

# PRACTICE EXAM 39

## NY REGENTS ALGEBRA I

### SIMULATION — 35 QUESTIONS

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**Recommended Time: 90 Minutes**

**Required Tools: Graphing Calculator, Straightedge**

Directions: This exam consists of 35 multiple-choice questions. Each question is worth equal credit. Select the single best answer for each question. No penalty for guessing.

1. Solve for  $x$ :  $7 - 3x = 22$ .

A.  $x = 5$

B.  $x = -5$

C.  $x = 15$

D.  $x = -15$

2. A function is defined by  $f(x) = 5 - x^2$ . What is the value of  $f(-2)$ ?

A. 1

B. 9

C. -1

D. -9

3. Which expression is the completely factored form of  $x^2 - 16x + 64$ ?

A.  $(x + 8)^2$

B.  $(x - 8)(x + 8)$

C.  $(x - 8)^2$

D.  $(x - 16)(x - 4)$

4. Which equation represents a horizontal line that passes through the point  $(3, -2)$ ?

A.  $x = 3$

B.  $x = -2$

C.  $y = 3$

D.  $y = -2$

5. An athlete burns 9 calories per minute while running. Which equation gives the total calories  $C$  burned after  $m$  minutes of running?

A.  $C = m + 9$

B.  $C = 9m$

C.  $C = m/9$

D.  $C = 9 + m$

6. The mean of five test scores is 82. The first four scores are 78, 88, 85, and 80. What is the fifth score?

A. 77

B. 78

C. 79

D. 80

7. Solve for  $x$ :  $2(x - 3) - 4 = 6$ .

A.  $x = 8$

B.  $x = 2$

C.  $x = 5$

D.  $x = -2$

8. What are the roots of the equation  $x^2 + x - 20 = 0$ ?

A.  $x = 5$  and  $x = 4$

B.  $x = 5$  and  $x = -4$

C.  $x = -5$  and  $x = -4$

D.  $x = -5$  and  $x = 4$

9. A pizza shop sells pizzas for \$12 each and salads for \$5 each. A customer spends \$46 on  $p$  pizzas and  $s$  salads. Which equation models this purchase?

A.  $12p + 5s = 46p$

B.  $12p + 5s = 46$

C.  $5p + 12s = 46$

D.  $17ps = 46$

10. What is the third quartile (Q3) of the data set 4, 7, 9, 12, 15, 18, 20, 23?

A. 12

B. 15

C. 19

D. 23

11. A line passes through the point  $(-2, 1)$  and is parallel to  $y = 5x + 3$ . What is the y-intercept of the line?

A. 11

B.  $-11$

C. 5

D. 13

12. Which of the following is an irrational number?

A. 0.5

B.  $\frac{7}{8}$

C.  $\sqrt{16}$

D.  $\pi$

13. A function is defined by  $f(x) = 4x^2 - 2x$ . What is the value of  $f(1/2)$ ?

A. 1

B. 0

C. 2

D. -1

14. A right triangle has legs of length 6 and 8. What is the length of the hypotenuse?

A. 14

B. 7

C. 10

D. 12

15. What is the average rate of change of  $f(x) = 3x + 4$  on the interval from  $x = 1$  to  $x = 5$ ?

A. 3

B. 4

C. 7

D. 12

16. The area of a trapezoid is given by  $A = (1/2)(b_1 + b_2)h$ . Which equation correctly solves this formula for  $h$ ?

