PRACTICE EXAM 52: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: $9 = 4 - x$.

A. $x = -5$

B. $x = 5$

C. $x = 13$

D. $x = -13$

2. A function is defined by $f(x) = -x^2 + 4x - 1$. What is the value of $f(3)$?

A. -1

B. 11

C. 8

D. 2

3. The first term of an arithmetic sequence is 10 and the common difference is −4. What is the sixth term?

A. −6

B. −10

C. −14

D. 30

4. A line has a slope of 1/2 and a y-intercept of −1. Which equation represents this line in slope-intercept form?

A. $y = -x + 1/2$

B. $y = -x + 1/2$ only

C. $y = (1/2)x - 1$

D. $y = (1/2)x + 1$

5. Solve the system by elimination: $2x + 3y = 12$ and $2x - y = 4$.

A. (2, 3)

B. (3, 0)

C. (4, 4)

D. (3, 2)

6. Which expression is the completely factored form of $6x^2 + 12x$?

A. $6x(x + 2)$

B. $6(x^2 + 2x)$

C. $2x(3x + 6)$

D. $12x(x + 1)$

7. Which expression is a perfect square trinomial?

A. $x^2 + 9$

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

C. $x^2 + 10x + 25$

D. $x^2 + 5x + 25$

8. What is the simplest radical form of $\sqrt{50}$?

A. $25\sqrt{2}$

B. $5\sqrt{2}$

C. $2\sqrt{5}$

D. $10\sqrt{5}$

9. A function is defined by $g(x) = 3x + 5$. If $g(a) = 23$, what is the value of a?

A. $a = 9$

B. $a = 19$

C. $a = 23$

D. $a = 6$

10. What is the value of the expression $(4^2)^3$?

A. 4,096

B. 256

C. 64

D. 16,384

11. A bag contains 10 marbles, 4 of which are red. If two marbles are drawn without replacement, what is the probability that both are red?

A. 2/5

B. 4/15

C. 2/15

D. 12/100

12. A linear function has a slope of −3 and passes through the point (4, −7). Which equation represents this function?

A. $y = -3x - 5$

B. $y = -3x + 5$

C. $y = 3x - 5$

D. $y = -3x + 7$

13. What is the value of the discriminant for the equation $2x^2 + 3x + 5 = 0$?

A. 31

B. 9

C. 40

D. −31

14. A car valued at $25,000 depreciates at a rate of 12% per year. What is its value after one year?

A. $22,000

B. $25,300

C. $3,000

D. $22,500

15. A right triangle has one leg of length 9 and a hypotenuse of length 15. What is the length of the other leg?

A. 6

B. 12

C. 13

D. 18

16. Simplify the expression $2(x - 3) + 5x - 1$.

A. $7x - 4$

B. $7x + 7$

C. $7x - 7$

D. $6x - 7$

17. What is the vertex of the parabola $y = (x - 5)^2 + 2$?

A. (5, 2)

B. (−5, 2)

C. (5, −2)

D. (−5, −2)

18. The total cost of t-shirts at a fundraiser is modeled by $C(n) = 12n + 50$, where n is the number of t-shirts produced. What does the slope of 12 represent in this context?

A. The fixed cost regardless of the number of t-shirts

B. The total cost when exactly 12 t-shirts are made

C. The total number of t-shirts that can be produced

D. The cost per additional t-shirt produced

19. Two integers have a sum of −4 and a product of −45. What are the two integers?

A. −9 and −5

B. −9 and 5

C. 9 and 5

D. 9 and −5

20. What is the range of the function $f(x) = \sqrt{(x - 1)}$?

A. All real numbers

B. $y > 0$

C. $y \geq 0$

D. $y \leq 0$

21. A geometric sequence begins 3, 6, 12, 24, … What is the sum of the first four terms?

A. 45

B. 24

C. 48

D. 30

22. Solve the inequality $5(x - 2) \leq 3x + 8$.

A. $x \geq 9$

B. $x \leq -9$

C. $x \geq -9$

D. $x \leq 9$

23. A circle has an area of 49π square units. What is the length of its radius?

A. 14

B. 7

C. 49

D. $\sqrt{49}$

24. What are the solutions to the equation $|x + 4| = 12$?

A. $x = 8$ only

B. $x = 8$ and $x = 16$

C. $x = 8$ and $x = -16$

D. $x = -8$ and $x = 16$

25. A line passes through the points (2, 5) and (6, 11). Which equation represents this line in slope-intercept form?

A. $y = 2x + 2$

B. $y = (2/3)x + 2$

C. $y = (3/2)x - 2$

D. $y = (3/2)x + 2$

26. What are the roots of the equation $x^2 - 6x + 9 = 0$?

A. $x = 3$ only, as a repeated root

B. $x = 3$ and $x = -3$

C. $x = 9$ and $x = -1$

D. There are no real roots

27. The mean of the values 6, 9, 14, 17, and x is 12. What is the value of x?

A. $x = 10$

B. $x = 12$

C. $x = 14$

D. $x = 16$

28. A spinner is divided into 8 equal sections numbered 1 through 8. What is the probability of landing on a multiple of 3?

