PRACTICE EXAM 57: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. What is the value of the expression $(-4)^2 - 3(2)$?

A. −22

B. 10

C. −10

D. 22

2. Solve for x: $x + 5 = 2x - 3$.

A. $x = 2$

B. $x = -8$

C. $x = -2$

D. $x = 8$

3. A linear function passes through the points $(3, 5)$ and $(-1, -3)$. What is the slope of the line?

A. 2

B. -2

C. $1/2$

D. $-1/2$

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

A. $3x + 4$

B. $3x + 7$

C. $3x + 16$

D. $7x + 4$

5. A geometric sequence has a first term of 6 and a common ratio of 1/3. What is the third term?

A. 2

B. 2/3

C. 1/3

D. 18

6. A right triangle has one leg of length 9 and a hypotenuse of length 41. What is the length of the other leg?

A. 40

B. 16

C. 32

D. 50

7. Which expression is the completely factored form of $3x^2 + 6x - 24$?

A. $(3x - 4)(x + 6)$

B. $3(x - 2)(x - 4)$

C. $3(x^2 + 2x - 8)$

D. $3(x + 4)(x - 2)$

8. A function is defined by f(x) = 2(3)^x. What is the value of f(2)?

A. 6

B. 9

C. 18

D. 36

9. Which of the following equations has no solution?

A. $3x + 5 = 3x + 7$

B. $2x = 2x$

C. $x + 1 = x + 1$

D. $4x - 1 = 11$

10. What is the value of $|-5| + |-7|$?

A. 2

B. 12

C. −2

D. −12

11. A rectangle has a width of x and a length of 2x + 5. If the perimeter of the rectangle is 40 units, what is the value of x?

A. x = 10

B. x = 7

C. x = 8

D. x = 5

12. The sum of three consecutive even integers is 84. What is the smallest of the three integers?

A. 30

B. 28

C. 26

D. 24

13. What is the slope of the line passing through the points (0, 3) and (4, 3)?

A. 0

B. 3

C. Undefined

D. 4

14. Solve the equation $2x^2 - 50 = 0$.

A. $x = \pm 25$

B. $x = \pm 5$

C. $x = 5$ only

D. $x = \pm\sqrt{50}$

15. A line of best fit is given by $\hat{y} = 2x + 7$. What value does the model predict for y when $x = 12$?

A. 24

B. 14

C. 21

D. 31

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

A. 2

B. 10

C. −2

D. −10

17. Which equation represents an exponential function with an initial value of 5 and a growth rate of 8% per year?

A. A(t) = 5(1.08)^t

B. A(t) = 5(0.08)^t

C. A(t) = 5(0.92)^t

D. A(t) = 5 + 0.08t

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

A. (1, 3)

B. (2, 5)

C. (3, 7)

D. (0, 1)

19. What are the coordinates of the vertex of the parabola $y = -2(x + 1)^2 + 3$?

A. (1, 3)

B. (1, −3)

C. (−1, 3)

D. (−1, −3)

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

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

B. $4x^2 + 8x + 2$

C. $2x^2 + 8x + 2$

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

21. Which expression represents "four less than twice a number"?

A. $2x + 4$

B. $2x - 4$

C. $4 - 2x$

D. $2(x - 4)$

22. A box contains 8 cards numbered 1 through 8. What is the probability of drawing an even-numbered card?

A. 1/2

B. 1/4

C. 3/8

D. 5/8

23. What is the simplified form of $\sqrt{27}$?

A. $9\sqrt{3}$

B. 9

C. $3\sqrt{3}$

D. $\sqrt{27}$

24. A function $f(x) = 4x - 2$ produces an output of 14. What is the corresponding input value?

A. $x = 14$

B. $x = 54$

C. $x = 3$

D. $x = 4$

25. What is the y-intercept of the linear function $f(x) = -7x + 11$?

A. (0, 11)

B. (0, −7)

C. (0, −11)

D. (11, 0)

26. A linear function increases by 4 units for every 1 unit increase in x. What is the slope of the function?

A. 1/4

B. 4

C. −4

D. −1/4

27. Solve for x: $5x/6 = 10$.

A. $x = 5/3$

B. $x = 60$

C. $x = 12$

D. $x = 4$

28. A function is defined by $f(x) = x^2 − 4x + 7$. What is the minimum value of the function?

A. 7

B. -7

C. -3

D. 3

29. A line is perpendicular to $y = (2/5)x + 3$ and passes through the point (0, 1). Which equation represents the line?

A. $y = -(5/2)x + 1$

B. $y = (5/2)x + 1$

C. $y = -(2/5)x + 1$

D. $y = (2/5)x - 1$

30. The graph of $y = x^2$ is shifted 6 units down. What is the equation of the new graph?

A. $y = (x - 6)^2$

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

C. $y = x^2 - 6$

D. $y = x^2 + 6$

31. A scatter plot has a correlation coefficient of $r = 0.02$. Which best describes the linear association between the two variables?

