PRACTICE EXAM 54: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: $5x - 3(2x + 1) = -8$.

A. $x = -5$

B. $x = 1$

C. $x = 5$

D. $x = -1$

2. Which equation represents a linear function?

A. $y = x^2$

B. $y = 2x + 1$

C. $y = 3^{\wedge}x$

D. $y = x^3$

3. Solve the system by substitution: $y = 4 - x$ and $3x + y = 10$.

A. (4, 0)

B. (1, 3)

C. (2, 2)

D. (3, 1)

4. A right triangle has legs of length 7 and 24. What is the length of the hypotenuse?

A. 25

B. 31

C. 27

D. $\sqrt{31}$

5. What are the coordinates of the vertex of $f(x) = x^2 - 4x + 1$?

A. $(-2, 5)$

B. (2, 5)

C. $(2, -3)$

D. $(-2, -3)$

6. Three more than four times a number is 31. What is the number?

A. 7

B. 8

C. 9

D. 6

7. A function is defined by $g(x) = -2x + 5$. What is the value of $g(-3)$?

A. -1

B. 1

C. -11

D. 11

8. Solve the inequality $-4x + 7 < 23$.

A. $x > 4$

B. $x > -4$

C. $x < -4$

D. $x < 4$

9. A line has a slope of −1/3 and passes through the point (0, 5). Which equation represents the line?

A. $y = -(1/3)x + 5$

B. $y = (1/3)x + 5$

C. $y = -3x + 5$

D. $y = 3x + 5$

10. A geometric sequence has a first term of 8 and a common ratio of 1/2. Which is the explicit formula for the nth term?

A. $a_n = 8 + (1/2)(n - 1)$

B. $a_n = (1/2)(8)^{(n - 1)}$

C. $a_n = 8 - (1/2)(n - 1)$

D. $a_n = 8(1/2)^{(n - 1)}$

11. Which expression is equivalent to $(5x^3 + 2x - 1) - (3x^3 + x + 4)$?

A. $2x^3 + x + 3$

B. $2x^3 + 3x - 5$

C. $2x^3 + x - 5$

D. $8x^3 + 3x - 5$

12. A fair coin is flipped four times. What is the probability of getting heads on all four flips?

A. 1/4

B. 1/16

C. 1/8

D. 1/2

13. A car's value depreciates at a rate of 8% per year. What percent of its value does the car retain each year?

A. 92%

B. 8%

C. 1.08%

D. 0.92%

14. The sum of the first 5 terms of an arithmetic sequence is 35, and the common difference is 2. What is the first term?