A. 1/2

B. 1/4

C. 3/8

D. 1/8

29. What is the y-intercept of the function $f(x) = 4 - 2x$?

A. (0, 4)

B. (0, −2)

C. (0, 2)

D. (4, 0)

30. The area of a triangle is given by $A = (1/2)bh$. Which equation correctly solves this formula for b?

A. $b = A/(2h)$

B. $b = 2A - h$

C. $b = A/h$

D. $b = 2A/h$

31. What is the distance between the points $(3, -2)$ and $(7, 4)$?

A. 4

B. $\sqrt{13}$

C. $2\sqrt{13}$

D. 10

32. Which equation represents the line passing through the point $(3, 5)$ and perpendicular to the line $y = (1/4)x + 2$?

A. $y = 4x + 17$

B. $y = -4x + 17$

C. $y = -(1/4)x + 17$

D. $y = (1/4)x + 17$

33. A function is defined by $f(x) = 3x^2 - 2x + 4$. What is the value of $f(0)$?

A. 4

B. 0

C. -2

D. 3

34. Which expression is the standard form of $(2x + 1)(x - 3)$?

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

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

C. $2x^2 + 7x - 3$

D. $2x^2 - 5x - 3$

35. A scatter plot has data points distributed randomly with no clear linear trend. Which value of the correlation coefficient is most likely?

A. $r = 1$

B. $r = -1$

C. $r = 0.1$

D. $r = 0.95$

ANSWER KEY WITH EXPLANATIONS — PRACTICE EXAM 52

1. A — $x = -5$. Subtracting 4 from both sides gives $5 = -x$, and multiplying by -1 yields $x = -5$. A negative coefficient on the variable flips the sign of the constant when isolated.
2. D — 2. Substituting $x = 3$ gives $-(3)^2 + 4(3) - 1 = -9 + 12 - 1 = 2$. Applying the negative sign only after squaring the input prevents the sign error behind the 11 distractor.
3. B — -10. The sixth term is $a_1 + 5d = 10 + 5(-4) = 10 - 20 = -10$. Multiplying the common difference by one less than the term number accounts for the steps taken from the first term.
4. C — $y = (1/2)x - 1$. The slope-intercept form is $y = mx + b$, with $m = 1/2$ and $b = -1$, producing $y = (1/2)x - 1$. Substituting the slope and y-intercept directly into the form recovers the equation.

5. D — (3, 2). Subtracting the second equation from the first eliminates x to give $4y = 8$, so $y = 2$; substituting back gives $2x - 2 = 4$, so $x = 3$. Elimination works cleanly when the x-coefficients are already equal.
6. A — $6x(x + 2)$. The greatest common factor of $6x^2$ and $12x$ is $6x$, and dividing each term by $6x$ leaves $(x + 2)$. Removing the GCF first ensures the expression is in completely factored form.
7. C — $x^2 + 10x + 25$. The expression matches $(a + b)^2 = a^2 + 2ab + b^2$ with $a = x$ and $b = 5$, since $2(x)(5) = 10x$ and $5^2 = 25$. A perfect-square trinomial has a middle term equal to twice the product of the square roots of the outer terms.
8. B — $5\sqrt{2}$. Factoring 50 as 25×2 gives $\sqrt{50} = \sqrt{25} \cdot \sqrt{2} = 5\sqrt{2}$. Pulling out the largest perfect-square factor reduces a radical to its simplest form.
9. D — $a = 6$. Setting $3a + 5 = 23$ gives $3a = 18$, so $a = 6$. Solving $g(a)$ equal to a target value reverses the function's operations to recover the input.
10. A — 4,096. The power-of-a-power rule multiplies exponents: $(4^2)^3 = 4^{(2 \cdot 3)} = 4^6 = 4{,}096$. Raising a power to a power multiplies the exponents rather than adding them.
11. C — 2/15. Without replacement, the probabilities of the two draws are dependent: $(4/10)(3/9) = 12/90 = 2/15$. The denominator decreases by one after the first draw because one marble has already been removed.
12. B — $y = -3x + 5$. Using point-slope form $y - (-7) = -3(x - 4)$ gives $y + 7 = -3x + 12$, so $y = -3x + 5$. Substituting the slope and point recovers the slope-intercept equation directly.
13. D — −31. The discriminant is $b^2 - 4ac = 3^2 - 4(2)(5) = 9 - 40 = -31$. A negative discriminant indicates that the quadratic has no real solutions.
14. A — $22,000. A 12% loss leaves 88% of the value, so the car is worth $25000 \times 0.88 = 22{,}000$ after one year. Exponential decay multiplies by the retention factor $1 - r$ rather than subtracting a flat amount.
15. B — 12. The Pythagorean theorem gives $9^2 + b^2 = 15^2$, so $b^2 = 225 - 81 = 144$ and $b = 12$. The square of the hypotenuse equals the sum of the squares of the legs, which rearranges to find a missing leg.
16. C — $7x - 7$. Distributing gives $2x - 6 + 5x - 1$, and combining like terms yields $7x - 7$. Multiplying every term inside the parentheses before combining like terms ensures the constants combine correctly.
17. A — (5, 2). Vertex form $a(x - h)^2 + k$ places the vertex at (h, k), so $(x - 5)^2 + 2$ has vertex (5, 2). The sign of h is flipped inside the parentheses, so the subtraction sign indicates a positive x-coordinate.
18. D — The cost per additional t-shirt produced. In $C(n) = 12n + 50$, the coefficient 12 is the slope, representing the change in cost for each additional t-shirt. The constant 50 represents the fixed cost while the coefficient represents the per-unit rate.
19. B — −9 and 5. Checking directly: $-9 + 5 = -4$ and $(-9)(5) = -45$, which satisfies both conditions. A negative sum and a negative product indicate the two integers have opposite signs with the larger magnitude on the negative.
20. C — $y \geq 0$. The square-root function outputs only non-negative values, so $f(x)$ is always 0 or positive. The principal square root is defined to be non-negative, restricting the range to $y \geq 0$.
21. A — 45. The first four terms sum to $3 + 6 + 12 + 24 = 45$. Adding the listed terms directly produces the partial sum without need for a closed formula.