A. Strong positive linear association

B. Very weak or no linear association

C. Strong negative linear association

D. Perfect linear association

32. An arithmetic sequence has a first term of 15 and a common difference of -2. What is the tenth term?

A. -5

B. 3

C. -7

D. -3

33. What is the value of the expression $2x^2$ when $x = -3$?

A. -18

B. -36

C. 18

D. 36

34. A regression line is given by $\hat{y} = 0.5x + 4$. What does the slope of 0.5 represent in this context?

A. y increases by 0.5 for each unit increase in x

B. The y-intercept of the regression line is 0.5

C. The correlation coefficient equals 0.5

D. The mean of the data is 0.5

35. Combine: $4\sqrt{5} + 7\sqrt{5} - 2\sqrt{5}$.

A. 9

B. $9\sqrt{5}$

C. $9\sqrt{15}$

D. $13\sqrt{5}$

ANSWER KEY WITH EXPLANATIONS — PRACTICE EXAM 57

1. B — 10. Following order of operations, $(-4)^2 = 16$ and $3(2) = 6$, so $16 - 6 = 10$. Squaring a negative produces a positive result, which prevents the -22 sign-error distractor.
2. D — $x = 8$. Subtracting x from both sides gives $5 = x - 3$, and adding 3 yields $x = 8$. Collecting variables on one side and constants on the other isolates the variable.
3. A — 2. The slope is $(5 - (-3))/(3 - (-1)) = 8/4 = 2$. Subtracting a negative is equivalent to adding, which prevents sign errors in the slope calculation.
4. C — $3x + 16$. Distributing gives $5x + 10 - 2x + 6$, and combining like terms yields $3x + 16$. Applying the negative sign to every term inside the second parentheses prevents sign-error distractors.
5. B — 2/3. Multiplying the first term 6 by the common ratio 1/3 produces 2, and then $2 \cdot 1/3 = 2/3$ as the third term. Each term multiplies the previous one by the common ratio.
6. A — 40. The Pythagorean theorem gives $9^2 + leg^2 = 41^2$, so $leg^2 = 1681 - 81 = 1600$ and leg = 40. The set 9-40-41 is a Pythagorean triple.
7. D — $3(x + 4)(x - 2)$. Factoring out the GCF 3 leaves $x^2 + 2x - 8$, which factors as $(x + 4)(x - 2)$. Removing the GCF first and then factoring the trinomial fully completes the factorization.
8. C — 18. Substituting $x = 2$ gives $2(3)^2 = 2(9) = 18$. The exponent applies only to the base 3 before the coefficient multiplies, by order of operations.
9. A — $3x + 5 = 3x + 7$. Subtracting 3x from both sides gives $5 = 7$, a false statement, so the equation has no solution. Equal coefficients with unequal constants on either side of an equation produce a contradiction.
10. B — 12. Absolute value strips the sign: $|-5| = 5$ and $|-7| = 7$, so $5 + 7 = 12$. Absolute value gives the magnitude of a quantity regardless of its sign.
11. D — $x = 5$. The perimeter equation $2(2x + 5) + 2(x) = 40$ simplifies to $6x + 10 = 40$, so $6x = 30$ and $x = 5$. The perimeter of a rectangle is $2L + 2W$, and substituting the variable expressions for each yields a one-variable equation.
12. C — 26. Letting the integers be n, n + 2, n + 4, the sum $3n + 6 = 84$ gives $n = 26$. Consecutive even integers differ by 2, which determines the algebraic setup.
13. A — 0. The y-coordinates of both points are equal, so the rise is zero and the slope is 0. A horizontal line has zero slope, distinct from a vertical line whose slope is undefined.
14. B — $x = \pm 5$. Adding 50 gives $2x^2 = 50$, so $x^2 = 25$ and $x = \pm 5$. A quadratic of this form has two real solutions equal in magnitude but opposite in sign.
15. D — 31. Substituting $x = 12$ into $\hat{y} = 2x + 7$ gives $2(12) + 7 = 31$. A line of best fit is used to predict output values by plugging in the input.
16. C — -2. Substituting gives $g(-2) = (-2)^2 + 3(-2) = 4 - 6 = -2$. Squaring the negative input before applying the linear term prevents the sign error behind the 10 distractor.
17. A — $A(t) = 5(1.08)^t$. Exponential growth follows $a(1 + r)^t$ with initial value 5 and rate $r = 0.08$, giving $1 + r = 1.08$. The base of the exponential is 1 plus the decimal growth rate.
18. B — (2, 5). Setting $2x + 1 = 3x - 1$ gives $x = 2$, and substituting yields $y = 5$. Two expressions for y can be set equal when both equations are solved for the same variable.
19. C — (−1, 3). Vertex form $a(x - h)^2 + k$ places the vertex at (h, k), so $(x + 1)^2$ gives $h = -1$ and the constant 3 gives $k = 3$. The sign of h is flipped inside the parentheses, so an addition sign indicates a negative x-coordinate.

