

# PRACTICE EXAM 37

## NY REGENTS ALGEBRA I

### SIMULATION — 35 QUESTIONS

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**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  $y$ :  $4x - 2y = 10$ .

A.  $y = 2x + 5$

B.  $y = -2x - 5$

C.  $y = 2x - 5$

D.  $y = 4x - 5$

2. What are the solutions to the equation  $x^2 - 6x + 4 = 0$ ?

A.  $x = 3 \pm \sqrt{5}$

B.  $x = -3 \pm \sqrt{5}$

C.  $x = 6 \pm \sqrt{5}$

D.  $x = 3 \pm \sqrt{20}$

3. Which slope is parallel to the line  $y = -4x + 7$ ?

A.  $1/4$

B.  $-1/4$

C.  $4$

D.  $-4$

4. Which expression is the completely factored form of  $3x^2 - 12x$ ?

A.  $3(x^2 - 4x)$

B.  $3x(x - 4)$

C.  $x(3x - 12)$

D.  $(3x)(x - 4)$  only

5. Solve the system by substitution:  $y = 3x - 1$  and  $2x + y = 9$ .

A.  $(1, 2)$

B.  $(3, 8)$

C.  $(2, 5)$

D.  $(5, 14)$

6. The arithmetic sequence begins  $-5, -2, 1, 4, \dots$ . Which explicit formula represents the  $n$ th term?

A.  $a_n = -5 + 3n$

B.  $a_n = 3 + (-5)(n - 1)$

C.  $a_n = -5n + 3$

D.  $a_n = -5 + 3(n - 1)$

7. Solve the compound inequality:  $-1 < 2x + 3 < 11$ .

A.  $-2 < x < 4$

B.  $-2 \leq x \leq 4$

C.  $-4 < x < 8$

D.  $2 < x < 4$

8. A geometric sequence begins 81, 27, 9, 3, ... What is the common ratio?

A. 3

B.  $\frac{1}{3}$

C. -3

D.  $-\frac{1}{3}$

9. A function takes the inputs 1, 2, 3, and 4 and produces outputs 5, 9, 13, and 17, respectively. Which best describes this function?

A. Exponential with a ratio of 4

B. Quadratic with constant second differences

C. Linear with a slope of 4

D. Exponential with a ratio of  $\frac{9}{5}$

10. A small business has fixed costs of \$300 per week and variable costs of \$4 per unit produced. Which expression represents the total weekly cost  $C$  when  $x$  units are produced?

A.  $C = 4x + 300$

B.  $C = 300x + 4$

C.  $C = 4 + 300x$

D.  $C = 304x$

11. Which equation is equivalent to  $2x + 3y = 6$  in slope-intercept form?

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

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

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

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

12. The function  $V(t) = 8000(0.85)^t$  models a value decaying over time  $t$  in years. What is the annual rate of decay?

A. 8.5%

B. 15%

C. 85%

D. 0.85%

13. What are the solutions to the equation  $x^2 - 7x + 12 = 0$ ?

A.  $x = -3$  and  $x = -4$

B.  $x = 6$  and  $x = 2$

C.  $x = 3$  and  $x = 4$

D.  $x = -3$  and  $x = 4$

14. What is the mode of the data set 5, 7, 7, 8, 9, 7, 10, 12?

A. 7

B. 8

C. 9

D. 12

15. A function is defined by  $g(x) = 5 - 2x$ . What is the value of  $g(-3)$ ?

A. -1

B. 11

C. -11

D. 1

16. What is the vertex of the parabola  $f(x) = x^2 + 4x + 1$ ?

A. (2, -3)

B. (-2, 3)

C. (2, 3)

D. (-2, -3)

17. A 40-liter mixture is 25% salt by volume. How many liters of salt does the mixture contain?

A. 10 liters

B. 15 liters

C. 25 liters

D. 30 liters

18. A bag contains 4 red marbles and 6 blue marbles. A marble is drawn at random and replaced before a second draw. What is the probability that both draws are red?

