
SAT/ACT MATH PREP WORKBOOK

Algebra & Data Analysis

Grades 9-11 | 90 Practice Problems

3 Focused Units

3 Mini Practice Tests

Full Worked Solutions

Heart of Algebra

Problem Solving & Data

Passport to Advanced Math

Calculator Strategy Guide

Student Score Tracker

SAT/ACT Authentic Format

UM Printables

TABLE OF CONTENTS

Calculator vs. No-Calculator Strategy Guide

UNIT 1: Heart of Algebra

Topic 1A: Linear Equations Problems 1-10

Topic 1B: Linear Inequalities Problems 11-20

Topic 1C: Systems of Linear Equations Problems 21-30

Unit 1 Answer Key & Full Worked Solutions

UNIT 2: Problem Solving & Data Analysis

Topic 2A: Ratios, Proportions & Percentages Problems 31-40

Topic 2B: Statistics & Probability Problems 41-50

Topic 2C: Scatterplots & Data Interpretation Problems 51-60

Unit 2 Answer Key & Full Worked Solutions

UNIT 3: Passport to Advanced Math

Topic 3A: Quadratic Equations Problems 61-70

Topic 3B: Polynomials Problems 71-80

Topic 3C: Functions & Graphs Problems 81-90

Unit 3 Answer Key & Full Worked Solutions

MINI PRACTICE TESTS

Mini Practice Test 1 (Mixed) 20 Problems

Mini Practice Test 2 (Mixed) 20 Problems

Mini Practice Test 3 (Mixed) 20 Problems

Practice Test Answer Keys & Solutions

Student Score-Tracking Log

CALCULATOR VS. NO-CALCULATOR STRATEGY GUIDE

The SAT splits its math test into two sections: one where calculator use is permitted, and one where it is not. The ACT allows a calculator for the entire math section, but over-reliance can cost you valuable time. Understanding when and how to use your calculator is a crucial test-taking skill.

No-Calculator Section Strategies

- 1. Focus on Algebraic Manipulation:** Problems in this section are designed to be solved without a calculator. If your algebra is solid, you should not need one. Practice isolating variables, combining like terms, and factoring efficiently.
- 2. Memorize Core Math Facts:** Know your squares (up to 15^2), cubes (up to 5^3), common fraction-to-decimal conversions (e.g., $1/8 = 0.125$), and Pythagorean triples (3-4-5, 5-12-13).
- 3. Estimate and Approximate:** If a problem involves complex numbers, look for ways to simplify or estimate. Often, rounding numbers to the nearest whole number can help you quickly eliminate incorrect multiple-choice options.
- 4. Use Backsolving:** Plug the answer choices back into the equation. Since one of them must be correct, testing them in order (starting with B or C) is often faster than solving a complex equation from scratch.

Calculator Section Strategies

- 1. Don't Use It as a Crutch:** The calculator is a tool, not a problem-solver. Many calculator-section problems can be solved faster using logic or algebra. If you find yourself typing in long strings of numbers, step back—there may be a simpler conceptual approach.
- 2. Save Time on Arithmetic:** Use your calculator for tedious calculations, such as dividing large numbers, calculating percentages with decimals, or finding means of large data sets. This reduces simple arithmetic errors.
- 3. Graphing is Your Friend:** For systems of equations or finding the roots of a quadratic, graphing the equations on your calculator and finding the intersection can be a fast, reliable backup method to verify your algebraic answer.
- 4. Check Your Inputs:** A calculator is only as smart as its operator. Ensure you use parentheses correctly, especially with negative exponents or fractions. A misplaced parenthesis can change the answer entirely.

STRATEGY TIP: Regardless of the section, always write out your steps. Mental math errors are the most common source of lost points. Writing down each step keeps your logic clear and makes it easy to check your work.

ESSENTIAL SKILLS

Calculator Skills to Master Before Test Day:

- Graphing functions and finding intercepts/intersections
- Using the fraction button or converting decimals to fractions
- Calculating means and standard deviations (if your calculator supports it)
- Proper use of parentheses in complex order-of-operations expressions
- Storing values for repeated calculations (e.g., the "ANS" key)

UNIT 1

Heart of Algebra

Linear Equations, Inequalities, & Systems

TOPIC 1A: LINEAR EQUATIONS

KEY CONCEPTS

A linear equation is an equation for a straight line. Standard form is $Ax + By = C$, while slope-intercept form is $y = mx + b$ (where m is the slope and b is the y -intercept). To solve, isolate the variable by performing inverse operations on both sides.

