $f(-2) = 4$, $f(3) = 6$.
13	Average Rate of Change	Average rate of change between two points = $(\text{change in } y) / (\text{change in } x)$ - the slope of the secant line through them.	It is the slope formula applied to the two endpoints, even for curves.	$f(x) = x^2$ from $x = 1$ to $x = 3$: $(9 - 1)/(3 - 1) = 4$.
14	Scatterplots & Lines of Best Fit	Scatterplots show relationships between two variables. A line of best fit approximates the trend; use it to estimate values and spot outliers.	Read the axes first. To estimate, find the point on the line above the x -value - not the data dot.	A scatterplot of study time vs score with a rising trend supports 'more study time is associated with higher scores.'
15	Word Problems: Modeling with Functions	Translate a real situation into a function: initial value + rate $\times$ time, or exponential growth for compounding.	Label the slope and intercept in context: 'the fee starts at \$25 and increases \$10/hr' -> $C(h) = 25 + 10h$.	Renting a bike \$5 + \$2/hour: $C(h) = 5 + 2h$; 4 hours -> \$13.
16	Even & Odd Functions & Symmetry	Even: $f(-x) = f(x)$, symmetric over the y -axis (parabolas, $y = x^2$). Odd: $f(-x) = -f(x)$, symmetric over the ORIGIN ($y = x^3$).	Test by plugging in $-x$. Almost all ACT examples are $y = x^2$ (even) and $y = x^3$ (odd).	$y = x^4$ is even; $y = x^3 - x$ is odd (both exponents odd).

Section 5: Math - Statistics & Probability (16 Concepts)

Roughly 8-10% of ACT Math. Mean/median/mode, data displays, and basic probability - plus interpreting data in context.

#	Term	Key Facts	ACT Tip	Example
1	Mean, Median & Mode	Mean = average (sum/count). Median = middle of SORTED data (average of the two middle for even counts). Mode = most frequent value.	ALWAYS sort before finding the median. A single outlier shifts the mean more than the median.	Data 3, 5, 8, 8, 11: mean 7, median 8, mode 8.
2	Range & Interquartile Range (IQR)	Range = max - min. IQR = Q3 - Q1 (the spread of the middle 50%). Quartiles split sorted data into four equal groups.	IQR ignores outliers - if the question worries about extreme values, the IQR is the robust answer.	Sorted data 2,4,6,8,10: Q1 = 4 (between 2 and 6), Q3 = 8, IQR = 4.
3	Standard Deviation (Concept)	Standard deviation measures how spread out data are around the mean. Low SD = clustered; high SD = scattered. It is never negative.	The ACT rarely computes SD - it asks which set is 'more spread out' or which change increases SD.	Data 50, 50, 50 has SD 0; adding 100 to the set increases it.
4	Histograms & Frequency Tables	A histogram groups data into bins; bar height = count in each bin. A frequency table lists each value and its count.	Read the bin labels on the x-axis and the counts on the y-axis. Total count = sum of the bars.	A histogram with a tallest bar at 20-29 tells you the most common score range, not the exact mean.
5	Bar Graphs & Pie Charts	Bar graphs compare categories by height. Pie charts show parts of a whole; each slice = $(\text{angle}/360)$ of the total.	For pie charts, convert the angle to a fraction: 90 degrees = 25%. For bars, read the exact value off the axis.	A 60-degree pie slice of 360 total items = $60/360 \times 360 = 60$ items.

6	Box Plots	A box plot shows min, Q1, median, Q3, max. The box spans Q1 to Q3 (the IQR); the whiskers reach the extremes; a line marks the median.	The median line inside the box is NOT the average. Skew shows in whether the median sits centered.	A box plot with the median near Q3 (high end) suggests a left-skewed distribution.
7	Probability: Single Event	$P(\text{event}) = \frac{\text{favorable outcomes}}{\text{total outcomes}}$. Always between 0 and 1 (0% to 100%).	Count the TOTAL outcomes carefully - the total includes ALL possibilities, not just the favorable ones.	A bag with 3 red and 5 blue marbles: $P(\text{red}) = \frac{3}{8}$.
8	Probability: Independent Events	Independent events: the outcome of one does not affect the other. $P(A \text{ and } B) = P(A) \times P(B)$ for independent events.	'And' multiplies, 'or' adds (for mutually exclusive). Two coins: $P(H \text{ then } T) = \frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$.	Rolling a 4 then a 6: $\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$.
9	Probability: 'Or' & Mutually Exclusive	$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$. For mutually exclusive events (can't both happen), $P(A \text{ and } B) = 0$, so just add.	Subtract the overlap when events can both occur. Drawing a 4 or a heart from a deck: $\frac{4}{52} + \frac{13}{52} - \frac{1}{52} = \frac{16}{52}$.	Drawing a red card or a king: $\frac{26}{52} + \frac{4}{52} - \frac{2}{52} = \frac{28}{52} = \frac{7}{13}$.
10	Conditional Probability	Conditional probability $P(B \text{ given } A)$ is the probability of B GIVEN the event A already happened - the sample space shrinks to A.	The word 'given' or 'if you know' signals conditional probability. Recompute the total from the condition.	$P(\text{red given it came from bag A})$ uses only bag A's marbles as the total.
11	Combinations & Permutations (Basics)	Permutations count ordered arrangements (order matters): $P(n,r)$. Combinations count selections (order does not matter): $C(n,r)$.	Ask 'does order matter?' - committees and hands are combinations; sequences and passwords are permutations.	Choosing 2 of 5 people for a committee: $C(5,2) = 10$. Arranging 2 of 5 in order: $P(5,2) = 20$.