A. 7

B. 5

C. 3

D. 1

15. Simplify the expression $3x + 2y - 5x + 4y$.

A. $-2x + 2y$

B. $8x + 6y$

C. $-2x - 6y$

D. $-2x + 6y$

16. Which form represents the standard form of a quadratic equation?

A. $y = a(x - h)^2 + k$

B. $ax^2 + bx + c = 0$

C. $y = mx + b$

D. $y - y_1 = m(x - x_1)$

17. What is the domain of the function $f(x) = 1/(x - 3)$?

A. All real numbers except 3

B. All real numbers except 0

C. All positive real numbers

D. $x \geq 3$

18. Two fair coins are flipped. What is the probability of getting at least one tail?

A. 1/4

B. 1/2

C. 1

D. 3/4

19. What is the slope of a line perpendicular to $y = 4x + 7$?

A. 4

B. $-1/4$

C. -4

D. 1/4

20. What are the coordinates of the vertex of $f(x) = (x + 3)^2 - 7$?

A. $(3, -7)$

B. $(3, 7)$

C. $(-3, -7)$

D. $(-3, 7)$

21. The five-number summary of a data set is 5, 10, 15, 20, 30. What is the interquartile range of the data?

A. 25

B. 15

C. 5

D. 10

22. The variable y varies inversely with x. When x = 4, y = 9. What is the value of y when x = 6?

A. 6

B. 13.5

C. 24

D. 1.5

23. Solve for x: x/4 + x/6 = 5.

A. x = 8

B. x = 10

C. x = 12

D. x = 14

24. Standard deviation provides information about which characteristic of a data set?

A. The center of the data

B. The spread of values around the mean

C. The most frequently occurring value

D. The exact shape of the distribution

25. Which expression is the completely factored form of $x^2 + 5x - 6$?

A. $(x + 6)(x - 1)$

B. $(x - 6)(x + 1)$

C. $(x + 3)(x + 2)$

D. $(x + 6)(x + 1)$

26. Simplify the expression $4x^2 \cdot 3x^3$.

A. $7x^5$

B. $7x^6$

C. $12x^6$

D. $12x^5$

27. A function is defined by $g(x) = x + 2$. What is the value of $g^{-1}(7)$?

A. 9

B. 7

C. 5

D. 14

28. A bag contains 12 marbles: 3 red, 4 blue, and 5 white. What is the probability of drawing a marble that is not red?

A. 1/4

B. 3/4

C. 5/12

D. 4/12

29. What is the y-intercept of the function f(x) = 2(3)^x?

A. (0, 2)

B. (0, 3)

C. (0, 6)

D. (0, 0)

30. What is the average rate of change of $f(x) = x^2$ on the interval from x = 2 to x = 5?

A. 25

B. 9

C. 4

D. 7

31. A box plot summarizes a data set with minimum 4, Q1 = 7, median = 10, Q3 = 14, and maximum = 20. Which value is the farthest from the median of the data?

A. 4

B. 20

C. 14

D. 10

32. Three consecutive integers have a sum of 72. What is the smallest of the three integers?

A. 23

B. 24

C. 25

D. 22

33. A linear function increases at a constant rate of 5 per unit, while an exponential function multiplies by 1.5 each unit. Which statement best compares the long-term growth of the two functions?

A. The linear function grows faster over the long run

B. Both functions grow at exactly the same rate forever

C. The exponential function grows faster over the long run

D. Neither function grows without bound over time

34. What is the y-intercept of the line represented by the equation $3x - 4y = 12$?

A. (0, 3)

B. (0, 12)

C. (4, 0)

D. (0, −3)

35. The graph of the function $y = x^2$ is shifted 4 units to the right. Which equation represents the new graph?

A. $y = (x + 4)^2$

B. $y = (x - 4)^2$

C. $y = x^2 + 4$

D. $y = x^2 - 4$

ANSWER KEY WITH EXPLANATIONS – PRACTICE EXAM 54

1. C — x = 5. Distributing gives $5x - 6x - 3 = -8$, which simplifies to $-x - 3 = -8$, so $-x = -5$ and $x = 5$. Distributing the negative coefficient across both terms inside the parentheses before combining like terms is essential.
2. B — $y = 2x + 1$. A linear function has the form $y = mx + b$ with x raised to the first power and no other variable operations. The other options contain squared, cubed, or exponential terms, which produce nonlinear graphs.
3. D — (3, 1). Substituting $y = 4 - x$ into $3x + y = 10$ gives $3x + 4 - x = 10$, so $2x = 6$ and $x = 3$; then $y = 1$. Substitution works cleanly when one equation is already solved for a variable.
4. A — 25. The Pythagorean theorem gives $c^2 = 7^2 + 24^2 = 49 + 576 = 625$, so $c = 25$. The set 7-24-25 is a known Pythagorean triple.