1. If $3x + 7 = 22$, what is the value of x ?
A) 5
B) 4
C) 6
D) 7
2. Solving for x in the equation $x/4 - 3 = 5$ yields which of the following?
A) 12
B) 16
C) 32
D) 64

3. If $5(x - 2) = 3x + 4$, what is the value of x ?
A) 3
B) 5
C) 7
D) 9

4. A plumber charges a flat fee of \$50 plus \$75 per hour for a service call. Which equation represents the total cost C for h hours of work?
A) $C = 75h + 50$
B) $C = 50h + 75$
C) $C = 125h$
D) $C = 75(h + 50)$

5. For the equation $y = 4x - 5$, what is the y -intercept?
A) (0, 4)
B) (0, -5)
C) (4, 0)
D) (-5, 0)

6. Maria buys 3 notebooks and a \$4 pen for a total of \$19. If each notebook costs the same amount, n , which equation represents this situation?
A) $3n + 4 = 19$
B) $3(n + 4) = 19$
C) $4n + 3 = 19$
D) $n + 4(3) = 19$

7. A car rental company charges \$30 per day plus \$0.20 per mile driven. If C is the total cost and m is the number of miles, which equation models the total cost?
A) $C = 30m + 0.20$
B) $C = 0.20m + 30$
C) $C = 0.20(m + 30)$
D) $C = 30(m + 0.20)$

8. A line passes through the points (0, 3) and (2, 7). What is the equation of the line?
A) $y = 2x + 3$
B) $y = 2x - 3$
C) $y = 3x + 2$
D) $y = 0.5x + 3$

9. A line has a slope of 2 and passes through the point (1, 5). Which of the following is the equation of the line?
A) $y = 2x + 3$
B) $y = 2x + 5$
C) $y = x + 4$
D) $y = 3x + 2$

10. If $2y - 6x = 10$, what is y in terms of x ?
A) $y = 3x + 5$
B) $y = 6x + 10$
C) $y = -3x + 5$
D) $y = -3x - 5$

TOPIC 1B: LINEAR INEQUALITIES

KEY CONCEPTS

An inequality is like an equation, but uses $>$, $<$, $\geq$, or $\leq$. The most important rule: if you multiply or divide both sides by a negative number, you must flip the inequality sign. On a number line, an open circle denotes $<$ or $>$, while a closed circle denotes $\leq$ or $\geq$.

11. If $3x - 4 > 11$, what is the solution set for x ?
- A) $x > 5$ B) $x < 5$
C) $x > 3$ D) $x < 3$
-
12. Solving $-2x \leq 8$ yields which of the following?
- A) $x \leq -4$ B) $x \geq -4$
C) $x \leq 4$ D) $x \geq 4$
-
13. What is the solution to $x/3 + 1 \leq 4$?
- A) $x \leq 3$ B) $x \geq 3$
C) $x \leq 9$ D) $x \geq 9$
-
14. Which of the following represents the solution to $-2 < x + 1 \leq 5$?
- A) $-1 < x \leq 6$ B) $-3 < x \leq 4$
C) $-2 < x \leq 4$ D) $-3 < x \leq 5$
-
15. A student scores 78, 82, and 74 on three tests. To earn a B, the average of four tests must be at least 80. What is the minimum score needed on the fourth test?
- A) 80 B) 82
C) 88 D) 90
-
16. A shopper has \$100 to spend on shirts. If each shirt costs \$15 and there is a flat \$5 sales tax, what is the maximum number of shirts the shopper can buy?
- A) 5 B) 6
C) 7 D) 8
-
17. If $2(3x - 1) \geq 4x + 6$, what is the solution for x ?
- A) $x \geq 2$ B) $x \geq 4$
C) $x \leq 4$ D) $x \geq 6$

UNIT 2

Problem Solving & Data Analysis

Ratios, Percentages, Statistics & Data

TOPIC 2A: RATIOS, PROPORTIONS & PERCENTAGES

KEY CONCEPTS

A ratio compares quantities. Set up proportions as equivalent fractions ($a/b = c/d$). For percentages, remember: "is" over "of" equals percent over 100. Percentage change = $(\text{New} - \text{Old}) / \text{Old} \times 100\%$.