22. D — $x \leq 9$. Distributing gives $5x - 10 \leq 3x + 8$; subtracting $3x$ and adding 10 yields $2x \leq 18$, so $x \leq 9$. Dividing by a positive coefficient preserves the direction of the inequality.
23. B — 7. Setting $\pi r^2 = 49\pi$ gives $r^2 = 49$, so $r = 7$. The area formula isolates r^2 when divided by π, and taking the positive square root yields the radius length.
24. C — $x = 8$ and $x = -16$. The absolute-value equation splits into $x + 4 = 12$, giving $x = 8$, and $x + 4 = -12$, giving $x = -16$. Two solutions arise because both a quantity and its opposite share the same distance from zero.
25. D — $y = (3/2)x + 2$. The slope is $(11 - 5)/(6 - 2) = 6/4 = 3/2$, and substituting $(2, 5)$ gives $5 = 3 + b$, so $b = 2$. Calculating the slope first and then solving for the intercept produces the equation in slope-intercept form.
26. A — $x = 3$ only, as a repeated root. The equation factors as $(x - 3)^2 = 0$, producing the single solution $x = 3$ counted twice. A perfect-square quadratic has one repeated real root where the parabola just touches the x-axis.
27. C — $x = 14$. A mean of 12 across five values requires a total of 60, and the four known values sum to 46, so $x = 60 - 46 = 14$. The mean determines the total, which then locates any missing value by subtraction.
28. B — 1/4. The multiples of 3 between 1 and 8 are 3 and 6, giving 2 favorable outcomes out of 8 total, which reduces to 1/4. Probability is favorable outcomes over total possible outcomes, expressed in lowest terms.
29. A — $(0, 4)$. At $x = 0$, $f(0) = 4 - 2(0) = 4$. The y-intercept is the constant term once the function is written in linear form.
30. D — $b = 2A/h$. Multiplying both sides of $A = (1/2)bh$ by 2 gives $2A = bh$, and dividing by h isolates b. Reversing the operations applied to the target variable is the standard literal-equation technique.
31. C — $2\sqrt{13}$. The distance formula gives $\sqrt{[(7 - 3)^2 + (4 - (-2))^2]} = \sqrt{(16 + 36)} = \sqrt{52}$, which simplifies as $\sqrt{(4 \cdot 13)} = 2\sqrt{13}$. Pulling out the perfect-square factor reduces the radical to its simplest form.
32. B — $y = -4x + 17$. The perpendicular slope is the negative reciprocal of 1/4, which is -4; substituting $(3, 5)$ into $y = -4x + b$ gives $5 = -12 + b$, so $b = 17$. Perpendicular slopes multiply to -1, which uniquely determines the new slope.
33. A — 4. Substituting $x = 0$ gives $f(0) = 3(0)^2 - 2(0) + 4 = 4$. The y-intercept of a polynomial function equals its constant term.
34. D — $2x^2 - 5x - 3$. Distributing using FOIL gives $2x^2 - 6x + x - 3$, and combining like terms produces $2x^2 - 5x - 3$. The outer and inner products combine to give the middle term $-5x$.
35. C — $r = 0.1$. A correlation coefficient close to zero indicates little or no linear association, matching a random scatter of points. The strength of a linear relationship is measured by the absolute value of r, with values near 0 indicating weak or no linear pattern.