5. C — (2, −3). The vertex x-coordinate is −b/(2a) = 4/2 = 2, and substituting gives 4 − 8 + 1 = −3. The vertex marks the minimum of an upward-opening parabola.
6. A — 7. The equation 4x + 3 = 31 gives 4x = 28, so x = 7. Translating "three more than four times a number" places 4x first and then adds 3.
7. D — 11. Substituting x = −3 gives g(−3) = −2(−3) + 5 = 6 + 5 = 11. Multiplying two negatives yields a positive, which prevents the −1 sign-error distractor.
8. B — x > −4. Subtracting 7 gives −4x < 16, and dividing by −4 reverses the inequality to x > −4. Dividing by a negative number always flips the direction of the inequality symbol.
9. A — y = −(1/3)x + 5. Slope-intercept form y = mx + b uses m = −1/3 and b = 5, producing the equation directly. The coefficient on x is the slope, and the constant is the y-intercept.
10. D — $a_n = 8(1/2)^{(n-1)}$. The general geometric formula is $a_1 \cdot r^{(n-1)}$, with first term 8 and common ratio 1/2. The first term is the coefficient and the ratio is the base raised to (n − 1).
11. C — $2x^3 + x - 5$. Distributing the subtraction gives $5x^3 + 2x - 1 - 3x^3 - x - 4$, and combining like terms produces $2x^3 + x - 5$. Applying the negative sign to every term inside the second parentheses prevents sign errors.
12. B — 1/16. Each flip has probability 1/2 of being heads, and the four flips are independent, giving $(1/2)^4 = 1/16$. Independent events multiply their individual probabilities.
13. A — 92%. A loss of 8% leaves 100% − 8% = 92% retained each year. The retention factor is 1 − r, while the loss rate is r itself.
14. C — 3. The arithmetic sum formula S = (n/2)(2a + (n − 1)d) gives 35 = (5/2)(2a + 8), so 14 = 2a + 8 and a = 3. Solving for the first term requires plugging the known sum, count, and common difference into the formula.
15. D — −2x + 6y. Combining like terms gives (3 − 5)x + (2 + 4)y = −2x + 6y. Like terms add by combining their coefficients while the variable parts remain unchanged.
16. B — $ax^2 + bx + c = 0$. The standard form of a quadratic equation sets a degree-two polynomial equal to zero with descending powers. Vertex form, slope-intercept, and point-slope describe different relationships.
17. A — All real numbers except 3. The denominator x − 3 equals zero at x = 3, making the function undefined there. Excluded values are those that make the denominator equal zero.
18. D — 3/4. The probability of no tails in two flips is $(1/2)^2 = 1/4$, and the complement is 1 − 1/4 = 3/4. The probability of "at least one" is most efficiently found as one minus the probability of "none."
19. B — −1/4. Perpendicular slopes are negative reciprocals, so the slope perpendicular to 4 is −1/4. The product of perpendicular slopes equals −1, which uniquely determines the perpendicular slope.
20. C — (−3, −7). Vertex form $a(x - h)^2 + k$ places the vertex at (h, k); here h = −3 (since (x + 3) means x − (−3)) and k = −7. The sign of h is flipped inside the parentheses, so an addition sign indicates a negative x-coordinate.
21. D — 10. The interquartile range is Q3 − Q1 = 20 − 10 = 10. The IQR measures the spread of the middle 50% of the data, ignoring extreme values.
22. A — 6. Inverse variation gives y = k/x; substituting (4, 9) yields k = 36, and y(6) = 36/6 = 6. The constant of variation is fixed by one pair and used to find any other paired value.
23. C — x = 12. Multiplying through by the LCD 12 gives 3x + 2x = 60, so 5x = 60 and x = 12. Clearing the denominators first turns a fractional equation into a routine linear one.

24. B — The spread of values around the mean. Standard deviation quantifies how far the data values tend to be from the mean. The mean measures center, the mode measures frequency, and standard deviation measures dispersion.
25. A — $(x + 6)(x - 1)$. The factors must multiply to -6 and add to 5, which 6 and -1 satisfy. The opposite signs reflect a negative product, and the larger magnitude on the positive factor produces a positive sum.
26. D — $12x^5$. Multiplying coefficients gives $4 \cdot 3 = 12$, and the product of powers rule $x^2 \cdot x^3 = x^5$ gives the variable part. Multiplying like bases adds the exponents rather than multiplying them.
27. C — 5. The inverse function reverses the original; if $g(x) = 7$, then $x + 2 = 7$, giving $x = 5$. Solving the original function equal to the target input recovers the inverse output.
28. B — 3/4. The non-red marbles total 4 blue + 5 white = 9 out of 12, giving $9/12 = 3/4$. The complement of $P(\text{red}) = 3/12$ is $1 - 1/4 = 3/4$.
29. A — (0, 2). At $x = 0$, $f(0) = 2(3)^0 = 2(1) = 2$. Any nonzero base raised to the zero power equals 1, so the coefficient alone determines the y-intercept.
30. D — 7. The average rate of change is $(f(5) - f(2))/(5 - 2) = (25 - 4)/3 = 21/3 = 7$. For a nonlinear function this represents the slope of the secant line between the two endpoints.
31. B — 20. The maximum value 20 sits 10 units above the median, while 4 sits 6 units below, 14 sits 4 units above, and 10 is the median itself. Distance from the median identifies the most extreme value in the data set.
32. A — 23. Letting the integers be n, $n + 1$, $n + 2$, the sum $3n + 3 = 72$ gives $n = 23$. Defining consecutive integers with successive offsets allows a single-variable equation.
33. C — The exponential function grows faster over the long run. An exponential function multiplied by a base greater than 1 ultimately outpaces any linear function, regardless of the linear slope. For sufficiently large inputs, exponential growth dominates linear growth.
34. D — $(0, -3)$. Solving for y in $3x - 4y = 12$ gives $-4y = -3x + 12$, so $y = (3/4)x - 3$, revealing a y-intercept of -3. The y-intercept is the constant term once the equation is in slope-intercept form.
35. B — $y = (x - 4)^2$. A horizontal shift of 4 units to the right replaces x with $(x - 4)$ in the function. Horizontal shifts move opposite to the sign attached to x, so a minus sign produces a rightward shift.