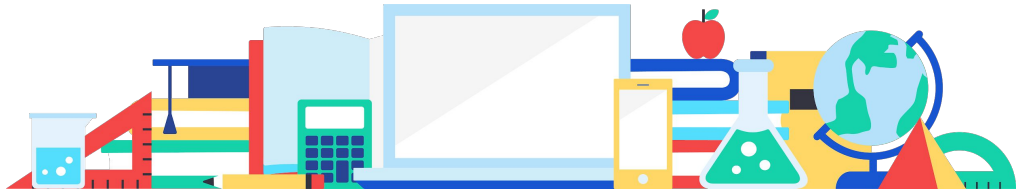
ACT Math

Updated February 1, 2025



After this training

You will be able to

- ➔ Understand the format of the ACT© test and how it is useful for students
- ➔ Advise students about how to use UPchieve to study for the ACT
- ➔ Help students apply test taking strategies
- ➔ Identify mathematical concepts covered in the ACT math section
- ➔ Find resources to help students prepare for the ACT math section

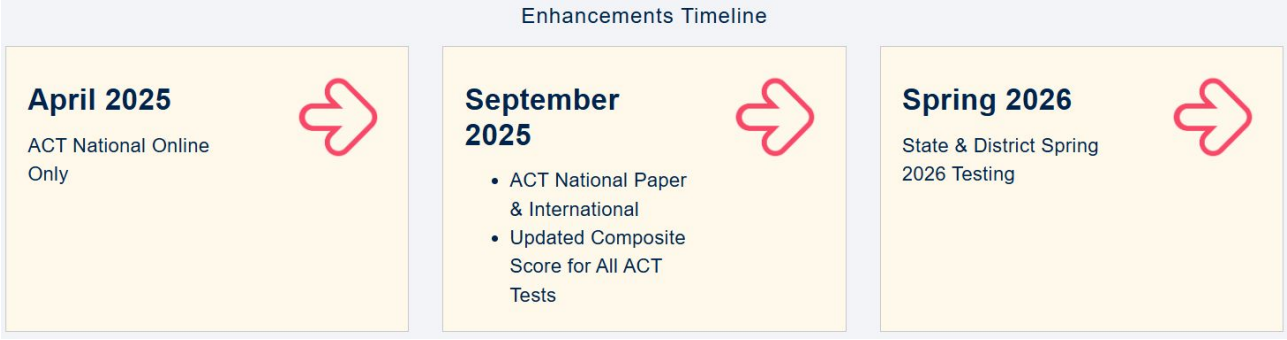
The ACT (American College Test)

2025 Enhancements to the ACT

Changes to the ACT

In April 2025, students who choose to take the ACT online will see an updated format that's shorter and lets them choose whether to include the science section.. These changes will also apply to the paper-pencil test starting in September 2025. Schools and districts will have these options starting in Spring 2026.

UPchieve's guide covers the updated test format and contents.



The ACT

An Overview

Test format

Starting April 2025, online test takers will answer 44 fewer questions overall, and the science section will be optional, like the writing section.

Three mandatory multiple-choice sections:

- English
  - 50 questions, 35 minutes
  - Covers grammar, punctuation, sentences and rhetorical skills
- Math
  - 45 questions, 50 minutes
- Reading
  - 36 questions, 40 minutes
  - Four passages (fiction, social studies, humanities, sciences) 10 questions each passage

Two optional sections:

- Writing/Essay
  - 40 minutes
  - 1 prompt
  - Very few colleges require the essay. Help your students determine if they should take the essay section. In general, the answer will be no.
- Science
  - 40 questions, 40 minutes
  - Science passages with graphs, charts, and tables
  - Some colleges may require or recommend an ACT science score. Students should check the requirements before skipping it. STEM majors are strongly encouraged to take and submit the science section.

