PRACTICE EXAM 58: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: $2x + 3 = 17 - 5x$.

A. $x = 5$

B. $x = -2$

C. $x = 2$

D. $x = 7$

2. Which expression is equivalent to $(3x^2)(2x^4)$?

A. $6x^6$

B. $6x^8$

C. $5x^6$

D. $6x^2$

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

A. −7

B. 1

C. −1

D. 7

4. What is the slope of the line $3x + 6y = 12$?

A. −3

B. −1/2

C. 1/2

D. 3

5. A geometric sequence begins 8, 4, 2, 1, … What is the next term of the sequence?

A. 1/2

B. 0

C. 0.25

D. 2/3

6. Which expression is the completely factored form of $x^2 + 3x - 28$?

A. $(x - 7)(x + 4)$

B. $(x + 14)(x - 2)$

C. $(x - 14)(x + 2)$

D. $(x + 7)(x - 4)$

7. The function $y = -2x + 8$ models the length of a shadow in feet as a variable x changes. What does the y-intercept of 8 represent in this context?

A. The rate of change of the shadow length

B. The maximum possible shadow length

C. The shadow length when x equals zero

D. The minimum possible shadow length

8. Solve for x: $4(x - 2) = 3x + 1$.

A. $x = 7$

B. $x = 9$

C. $x = -7$

D. $x = 5$

9. A right triangle has legs of length 10 and 24. What is the length of the hypotenuse?

A. 14

B. 30

C. 34

D. 26

10. Which of the following is an irrational number?

A. $\sqrt{3}$

B. 0.5

C. $\sqrt{25}$

D. 7/2

11. What are the solutions to the equation $3x^2 - 12 = 0$?

A. $x = \pm 4$

B. $x = 2$ only

C. $x = \pm 2$

D. $x = \pm\sqrt{12}$

12. A line passes through the point (4, 0) and has a slope of 2. Which equation represents this line?

A. $y = 2x + 8$

B. $y = 2x - 8$

C. $y = -2x + 8$

D. $y = -2x - 8$

13. The mean of the data set 4, 6, x, 10, 12 is 9. What is the value of x?

A. 9

B. 8

C. 11

D. 13

14. What are the zeros of the function $f(x) = x^2 + 4x + 3$?

A. $x = -1$ and $x = -3$

B. $x = 1$ and $x = 3$

C. $x = -1$ and $x = 3$

D. $x = 1$ and $x = -3$

15. What is the probability of drawing a heart from a standard 52-card deck?

A. 1/2

B. 1/4

C. 1/13

D. 3/13

16. A function is defined by $g(x) = (1/2)x - 4$. Which expression represents the inverse function $g^{-1}(x)$?

A. $g^{-1}(x) = 2x - 4$

B. $g^{-1}(x) = -2x + 8$

C. $g^{-1}(x) = 2x + 8$

D. $g^{-1}(x) = (x + 4)/2$

17. If 5^x = 125, what is the value of x?

A. x = 1

B. x = 5

C. x = 25

D. x = 3

18. Convert $y = -3x + 1$ to standard form with a positive leading coefficient.

A. $3x + y = 1$

B. $-3x + y = 1$

C. $3x - y = 1$

D. $3x + y = -1$

19. Simplify the expression $4x^3 \cdot 2x^5$.

A. $6x^8$

B. $8x^{15}$

C. $8x^8$

D. $8x^2$

20. What is the vertex of the function $f(x) = 2x^2 - 4x + 5$?

A. $(-1, 3)$

B. $(1, 3)$

C. $(1, -3)$

D. $(2, 5)$

21. What is the range of the function $f(x) = -(x - 1)^2 + 4$?

A. $y \leq 4$

B. $y \geq 4$

C. $y \leq 1$

D. All real numbers

22. Two consecutive odd integers have a sum of 56. What is the larger integer?

A. 25

B. 31

C. 27

D. 29

23. A function is defined by $f(x) = -2(x + 1)^2$. Which statement best describes the parabola?

A. It opens upward and has a minimum

B. It opens downward and has a maximum

C. It is a linear function

D. It has no vertex

24. Which sequence represents a function that doubles each time?

A. 1, 3, 5, 7, …

B. 1, 2, 4, 6, …

C. 1, 2, 4, 8, 16, …

D. 1, 4, 9, 16, …

25. Two functions are defined as $f(x) = 2x$ and $g(x) = x + 3$. What is the value of $(f - g)(4)$?

A. 11

B. 15

C. 8

D. 1

26. Solve the inequality $5x + 2 \leq 17$.

A. $x \leq 3$

B. $x \geq 3$

C. $x < 3$

D. $x > 3$

27. Combine the expressions $(4x^2 - 3x) + (2x^2 + 5x - 1)$.

A. $6x^2 + 8x - 1$

B. $4x^2 + 2x - 1$

C. $6x^2 + 2x - 1$

D. $6x^2 - 2x - 1$

28. A line passes through the point $(2, -4)$ and has a slope of -1. What is the y-intercept of the line?

A. 2

B. −2

C. 4

D. −4

29. A bag contains 3 quarters, 5 dimes, and 2 nickels. What is the probability of drawing either a quarter or a nickel at random?