A.  $h = 2A - (b_1 + b_2)$

B.  $h = A/(2(b_1 + b_2))$

C.  $h = (b_1 + b_2)/(2A)$

D.  $h = 2A/(b_1 + b_2)$

17. Which equation, in vertex form, has a vertex at  $(-2, 1)$  and opens downward?

A.  $y = (x + 2)^2 + 1$

B.  $y = -(x - 2)^2 + 1$

C.  $y = -(x + 2)^2 + 1$

D.  $y = (x - 2)^2 - 1$

18. A function is defined by  $g(x) = 4 - 3x$ . For what value of  $x$  does  $g(x) = -5$ ?

A.  $x = 1$

B.  $x = 3$

C.  $x = -3$

D.  $x = -1$

19. A data set has a mean that is much greater than its median. What does this most likely indicate?

A. The distribution is skewed by large outliers

B. The mode equals the median exactly

C. The distribution is perfectly symmetric

D. The standard deviation must be zero

20. Solve for  $x$ :  $4x - 7 = 2x + 11$ .

A.  $x = 1$

B.  $x = 2$

C.  $x = 4$

D.  $x = 9$

21. Combine like terms:  $3x^2 + 5x - 7 + 2x^2 - 4x + 1$ .

A.  $5x^2 - x + 6$

B.  $5x^2 + 9x - 6$

C.  $5x^2 + x - 6$

D.  $6x^2 + x - 8$

22. The first three terms of a sequence are 7, 11, 15. What is the common difference?

A. 7

B. 4

C. 3

D. 5

23. Two angles are supplementary. One angle measures  $3x$  and the other measures  $5x + 20$ . What is the value of  $x$ ?

A. 20

B. 22

C. 14

D. 18

24. Solve the inequality  $7 - 2x \geq 1$ .

A.  $x \geq 3$

B.  $x \geq -3$

C.  $x \leq -3$

D.  $x \leq 3$

25. What is the slope of the line passing through the points (5, 1) and (5, 7)?

A. 0

B. 6

C. Undefined

D. 1

26. What are the zeros of the function  $f(x) = -x^2 + 2x + 8$ ?

A.  $x = 4$  and  $x = 2$

B.  $x = 4$  and  $x = -2$

C.  $x = -4$  and  $x = 2$

D.  $x = -4$  and  $x = -2$

27. A box contains 12 apples and 8 oranges. Two pieces of fruit are chosen at random without replacement. What is the probability that both are apples?

A.  $12/19$

B.  $3/5$

C.  $11/30$

D.  $33/95$

28. If  $5(x + 2) = 7x - 4$ , what is the value of  $x$ ?

A.  $x = 7$

B.  $x = -7$

C.  $x = 3$

D.  $x = -3$

29. A function is defined by the equation  $y = x^2 + 1$ . Which of the following is the domain of the function?

A.  $y \geq 1$

B.  $x \geq 0$

C. All real numbers

D.  $y \geq 0$

30. A geometric sequence has a first term of 64 and a common ratio of  $1/4$ . What is the fourth term?

A. 4

B. 1

C.  $1/4$

D. 16

31. Which set of numbers includes both all integers and all fractions?

A. Rational numbers

B. Irrational numbers

C. Whole numbers

D. Natural numbers

32. A line passes through the point  $(4, 7)$  and has a  $y$ -intercept of 3. What is the slope of the line?

A. 4

B. 7

C. 3

D. 1

33. What is the value of the discriminant for the equation  $x^2 - 4x + 4 = 0$ ?

A. 16

B. -16

C. 0

D. 8

34. The cost in dollars of producing  $x$  widgets is given by  $C(x) = 50 + 4x$ . What does the constant 50 represent in this context?

A. The variable cost per widget produced

B. The fixed cost regardless of widgets produced

C. The total number of widgets produced

D. The total cost when only 4 widgets are made

35. Three friends share  $x$  dollars equally. If each friend receives \$24, which equation correctly models this situation?

