PRACTICE EXAM 55: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: $(1/2)x + 3 = 7$.

A. $x = 8$

B. $x = 14$

C. $x = 4$

D. $x = 2$

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

A. 2

B. -2

C. -4

D. 4

3. What is the slope of the line represented by the equation $5x - 2y = 6$?

A. $-5/2$

B. $5/2$

C. $-2/5$

D. $2/5$

4. A right triangle has legs of length 3 and 5. What is the length of the hypotenuse?

A. 8

B. 4

C. $\sqrt{8}$

D. $\sqrt{34}$

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

A. 4

B. 1/4

C. $-1/4$

D. -4

6. A car travels at a constant rate of 45 mph. How far does the car travel in 3.5 hours?

A. 130 miles

B. 157.5 miles

C. 145 miles

D. 165 miles

7. The discriminant of a quadratic equation is 0. How many real solutions does the equation have?

A. Two distinct real solutions

B. No real solutions

C. One repeated real solution

D. Infinitely many solutions

8. Solve the inequality $4x + 5 < 17$.

A. $x \geq 3$

B. $x \leq 3$

C. $x > 3$

D. $x < 3$

9. Which equation expresses $y = (x - 2)^2 + 5$ in standard form?

A. $y = x^2 + 4x + 9$

B. $y = x^2 - 4x + 9$

C. $y = x^2 - 4x + 1$

D. $y = x^2 + 4x + 1$

10. The first three terms of an arithmetic sequence are 7, 13, 19. What is the next term?

A. 25

B. 23

C. 27

D. 31

11. A projectile's height in feet is modeled by $h(t) = -16t^2 + 64t$, where t is in seconds. What is the maximum height the projectile reaches?

A. 32 feet

B. 48 feet

C. 16 feet

D. 64 feet

12. What is the probability of rolling a sum of 9 with two standard six-sided dice?

A. 1/4

B. 9/36

C. 1/9

D. 1/6

13. Standard deviation is best described as which type of statistical measure?

A. A measure of central tendency

B. A measure of spread around the mean

C. A measure of frequency

D. A measure of skewness only

14. The formula d = rt relates distance, rate, and time. Which equation correctly solves this formula for t?

A. t = d/r

B. t = dr

C. t = r/d

D. t = d − r

15. The weight of an infant varies directly with age in months. If a 3-month-old infant weighs 12 pounds, how much would an 8-month-old infant be predicted to weigh under the same proportional model?

A. 24 pounds

B. 28 pounds

C. 32 pounds

D. 16 pounds

16. A stock's value increased from $50 to $65. What is the percent increase?

A. 15%

B. 65%

C. 50%

D. 30%

17. What is the distance between the points $(-1, 2)$ and $(3, -4)$?

A. $\sqrt{13}$

B. $2\sqrt{13}$

C. 10

D. 52

18. A coffee shop has fixed weekly costs of $200 plus $0.75 per cup served. If the shop served 320 cups in one week, what is the total weekly cost?

A. $440

B. $440.75

C. $400

D. $560

19. Which expression is equivalent to $x^2 + 8x + 16$?

A. $(x - 4)^2$

B. $(x + 8)^2$

C. $(x + 4)^2$

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

20. Two functions are defined as $f(x) = x + 3$ and $g(x) = 2x$. What is the value of $(f + g)(5)$?

A. 13

B. 16

C. 15

D. 18

21. Combine like terms: $6x^2y - 3xy^2 + 2x^2y + xy^2$.

A. $8x^2y - 2xy^2$

B. $8x^2y + 2xy^2$

C. $6x^2y - 2xy^2$

D. $4x^2y - 4xy^2$

22. Which phrase correctly represents the expression $3x - 7$?

A. Three times a number plus seven

B. Three times a number decreased by seven

C. Three less than seven times a number

D. Seven times a number less three

23. Solve the equation $\sqrt{(x + 6)} = 5$ for x.

A. $x = 25$

B. $x = 11$

C. $x = 5$

D. $x = 19$

24. An exam has 15 multiple-choice questions and 10 short-answer questions. What fraction of the exam is multiple-choice?