A. 3/10

B. 2/10

C. 5/12

D. 1/2

30. The cost C of producing n items is given by C = 50 + 4n. What is the total cost when n = 25?

A. $150

B. $110

C. $130

D. $175

31. Combine the radicals $3\sqrt{2} + 5\sqrt{2} - \sqrt{2}$.

A. $9\sqrt{2}$

B. 7

C. $7\sqrt{2}$

D. $8\sqrt{2}$

32. If the discriminant of a quadratic equation is 25, how many real solutions does the equation have?
A. No real solutions

B. Two distinct real solutions

C. One repeated real solution

D. Infinitely many solutions

33. What is the value of the expression $|3 - 8|$?
A. 5

B. -5

C. 11

D. -11

34. A function is defined by $f(x) = 2x + 1$. What is the value of $f(3) + f(4)$?
A. 13

B. 14

C. 15

D. 16

35. A line is written in slope-intercept form as $y = -4x + 9$. Which point lies on this line?

A. (1, 5)

B. (2, 0)

C. (2, 1)

D. (0, 4)

ANSWER KEY WITH EXPLANATIONS – PRACTICE EXAM 58

1. C — $x = 2$. Adding $5x$ to both sides gives $7x + 3 = 17$, so $7x = 14$ and $x = 2$. Collecting variables on one side and constants on the other is the standard procedure for linear equations.
2. A — $6x^6$. Multiplying coefficients gives $3 \cdot 2 = 6$, and the product of powers rule $x^2 \cdot x^4 = x^6$ gives the variable part. Multiplying like bases adds the exponents rather than multiplying them.
3. D — 7. Substituting $x = -3$ gives $-(-3) + 4 = 3 + 4 = 7$. Subtracting a negative is equivalent to addition, which prevents the −7 sign-error distractor.
4. B — −1/2. Solving $3x + 6y = 12$ for y gives $6y = -3x + 12$, so $y = -(1/2)x + 2$, revealing a slope of −1/2. Converting to slope-intercept form exposes the coefficient of x as the slope.
5. A — 1/2. Each term is half of the previous: 8, 4, 2, 1, 1/2. A geometric sequence multiplies the previous term by the common ratio, here 1/2.
6. D — $(x + 7)(x - 4)$. The factors must multiply to −28 and add to 3, which 7 and −4 satisfy. The opposite signs reflect a negative product, and the larger magnitude on the positive factor produces a positive sum.
7. C — The shadow length when x equals zero. The y-intercept is the value of the function when the input is zero, so the constant 8 represents the initial output. The y-intercept of a linear model represents the starting value of the dependent variable.
8. B — $x = 9$. Distributing gives $4x - 8 = 3x + 1$, and isolating x yields $x = 9$. Distributing across the parentheses before combining like terms keeps the equation organized.
9. D — 26. The Pythagorean theorem gives $c^2 = 10^2 + 24^2 = 100 + 576 = 676$, so $c = 26$. The set 10-24-26 is the 5-12-13 Pythagorean triple scaled by 2.

