PRACTICE EXAM 53:NY REGENTS ALGEBRA I SIMULATION — 35 QUESTIONS

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: $7x + 4 = 25$.

A. $x = 4$

B. $x = 3$

C. $x = 5$

D. $x = 6$

2. What is the slope of the line $4x + 5y = 20$?

A. $4/5$

B. $-5/4$

C. $5/4$

D. $-4/5$

3. Solve the equation $x^2 - 100 = 0$.

A. $x = \pm 10$

B. $x = 10$ only

C. $x = \pm 100$

D. $x = \pm\sqrt{10}$

4. A line passes through the points (1, 4) and (3, 10). What is the slope of the line?

A. 1/3

B. 6

C. 3

D. -3

5. A function is defined by $f(x) = 2x - 7$. What is the value of $f(-2)$?

A. -3

B. -11

C. 3

D. 11

6. Which expression is the completely factored form of $x^2 + 11x + 30$?

A. $(x + 3)(x + 10)$

B. $(x - 5)(x - 6)$

C. $(x + 2)(x + 15)$

D. $(x + 5)(x + 6)$

7. What is the probability of drawing a queen from a standard 52-card deck?

A. 1/52

B. 4/52

C. 1/13

D. 1/4

8. A geometric sequence has a first term of 2 and a common ratio of 5. What is the third term?

A. 50

B. 25

C. 10

D. 100

9. Solve for x: $3(x + 1) = 18$.

A. $x = 6$

B. $x = 5$

C. $x = 7$

D. $x = 15$

10. A right triangle has a hypotenuse of length 13 and one leg of length 5. What is the length of the other leg?

A. 8

B. 18

C. 12

D. 168

11. Which expression is equivalent to $(2x)^3$?

A. $2x^3$

B. $6x^3$

C. $2x^6$

D. $8x^3$

12. A function is defined by $f(x) = 4x - 1$. For what value of x does $f(x) = 19$?

A. $x = 5$

B. $x = 4$

C. $x = 19$

D. $x = 75$

13. What is the mean of the data set 12, 14, 16, 18, 20?

A. 14

B. 15

C. 16

D. 17

14. A line has a slope of 3 and passes through the point $(0, -2)$. What is the y-intercept of the line?

A. (0, 2)

B. $(0, -2)$

C. $(-2, 0)$

D. (3, 0)

15. Solve the system of equations $y = x + 3$ and $y = 2x - 1$.

A. (3, 6)

B. (1, 4)

C. (2, 5)

D. (4, 7)

16. Which expression is equivalent to $4(x - 2) - 3(x + 1)$?

A. $x - 11$

B. $x + 11$

C. $x - 5$

D. $7x - 11$

17. Solve the inequality $2x - 5 > 7$.

A. $x < 6$

B. $x > 1$

C. $x > 6$

D. $x < -1$

18. A linear function passes through the points (0, 4) and (2, 10). Which equation represents this function in slope-intercept form?

A. $y = 4x + 3$

B. $y = 3x + 4$

C. $y = 3x - 4$

D. $y = -3x + 4$

19. The area of a square is 81 cm^2. What is the length of one side?

A. 27 cm

B. 9 cm^2

C. 81/2 cm

D. 9 cm

20. Two consecutive integers have a sum of 49. What is the larger integer?

A. 25

B. 24

C. 23

D. 26

21. What is the value of the expression $|-7| - |3|$?

A. −10

B. 4

C. 10

D. −4

22. A quadratic function has a vertex at $(1, -3)$ and opens upward. Which equation matches the function in vertex form?

A. $y = (x + 1)^2 - 3$

B. $y = -(x - 1)^2 - 3$

C. $y = (x - 1)^2 - 3$

D. $y = (x - 1)^2 + 3$

23. Which expression is equivalent to $(4x^2 - 3) + (2x^2 + 7)$?

A. $6x^2 - 4$

B. $8x^2 + 4$

C. $6x^2 + 10$

D. $6x^2 + 4$

24. What is the probability of rolling a sum of 7 with two standard six-sided dice?

A. 1/6

B. 1/12

C. 7/36

D. 1/9

25. What is the value of the discriminant for the equation $x^2 + 5x + 6 = 0$?

A. 5

B. 1

C. 24

D. −1

26. A line is parallel to $y = -3x + 5$ and passes through the point (2, 1). Which equation represents this line?

A. $y = 3x + 1$

B. $y = -3x - 7$

C. $y = -3x + 7$

D. $y = (1/3)x + 7$

27. Which expression in standard form represents $(x - 4)(x + 6)$?

A. $x^2 + 2x - 24$

B. $x^2 - 2x - 24$

C. $x^2 + 2x + 24$

D. $x^2 + 10x - 24$

28. A bag contains 8 marbles: 3 red, 2 blue, and 3 green. What is the probability of drawing a marble that is red or blue?