A. 1/5

B. 2/5

C. 3/5

D. 5/15

25. A $1,000 investment earns 5% annual interest compounded yearly. What is its value after 2 years?

A. $1,050.00

B. $1,102.50

C. $1,100.00

D. $1,150.00

26. A line passes through the points (−3, 4) and (1, −2). Which equation represents this line in slope-intercept form?

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

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

C. $y = -(2/3)x + 4$

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

27. A recursive sequence is defined by $a_1 = 4$ and $a_n = 2a_{n-1} + 1$. What is the value of a_3?

A. 9

B. 11

C. 16

D. 19

28. A data set has a mean of 25. If a new value of 100 is added to the set, how will the mean change?

A. Decrease

B. Stay the same

C. Increase

D. Become undefined

29. Divide the expression $(8x^3 - 12x^2) \div 4x$.

A. $2x^2 - 12x$

B. $2x^2 - 3x$

C. $8x^2 - 12x$

D. $2x^3 - 3x$

30. A bookstore sells novels for $15 each and journals for $8 each. A customer buys n novels and j journals for a total of $100. Which equation models this purchase?

A. $15n + 8j = 100$

B. $15j + 8n = 100$

C. $23nj = 100$

D. $n + j = 100$

31. A function is defined by $f(x) = 3x - 6$. Which expression represents the inverse function $f^{-1}(x)$?

A. $f^{-1}(x) = 3x + 6$

B. $f^{-1}(x) = (x - 6)/3$

C. $f^{-1}(x) = (x + 6)/3$

D. $f^{-1}(x) = -3x + 6$

32. A spinner is divided into 6 equal sections numbered 1 through 6. What is the probability of landing on a number greater than 4?

A. 1/2

B. 1/6

C. 2/3

D. 1/3

33. What is the y-intercept of the function $f(x) = 4 - 3x^2$?

A. (0, 4)

B. (0, −3)

C. (0, 0)

D. (4, 0)

34. A box plot summarizing test scores has minimum 60, Q1 = 70, median = 78, Q3 = 85, and maximum 95. What is the interquartile range of the data?

A. 35

B. 15

C. 25

D. 18

35. A linear function is defined by f(x) = 3x + 2. What is the value of f(x + 1) − f(x)?

A. 1

B. 2

C. 3

D. 5

ANSWER KEY WITH EXPLANATIONS — PRACTICE EXAM *55*

1. A — x = 8. Subtracting 3 gives (1/2)x = 4, and multiplying both sides by 2 yields x = 8. Reversing the order of operations isolates the variable in a one-variable linear equation.
2. C — −4. Substituting x = −1 gives −(−1)² + 3(−1) = −1 − 3 = −4. Squaring the input before applying the negative sign produces the correct intermediate value.
3. B — 5/2. Isolating y in 5x − 2y = 6 gives −2y = −5x + 6, so y = (5/2)x − 3, revealing a slope of 5/2. Dividing every term by the negative coefficient on y preserves the equation while exposing the slope.

4. D — $\sqrt{34}$. The Pythagorean theorem gives $c^2 = 3^2 + 5^2 = 9 + 25 = 34$, so $c = \sqrt{34}$. The hypotenuse is recovered by taking the square root of the sum of the squared legs, even when the result is irrational.
5. A — 4. A negative exponent inverts the base: $(1/2)^{(-2)} = (2/1)^2 = 4$. Negative exponents convert the expression to the reciprocal raised to the positive power.
6. B — 157.5 miles. Distance equals rate times time, so $45 \times 3.5 = 157.5$ miles. A constant speed produces a linear relationship between distance and time.
7. C — One repeated real solution. A discriminant of zero means $b^2 - 4ac = 0$, so the quadratic formula produces a single value for x. The parabola touches the x-axis at exactly one point when the discriminant is zero.
8. D — $x < 3$. Subtracting 5 gives $4x < 12$, and dividing by 4 yields $x < 3$. Dividing by a positive number preserves the direction of the inequality.
9. B — $y = x^2 - 4x + 9$. Expanding $(x - 2)^2$ gives $x^2 - 4x + 4$, and adding 5 yields $x^2 - 4x + 9$. Vertex form converts to standard form by squaring the binomial and adding the constant.
10. A — 25. The common difference is 6 ($13 - 7 = 6$, $19 - 13 = 6$), so the next term is $19 + 6 = 25$. An arithmetic sequence adds the common difference to each term to obtain the next.
11. D — 64 feet. The vertex time is $-b/(2a) = -64/(2 \cdot -16) = 2$ seconds, and $h(2) = -16(4) + 64(2) = -64 + 128 = 64$. For a downward-opening height function, the vertex gives the greatest height the projectile reaches.
12. C — 1/9. The favorable sums of 9 are (3,6), (4,5), (5,4), (6,3), giving 4 outcomes out of 36, which simplifies to 1/9. Each ordered pair of dice rolls is equally likely, totaling 36 outcomes.
13. B — A measure of spread around the mean. Standard deviation quantifies how far data values tend to be from the mean. The mean measures center while standard deviation measures dispersion.
14. A — $t = d/r$. Dividing both sides of $d = rt$ by r isolates t, giving $t = d/r$. Reversing the multiplication applied to the target variable is the core step in solving a literal equation.
15. C — 32 pounds. Direct variation gives $w = ka$; substituting (3, 12) yields $k = 4$, and $w(8) = 4 \times 8 = 32$. The constant of variation is fixed by one known pair and applied to any other input.
16. D — 30%. Percent change is $(\text{new} - \text{old})/\text{old} \times 100 = (65 - 50)/50 \times 100 = 30\%$. Dividing the change by the original value, not the new value, gives the correct percent.
17. B — $2\sqrt{13}$. The distance formula gives $\sqrt{[(3 - (-1))^2 + (-4 - 2)^2]} = \sqrt{(16 + 36)} = \sqrt{52}$, which simplifies to $\sqrt{(4 \cdot 13)} = 2\sqrt{13}$. Pulling out the perfect-square factor reduces the radical to its simplest form.
18. A — $440. Total cost is fixed cost plus per-cup cost times cups: $200 + 0.75(320) = 200 + 240 = 440$. The variable cost is computed by multiplying the per-unit rate by the number of units.
19. C — $(x + 4)^2$. The expression is a perfect-square trinomial because $(4)^2 = 16$ and $2(x)(4) = 8x$, matching $(x + 4)^2$. A perfect-square trinomial has a middle term equal to twice the product of the square roots of the outer terms.
20. D — 18. The sum of functions evaluated at 5 gives $f(5) + g(5) = 8 + 10 = 18$. Function addition combines outputs at the same input.
21. A — $8x^2y - 2xy^2$. Combining like terms separately, $(6 + 2)x^2y = 8x^2y$ and $(-3 + 1)xy^2 = -2xy^2$, gives $8x^2y - 2xy^2$. Terms are like only when they share identical variable parts and exponents.