12	Expected Value	Expected value = sum of each outcome x its probability. It is the long-run average: $EV = p_1 \times v_1 + p_2 \times v_2 + \dots$	Multiply each payoff by its probability and add - include the cost of playing as a negative outcome.	A \$5 ticket that wins \$100 with $P = 1/20$: $EV = (1/20)(100) + (19/20)(0) = \5 - break even before the price.
13	Surveys, Bias & Sampling	A representative sample is random and large enough to stand in for the population. Bias creeps in with convenience samples, leading questions, or nonresponse.	The ACT asks 'why might this survey be flawed?' - look for a non-representative sample.	Surveying only shoppers at a mall about a national soda preference is biased toward mall-goers.
14	Correlation vs Causation	Correlation measures association (r from -1 to 1). Correlation does NOT prove causation - a third variable or reverse cause may explain it.	The ACT loves 'which conclusion is NOT justified?' - any causal claim from a scatterplot alone is too strong.	Ice cream sales and drowning deaths rise together in summer, but ice cream does not cause drowning.
15	Random Variables & Distributions	A random variable assigns numbers to outcomes. Normal distributions are bell-shaped, symmetric, and centered on the mean; most data sit within 1 SD of the mean.	For normal curves, about 68% of data fall within 1 SD, 95% within 2 - the ACT uses these as rounding speeds.	Heights ~normal with mean 66' and SD 3': about 68% are between 63' and 69'.
16	Interpreting Data in Context	Data questions ask 'what does this value MEAN in context?' - the answer connects the number to the situation, not just the arithmetic.	Reread the question's key words ('per year', 'on average', 'compared to') and match the units.	A slope of 3 in a 'savings over weeks' graph means saving \$3 per week, not \$3 total.

Section 6: Math - Number Sense & Operations (16 Concepts)

Roughly 11-13% of ACT Math. Integers, primes, fractions, percents, and order of operations - quick and coachable.

#	Term	Key Facts	ACT Tip	Example
1	Integer Properties & Divisibility	Integers are whole numbers and their negatives. Divisibility rules: a number is divisible by 2 if even, by 3 if digit sum divides by 3, by 5 if it ends in 0 or 5, by 9 if digit sum divides by 9.	Use digit-sum checks for 3 and 9 - they are the fastest ACT divisibility traps.	2,718: digit sum 18 -> divisible by 3 AND 9; ends in 8 -> divisible by 2.
2	Primes & Prime Factorization	A prime has exactly two factors (1 and itself). First primes: 2, 3, 5, 7, 11, 13, 17, 19. 1 is not prime; 2 is the only even prime.	Factor into primes for GCF/LCM questions and for simplifying square roots.	$60 = 2 \times 2 \times 3 \times 5 = 2^2 \times 3 \times 5$.
3	GCF & LCM	GCF = largest factor shared (use lowest exponent of common primes). LCM = smallest common multiple (use highest exponent of each prime).	GCF for reducing fractions; LCM for common denominators and repeating events.	$24 = 2^3 \times 3$, $36 = 2^2 \times 3^2$: GCF = $2^2 \times 3 = 12$; LCM = $2^3 \times 3^2 = 72$.
4	Fractions: Equivalence & Operations	Multiplying: top x top, bottom x bottom. Dividing: multiply by the reciprocal of the SECOND fraction. Adding/subtracting: common denominator first.	Keep-change-flip only the SECOND fraction. Simplify answers to lowest terms.	$2/3 \div 3/4 = 2/3 \times 4/3 = 8/9$. $1/3 + 1/4 = 4/12 + 3/12 = 7/12$.

5	Mixed Numbers & Improper Fractions	Improper: numerator $\geq$ denominator (7/4). Mixed: whole + fraction (1 3/4). Convert by multiply-and-add: whole $\times$ denominator + numerator.	Convert to improper before multiplying or dividing; convert back for a clean answer.	$1 \frac{3}{4} = (1 \times 4 + 3)/4 = 7/4$. $9/2 = 4 \frac{1}{2}$.
6	Decimals & Place Value	Decimals extend place value to tenths, hundredths, thousandths. Line up decimal points to add/subtract; count decimal places to multiply.	Watch the answer choices: 0.07 vs 0.7 is usually the trap. Count zeros carefully.	$0.2 + 0.07 = 0.27$. $0.3 \times 0.4 = 0.12$.
7	Percents	Percent = per hundred. Move the decimal two places to convert. 'What is 15% of 200?' $\rightarrow 0.15 \times 200 = 30$. 'What percent of 80 is 12?' $\rightarrow 12/80 = 0.15 = 15\%$.	Convert to decimals BEFORE multiplying. Percent-of-change is relative to the ORIGINAL.	A \$40 item at 25% off costs $40 \times 0.75 = \$30$.
8	Order of Operations (PEMDAS)	Parentheses, Exponents, Multiplication/Division (left to right), Addition/Subtraction (left to right).	Equal-priority operations run LEFT to RIGHT. $10 - 3 + 2 = 9$, not 5.	$3 + 6 \times (5 + 4) / 3 - 7 = 3 + 6 \times 9 / 3 - 7 = 3 + 18 - 7 = 14$.
9	Negative Numbers & Absolute Value	Same signs multiply to positive; different signs to negative. Absolute value (abs(x)) is distance from zero (never negative). Subtract a negative = add its positive.	Two negatives make a positive in multiplication and in 'minus a negative'.	$(-3) \times (-4) = 12$. $5 - (-2) = 7$. $\text{abs}(-8) = 8$.