A.  $x/3 = 24$

B.  $3x = 24$

C.  $x - 3 = 24$

D.  $x + 3 = 24$

## ANSWER KEY WITH EXPLANATIONS — PRACTICE EXAM 39

1. B —  $x = -5$ . Subtracting 7 from both sides gives  $-3x = 15$ , and dividing by  $-3$  yields  $x = -5$ . The negative coefficient on the variable produces a negative solution from a positive right-hand value.
2. A — 1. Substituting  $x = -2$  gives  $5 - (-2)^2 = 5 - 4 = 1$ . Squaring the negative input before applying the subtraction prevents the sign error behind the 9 distractor.
3. C —  $(x - 8)^2$ . The expression is a perfect-square trinomial because  $(-8)^2 = 64$  and  $2(x)(-8) = -16x$ . Recognizing perfect-square structure avoids trial-and-error factoring and signals a double root.
4. D —  $y = -2$ . A horizontal line has constant  $y$ , so its equation is  $y$  equals the  $y$ -coordinate of any point on the line. Horizontal lines are  $y = \text{constant}$ ; vertical lines would be  $x = \text{constant}$ .
5. B —  $C = 9m$ . Burning 9 calories per minute means total calories equal the rate times the number of minutes. A constant per-unit rate produces a proportional model with no intercept term.
6. C — 79. A mean of 82 across five scores requires a total of 410, and the first four scores sum to 331, so the fifth is  $410 - 331 = 79$ . The mean determines the total, which then locates any missing value by subtraction.
7. A —  $x = 8$ . Distributing gives  $2x - 6 - 4 = 6$ , which simplifies to  $2x - 10 = 6$ , so  $2x = 16$  and  $x = 8$ . Distributing carefully before combining like terms prevents arithmetic slips.
8. D —  $x = -5$  and  $x = 4$ . Factoring  $x^2 + x - 20$  gives  $(x + 5)(x - 4) = 0$ , so  $x = -5$  or  $x = 4$ . The factors must multiply to  $-20$  and add to 1, which 5 and  $-4$  satisfy.
9. B —  $12p + 5s = 46$ . The cost of  $p$  pizzas is  $12p$  and of  $s$  salads is  $5s$ , and their sum equals the total spent. Multiplying each unit price by its corresponding count gives a total-cost equation.
10. C — 19. The upper half of the ordered data is 15, 18, 20, 23, and its median is  $(18 + 20)/2 = 19$ . The third quartile is the median of the values above the overall median.
11. A — 11. Parallel lines share the same slope, so the new line has slope 5; substituting  $(-2, 1)$  into  $y = 5x + b$  gives  $1 = -10 + b$ , so  $b = 11$ . Two lines are parallel exactly when their slopes are equal but their  $y$ -intercepts differ.
12. D —  $\pi$ . The number  $\pi$  has a non-terminating, non-repeating decimal expansion and cannot be expressed as a ratio of integers. Rational numbers can be written as  $a/b$  with integer numerator and nonzero integer denominator, which  $\pi$  cannot.
13. B — 0. Substituting  $x = 1/2$  gives  $4(1/2)^2 - 2(1/2) = 4(1/4) - 1 = 1 - 1 = 0$ . Squaring the fractional input before applying the coefficient produces the correct intermediate value.
14. C — 10. The Pythagorean theorem gives  $c^2 = 6^2 + 8^2 = 36 + 64 = 100$ , so  $c = 10$ . The hypotenuse is always recovered by taking the square root of the sum of the squared legs.