A. 3/8

B. 1/4

C. 6/8

D. 5/8

29. What is the value of $f(g(2))$ when $f(x) = x + 5$ and $g(x) = 3x - 1$?

A. 5

B. 6

C. 10

D. 11

30. A geometric sequence begins 81, 27, 9, … What is the common ratio of the sequence?

A. 3

B. 1/3

C. $-1/3$

D. 1/9

31. What is the simplified form of $3\sqrt{32}$?

A. $12\sqrt{2}$

B. $6\sqrt{8}$

C. 24

D. $3\sqrt{32}$

32. A rectangle has an area of $x^2 + 5x + 6$ square units. If one side measures $(x + 2)$, what is the length of the other side?

A. $x + 5$

B. $x + 6$

C. $x + 2$

D. $x + 3$

33. A line has the equation $2y - 6x = 8$. What is the slope of the line?

A. -3

B. 6

C. 3

D. 2

34. The first three terms of an arithmetic sequence are 4, 10, 16. What is the common difference?

A. 4

B. 6

C. 8

D. 10

35. A polynomial function has degree 4. What is the maximum number of real zeros that the function can have?

A. 4

B. 1

C. 2

D. Unlimited

ANSWER KEY WITH EXPLANATIONS — PRACTICE EXAM 53

1. B — x = 3. Subtracting 4 gives 7x = 21, and dividing by 7 yields x = 3. Reversing the order of operations isolates the variable in a one-variable linear equation.
2. D — −4/5. Isolating y in 4x + 5y = 20 gives 5y = −4x + 20, so y = −(4/5)x + 4. Standard form converted to slope-intercept exposes the coefficient of x as the slope.
3. A — x = ±10. Setting $x^2 = 100$ and taking the square root gives $x = \pm\sqrt{100} = \pm 10$. A quadratic of this form always has two real solutions equal in magnitude but opposite in sign.
4. C — 3. The slope is (10 − 4)/(3 − 1) = 6/2 = 3. Keeping the coordinates in matching order in numerator and denominator yields the rate of change.
5. B — −11. Substituting x = −2 gives 2(−2) − 7 = −4 − 7 = −11. Following the order of operations carefully prevents the −3 sign-error distractor.
6. D — (x + 5)(x + 6). The factors must multiply to 30 and add to 11, which 5 and 6 satisfy. Both factors carry positive signs because the product and sum are both positive.
7. C — 1/13. A standard deck contains 4 queens out of 52 cards, and 4/52 simplifies to 1/13. Reducing the fraction by the greatest common factor expresses the probability in lowest terms.
8. A — 50. The third term is $a_1 \cdot r^2 = 2 \cdot 5^2 = 2 \cdot 25 = 50$. Each term multiplies the previous by the common ratio, so the exponent is one less than the term number.