10	Scientific Notation	A number written as $N \times 10^k$ with $1 \leq N < 10$. Large positive exponent = big number; negative = small. Move the decimal; count in the exponent.	4,500,000 = 4.5×10^6 (decimal moved 6 left). $0.00032 = 3.2 \times 10^{-4}$ (moved 4 right).	$2,000,000 = 2 \times 10^6$.
11	Rational vs Irrational Numbers	Rational numbers are ratios of integers (fractions, terminating or repeating decimals). Irrational numbers cannot be written as fractions (π , $\sqrt{2}$).	A non-terminating, non-repeating decimal is irrational. $\sqrt{2}$ of a non-perfect square is irrational.	0.5 and $1/3$ are rational; π and $\sqrt{2}$ are irrational.
12	Complex Numbers (Basics)	$i = \sqrt{-1}$, so $i^2 = -1$. Add real and imaginary parts separately; multiply with FOIL and replace i^2 with -1.	i powers cycle: $i, -1, -i, 1$. Divide $i^4 = 1$; that simplifies big powers.	$(2 + 3i) + (1 - i) = 3 + 2i$. $i \times i = i^2 = -1$.
13	Number Lines & Inequalities	A number line shows order and distance. Inequalities graph as rays with open (strict) or closed (inclusive) circles.	Graph ' $x \geq 2$ ' with a CLOSED circle at 2 and shading right; ' $x < 2$ ' gets an OPEN circle.	If $x > -1$ and $x \leq 4$, x lives between -1 and 4 on the line.
14	Estimation & Rounding	Round to convenient values before computing. When answer choices are far apart, a good estimate picks the answer.	Use the spread of choices: if they are 10, 100, 1000, 10000, rough estimation settles it.	47×32 is near $50 \times 30 = 1500$; pick the choice near 1500.
15	Units & Conversions	Convert with factor labels: multiply by a fraction equal to 1 (1 mile/5280 ft)		

so units cancel.
Know the dozen
common
equivalences.

Write a chain
and cancel units
- if the units do
not cancel, the
setup is wrong.

2 miles = 2 x
5280 = 10,560
feet. 3 hours =
180 minutes.

16	Number Properties	Commutative: $a + b = b + a$, $a \times b = b \times a$. Associative: $(a + b) + c = a + (b + c)$. Distributive: $a(b + c) = ab + ac$. Identity: $a + 0 = a$, $a \times 1 = a$.	The ACT asks which property justifies a step or which one is NOT always true - subtraction and division are not commutative.	$(5 + 3) + 2 = 5 + (3 + 2)$ shows the associative property.
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Section 7: Reading (24 Concepts)

36 questions / 40 minutes across four passages plus paired passages. A skills section - speed and accuracy come from strategy.

#	Strategy	Key Facts	ACT Tip	Example
1	Main Idea & Central Theme	The main idea is the single most important point - the sentence almost everything else supports. Look at the first and last sentences and the topic repeated throughout.	If every paragraph points to one idea, that is the main idea. A detail appearing once is NOT it.	A passage describing recycling programs, waste volume, and policy is about recycling - not about bins.
2	Supporting Details	Details are the facts, examples, and figures that develop the main idea. Detail questions are answered by locating the exact sentence.	Scan for the question's key word, then read that sentence plus the one after it - the answer is there.	Asked for the year a law passed: find the sentence naming the law and read it.
3	Inference	An inference is a conclusion the passage supports but does not state. It must follow from the text - not from outside knowledge.	The correct inference is the one the passage's facts point to. If the passage does not support it, it is wrong even if true.	If a passage says sales doubled after the campaign, a supported inference is the campaign likely helped.
4	Vocabulary in Context	Some questions ask the meaning of a word AS USED in the passage. The context, not the dictionary, is authoritative.	Replace the word with each answer choice and keep the sentence's meaning - 'joyful' context = celebrating.	'The team was jubilant after the win' -> very happy.
5	Author's Purpose & Tone	Purpose: to inform, persuade, entertain, explain, describe. Tone: neutral, approving,		

critical,
concerned,
humorous.

An opinionated
tone signals
persuasion;
neutral facts
signal
information.
Tone words
(‘unfortunately’,

'remarkably') are the clues.

A passage arguing for bike lanes is written to persuade, even with facts.