31. The ratio of boys to girls in a class is 3 to 5. If there are 40 students in the class, how many boys are there?
- A) 12 B) 15
C) 24 D) 25
-

32. If a car travels 60 miles in 1.5 hours, what is the average speed of the car in miles per hour?

A) 30
B) 40
C) 90
D) 120

33. A shirt originally priced at \$40 is increased to \$50. What is the percent increase in the price of the shirt?

A) 10%
B) 20%
C) 25%
D) 50%

34. A store applies a 25% discount to a jacket originally priced at \$80. What is the price of the jacket after the discount?

A) \$20
B) \$55
C) \$60
D) \$75

35. If 4 cans of paint cover 120 square feet, how many cans are needed to cover 300 square feet?

A) 8
B) 10
C) 12
D) 15

36. A laptop costs \$500 before tax. If the sales tax rate is 8%, what is the total cost of the laptop including tax?

A) \$400
B) \$508
C) \$540
D) \$580

37. The ratio of sugar to flour in a recipe is 2:3. If 12 cups of sugar are used, how many cups of flour are needed?

A) 8
B) 15
C) 18
D) 24

38. What is 30% of 40% of 200?

A) 16
B) 24
C) 40
D) 80

39. If 1 US dollar is equivalent to 0.8 euros, how many US dollars are equivalent to 100 euros?

A) \$80
B) \$125
C) \$180
D) \$200

UNIT 3

Passport to Advanced Math

Quadratics, Polynomials, & Functions

TOPIC 3A: QUADRATIC EQUATIONS

KEY CONCEPTS

A quadratic equation is of the form $ax^2 + bx + c = 0$. Solutions (roots) can be found by factoring, completing the square, or the quadratic formula: $x = (-b \pm \sqrt{b^2 - 4ac}) / 2a$. The discriminant ($b^2 - 4ac$) determines the number of real solutions: >0 (two), $=0$ (one), <0 (none).

61. What is one solution to the equation $x^2 - 5x + 6 = 0$?

A) 2

B) -3

C) 5

D) 6

62. Which of the following is a solution to $2x^2 + 3x - 2 = 0$?

A) -2

B) -1

C) $1/2$

D) 2

63. The graph of $y = (x - 2)^2 + 3$ is a parabola. What is the vertex of this parabola?
- A) $(-2, 3)$ B) $(2, 3)$
C) $(2, -3)$ D) $(-2, -3)$
-
64. To complete the square for $x^2 + 6x + c$, what value must c be?
- A) 3 B) 6
C) 9 D) 36
-
65. If $x = 4$ and $x = -1$ are the only solutions to a quadratic equation, which of the following could be the equation?
- A) $x^2 + 3x - 4 = 0$ B) $x^2 - 3x - 4 = 0$
C) $x^2 - 3x + 4 = 0$ D) $x^2 + 5x + 4 = 0$
-
66. What is the y -intercept of the graph of $y = x^2 - 4x + 5$?
- A) $(0, 5)$ B) $(5, 0)$
C) $(0, 1)$ D) $(2, 1)$
-
67. How many real solutions does the equation $x^2 + 4x + 5 = 0$ have?
- A) 0 B) 1
C) 2 D) Infinitely many
-
68. What is the minimum value of the function $y = x^2 - 2x + 7$?
- A) 1 B) 6
C) 7 D) -2
-
69. The equations $y = x^2$ and $y = 4$ are graphed in the xy -plane. How many points of intersection are there?
- A) 0 B) 1
C) 2 D) 4
-
70. The height h of a ball in feet t seconds after being thrown is given by $h = -16t^2 + 64t + 5$. What is the maximum height the ball reaches?
- A) 64 B) 67
C) 69 D) 74

MINI PRACTICE TEST 1

40 Mixed Problems • 3 Units • SAT/ACT Format

Instructions: Solve each problem and choose the best answer. For grid-in problems, calculate your numerical answer.