15. A — 3. For a linear function, the average rate of change equals the constant slope:  $(f(5) - f(1))/(5 - 1) = (19 - 7)/4 = 3$ . A linear function has the same rate of change over every interval.
16. D —  $h = 2A/(b_1 + b_2)$ . Multiplying both sides by 2 gives  $2A = (b_1 + b_2)h$ , and dividing by  $(b_1 + b_2)$  isolates  $h$ . Reversing the operations applied to the target variable is the standard literal-equation technique.
17. C —  $y = -(x + 2)^2 + 1$ . Vertex form  $a(x - h)^2 + k$  uses  $h = -2$  and  $k = 1$ , so  $(x - (-2))^2 = (x + 2)^2$ , and the negative coefficient produces a downward-opening parabola. The sign of  $h$  is flipped inside the parentheses, so a vertex  $x$ -coordinate of  $-2$  appears as  $(x + 2)$ .
18. B —  $x = 3$ . Setting  $4 - 3x = -5$  gives  $-3x = -9$ , so  $x = 3$ . Solving  $g(x)$  equal to a target value reverses the function's operations to recover the input.
19. A — The distribution is skewed by large outliers. A mean substantially greater than the median indicates right-skew, where large extreme values pull the average upward while the middle position stays relatively unaffected. The relationship between mean and median reveals the direction of skew.
20. D —  $x = 9$ . Subtracting  $2x$  and adding 7 give  $2x = 18$ , so  $x = 9$ . Collecting variables on one side and constants on the other is the standard procedure for linear equations.
21. C —  $5x^2 + x - 6$ . Combining like terms gives  $(3 + 2)x^2 + (5 - 4)x + (-7 + 1) = 5x^2 + x - 6$ . Like terms add by combining their coefficients while the variable parts remain unchanged.
22. B — 4. The differences  $11 - 7 = 4$  and  $15 - 11 = 4$  confirm a constant difference of 4. An arithmetic sequence has the same difference between every pair of successive terms.
23. A —  $x = 20$ . Supplementary angles sum to 180, so  $3x + 5x + 20 = 180$ , giving  $8x = 160$  and  $x = 20$ . Two angles are supplementary when their measures add to a straight angle.
24. D —  $x \leq 3$ . Subtracting 7 gives  $-2x \geq -6$ , and dividing by  $-2$  reverses the inequality to  $x \leq 3$ . Dividing by a negative number always flips the direction of the inequality symbol.
25. C — Undefined. Both points share the same  $x$ -coordinate, producing a vertical line with zero change in  $x$ . The slope formula's denominator becomes 0, and division by zero is undefined.
26. B —  $x = 4$  and  $x = -2$ . Setting  $-x^2 + 2x + 8 = 0$  and multiplying by  $-1$  gives  $x^2 - 2x - 8 = 0$ , which factors as  $(x - 4)(x + 2) = 0$ , so  $x = 4$  or  $x = -2$ . The zeros of a function are the  $x$ -values that make the output zero.
27. D —  $33/95$ . Without replacement, the probabilities of the two draws are dependent:  $(12/20)(11/19) = 132/380 = 33/95$ . The denominator decreases by one after the first draw because one piece of fruit has been removed.
28. A —  $x = 7$ . Distributing gives  $5x + 10 = 7x - 4$ , and isolating  $x$  yields  $14 = 2x$ , so  $x = 7$ . Collecting like terms before solving makes the linear equation tractable.
29. C — All real numbers. The expression  $x^2 + 1$  is defined for every real input, since squaring and adding produce real outputs for any real  $x$ . Polynomial functions have a domain of all real numbers because no operation involved restricts the input.
30. B — 1. The terms are 64, 16, 4, 1, with each successive term one-quarter of the previous. Multiplying by the common ratio three times moves from the first term to the fourth term.
31. A — Rational numbers. The set of rational numbers includes every integer (which can be written as  $n/1$ ) and every fraction  $a/b$  with integer numerator and nonzero integer denominator. Irrational numbers, by contrast, cannot be expressed as such a ratio.

32. D — 1. Using  $y = mx + b$  with intercept 3 and point (4, 7) gives  $7 = 4m + 3$ , so  $4m = 4$  and  $m = 1$ . Substituting a known point and intercept into slope-intercept form recovers the slope.
33. C — 0. The discriminant is  $b^2 - 4ac = (-4)^2 - 4(1)(4) = 16 - 16 = 0$ . A zero discriminant indicates exactly one repeated real root, where the parabola touches the x-axis at a single point.
34. B — The fixed cost regardless of widgets produced. In  $C(x) = 50 + 4x$ , the constant 50 represents the cost at  $x = 0$ , the y-intercept of the linear cost function. The coefficient 4 represents the variable cost per widget, while 50 is the unchanging base cost.
35. A —  $x/3 = 24$ . Splitting  $x$  dollars equally among three friends gives each  $x/3$ , and that amount equals \$24. Dividing the total by the number of equal shares produces the per-share amount.