6	Cause & Effect Structure	Some passages explain why something happened (cause) and what resulted (effect). Signal words: because, since, therefore, as a result, consequently.	The cause answers 'why'; the effect answers 'what happened next.'	Because the dam failed (cause), the valley flooded (effect).
7	Compare & Contrast Structure	Comparing shows similarities; contrasting shows differences. Signal words: similarly, likewise, both; however, unlike, whereas.	Paired passages often ask 'how do these two authors differ?' - track each author's stance with a note.	'Unlike the first author, the second claims...' signals contrast.
8	Chronological & Sequence Structure	Some passages present events or steps in order. Signal words: first, next, then, finally, before, after, while.	Number the events in the margin as you read; sequence questions become free points.	First mix dry ingredients, then add wet, finally bake.
9	Point of View & Perspective	A narrator or author can be first-person (I), third-person limited (one character's thoughts), or omniscient (all minds). Perspective shapes what the reader is told.	Ask 'whose eyes are we seeing through?' - the answer limits what can be known.	Third-person limited shows only the protagonist's thoughts, hiding others'.
10	Function of a Detail	Some questions ask WHY a detail is included: to support a claim, to illustrate, to provide contrast, to add credibility.	Connect the detail to the paragraph's job - a statistic supports; an anecdote humanizes.	A quote from an expert supports the author's reliability.
11	Summarizing	A summary restates the main idea plus key supporting points		

in a few
sentences,
excluding
examples and
tangents.

The right
summary covers
the **WHOLE**
passage; one

that leaves a
major section is
wrong.

Covering both
voting systems
and their
trade-offs

summarizes a
two-system
essay.

12	Paraphrasing	Paraphrase = same idea in different words. Answer choices that copy the passage's phrasing exactly are often decoys.	If two choices look similar, the one that changes the words but keeps the meaning is the paraphrase.	Passage: 'The device runs on solar power.' Paraphrase: 'The gadget is powered by the sun.'
13	Paired Passages: Synthesis	Two passages on the same topic; questions ask how they relate: agree, disagree, or cover different aspects. Some questions apply one passage's view to the other.	Sketch one line per author's thesis. For 'would Author B agree?' - test the claim against B's core stance, not the details.	Author A praises the policy; Author B warns of costs - they disagree on outcomes.
14	Literary Narrative: Character & Motivation	Fiction passages test character: what a character wants, feels, decides, and why. Motivation is often implicit.	Track what the character SAYS, DOES, and WANTS - motivation is inferred from behavior, not stated.	A character who rereads old love letters is likely nostalgic or grieving, depending on context.
15	Literary Narrative: Setting & Mood	Setting (time and place) creates mood: a stormy moor signals danger; a sunny kitchen signals comfort. Details of setting do emotional work.	Link the setting details to the feeling they create - the mood matches the imagery.	Fog, cold, and shutters banging = an ominous mood.
16	Humanities Passage Strategy	Humanities passages (art, music, philosophy, memoir) are often reflective and opinionated. The author's perspective is central - pay attention to 'I' statements.	Humanities = attitude questions. Highlight the author's judgments; they drive main-idea answers.	A memoir about learning piano is mainly about the writer's growth, not piano technique.
17	Social Science Passage Strategy	Social science passages (history, sociology,		

economics)
present theories,
evidence, and
arguments.
Track the
argument's claim
and its evidence.

Diagram: claim
-> evidence
-> conclusion.
A question about

'the author's
argument' needs
the claim, not a
statistic.

A passage
arguing that
cities grow
fastest at trade

crossroads pairs
the claim with
port-city
examples.

18	Natural Science Passage Strategy	Natural science passages (biology, chemistry, physics) explain research or concepts. Structure: phenomenon, hypothesis, experiment, findings.	Follow the research story: question -> method -> result. Questions often test the method's purpose.	A passage about a drug trial: the method section explains why a placebo group was used.
19	Active Reading & Annotation	Read once, actively: underline the main idea of each paragraph, circle signal words, and write one margin word per paragraph (e.g., 'cause', 'example').	One word per paragraph is enough - too much annotation costs time you need for 36 questions in 40 minutes.	Margin notes 'claim', 'evidence', 'counter' map an argument in seconds.
20	Pacing for Reading	40 minutes / 36 questions / 4 passages: budget roughly 8-9 minutes per passage including questions (about 90 seconds per passage read, ~1 min per question).	Do not finish one passage at the cost of another - every passage is worth the same points. Flag and move on after 9 minutes.	On a 4-passage section, treating all passages equally beats perfecting only three.
21	Answering from the Passage	Every correct answer is supportable from the text. If you cannot find support for a choice, it is wrong - even if it sounds true.	Check the choice against the exact lines; 'the passage states' questions are the most concrete.	A choice about 'the author's childhood' is wrong if the passage never mentions it.
22	Eliminating Wrong Answers	Eliminate choices that are too broad, too narrow, opposite, or unsupported. The survivor is correct by process of		

elimination.

Extreme words
(always, never,
all, only) are
usually wrong in
reading answers
- the passage
rarely proves
absolutes.

A choice saying
'all cities benefit'
fails when the
passage names
exceptions.

23	Narrative Structure & Plot Devices	Fiction passages use plot elements: exposition, rising action, climax, resolution; plus devices like flashback, foreshadowing, and irony that shape meaning.	Ask what a device DOES to the reader - a flashback adds backstory; foreshadowing builds tension.	A flashback explaining a character's fear makes the present behavior understandable.
24	Text Features & Author Craft	Nonfiction passages use text features (headings, intro paragraphs, conclusions) and craft moves (rhetorical questions, repetition, parallel structure) to guide the reader.	Feature questions ask about the role of a paragraph or heading - it frames, transitions, or emphasizes.	A section heading 'The Evidence' signals that the upcoming paragraph presents data.