9. B — x = 5. Distributing gives 3x + 3 = 18, so 3x = 15 and x = 5. Distributing across the parentheses before isolating the variable produces the linear solution.
10. C — 12. The Pythagorean theorem gives $5^2 + leg^2 = 13^2$, so $leg^2 = 169 - 25 = 144$ and leg = 12. The square of the hypotenuse equals the sum of the squares of the legs, which can be rearranged to find a missing leg.
11. D — $8x^3$. Raising a product to a power distributes the exponent: $(2x)^3 = 2^3 \cdot x^3 = 8x^3$. Both the coefficient and the variable receive the exponent.
12. A — x = 5. Setting 4x − 1 = 19 gives 4x = 20, so x = 5. Solving f(x) equal to a target value reverses the function's operations to recover the input.
13. C — 16. The five values sum to 80, and dividing by 5 gives a mean of 16. The mean is the total divided by the number of values.
14. B — (0, −2). The y-intercept is the point where the line crosses the y-axis, and the point (0, −2) lies on that axis. A point on the y-axis has an x-coordinate of 0, by definition.
15. D — (4, 7). Setting x + 3 = 2x − 1 gives x = 4, and substituting back gives y = 7. Two expressions for y can be set equal when both equations are solved for the same variable.
16. A — x − 11. Distributing gives 4x − 8 − 3x − 3, and combining like terms yields x − 11. Applying the negative sign to every term inside the second parentheses prevents sign-error distractors.
17. C — x > 6. Adding 5 gives 2x > 12, and dividing by 2 yields x > 6. Dividing by a positive number preserves the direction of the inequality.
18. B — y = 3x + 4. The slope is (10 − 4)/(2 − 0) = 3, and the y-intercept is 4 since the point (0, 4) lies on the line. Substituting the slope and intercept directly into y = mx + b produces the equation.
19. D — 9 cm. The side of a square is the square root of its area, so √81 = 9 cm. The unit on side length is linear (cm), not square (cm^2).
20. A — 25. Letting the integers be n and n + 1, the sum 2n + 1 = 49 gives n = 24, and the larger is 25. Consecutive integers differ by 1, which determines the algebraic setup.
21. B — 4. Absolute value strips the sign: |−7| = 7 and |3| = 3, so |−7| − |3| = 7 − 3 = 4. Absolute value gives the magnitude regardless of the original sign.
22. C — $y = (x - 1)^2 - 3$. Vertex form $a(x - h)^2 + k$ uses h = 1 and k = −3, and a positive coefficient causes the parabola to open upward. The sign of h is flipped inside the parentheses, so a vertex x-coordinate of 1 appears as (x − 1).
23. D — $6x^2 + 4$. Combining like terms gives $(4 + 2)x^2 + (-3 + 7) = 6x^2 + 4$. The x^2-terms add coefficients and the constants combine separately.
24. A — 1/6. The favorable sums of 7 are (1,6), (2,5), (3,4), (4,3), (5,2), (6,1), giving 6 outcomes out of 36 total, which reduces to 1/6. Each ordered pair of dice rolls is equally likely.
25. B — 1. The discriminant is $b^2 - 4ac = 5^2 - 4(1)(6) = 25 - 24 = 1$. A positive discriminant indicates two distinct real solutions.
26. C — y = −3x + 7. Parallel lines share the same slope, so the new line uses slope −3; substituting (2, 1) gives 1 = −6 + b, so b = 7. Two lines are parallel exactly when their slopes are equal but their intercepts differ.
27. A — $x^2 + 2x - 24$. Using FOIL gives $x^2 + 6x - 4x - 24$, and combining like terms produces $x^2 + 2x - 24$. The outer and inner products combine to give the middle term 2x.

28. D — 5/8. The probability is favorable outcomes over total: (3 red + 2 blue)/8 = 5/8. For mutually exclusive events, the probability of either is the sum of the individual probabilities.
29. C — 10. Inside-out composition gives $g(2) = 3(2) - 1 = 5$, and then $f(5) = 5 + 5 = 10$. Function composition evaluates the inner function first, then feeds its output into the outer function.
30. B — 1/3. Each term is one-third of the previous: 27/81 = 1/3 and 9/27 = 1/3, confirming a constant ratio. A consistent ratio between successive terms defines a geometric sequence.
31. A — $12\sqrt{2}$. Simplifying gives $3\sqrt{(16 \cdot 2)} = 3 \cdot 4\sqrt{2} = 12\sqrt{2}$. Pulling out the largest perfect-square factor reduces the radical to its simplest form.
32. D — $x + 3$. Since $x^2 + 5x + 6$ factors as $(x + 2)(x + 3)$ and one side is $(x + 2)$, the other side must be $(x + 3)$. Factoring the area expression recovers the two-side product.
33. C — 3. Isolating y gives $2y = 6x + 8$, so $y = 3x + 4$, revealing a slope of 3. Converting to slope-intercept form exposes the coefficient of x as the slope.
34. B — 6. The differences $10 - 4 = 6$ and $16 - 10 = 6$ confirm a constant difference of 6. An arithmetic sequence has the same difference between every pair of successive terms.
35. A — 4. By the fundamental theorem of algebra, a polynomial of degree n has at most n real zeros. The degree of the polynomial gives an upper bound on the number of times the graph can cross the x-axis.