PRACTICE EXAM 32

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: $5(x - 2) - 3 = 2(x + 4)$.

A. $x = 3$

B. $x = -7$

C. $x = 7$

D. $x = 21$

2. A line passes through the points $(-2, 7)$ and $(2, -1)$. Which equation represents this line?

A. $y = -2x + 3$

B. $y = 2x + 3$

C. $y = -2x - 1$

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

3. A medication's concentration decreases by 30% each hour, starting at 80 mg. Which function models the concentration C after t hours?

A. $C(t) = 80(1.30)^t$

B. $C(t) = 80(0.30)^t$

C. $C(t) = 80 - 0.30t$

D. $C(t) = 80(0.70)^t$

4. Which expression is the completely factored form of $3x^2 + 11x + 6$?

A. $(3x + 6)(x + 1)$

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

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

D. $(x + 6)(3x + 1)$

5. Which ordered pair is a solution to the system $y = x^2$ and $y = x + 6$?

A. (2, 4)

B. (−3, 9)

C. (3, 9)

D. (6, 6)

6. A piecewise function is defined as $f(x) = 2x + 1$ for $x < 3$, and $f(x) = x^2 - 4$ for $x \geq 3$. What is the value of $f(3)$?

A. 7

B. 13

C. 9

D. 5

7. A sequence is defined by $a_1 = 4$ and $a_n = a_{n-1} + 5$. What is the value of a_4?

A. 19

B. 24

C. 14

D. 20

8. A quadratic function is graphed as an upward-opening parabola with its vertex at (2, −3). Over which interval is the function increasing?

A. $x < 2$

B. $x > 2$

C. $-3 < x < 2$

D. All real numbers

9. The solution to an inequality is graphed on a number line with a closed (filled) circle at −2 and a bold arrow extending to the right toward positive infinity. Which inequality is represented?

A. $x > -2$

B. $x \leq -2$

C. $x < -2$

D. $x \geq -2$

10. What is the x-intercept of the line represented by $4x + 5y = 20$?

A. (0, 4)

B. (4, 0)

C. (5, 0)

D. (0, 5)

11. A rectangular garden has a length that is 3 feet more than its width. If the area of the garden is 54 square feet, what is the width?

A. 6 feet

B. 9 feet

C. 7 feet

D. 18 feet

12. A population of 300 organisms doubles every 5 years. What is the population after 15 years?

A. 1,200

B. 2,400

C. 900

D. 4,800

13. A two-way frequency table of sport preferences shows that Grade 9 students total 20 (12 prefer soccer, 8 prefer basketball), and Grade 10 students total 30 (18 prefer soccer, 12 prefer basketball). Overall, 30 of the 50 students prefer soccer and 20 prefer basketball. What fraction of all students prefer soccer?

A. 12/50

B. 18/50

C. 20/50

D. 30/50

14. A line of best fit predicts $\hat{y} = 1.5x + 10$. The actual data value at $x = 8$ is 20. The residual is negative. What does this indicate?

A. The point lies exactly on the line

B. The point lies above the line

C. The point lies below the line

D. The model contains no error

15. Which expression is equivalent to $(3x^2 - 5x + 2) + (x^2 + 5x - 7)$?

A. $4x^2 - 10x - 5$

B. $4x^2 - 5$

C. $4x^2 + 10x - 5$

D. $2x^2 - 5$

16. A school needs to transport 30 students in vans that hold 8 students each. What is the minimum number of vans needed?

A. 4

B. 3

C. 5

D. 30

17. A phone's battery level is modeled by $B(t) = 100 - 12t$, where B is the percent charge and t is the number of hours. What does the slope represent?

A. The battery starts at 12%

B. The battery lasts 100 hours

C. The battery gains 12% each hour

D. The battery loses 12% each hour

18. A ball is thrown upward and its height in feet is modeled by $h(t) = -16t^2 + 48t + 6$, where t is in seconds. What is the maximum height the ball reaches?

A. 1.5 feet

B. 48 feet

C. 42 feet

D. 6 feet

19. A theater sells adult tickets for $9 and child tickets for $5. A total of 200 tickets are sold for $1,480. How many adult tickets were sold?

A. 80

B. 120

C. 100

D. 140

20. A scatter plot of 10 data points shows the points distributed randomly throughout the coordinate plane with no apparent upward or downward trend. Which value is closest to the correlation coefficient for this data?

A. $r = 0.05$

B. $r = 0.85$

C. $r = -0.90$

D. $r = 0.60$

21. The circumference of a circle is given by $C = 2\pi r$. Which equation correctly solves this formula for r?

A. $r = 2\pi C$

B. $r = C - 2\pi$

C. $r = C/(2\pi)$

D. $r = 2\pi/C$

22. Consider the functions $f(x) = 5x + 20$ and $g(x) = 2(2)^x$. Which statement is true for large values of x?

A. f(x) always exceeds g(x)

B. f(x) and g(x) are always equal

C. f(x) and g(x) never intersect

D. g(x) eventually exceeds f(x) for large x

23. Participants in a fitness study were grouped by daily step count (in thousands) as follows: [0, 5) had 4 participants, [5, 10) had 9, [10, 15) had 15, [15, 20) had 7, and [20, 25) had 2. Which interval contains the greatest number of participants?