A.  $1/2$

B.  $1/5$

C.  $4/25$

D.  $2/5$

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

A.  $x^3 + x^2 + x + 15$

B.  $x^3 + x^2 - x + 15$

C.  $x^3 - x^2 - x + 15$

D.  $x^3 + 5x + 15$

20. Solve for x:  $x/3 - 2 = 5$ .

A.  $x = 3$

B.  $x = 7$

C.  $x = 9$

D.  $x = 21$

21. What is the distance between the points (1, 2) and (4, 6)?

A. 5

B. 7

C. 25

D.  $\sqrt{7}$

22. A linear function has a slope of 4 and passes through the point (2, 5). What is the y-intercept of the function?

A. 3

B. -2

C. -3

D. 2

23. What is the range of the data set 12, 15, 20, 8, 14, 22?

A. 8

B. 22

C. 12

D. 14

24. Solve for  $x$ :  $5x - 3 \leq 12$ .

A.  $x \geq 3$

B.  $x \leq 3$

C.  $x < 3$

D.  $x > 3$

25. What is the slope of the line represented by  $x + 4y = 12$ ?

A.  $1/4$

B. 4

C.  $-\frac{1}{4}$

D.  $-4$

26. A recipe calls for 2 cups of flour for every 3 cups of sugar. How many cups of flour are needed when 12 cups of sugar are used?

A. 8 cups

B. 6 cups

C. 9 cups

D. 18 cups

27. Which expression is the completely factored form of  $4x^2 - 9$ ?

A.  $(2x - 3)^2$

B.  $(4x - 9)(x + 1)$

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

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

28. A correlation coefficient of  $-0.92$  between two variables indicates:

A. A weak positive linear relationship

B. A strong negative linear relationship

C. A strong positive linear relationship

D. No linear relationship at all

29. What is the value of the expression  $2^3 \cdot 2^4$ ?

A. 128

B. 64

C. 256

D. 16

30. Which represents the solution set of the compound inequality  $x + 2 \leq 6$  or  $x - 1 > 7$ ?

A.  $4 \leq x \leq 8$

B.  $x \leq 4$  and  $x > 8$

C.  $x \leq 4$  or  $x > 8$

D. all real numbers

31. Which statement best describes the function  $f(x) = 2^x$ ?

A. Linear and decreasing

B. Exponential and increasing

C. Quadratic, opening upward

D. Linear and increasing

32. A fair coin is flipped three times. What is the probability of NOT getting heads on all three flips?

A.  $\frac{1}{8}$

B.  $\frac{1}{2}$

C.  $\frac{1}{4}$

D.  $\frac{7}{8}$

33. Solve the formula  $V = \pi r^2 h$  for  $h$ .

A.  $h = V/(\pi r^2)$

B.  $h = V\pi r^2$

C.  $h = V - \pi r^2$

D.  $h = (V - \pi)/r^2$

34. Compare the long-term growth of  $f(x) = x^2$  and  $g(x) = 2^x$ . For large positive values of  $x$ , which statement is true?