Section 8: Science (Optional) (26 Concepts)

40 questions / 40 minutes - a data-reading test, not content recall. Science is **OPTIONAL** on most National ACTs; see the exam overview.

#	Term	Key Facts	ACT Tip	Example
1	Reading Tables	Tables organize data in rows and columns with units in the header. Find a value by locating the correct row and column, then read the unit.	Check the units FIRST (grams vs kg, seconds vs minutes) - the trap is almost always unit confusion.	A table with 'Temp (C)' and 'Time (s)' - the value in row 2, col 3 is the temp at that time.
2	Reading Graphs	Graphs plot dependent (y) vs independent (x) variables. Identify both axes, the scale, and what each point means before answering.	Read the axis labels and the scaling (each tick = ?). Trends go up, down, or flat - name the trend before choosing.	A graph of 'growth vs fertilizer' with x = dose and y = height shows the relationship between them.
3	Trends & Patterns	A trend is the overall direction: increasing, decreasing, constant, or curved. 'As x increases, y decreases' is the language of trend questions.	The ACT asks 'according to the data, as X increases, Y...' - trace X from left to right and read Y's response.	As temperature rises, solubility rises: a positive (direct) relationship.
4	Units & Scales	Scientific data always carry units. Converting or comparing values requires consistent units.	If the answer choices mix units (mL vs L), convert before comparing - the ACT tests this constantly.	Comparing 500 mL to 1.5 L -> 1.5 L = 1500 mL, so 1.5 L is larger.
5	Controlled Experiments: Variables	The independent variable is what the researcher changes; the dependent variable is what is measured in response. Controlled variables are		

kept constant.

6	Experimental Design: Controls	A control group receives no treatment (or a standard one). It	Ask 'what did they change?' (independent) and 'what did they measure?' (dependent).	Testing fertilizer dose on plant height: dose = independent, height = dependent.
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isolates the effect of the independent variable by providing a baseline.

A control lets you say 'the change was caused by the treatment,

not by chance or
the setup.'

A drug trial's
placebo group is
the control: same
procedure, no

active drug.

7	Hypotheses & Predictions	A hypothesis is a testable prediction of how the independent variable affects the dependent one. 'If X increases, then Y will...'	Predictions must be testable with the experiment's design - 'the graph would look like...' names the expected shape.	Hypothesis: 'Higher temperature speeds reaction time' -> predict a downward trend in time as temp rises.
8	Conclusions & Evidence	A conclusion states what the data show. Evidence = the data pattern that supports it. The conclusion may NOT overclaim beyond the experiment's scope.	Overclaiming is the classic trap: 'the data support' vs 'this proves in all cases'. Stay inside the tested range.	Data showing 3 of 4 doses improve growth supports 'higher doses helped here', not 'fertilizer always works.'
9	Conflicting Viewpoints	Two scientists (or studies) explain the same data differently. Questions ask how each view explains an observation or which fact each would cite.	Restate each viewpoint in one sentence, then test every answer against those sentences.	Scientist 1: warming is natural. Scientist 2: warming is human-caused. A fact about pre-industrial CO2 supports Scientist 1's baseline.
10	Research Summaries & Procedures	A passage describes an experiment: purpose, method, materials, results. Questions probe why a step was done or what would change results.	Match the question to the METHOD: 'why did they control temperature?' -> to keep it from affecting results.	A study keeping soil moisture constant is controlling a variable that would otherwise confound growth.
11	Extrapolation & Interpolation	Interpolation reads a value BETWEEN data points; extrapolation extends the trend BEYOND the data. Both use the trend line, not magic.	For values inside the range, read between points; outside, follow the trend line's direction - and beware of overreaching.	A line through (5, 10) and (10, 20) lets you estimate 7.5 -> 15 (interpolation).

12	Mean, Median & Mode in Data Sets	Experiments report repeated trials; the mean summarizes them. The median resists outliers; the mode is least used in ACT Science.	Questions say 'the average of the trials is...' - sum and divide. A wild outlier makes the median more representative.	Trials 8, 9, 10, 51: mean 19.5, median 9.5 - the 51 is an outlier.
13	Percent Change in Data	Percent change = (new - original)/original x 100%. Experiments report growth or decline this way.	The change is over the ORIGINAL value - a jump from 50 to 75 is a 50% increase, not 25%.	Population 200 -> 280: change 80/200 = 40% increase.
14	Slope & Rate in Graphs	The slope of a line in Science = rate of change: how much y changes per unit x. Steeper = faster rate.	'The rate at which the population grows' is the slope of the population-vs-time line.	A graph rising 20 units over 4 time units has a rate of 5 units per time unit.
15	Background Knowledge (Minimal Use)	ACT Science is designed to be answered from the passage and figures - outside content knowledge is rarely required and often a trap.	When a question 'requires background knowledge,' the answer is almost always derivable from the figure. Trust the data you are given.	A DNA question whose answer is visible in the provided table needs the table, not a biology class.
16	Scientific Reasoning & Logic	Reasoning questions ask which choice is strongest: best supported, weakest link, most likely to strengthen/weaken.	'Strengthen' = adds supporting evidence; 'weaken' = brings a competing explanation or doubt.	Finding that a correlate disappears when controlling a third variable weakens the original causal claim.
17	Evaluating Methods	Method questions ask whether a procedure is valid: enough trials, controlled variables, appropriate sample, calibrated		

instruments.