A. [5, 10)

B. [10, 15)

C. [15, 20)

D. [0, 5)

24. What are the solutions to the equation $x^2 - 9x + 20 = 0$?

A. $x = 4$ and $x = 5$

B. $x = -4$ and $x = -5$

C. x = 2 and x = 10

D. x = 4 and x = −5

25. If f(x) = 3x − 7, for what value of x does f(x) = 11?

A. x = 26

B. x = 4

C. x = 11

D. x = 6

26. A data set summarizing weekly overtime hours has a minimum of 5, Q1 = 12, median = 16, Q3 = 24, and maximum = 35. What is the interquartile range of the data?

A. 30

B. 4

C. 12

D. 8

27. A geometric sequence has a first term of 3 and a common ratio of 4. What is the third term?

A. 48

B. 12

C. 24

D. 36

28. Which inequality represents the solution to $4 - 3x > 19$?

A. $x > -5$

B. $x < -5$

C. $x > 5$

D. $x < 5$

29. A system of two linear equations consists of Line 1, which passes through (0, −3) and (3, 3) with a positive slope of 2, and Line 2, which passes through (0, 6) and (6, 0) with a negative slope of −1. The two lines intersect at one point. What is the solution to this system?

A. (0, 6)

B. (1, 5)

C. (0, −3)

D. (3, 3)

30. A car travels at a constant speed of 60 miles per hour. How far does it travel in 2.5 hours?

A. 120 miles

B. 90 miles

C. 150 miles

D. 240 miles

31. The equation $x^2 - 6x + 9 = 0$ has what type of solution(s)?

A. Two distinct real solutions

B. One repeated real solution

C. No real solutions

D. Two irrational solutions

32. An investment of $500 grows at a rate of 8% per year. What is its value after 1 year?

A. $540

B. $508

C. $580

D. $560

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

A. (0, 3)

B. (0, 6)

C. (0, 0)

D. (0, 2)

34. The mean of five numbers is 14. Four of the numbers are 10, 12, 16, and 18. What is the fifth number?

A. 12

B. 16

C. 14

D. 20

35. A parabola opens upward, crosses the x-axis at (−4, 0) and (2, 0), and has its vertex below the x-axis at (−1, −9). What are the zeros of the function?

A. x = 4 and x = −2

B. x = −4 and x = 2

C. x = −1 only

D. x = 0 and x = 2

ANSWER KEY WITH EXPLANATIONS – PRACTICE EXAM 32

1. C — x = 7. Distributing gives 5x − 10 − 3 = 2x + 8, which simplifies to 5x − 13 = 2x + 8, and isolating the variable yields 3x = 21, so x = 7. Distributing across the parentheses before collecting like terms keeps a multi-step equation organized and accurate.
2. A — y = −2x + 3. The slope is (−1 − 7)/(2 − (−2)) = −8/4 = −2, and substituting (2, −1) gives −1 = −2(2) + b, so b = 3. Finding the slope first and then solving for the intercept produces the equation in slope-intercept form.
3. D — C(t) = 80(0.70)^t. A 30% hourly loss leaves 70% of the concentration each hour, so the decay factor is 1 − 0.30 = 0.70 applied to the 80 mg start. Exponential decay multiplies by a factor between 0 and 1 each period, unlike linear subtraction.
4. B — (3x + 2)(x + 3). The factors must produce $3x^2$ and 6 while the cross terms 9x + 2x combine to the middle term 11x. Matching both the outer-inner sum and the end products confirms the correct grouping for a trinomial with a leading coefficient.
5. C — (3, 9). Setting $x^2 = x + 6$ gives $x^2 - x - 6 = 0$, which factors to (x − 3)(x + 2) = 0, so x = 3 produces the point (3, 9) on both graphs. A solution to a system of two curves must satisfy both equations at the same point.
6. D — 5. Since 3 meets the condition x ≥ 3, the second rule applies: $f(3) = 3^2 - 4 = 5$. Selecting the correct branch of a piecewise function based on the input value is essential, since the first rule would give a different result.

