



Math Tutoring AI

ACT Math Workbook

Complete Study Guide • Visual Lessons • Formula Sheets • Full-Length Practice Test

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Chapter 1 — Introduction

Overview of ACT Math topics, scoring, timing, and strategy for maximizing points.

Chapter 2 — ACT Math Test Structure

Details on section length, pacing recommendations, and question difficulty progression.

Chapter 3 — Number & Quantity

Key number properties, scientific notation, absolute value, and ratio fundamentals.

Chapter 4 — Algebra

Slope, equations, inequalities, systems, exponent rules, radicals, and linear graphs.

Chapter 5 — Functions

Function notation, evaluating functions, tables, graphs, and transformations.

Chapter 6 — Geometry

Triangles, circles, polygons, coordinate geometry, and foundational theorems.

Chapter 7 — Statistics & Probability

Mean/median/mode, histograms, box plots, scatterplots, and probability rules.

Formula Sheets (Summary)

Includes Algebra, Geometry, Trigonometry, and Probability/Statistics formulas with color-coded tables.

Full-Length Practice Test

A complete 60-question ACT Math practice test is provided as a separate downloadable PDF.

Answer Key and Explanations

Detailed explanations accompany all 60 questions in the answer key PDF.

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ACT Math Formula Sheets (Corrected Version)

Algebra

Formula	Expression
Slope Formula	$m = (y_2 - y_1) / (x_2 - x_1)$
Slope-Intercept Form	$y = mx + b$
Point-Slope Form	$y - y_1 = m(x - x_1)$
Quadratic Formula	$x = [-b \pm \sqrt{b^2 - 4ac}] / (2a)$
Exponent Rules	$a^m \cdot a^n = a^{(m+n)}$, $a^m / a^n = a^{(m-n)}$
Radicals	$\sqrt{a \cdot b} = \sqrt{a} \cdot \sqrt{b}$

Geometry

Formula	Expression
Area of Triangle	$A = (1/2) \cdot b \cdot h$
Area of Circle	$A = \pi \cdot r^2$
Circumference	$C = 2 \cdot \pi \cdot r$
Pythagorean Theorem	$a^2 + b^2 = c^2$
Volume (Rectangular Prism)	$V = l \cdot w \cdot h$

Trigonometry

Formula	Expression
SOH-CAH-TOA	$\sin = \text{opp/hyp}$, $\cos = \text{adj/hyp}$, $\tan = \text{opp/adj}$
Special Value	$\sin 45^\circ = \cos 45^\circ = \sqrt{2}/2$
Radians-Degrees	$\pi \text{ radians} = 180 \text{ degrees}$

Probability & Statistics

Formula	Expression
Probability	$P(A) = \text{favorable} / \text{total}$
Independent Events	$P(A \text{ and } B) = P(A) * P(B)$
Mean	$\text{sum}(\text{values}) / n$
Median	middle value
Mode	most frequent value

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ACT Math — Full-Length Practice Test (60 Questions)

1. If $3x + 7 = 25$, what is x ?
2. A rectangle has width 5 and area 45. What is its length?
3. What is the slope of the line passing through (2,3) and (6,15)?
4. Simplify: $(x^2 - 9) / (x - 3)$, $x \neq 3$.
5. If $f(x) = 2x - 5$, what is $f(8)$?
6. The mean of 5 numbers is 12. If four of the numbers are 10, 11, 13, and 9, what is the fifth number?
7. A company sells 12 pens for \$9. What is the cost per pen?
8. Solve: $|x - 4| = 7$.
9. What is the area of a triangle with base 14 and height 6?
10. Convert 3.2×10^3 to standard form.
11. On a coordinate plane, what is the distance between (1,2) and (5,5)?
12. If $g(x) = x^2 - 4x$, what is $g(3)$?
13. Solve for x : $5x - 12 > 3$.
14. A store discount reduces a \$80 item by 15%. What is the sale price?
15. What is the value of $\sqrt{50}$?
16. If $(x - 3)(x + 5) = 0$, what are the solutions?
17. A circle has radius 9. What is its circumference?