The ACT

An Overview

Scoring

- For each section the number of correct answers converts to a scaled score of 1–36.
- Students can “superscore” multiple ACT tests by taking their best score from a section and averaging those best scores across multiple tests.
- Starting April 2025, online ACT takers will have Superscores calculated with a new method which includes English, math, and reading. For others, this starts in September 2025.
- Students taking the science section will receive a section score which is factored into the STEM score (science + math) but won’t count toward the composite score.
- Students taking the writing/essay section will receive five scores: a writing score (2-12) and four domain scores (2-12) based on an analytic rubric. Two readers will score the essay on a 1-6 scale per domain.

The ACT

Uses

College Admissions & Placement

- College admissions: Since COVID, more colleges stopped requiring college entrance exams such as the ACT or SAT (full list). However, many colleges still require either the ACT or SAT. These scores can be used as:
  - Minimum scores for entrance
  - Entrance into selective programs/majors
  - Qualifiers for merit scholarships
  - Placement exams for courses

Other

- Scholarships: Providers sometimes require ACT scores
- High School Graduation: Some states have exam requirements for graduation

ACT & UPchieve

How to advise a student to use UPchieve to study

- **Understand basic test taking strategies**: We'll review basic test taking strategies for the ACT in the following slide, students should familiarize themselves with these before taking practice tests.
  - Feel free to provide this resource to them during your sessions.
- **Take at least 3 timed, full-length practice tests**: Studies have shown that familiarizing oneself with the format, content, and timing of the test is very helpful in increasing their score. Practice exams are readily available for free on the internet, please help your students find them!
  - Here's a link to the official full-length practice tests with the 2025 enhancements.
  - If students used a fee waiver to register for the test they have access to The Official ACT® Self-Paced Course, Powered by Kaplan® which has 5 full length practice tests and 2000+ questions
- **Help your student build a schedule** to take 3 tests before the date of their exam and time to review their answers with a coach.
- **Review each incorrect answer**: We recommend students request 1:1 coaching sessions to review their incorrect answers with an UPchieve coach.

ACT & UPchieve

How to coach students when reviewing ACT problems

- **Help your student understand why their answer was incorrect**: Students can get answers incorrect for a multitude of reasons and need to take different actions to not make the same mistake in the future. Encourage students to talk through their thinking for each problem and identify what went wrong. Ask questions like:
  - What are we solving for? (Error: misread the instructions)
  - What concept do we need to apply (Error: not understanding the concept or missing key skills)
  - What is the last step to this problem? (Error: missing steps)
  - How did you start this problem? (Error: not knowing how to approach a problem)
- **Focus on building skills or content knowledge to get answer correct next time:**
  - **Misreading instructions:** Help the student read through similar problems and ask them “What are we solving for here?”
  - **Missing a step:** Encourage students to reread the question after getting their answer to ensure they took all the steps, feel free to create a similar multi-step problem for them or find one on the internet to help them practice.
  - **Reviewing or learning content**: If a student gets a question incorrect because they didn’t understand the underlying concept, coaches should review the concept and students should engage with more practice problems covering this topic.

Tips & Strategies

ACT Test-Taking Strategies

The Basics

- **Know what to bring**: From printouts of their admissions ticket to the right calculator, students often forget important things the day of the test and aren't allowed to sit for the exam.
- **Read each question carefully**: Questions are often written with multiple steps or present familiar math in unfamiliar ways.
- **Take all the steps**: Make sure to note if the question is asking to perform multiple steps or operations
- **Answer every question**: No points are taken away for incorrect answers so students should fill in each bubble.
- **Guess strategically:**
  - Try to **eliminate answers**, some answers will be clearly wrong - tell students to eliminate these where possible and then guess if time is running out.
  - Students should **pick one letter to guess** on questions they don't have time to read or are unable to eliminate choices from, this will save them time because they won't have to decide which letter to guess.