22. B — Three times a number decreased by seven. The expression 3x represents three times a number, and "decreased by seven" subtracts 7. Translation of each verbal phrase must match the corresponding algebraic operation.
23. D — x = 19. Squaring both sides gives x + 6 = 25, so x = 19. Squaring is the inverse of taking a square root, which isolates the expression inside the radical.
24. C — 3/5. Multiple-choice questions form 15 out of 25 total questions, and 15/25 simplifies to 3/5. Reducing the fraction by the greatest common factor expresses the proportion in lowest terms.
25. B — $1,102.50. Compound interest gives $A = 1000(1.05)^2 = 1000(1.1025) = 1{,}102.50$. Compounding multiplies the principal by 1 + r once per compounding period.
26. A — $y = -(3/2)x - 1/2$. The slope is $(-2 - 4)/(1 - (-3)) = -6/4 = -3/2$, and substituting (1, −2) gives $-2 = -3/2 + b$, so $b = -1/2$. Calculating the slope first and then solving for the intercept produces the equation in slope-intercept form.
27. D — 19. Building the sequence forward, $a_2 = 2(4) + 1 = 9$ and $a_3 = 2(9) + 1 = 19$. A recursive rule generates each term by applying the formula to the previous term.
28. C — Increase. Adding a value of 100 to a data set with mean 25 raises the total significantly more than it raises the count, pulling the average upward. The mean responds to extreme values, while the median is more resistant.
29. B — $2x^2 - 3x$. Dividing each term in the numerator by 4x gives $(8x^3)/(4x) - (12x^2)/(4x) = 2x^2 - 3x$. Polynomial-by-monomial division distributes the divisor across each term.
30. A — 15n + 8j = 100. The cost of novels is 15n and of journals is 8j, and their sum equals the total spent. Modeling each item's contribution as price times quantity produces the correct total-cost equation.
31. C — $f^{-1}(x) = (x + 6)/3$. Writing $y = 3x - 6$ and swapping variables gives $x = 3y - 6$, so $3y = x + 6$ and $y = (x + 6)/3$. The inverse function reverses every operation in the original.
32. D — 1/3. The numbers greater than 4 are 5 and 6, giving 2 favorable outcomes out of 6, which simplifies to 1/3. Probability is favorable outcomes over total outcomes in lowest terms.
33. A — (0, 4). At x = 0, $f(0) = 4 - 3(0)^2 = 4$. The constant term equals the y-intercept once any variable term involving x evaluates to zero.
34. B — 15. The interquartile range is Q3 − Q1 = 85 − 70 = 15. The IQR measures the spread of the middle 50% of the data, ignoring extreme values.
35. C — 3. Expanding gives $[3(x + 1) + 2] - [3x + 2] = (3x + 3 + 2) - (3x + 2) = 3$. For a linear function, the difference between consecutive outputs equals the slope.