20. D — $2x^2 + 8x - 6$. Distributing the subtraction gives $3x^2 + 5x - 2 - x^2 + 3x - 4$, and combining like terms produces $2x^2 + 8x - 6$. Applying the negative sign to every term inside the second parentheses prevents sign-error distractors.
21. B — $2x - 4$. "Twice a number" gives $2x$, and "four less than" subtracts 4 from that. The order of "less than" reverses the order of subtraction relative to the way the phrase reads.
22. A — 1/2. The even numbers among 1 through 8 are 2, 4, 6, 8, giving 4 favorable outcomes out of 8, which reduces to 1/2. Reducing the fraction by the greatest common factor expresses the probability in lowest terms.
23. C — $3\sqrt{3}$. Factoring 27 as 9×3 gives $\sqrt{27} = \sqrt{9} \cdot \sqrt{3} = 3\sqrt{3}$. Pulling out the largest perfect-square factor reduces the radical to its simplest form.
24. D — $x = 4$. Setting $4x - 2 = 14$ gives $4x = 16$, so $x = 4$. Solving $f(x)$ equal to a target value reverses the function's operations to recover the input.
25. A — (0, 11). At $x = 0$, $f(0) = -7(0) + 11 = 11$. The y-intercept of a linear function in slope-intercept form is the constant term.
26. B — 4. The slope is the change in y per unit change in x, so 4 units up per 1 unit right is a slope of 4. The slope is the rate of change of output with respect to input.
27. C — $x = 12$. Multiplying both sides by 6 gives $5x = 60$, and dividing by 5 yields $x = 12$. Clearing the denominator first turns a fractional equation into a routine linear one.
28. D — 3. The vertex x-coordinate is $-b/(2a) = 4/2 = 2$, and substituting gives $4 - 8 + 7 = 3$. For an upward-opening parabola the vertex y-coordinate is the minimum value.
29. A — $y = -(5/2)x + 1$. Perpendicular slopes are negative reciprocals, so the slope perpendicular to 2/5 is −5/2; the y-intercept of 1 comes from the given point. Perpendicular slopes multiply to −1, which uniquely determines the new slope.
30. C — $y = x^2 - 6$. A vertical shift downward by 6 units subtracts 6 from the function's output, giving $y = x^2 - 6$. Vertical shifts adjust the constant term outside the squared expression.
31. B — Very weak or no linear association. A correlation coefficient close to zero indicates that the variables show little to no linear pattern. The strength of a linear relationship is measured by the absolute value of r, with values near 0 indicating weak association.
32. D — −3. The tenth term is $a_1 + 9d = 15 + 9(-2) = 15 - 18 = -3$. Multiplying the common difference by one less than the term number accounts for the steps from the first term.
33. C — 18. Substituting $x = -3$ gives $2(-3)^2 = 2(9) = 18$. Squaring the negative input before multiplying by the coefficient produces a positive result.
34. A — y increases by 0.5 for each unit increase in x. The slope of a regression line represents the predicted change in y per one-unit change in x. The intercept gives the predicted value when $x = 0$, so the slope answers the per-unit interpretation question.
35. B — $9\sqrt{5}$. Like radicals add by combining coefficients while the radical stays the same: $(4 + 7 - 2)\sqrt{5} = 9\sqrt{5}$. Terms with the same radicand combine like other algebraic like terms.