ACT Test-Taking Strategies

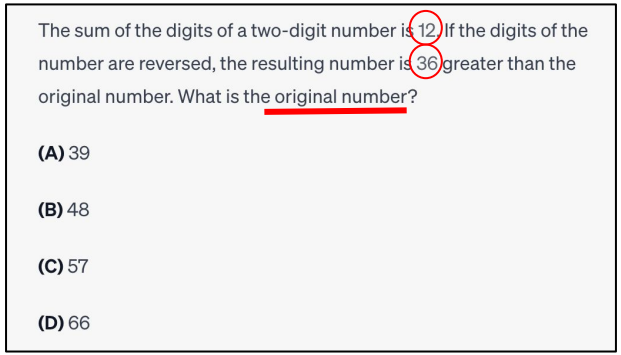
Manage time

- **Pace themselves**: Students should spend, on average, **1 minute per question in the math section** if they intend to answer them all. If they find themselves at 2 minutes, not close to the solution they should skip it and come back to it if they have time.
- **Do easy problems first**: The math section is in order of difficulty. Students should:
  - Answer easy questions immediately
  - Skip and return to medium difficulty level questions (and mark the question in the test booklet with an R next the number so they know to return to it)
  - Strategically guess on hard questions, coming back to them only if they have extra time at the end of the section
- **Bubble at the end**: Students should mark their answers in their exam booklet and save the last 5 minutes of the section to transfer their answers to their answer sheet. This will save them time and focus during the test by avoiding going back and forth between booklet and answer sheet.

Math Strategies

Identify what they are solving for

- ➔ Students should mark up their booklet to focus on key information
  - ◆ Circle any relevant numbers given
  - ◆ Underline what they are solving for
  - ◆ Use the booklet to work through the problem



Math Strategies

Change words to math actions

➔ Look for keywords that indicate mathematical concepts and write them in the problem

Key Terms	Mathematical Action
Sum, increased by, added to, more than, total of	+
Difference, decreased by, less than, subtracted from	–
Product, times, __ times as much, __ times as many (a number, e.g., “three times as many”)	* or x
Divided by, per, __ as many, __ as much (a fraction, e.g., “one-third as much”)	/ or ÷
Equals, is, are, equivalent	=
Is less than	<
Is greater than	>
Is less than or equal to	≤
Is greater than or equal to	≥

Math Strategies

Plug in answer choices

- The answer choices are arranged in numeric order, so students should **start with answer choice C/H** unless the question asks for the smallest or largest value. This will help them make informed choices about two answers instead of just one!
- **Example:** If we plug in choice C. Area = length x width = 12 x 8 = 96 square units. Clearly, this is too large. This means that answer choices (D) and (E) would also result in areas larger than 60. So we can eliminate options (C) and (D).

A rectangle has a length that is 4 units longer than its width. If the area of the rectangle is 60 square units, what is the length of the rectangle?

(A) 6 units

(B) 10 units

(C) 12 units

(D) 15 units

Math Strategies

Replace abstract values with concrete ones

- ➔ Use regular numbers like 2 or 6 first, and then test with numbers like 0 or 1 which have special properties
- ➔ **Example:** Plug in -2 to the answer choices below to solve the question

For all negative real values of x, all of the following statements are true EXCEPT:

(A) x^2 is positive.

(B) x^3 is negative.

(C) $|x|$ is negative.

(D) $x^2 - x$ is positive.

Math Strategies

Draw & label diagrams

- Instead of keeping information in their mind, students should always draw visual representations to help solve problems
- **Example**

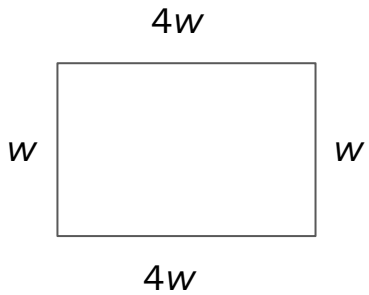
A rectangular garden is 4 times as long as it is wide. If the perimeter of the garden is 90 feet, what is the area of the garden?

(A) 81 sq. ft.

(B) 162 sq. ft.

(C) 216 sq. ft.

(D) 324 sq. ft.



General Math Strategies

Use their calculator

- ➔ Students should familiarize themselves with their ACT approved calculator and which functionalities would be helpful on the test
- ➔ **Example:** Plug all values into a calculator to convert them to decimals to easily reorder them

In what order should $\frac{6}{5}$, $\frac{9}{13}$, $\frac{13}{7}$, and $\frac{5}{3}$ be listed to be arranged in decreasing order?