10. A — $\sqrt{3}$. The square root of a non-perfect-square integer cannot be expressed as a ratio of integers and has a non-terminating, non-repeating decimal expansion. Rational numbers can be written as a/b with integer numerator and nonzero integer denominator, which $\sqrt{3}$ cannot.
11. C — $x = \pm 2$. Adding 12 gives $3x^2 = 12$, so $x^2 = 4$ and $x = \pm 2$. A quadratic of this form has two real solutions equal in magnitude but opposite in sign.
12. B — $y = 2x - 8$. Using point-slope form $y - 0 = 2(x - 4)$ gives $y = 2x - 8$. Substituting the given point and slope into point-slope form recovers the equation in slope-intercept form.
13. D — 13. A mean of 9 across five values requires a total of 45, and the four known values sum to 32, so $x = 45 - 32 = 13$. The mean determines the total, which then locates any missing value by subtraction.
14. A — $x = -1$ and $x = -3$. Factoring $x^2 + 4x + 3$ gives $(x + 1)(x + 3) = 0$, so $x = -1$ or $x = -3$. Setting each factor equal to zero applies the zero-product property.
15. B — 1/4. A standard deck contains 13 hearts out of 52 cards, and 13/52 simplifies to 1/4. Reducing the fraction by the greatest common factor expresses the probability in lowest terms.
16. C — $g^{-1}(x) = 2x + 8$. Writing $y = (1/2)x - 4$ and swapping variables gives $x = (1/2)y - 4$, so $(1/2)y = x + 4$ and $y = 2x + 8$. The inverse function reverses every operation in the original.
17. D — $x = 3$. Rewriting 125 as 5^3 gives $5^x = 5^3$, so $x = 3$. When the bases are equal, the exponents must be equal.
18. A — $3x + y = 1$. Adding 3x to both sides of $y = -3x + 1$ gives $3x + y = 1$. Standard form requires a positive leading coefficient, which is achieved by moving the x-term to the left.
19. C — $8x^8$. Multiplying coefficients gives $4 \cdot 2 = 8$, and the product of powers rule $x^3 \cdot x^5 = x^8$ gives the variable part. Multiplying like bases adds the exponents.
20. B — (1, 3). The vertex x-coordinate is $-b/(2a) = 4/4 = 1$, and substituting gives $2 - 4 + 5 = 3$. The vertex marks the minimum of an upward-opening parabola.
21. A — $y \leq 4$. The negative coefficient indicates a downward-opening parabola, and the constant 4 is the maximum y-value at the vertex. The range of a downward parabola is restricted to values at or below the vertex y-coordinate.
22. D — 29. Letting the integers be n and n + 2, the sum $2n + 2 = 56$ gives $n = 27$, so the larger is 29. Consecutive odd integers differ by 2, which determines the algebraic setup.
23. B — It opens downward and has a maximum. The negative leading coefficient −2 makes the parabola open downward, producing a vertex that is the highest point. The sign of the leading coefficient controls the direction of opening for any parabola.
24. C — 1, 2, 4, 8, 16, … Each term is twice the previous: 2/1 = 2, 4/2 = 2, 8/4 = 2, 16/8 = 2. A constant ratio between successive terms identifies a geometric sequence.
25. D — 1. Evaluating gives $f(4) = 2(4) = 8$ and $g(4) = 4 + 3 = 7$, so $(f - g)(4) = 8 - 7 = 1$. Function subtraction at a point subtracts the outputs of the two functions at that input.
26. A — $x \leq 3$. Subtracting 2 gives $5x \leq 15$, and dividing by 5 yields $x \leq 3$. Dividing by a positive number preserves the direction of the inequality.
27. C — $6x^2 + 2x - 1$. Combining like terms gives $(4 + 2)x^2 + (-3 + 5)x + (0 - 1) = 6x^2 + 2x - 1$. Adding the corresponding terms of two polynomials produces a single polynomial of the same form.
28. B — −2. Substituting (2, −4) into $y = -x + b$ gives $-4 = -2 + b$, so $b = -2$. The y-intercept is the constant value once the slope and one point are known.
29. D — 1/2. The favorable outcomes are 3 quarters + 2 nickels = 5 out of 10 total, which simplifies to 1/2. For mutually exclusive outcomes, the probability of either event is the sum of their individual probabilities.

30. A — \$150. Substituting $n = 25$ gives $C = 50 + 4(25) = 50 + 100 = 150$. Multiplying the per-item cost by the quantity and adding the fixed cost gives the total.
31. C — $7\sqrt{2}$. Like radicals add by combining coefficients while the radical stays the same: $(3 + 5 - 1)\sqrt{2} = 7\sqrt{2}$. Terms with the same radicand combine like other algebraic like terms.
32. B — Two distinct real solutions. A positive discriminant indicates that the quadratic formula produces two distinct real values for x. The sign of the discriminant determines whether the parabola crosses the x-axis twice, once, or not at all.
33. A — 5. Evaluating inside the bars first gives $3 - 8 = -5$, and the absolute value strips the sign: $|-5| = 5$. Absolute value gives the magnitude of a quantity regardless of its sign.
34. D — 16. Evaluating gives $f(3) = 7$ and $f(4) = 9$, so $f(3) + f(4) = 16$. Each output is computed separately before the sum is taken.
35. C — (2, 1). Substituting $x = 2$ gives $y = -4(2) + 9 = -8 + 9 = 1$, which matches the y-coordinate. A point lies on a line only when its coordinates satisfy the equation.