A flawed method
= uncontrolled
variable or tiny
sample - name
the flaw; the ACT
asks 'which
would best
improve the
study?'

Adding a control
group or more
trials improves a
weak study.

18	Biology Basics for Data Passages	Experiments often use biology: cells, genetics (dominant/recessive, Punnett squares), evolution, photosynthesis/respiration.	When genetics data appear, map phenotype to genotype ratios (3:1, 1:1) - the numbers, not the terms, answer the question.	A cross yielding 3:1 dominant-to-recessive matches two heterozygous parents.
19	Chemistry Basics for Data Passages	Chemistry passages use pH, concentration, temperature, and reaction rates. Higher concentration or temperature usually means faster reactions.	Relate the data to the simple rule: more reactant = faster; higher T = faster; lower pH = more acidic.	A table showing faster dissolving at higher temperature supports 'temperature increases solubility.'
20	Physics Basics for Data Passages	Motion and energy appear as data: distance-time, velocity, force, work. Distance-time slope = speed; flat line = at rest.	A constant slope = constant speed; a curve = changing speed (acceleration).	A distance-time graph going flat means the object stopped moving.
21	Digesting Wordy Passages	Research summaries have a predictable skeleton: background, hypothesis, method, results, conclusion. Skim background; slow down on method and results.	Convert each paragraph into a one-line job ('why', 'how', 'what happened', 'so what') and you will never feel lost.	A paragraph listing materials is the method - the answer to 'which instrument?' lives there.
22	Pacing for Science	40 questions / 40 minutes = 1 minute per question. Most of your time should go to READING THE FIGURE, not the prose.	For each question, find the relevant figure first, then answer - the prose is mostly setup.	On a data question, skip the intro paragraph and go straight to the table.

23	Deciding Whether to Take Science	Science is optional on most National ACTs. Colleges differ: some STEM programs want it; EMR-only policies ignore it. You CANNOT add it later.	Check each target college's stated policy before test day, then commit - a decision on test day is rushed and costly.	If your top school's engineering program asks for a Science score, take the section.
24	The 'Always' Science Question Patterns	Certain patterns recur: 'According to Table 1', 'Based on Figure 2', 'Which experiment best tests...', 'Both scientists agree that...'. .	Memorize the question stems so you know instantly where to look - question type determines strategy.	'Both scientists would agree that...' needs a fact both viewpoints share, usually a measurement.
25	Identifying Errors in Graphs & Tables	Common data errors: mislabeled axes, swapped columns, unit shifts, and scale jumps. The ACT may ask which figure matches the described data.	Check the AXIS LABELS and UNITS against the description first - a swapped axis or wrong unit kills the answer.	A description saying 'temperature rose from 20 to 40 degrees C' must match a y-axis in C, not F.
26	Comparing Two Experiments	Two studies of the same phenomenon may differ in method (samples, variables, controls). Questions ask which finding differs and why.	Align the two designs side by side: what did Study 2 change? That change explains the differing result.	Study 1 uses adults, Study 2 uses children - a different result is explained by the different sample.

Section 9: Writing (Optional) (14 Concepts)

One essay / 40 minutes, scored 2-12 across four domains. Optional and college-selected - it does not affect the composite.

#	Strategy	Key Facts	ACT Tip	Example
1	Essay Structure: Intro-Body-Conclusion	A strong essay has a clear intro (context + thesis), body paragraphs (one idea each, developed), and a conclusion that lands the point.	The ACT essay is 4-5 paragraphs: intro, 2-3 body, conclusion. Spend ~5 min planning so each paragraph has a job.	Intro states the position, body 1 defends it, body 2 evaluates another perspective, conclusion synthesizes.
2	Ideas & Analysis	The Ideas & Analysis domain rewards essays that engage the given perspectives meaningfully and develop an argument with genuine insight, not just a clear position.	Show the 'how' and 'why' behind your position - analysis beats assertion.	Instead of 'technology is good', analyze that it lowers barriers but may deepen divides.
3	Development & Support	Support your claims with specific examples, evidence, and reasoning: real events, studies, observations, or well-argued hypotheticals.	Each body paragraph needs at least one concrete example - generic claims earn low development scores.	Arguing for later school start times: cite the sleep research and an example district.
4	Organization & Logical Flow	Organize with a clear progression: each paragraph introduces an idea, develops it, and links to the next. Transitions carry the logic.	Use connective language (however, therefore, for example) to show the relationships between ideas.	A paragraph about costs should transition to one about benefits with 'Despite the costs...'
5	Language Use & Style	The Language Use domain rewards precise word choice, varied sentence structure, and a		

consistent,
appropriate
voice.

Vary sentence
length; avoid
slang and
wordiness.
Formal but
natural beats

ornate.

'The policy's effects were far-reaching' is stronger than 'the policy was really impactful.'