(A) $\frac{13}{7}, \frac{5}{3}, \frac{6}{5}, \frac{9}{13}$

(B) $\frac{5}{3}, \frac{13}{7}, \frac{6}{5}, \frac{9}{13}$

(C) $\frac{13}{7}, \frac{6}{5}, \frac{5}{3}, \frac{9}{13}$

(D) $\frac{6}{5}, \frac{13}{7}, \frac{5}{3}, \frac{9}{13}$

Math Content

The ACT Math Section

An Overview

The basics

- 45 mostly “self-contained” multiple-choice questions
- Some question sets (about same chart, etc)
- An approved calculator is allowed for all math problems

Content*

- Number and Quantity 7-10% of questions
- Algebra 12-15%
- Functions 12-15%
- Geometry 12-15%
- Statistics & Probability 8-12%
- Integrating these skills in complex problems 40-43%

**The new ACT will rebalance the math reporting categories, so some question types may become more prominent after the Enhanced ACT is launched.*

Number and Quantity

Essential formulas and concepts

Real and complex number systems, including expressions with integer and rational exponents and vectors and matrices

- Order of Operations: PEMDAS (Parentheses, Exponents, Multiplication and Division, Addition and Subtraction)
- Prime numbers: A number greater than 1 only divisible by 1 and itself (examples: 2, 7, 13)
- Prime factorization: Determining the prime numbers that multiply together to give a certain original number
- Greatest common factor: Identify the largest number that divides both numbers given without leaving a remainder.
- Relationship between percents, fractions, and decimals: 50% = ½ = .5
- Exponents (including $i^2 = -1$)
- Square roots: Solve, simplify, add, subtract, multiply or divide

Algebra

Essential formulas and concepts

Solve, graph, and model multiple types of expressions, use many different kinds of equations, including linear, polynomial, radical, and exponential relationships

- ➔ Quadratic Formula: $x = (-b \pm \sqrt{(b^2 - 4ac)}) / 2a$
- ➔ Factoring Quadratics: $(x - a)(x - b) = 0$
- ➔ Slope-Intercept Form: $y = mx + b$
- ➔ Point-slope form: $y - y_1 = m(x - x_1)$
- ➔ Slope formula: $m = (y_2 - y_1)/(x_2 - x_1)$
- ➔ Distance Formula: $\sqrt{((x_2 - x_1)^2 + (y_2 - y_1)^2)}$
- ➔ System of equations using substitution or elimination
- ➔ Matrices

Functions

Essential formulas and concepts

Understand, use, and manipulate functions

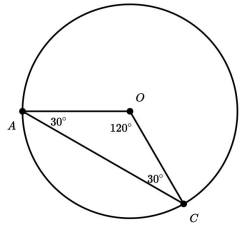
- Basic Function Concepts
  - Domain and range
  - Evaluating functions
- Quadratic Functions
  - Standard form: $y = ab^2 + bx + c$
  - Vertex form: $y = a(x - h)^2 + k$
  - Factoring and finding the roots (zeros) of quadratic equations
  - Vertex of a parabola (h,k) where $h = -b/2a$
- Polynomial Functions
  - Basic understanding of polynomials and their degree
  - Factorization techniques, such as factoring by grouping
- Exponential and Logarithmic Functions
  - Properties of exponential functions, a^x where $a > 0$
  - Basic logarithm properties, including the change of base formula,
    - $\log_b(a) \times \log_c(b) = \log_c(a)$
  - Relationship between exponential and logarithmic functions
- Composite and Inverse Functions
  - Finding the composition of functions: $f(g(x))$
  - Finding the inverse of a function

Geometry

Essential formulas and concepts

Congruency, similarity, surface area and volume, as well as solving for missing values on shapes and figures