18. What is the median of the set $\{4, 7, 9, 11, 15, 20\}$?
19. If $f(x) = 3x^2$ and $f(k) = 75$, find k .
20. What is the slope of $y = -2x + 7$?
21. A right triangle has legs of lengths 8 and 15. What is the hypotenuse?
22. If $\frac{3}{4}$ of x is 24, what is x ?
23. Solve: $2^{(x+1)} = 16$.
24. If the ratio of boys to girls is 5:7 and there are 35 boys, how many girls?
25. What is the volume of a rectangular prism with dimensions $3 \times 4 \times 10$?
26. Simplify: $(3x^3)(2x^2)$.
27. If points $A(2,5)$ and $B(10,y)$ have slope 3, what is y ?
28. A spinner has 8 equal sections. What is the probability of landing on one specific section?
29. Factor: $x^2 + 7x + 12$.
30. If $\sin\theta = \frac{3}{5}$ in a right triangle, what is $\cos\theta$?
31. What is the solution to $4x + 1 = 9$?
32. A line has slope 4 and passes through $(0,-3)$. What is its equation?
33. If $f(x) = \frac{x}{2} - 6$, what is $f(-4)$?
34. Simplify: $(x^{\blacksquare})/(x^2)$.
35. A sequence starts 2, 5, 8, 11... What is the 20th term?
36. If a box contains 3 red, 5 green, and 2 blue marbles, what is the probability of drawing a green?
37. What is the area of a circle with diameter 12?
38. Solve: $x^2 - 16 = 0$.

39. The average of x and 14 is 20. Find x .
40. If 30% of a number is 45, what is the number?
41. Solve the system: $x + y = 16$ and $x - y = 4$.
42. Expand: $(x + 3)^2$.
43. Convert 0.0045 into scientific notation.
44. A triangle has sides 6, 8, and 10. Is it a right triangle?
45. If the perimeter of a square is 48, what is the length of one side?
46. What is the range of the set $\{12, 15, 3, 8, 20\}$?
47. Solve for x : $7x - 14 = 0$.
48. If k varies directly with m and $k=18$ when $m=6$, find k when $m=10$.
49. What is $\sqrt{(81/25)}$?
50. If a car travels 150 miles in 3 hours, what is its average speed?
51. Solve: $3^x = 27$.
52. What is the y -intercept of $y = 5x - 12$?
53. Evaluate $h(4)$ for $h(x)=x^2-2x+1$.
54. A polygon has interior angle sum 1260° . How many sides does it have?
55. What is the midpoint between $(-2,7)$ and $(4,-1)$?
56. Solve: $\sqrt{x+9} = 6$.
57. If a bag contains 12 items and 3 are defective, what percent are defective?
58. Simplify: $(2x - 3) - (x + 5)$.
59. A circle has area 49π . What is its radius?
60. If a function increases by a constant amount each step, what type of function is it?

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ACT Math — Full-Length Practice Test (60 Questions)

Answer Key and Explanations

1. $x = 6$. $3x+7=25 \rightarrow 3x=18 \rightarrow x=6$.
2. Length = 9. Area= $45=5 \times L \rightarrow L=9$.
3. Slope = 3. $(15-3)/(6-2)=12/4=3$.
4. $x+3$. Difference of squares.
5. 11. $f(8)=2(8)-5$.
6. Fifth number = 17. Mean= $12 \rightarrow$ total= 60 .
7. \$0.75 per pen.
8. $x=11$ or $x=-3$.
9. Area = 42. $(1/2) \times 14 \times 6$.
10. 3200.
11. Distance = 5.
12. $g(3)=9-12=-3$.
13. $x>3$.
14. \$68.
15. $5\sqrt{2}$.
16. $x=3$ or $x=-5$.

17. $C=18\pi$.

18. Median = $(9+11)/2 = 10$.

19. $k = 5 \cdot \sqrt{75/3}$.

20. Slope = -2 .

21. Hypotenuse = 17.

22. $x = 32$.

23. $x = 3$.

24. 49 girls.

25. Volume = 120.

26. $6x \blacksquare$.

27. $y = 29$.

28. $1/8$.

29. $(x+3)(x+4)$.

30. $4/5$.

31. $x = 2$.

32. $y = 4x - 3$.

33. -8 .

34. x^2 .

35. $2+19 \cdot 3=59$.

36. $5/10 = 1/2$.

37. Area= $36\pi \rightarrow$ radius=6.

38. $x=4$ or $x=-4$.

39. $x = 26$.

40. 150.

41. $x=10, y=6$.

42. x^2+6x+9 .

43. 4.5×10^3 .

44. Yes, $6^2+8^2=10^2$.

45. Side = 12.

46. Range = 17.

47. $x = 2$.

48. $k = 30$.

49. $9/5$.

50. 50 mph.

51. $x = 3$.

52. -12.

53. 9.

54. $n=9$.

55. (1,3).

56. $x=27$.

57. 25%.

58. $x-8$.

59. $r=7$.

60. Linear function.

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