6	Conventions (Grammar & Mechanics)	Standard written English: correct grammar, punctuation, and spelling. Errors lower the Language Use score even if the ideas are strong.	Leave 3-5 minutes to proofread - a clean essay earns a higher domain score.	Fix run-ons and comma splices in the final pass; they are the most common convention errors.
7	Taking a Position	The prompt gives a topic and three perspectives; you take a position and may agree, disagree, or blend them - but you must engage all three perspectives.	Mention each perspective explicitly at least once; ignoring one caps your Analysis score.	Agreeing partly with Perspective Two while adding a caveat shows nuanced engagement.
8	Addressing Other Perspectives	Strong essays evaluate the OTHER perspectives, explaining why they have merit or where they fall short - not just rejecting them.	Use one body paragraph to steelman (fairly state) a competing view before rebutting it.	'Perspective One emphasizes efficiency, which matters, but it overlooks equity...'
9	Evidence & Examples	Concrete evidence earns Development points: history, current events, literature, personal observation, or invented-but-plausible scenarios.	One well-developed example beats three name-dropped ones. Explain HOW the example supports the claim.	Supporting 'community matters' with the story of a town rebuilding after a flood.
10	Transitions Within the Essay	Transitions show how sentences and paragraphs connect: however, moreover, as a result, for example, in contrast, in addition.	Every paragraph should open with a transition or a reference to the previous paragraph.	Open body 2 with 'Nevertheless, the benefits come with real costs.'
11	Thesis Statement	The thesis is your position stated precisely in the intro - it		

names the
stance and often
previews the
reasons.

Write the thesis
BEFORE drafting
(in the 5-minute
plan) and check

every body
paragraph
serves it.

'School uniforms
improve focus
and equity,
though they limit

self-expression.'

12	Time Budget & Strategy	40 minutes total: 5 plan, 30 write, 5 proofread. A complete, clean essay beats a perfect half-essay.	Write the thesis and topic sentences in the plan, then the bodies follow fast - no upkeep.	If time runs low, finish each paragraph before moving on; a finished essay scores better.
13	Scoring: What Matters	Two graders score 1-6 per domain (Ideas & Analysis, Development & Support, Organization, Language Use); the sum becomes your 2-12 Writing score. It is reported separately and does not enter the composite.	Domain scores are what colleges see - even a strong argument scores low if Development or Organization collapses.	A 6/6/5/5 pattern (total 22 -> scaled 12) needs ALL domains, not just brilliant ideas.
14	Knowing If You Should Take It	Writing is optional and college-selected. Some colleges require it, many recommend it, and a minority ignores it.	Check each target school's policy months before registering; taking it 'just in case' costs 40 minutes and is unreportable separately.	If no school on your list wants Writing, skip it and protect your EMR stamina.

Section 10: Test-Day Strategy & Pacing (13 Concepts)

The Enhanced ACT is digital-first with fewer questions, four answer choices, and optional Science - strategy is worth real points.

#	Term	Key Facts	ACT Tip	Example
1	Digital vs Paper: Know Your Format	National online tests use a digital platform with on-screen passages, flagging, a highlighter, and a calculator. Paper is still offered with the same blueprint.	Practice on the format you will use - the digital interface is a skill. On paper you can annotate freely; on digital you use the built-in tools.	Do two full digital practice tests before test day if you will test online.
2	No Guessing Penalty - Never Leave Blanks	The ACT does not deduct for wrong answers. A blank is the only guaranteed-zero answer.	Answer EVERY question - when unsure, eliminate obviously wrong choices and guess. On digital, fill remaining answers before time runs out.	With no penalty, a 25% guess on four choices is worth taking every time.
3	Pacing: Section Time Budgets	English 35 min/50 q (~42 sec each), Math 50/45 (~67 sec), Reading 40/36 (~67 sec), Science 40/40 (60 sec), Writing 40 min total.	Watch the clock per section, not per question - flag a hard question, guess-mark it, and return if time remains.	At 20 minutes on English you should be near question 28.
4	Four Answer Choices (Not Five)	The Enhanced ACT uses FOUR answer choices on every section - one fewer per question than the old test.	A 1-in-4 guess beats the old 1-in-5 - and elimination works even faster because there are fewer decoys.	Eliminating two choices leaves a 50/50 - far better odds than the old test.
5	Flag & Skip Strategy	Do not get stuck on one question: flag it, pick your best guess, and move on. Returning is optional; finishing		

the section is
mandatory.

A guaranteed point on an easy question beats a long shot on a hard one - the ACT is scored by total correct.	Spending 4 minutes on one question costs you easier points later in the section.
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6	Use the Digital Tools	The digital platform has a flag, highlighter, line reader, answer eliminator, and a built-in calculator (Math). Learn them before test day.	Highlight the question stem's key words; use the line reader on dense passages to keep your place.	Flagging two questions in Reading and returning after the passage saves time.
7	Science Optional: Make the Call Early	On the National ACT you choose whether to take Science. Decide BEFORE test day based on your target colleges' score policies.	If your schools want Science (STEM programs often do) or you score well at data reading, take it. If EMR-only applies to all your schools and Science drags your stamina, skip it.	A 25 in Science with a 30 EMR gives you a 27-ish STEM - decide if that STEM number matters to your applications.
8	Reading Order Strategy	Some students do better reading passages in a chosen order (e.g., natural science first if it is strongest). The four passages are worth equal points.	If you read faster on science, start there while you are freshest - but budget 9 minutes per passage regardless of order.	Literary fiction last is a common choice for students who find narratives slow.
9	English: Read the Passage or Not?	Strong English scores come from reading the whole passage (about 3-4 minutes) so you can answer rhetoric questions in context, then attacking mechanics questions underline-by-underline.	Skim the passage to get its gist and main idea FIRST - rhetorical questions are impossible without context.	Read the passage in 3 minutes, then answer in 32 minutes at ~40 seconds each.
10	Checking Your Work	If you finish early, do NOT change answers on a whim - only		