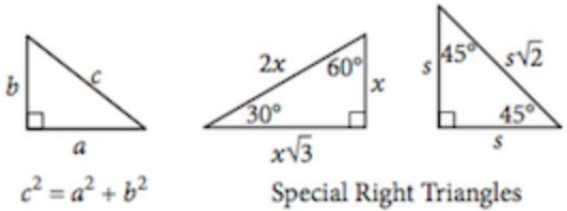
- Area Formulas
  - Triangle: *1/2 * base * height*
  - Rectangle: *length * width*
  - Circle: πr^2
- Volume Formulas
  - Cylinder: $\pi r^2 h$
  - Sphere: $4/3 * \pi r^3$
  - Cone: $1/3 * \pi r^2 h$
- Unit Circle: Angles and their corresponding trigonometric values on the unit circle
  - The sum of central angle measures in a circle is 360°.
  - Since all radii have the same length, any triangle that has two radii as sides is an isosceles triangle.

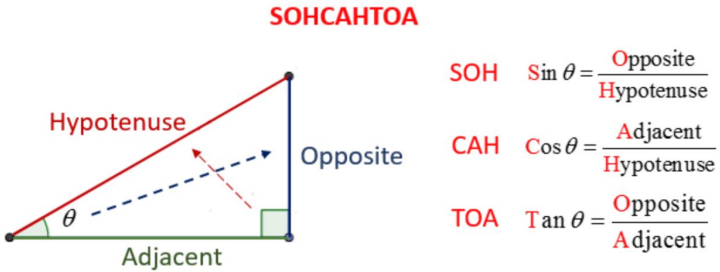


Geometry: Triangles

Essential formulas and concepts

- Pythagorean Theorem: $a^2 + b^2 = c^2$
- Special right triangles
- SOCAHTOA





Statistics & Probability

Essential formulas and concepts

- Mean: Average of the set of numbers
- Median: The middle number in an ordered set
- Mode: The number that appears most frequently
- Range: The difference between the largest and smallest values
- Understanding of histograms, box plots, scatter plots, bar graphs, and line graphs
- Recognizing trends, outliers, and other features in data
- Understand and interpret data distributions
- Basic understanding sampling and experiments
- Probability of an event: *P(A)= number of favorable outcomes/total outcomes*
- Complementary events: *P(A') = 1 - P(A),* where *A'* is the complement of event *A*
- Compound events
  - Independent events: *P(A* and *B) = P(A) x P(B)*
  - Mutually exclusive events *P(A* or *B) = P(A) + P(B)*
- Dependent Events
  - *P(A* and *B) = P(A) x P(B|A)*
- Permutations (nPr): when order matters, like arranging 3 books out of 5 on a shelf

$$nPr = \frac{n!}{(n-r)!}$$

- Combinations (nCr): when order doesn't matter, like selecting 3 books out of 5 to take on a trip

$$nCr = \frac{n!}{r!(n-r)!}$$

Integrating Essential Skills

Complex problems

Synthesize and apply knowledge and skills to solve more complex problems; often problems ask students to combine skills, complete multiple steps, and/or apply skills in novel or real-world contexts.

- Multi-step example:
  - If a is inversely proportional to $b/2$ and $a = 1$ when $b = 10$, then what is the value of a when $b = 35$?
  - Steps: Set up the inverse proportionality relationship, plug in given values to find the constant of proportionality (k), plug in k to find the value of a when $b = 35$
- Real world context example:
  - At the town fair, Sarah will play a game in which she will toss a quarter, a loonie (Canadian one-dollar coin), and a two-dollar coin (toonie) simultaneously. She will be awarded 5 points for each coin that lands with tails faceup. Let the random variable y represent the total number of points awarded on any toss of the coins. What is the expected value of y?
  - Skills: Extracting relevant information from the context of the problem and applying it. Understanding of probability concepts, application of expected value, combinatorial thinking
- Multi-skill example:
  - For $-\pi/2 \leq \theta \leq \pi/2, |\sin, \theta| \geq 1$ is true for all and only the values of θ in which of the following sets?
  - Skills: Understanding of sine function, unit circles and special angles inequalities, interval notation, and absolute values

Resources

- Full-length practice tests with the 2025 enhancements
- ACT math sample questions
- If students used a fee waiver to register for the test they have access to The Official ACT® Self-Paced Course, Powered by Kaplan®