Heart of Algebra

1. If $3x + 5 = 2x - 1$, what is the value of x ?
A) -6
B) -4
C) 4
D) 6
2. A taxi service charges a base fare of \$3.50 plus \$2.25 per mile. Which equation represents the total fare F for a trip of m miles?
A) $F = 2.25m + 3.50$
B) $F = 3.50m + 2.25$
C) $F = 5.75m$
D) $F = 2.25(m + 3.50)$
3. What is the solution to the inequality $4x - 3 > 9$?
A) $x > 1.5$
B) $x > 3$
C) $x < 1.5$
D) $x < 3$
4. If $x + y = 8$ and $x - y = 2$, what is the value of x ?
A) 3
B) 5
C) 6
D) 10
5. A line passes through the points $(0, 4)$ and $(3, 13)$. What is the equation of the line?
A) $y = 3x + 4$
B) $y = 4x + 3$
C) $y = 3x + 13$
D) $y = 9x + 4$
6. How many solutions does the system $2y - 6x = 8$ and $y = 3x + 5$ have?
A) Zero
B) One
C) Two
D) Infinitely many
7. Which of the following inequalities represents a graph with a dashed boundary line and shading below it?
A) $y \geq 2x + 1$
B) $y > 2x + 1$
C) $y \leq 2x + 1$
D) $y < 2x + 1$

MINI PRACTICE TEST 3: ANSWER KEY & SOLUTIONS

1. Answer: C

Subtract $2x$ from both sides: $2x - 3 = 5$. Add 3 to both sides: $2x = 8$. Divide by 2: $x = 4$.

2. Answer: A

The total cost is the base fee (\$15) plus the variable cost per movie (\$1.50) multiplied by the number of movies (M): $C = 1.50M + 15$.

3. Answer: B

Divide both sides by -3 . Remember that dividing or multiplying an inequality by a negative number flips the sign: $x < -4$.

4. Answer: B

Substitute $y = 2x - 1$ into $x + y = 8$: $x + (2x - 1) = 8 \rightarrow 3x - 1 = 8 \rightarrow 3x = 9 \rightarrow x = 3$. Substitute $x = 3$ back into $y = 2x - 1$: $y = 2(3) - 1 = 5$.

5. Answer: B

The equation is in slope-intercept form $y = mx + b$, where m is the slope. Here, the slope is 3.

6. Answer: C

In a linear cost function $y = mx + b$, the y -intercept (b) represents the initial fixed cost (the cost when $x = 0$). Here, 100 is the fixed cost.

7. Answer: D

Divide the first equation by 2 to get $y = 2x + 3$. This is identical to the second equation. Since they are the same line, there are infinitely many solutions.

8. Answer: C

The ratio of girls to total students is $5/(3+5) = 5/8$. Girls = $(5/8) \times 40 = 25$.

9. Answer: C

Percent decrease = $(\text{Original} - \text{New}) / \text{Original} = (80 - 60) / 80 = 20 / 80 = 0.25 = 25\%$.

10. Answer: A

A standard die has 6 sides. Only one of those sides is a 5. Probability = $1/6$.

11. Answer: B

Mean = $(4 + 8 + 12 + 16 + 20) / 5 = 60 / 5 = 12$.

STUDENT SCORE-TRACKING LOG

Use this log to track your progress throughout the workbook. Record the number of correct answers out of the total problems for each section, then calculate your percentage. Use the "Areas to Review" column to note specific topics that need extra practice before test day.

Section / Topic	Total Problems	Correct	Score (%)	Areas to Review
Unit 1: Topic 1A (Linear Equations)	10			
Unit 1: Topic 1B (Linear Inequalities)	10			
Unit 1: Topic 1C (Systems of Equations)	10			
Unit 1: Overall	30			
Unit 2: Topic 2A (Ratios & Percentages)	10			
Unit 2: Topic 2B (Statistics & Probability)	10			
Unit 2: Topic 2C (Scatterplots & Data)	10			
Unit 2: Overall	30			
Unit 3: Topic 3A (Quadratic Equations)	10			
Unit 3: Topic 3B (Polynomials)	10			
Unit 3: Topic 3C (Functions & Graphs)	10			
Unit 3: Overall	30			
Mini Practice Test 1	20			
Mini Practice Test 2	20			
Mini Practice Test 3	20			

Thank You for Downloading!

We hope this workbook helps you or your students achieve math mastery and confidence for the SAT and ACT. Your success is our top priority!

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Thank you for your support!

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