7. A — 19. Starting from $a_1 = 4$ and adding 5 at each step gives 9, 14, 19, so $a_4 = 19$. A recursive rule builds each term from the previous one, requiring the sequence to be generated in order.
8. B — $x > 2$. The parabola opens upward with its vertex at (2, −3), so the function decreases to the left of the vertex and increases for all x greater than 2. An upward-opening parabola rises on the side of the vertex where x increases.
9. D — $x \geq -2$. The closed circle at −2 indicates that −2 is included, and the arrow pointing right represents all values greater than −2. A filled endpoint corresponds to "greater than or equal to," distinguishing it from a strict inequality.
10. C — (5, 0). The x-intercept occurs where $y = 0$, so $4x = 20$ gives $x = 5$, the point (5, 0). Setting the other variable to zero is the standard method for locating an intercept on an axis.
11. A — 6 feet. Letting the width be w, the equation $w(w + 3) = 54$ becomes $w^2 + 3w - 54 = 0$, which factors to $(w + 9)(w - 6) = 0$, giving the positive width $w = 6$. Only the positive root is physically meaningful for a length measurement.
12. B — 2,400. Over 15 years the population doubles $15 \div 5 = 3$ times, so the result is $300 \times 2^3 = 300 \times 8 = 2{,}400$. Counting the number of doubling periods and applying them as an exponent models repeated multiplicative growth.
13. D — 30/50. The soccer column total is 30 and the overall total is 50, so the fraction preferring soccer is 30/50. Relative frequency for a category divides that category's total by the grand total of the table.
14. C — the point lies below the line. The residual is observed minus predicted, so a negative residual means the actual value is less than the line's prediction. A point with a negative residual sits below the line of best fit.
15. B — $4x^2 - 5$. Combining like terms gives $(3x^2 + x^2) + (-5x + 5x) + (2 - 7) = 4x^2 + 0x - 5$. The x-terms cancel because $-5x$ and $+5x$ are opposites, leaving only the quadratic and constant terms.
16. A — 4. Dividing 30 students by 8 seats gives 3.75, and since a partial van still requires a whole van, the count rounds up to 4. Real-world counting contexts require rounding up whenever any remainder exists.
17. D — the battery loses 12% each hour. In $B(t) = 100 - 12t$, the slope −12 is the rate of change, indicating a 12% drop in charge for each additional hour. A negative slope represents a quantity decreasing over time.
18. C — 42 feet. The maximum occurs at the vertex time $t = -48/(2\cdot-16) = 1.5$ seconds, and $h(1.5) = -16(2.25) + 48(1.5) + 6 = 42$ feet. For a downward-opening height function, the vertex gives the greatest height the object reaches.
19. B — 120. With $a + c = 200$ and $9a + 5c = 1480$, substituting $c = 200 - a$ gives $4a = 480$, so $a = 120$ adult tickets. Setting up one equation for the count and one for the value allows elimination of the second variable.
20. A — $r = 0.05$. The points form a diffuse cloud with no upward or downward trend, indicating almost no linear relationship and a correlation coefficient near zero. A value close to 0 reflects the absence of a consistent linear pattern.
21. C — $r = C/(2\pi)$. Dividing both sides of $C = 2\pi r$ by 2π isolates r, giving $r = C/(2\pi)$. Reversing the multiplication applied to the target variable is the core step in solving a literal equation.
22. D — g(x) eventually exceeds f(x) for large x. Exponential functions grow by repeated multiplication, which outpaces the constant additive growth of any linear function for

sufficiently large inputs. The exponential term ultimately dominates regardless of the linear function's slope.

23. B — [10, 15). The interval with the greatest frequency is [10, 15) with 15 participants, more than any other interval in the data. The interval with the greatest count contains the most data values.
24. A — $x = 4$ and $x = 5$. Factoring $x^2 - 9x + 20$ gives $(x - 4)(x - 5) = 0$, so the solutions are $x = 4$ and $x = 5$. The factors must multiply to 20 and add to −9, which −4 and −5 satisfy.
25. D — $x = 6$. Setting $3x - 7 = 11$ gives $3x = 18$, so $x = 6$. Solving f(x) equal to a target value reverses the function's operations to recover the input.
26. C — 12. The interquartile range is Q3 − Q1 = 24 − 12 = 12. The IQR measures the spread of the middle 50% of the data while ignoring extreme values.
27. A — 48. The third term of a geometric sequence is $a_1 \cdot r^2 = 3 \cdot 4^2 = 3 \cdot 16 = 48$. Each term multiplies the previous one by the common ratio, so the exponent is one less than the term number.
28. B — $x < -5$. Subtracting 4 gives $-3x > 15$, and dividing by −3 reverses the inequality to $x < -5$. Dividing by a negative number always flips the direction of the inequality symbol.
29. D — (3, 3). The solution to a system is the intersection point of the two lines, which lies at (3, 3). Verifying that the point satisfies both lines confirms the unique solution to the system.
30. C — 150 miles. Distance equals rate times time, so $60 \times 2.5 = 150$ miles. A constant speed produces a linear relationship between distance and time.
31. B — one repeated real solution. The discriminant $b^2 - 4ac = 36 - 36 = 0$, indicating exactly one repeated real root. A zero discriminant means the parabola touches the x-axis at a single point.
32. A — $540. Growth of 8% multiplies the principal by 1.08, so $500 \times 1.08 = 540$ after one year. Percent growth applies the factor 1 + r to the starting amount.
33. D — (0, 2). The y-intercept occurs at $x = 0$, where $f(0) = 2(3)^0 = 2(1) = 2$. Any nonzero base raised to the zero power equals 1, so the coefficient alone determines the starting value.
34. C — 14. A mean of 14 over five numbers requires a total of 70, and the four known values sum to 56, so the fifth is 70 − 56 = 14. The mean fixes the total, allowing a missing value to be found by subtraction.
35. B — $x = -4$ and $x = 2$. The zeros are the x-coordinates where the parabola crosses the x-axis, given as (−4, 0) and (2, 0). The zeros of a function are the input values that make the output equal zero.