change when
you found a
concrete error
(misread the
question,
arithmetic slip).

First guesses are
usually right.
Review flagged
questions and

bubbling/entry
errors first.

On digital, verify
flagged
questions; on
paper, verify the

answer sheet
matches the
booklet before
time ends.

11	Sleep, Food & Logistics	Get a full night's sleep, eat a steady breakfast, arrive early with the required ID and admission ticket, and bring an approved calculator with fresh batteries.	The ACT rewards stamina - a tired 3-hour test is a real score risk.	Pack the calculator the night before; a dead battery is an avoidable disaster.
12	Score Choice & Superscoring	Most colleges accept superscores (best section scores across sittings) and many let you choose which scores to send. Check each school's policy.	A weak first sitting is not final - superscoring means one bad section can be offset by a strong retake.	A 30 EMR with a 22 Science can sit as-is for EMR-only schools; a retake can lift the Science for STEM apps.
13	Calculator Use & Policy	The ACT Math section allows an approved calculator (TI graphing, scientific, etc.); the digital platform has a built-in calculator. Math questions do not require a calculator.	Use the calculator for arithmetic, not for concepts - know the formulas cold and calculate fast. Bring a fresh-battery backup and know your model's menu.	For the quadratic formula, the calculator saves time on arithmetic but you still set up a, b, and c correctly.

Final Review: 48-Hour Rapid Review

The highest-yield items to drill in your final two days.

- The Enhanced ACT: composite = rounded average of English + Math + Reading (EMR), scale 1-36; Science and Writing are optional (Science added back for a STEM score if you take it); Math now has FOUR answer choices; there is no wrong-answer penalty, so answer everything. Total core time ~125 minutes (English 35, Math 50, Reading 40). Digital-first on national dates - practice the interface before test day.
- English: match the verb to the real subject (ignore interrupting phrases); pronouns agree with singular -one/-body/-thing words; keep tenses consistent; parallel lists match in form; commas join two sentences only with a conjunction (and/but/so); semicolon = period-lite; its = possession, it's = it is; delete redundancy; the shortest correct phrasing wins.
- Math: quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$; vertex $x = -b/(2a)$; special triangles 45-45-90 ($1-1-\sqrt{2}$) and 30-60-90 ($1-\sqrt{3}-2$); slope = rise/run; perpendicular slopes are negative reciprocals; percent change is relative to the ORIGINAL; combined work rate adds reciprocals; median needs sorted data; $P(A \text{ or } B)$ adds and subtracts the overlap.
- Reading: main idea lives in the first/last sentences and the repeated topic; inferences must be supported by the passage; answer from the text, not outside knowledge; extreme words (always, never, all) are usually wrong; one paragraph of margin notes maps the passage.
- Science (if taking): read the figure, then the question; independent = changed, dependent = measured; control groups isolate the cause; conclusions must stay inside the tested range; correlations do not prove causation.
- Writing (if taking): 5 min plan / 30 write / 5 proofread; engage all three perspectives; one concrete example per body paragraph.
- Test-day: skip-and-flag rather than grinding; return to flagged questions only after finishing the section; check units and answer choices for the classic traps; sleep, eat, and arrive early; decide your Science and Writing choices BEFORE the morning of the test, based on your colleges' score policies.

Test-Day Strategy: The 10-Point Blueprint

A condensed checklist to review the morning of the test.

- 1. Format check: digital or paper? On digital, practice the flag/highlight/calculator tools before test day.
- 2. Answer every single question - there is no penalty for guessing, and blanks are guaranteed zeros.
- 3. Pace by section: English ~42 sec/question, Math ~67 sec, Reading ~67 sec, Science 60 sec (if taken).
- 4. Use the four-choice advantage: eliminate two and guess; elimination is faster with fewer decoys.
- 5. Flag and move on - never sink minutes into one question.
- 6. English: skim the passage for the gist before answering rhetoric questions.
- 7. Reading: track the main idea of each paragraph with one margin word.
- 8. Science (if taken): read the figure first; the prose is mostly setup.
- 9. Writing (if taken): 5/30/5 plan-write-proofread; engage all three perspectives.
- 10. Logistics: sleep, breakfast, ID, ticket, approved calculator with fresh batteries, arrive early.
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- Scores you will see: section scores 1-36, the EMR composite (rounded average of English, Math, Reading), plus STEM (Math + Science average) if you took Science and ELA (English + Reading + Writing average) if you took Writing. Check each college's superscore and score-use policy before deciding what to take and what to send.