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

B. Both functions grow at exactly the same rate

C.  $g(x)$  eventually exceeds  $f(x)$  for large  $x$

D. Neither function grows without bound

35. What is the vertex of the parabola  $y = 3x^2 - 12x + 5$ ?

A.  $(-2, -7)$

B.  $(2, -7)$

C.  $(-2, 7)$

D.  $(2, 7)$

## ANSWER KEY WITH EXPLANATIONS – PRACTICE EXAM 37

1. C —  $y = 2x - 5$ . Subtracting  $4x$  from both sides gives  $-2y = -4x + 10$ , and dividing every term by  $-2$  isolates  $y$  as  $2x - 5$ . Solving a literal equation for one variable mirrors the steps used for a numerical equation.
2. A —  $x = 3 \pm \sqrt{5}$ . The quadratic formula gives  $x = [6 \pm \sqrt{(36 - 16)}]/2 = (6 \pm \sqrt{20})/2$ , and simplifying  $\sqrt{20} = 2\sqrt{5}$  reduces this to  $3 \pm \sqrt{5}$ . Dividing every numerator term by the common factor and simplifying the radical produce the simplest exact form.
3. D —  $-4$ . Parallel lines have equal slopes, so a line parallel to  $y = -4x + 7$  also has slope  $-4$ . Comparing the coefficient of  $x$  in slope-intercept form recovers the slope directly.
4. B —  $3x(x - 4)$ . The greatest common factor of  $3x^2$  and  $-12x$  is  $3x$ , and dividing gives  $3x(x - 4)$ . Removing the GCF first ensures the expression is in completely factored form.
5. C —  $(2, 5)$ . Substituting  $y = 3x - 1$  into  $2x + y = 9$  gives  $2x + 3x - 1 = 9$ , so  $5x = 10$  and  $x = 2$ ; then  $y = 3(2) - 1 = 5$ . Substitution works cleanly when one equation is already solved for a variable.
6. D —  $a_n = -5 + 3(n - 1)$ . The first term is  $-5$  and the common difference between consecutive terms is  $3$ , matching the standard arithmetic formula  $a_1 + d(n - 1)$ . Assigning the first term and the difference to their correct roles separates this from the swapped-value distractors.
7. A —  $-2 < x < 4$ . Subtracting  $3$  from all three parts gives  $-4 < 2x < 8$ , and dividing by  $2$  gives  $-2 < x < 4$ . Operations on a compound inequality must be applied to all three parts simultaneously.
8. B —  $1/3$ . Each term is one-third of the previous ( $27/81 = 1/3$ ,  $9/27 = 1/3$ ), establishing a constant ratio of  $1/3$ . A consistent ratio between successive terms defines geometric decay.
9. C — Linear with a slope of  $4$ . The outputs rise by  $4$  for each unit increase in input ( $5, 9, 13, 17$ ), indicating a constant first difference. A constant additive change identifies a linear function with that change as the slope.
10. A —  $C = 4x + 300$ . Total cost is the variable cost per unit times the number of units plus the fixed cost. Modeling the per-unit charge as a coefficient on  $x$  and the fixed cost as a constant produces the linear cost equation.
11. D —  $y = -(2/3)x + 2$ . Isolating  $y$  in  $2x + 3y = 6$  gives  $3y = -2x + 6$ , and dividing by  $3$  yields  $y = -(2/3)x + 2$ . Slope-intercept form makes the slope and intercept visible as the coefficient of  $x$  and the constant term.
12. B —  $15\%$ . The decay factor  $0.85$  represents the proportion retained each year, so the rate of loss is  $1 - 0.85 = 0.15$  or  $15\%$ . Reading the base of an exponential decay model as  $1 - r$  recovers the percent loss.
13. C —  $x = 3$  and  $x = 4$ . Factoring  $x^2 - 7x + 12$  gives  $(x - 3)(x - 4) = 0$ , so the solutions are  $3$  and  $4$ . The factors must multiply to  $12$  and add to  $-7$ , which  $-3$  and  $-4$  satisfy.
14. A —  $7$ . The value  $7$  appears three times, more frequently than any other value in the set. The mode is the value with the highest frequency, distinguishing it from the mean and median.
15. B —  $11$ . Substituting  $x = -3$  gives  $g(-3) = 5 - 2(-3) = 5 + 6 = 11$ . Subtracting a negative is equivalent to addition, which prevents the  $-1$  sign-error distractor.

16. D —  $(-2, -3)$ . The vertex x-coordinate is  $-b/(2a) = -4/2 = -2$ , and substituting gives  $(-2)^2 + 4(-2) + 1 = 4 - 8 + 1 = -3$ . The vertex marks the minimum of this upward-opening parabola.
17. A — 10 liters. Salt content equals the percentage times the total volume:  $0.25 \times 40 = 10$  liters. A percent concentration applied to a known total recovers the amount of solute.
18. C —  $4/25$ . With replacement, the two draws are independent, so the probability is  $(4/10)(4/10) = 16/100 = 4/25$ . Independent events multiply their individual probabilities.
19. B —  $x^3 + x^2 - x + 15$ . Distributing gives  $x^3 - 2x^2 + 5x + 3x^2 - 6x + 15$ , and combining like terms yields  $x^3 + x^2 - x + 15$ . Each term of the binomial must multiply every term of the trinomial before like terms are collected.
20. D —  $x = 21$ . Adding 2 gives  $x/3 = 7$ , and multiplying by 3 yields  $x = 21$ . Reversing the order of operations isolates the variable in a one-variable linear equation.
21. A — 5. The distance formula gives  $\sqrt{[(4 - 1)^2 + (6 - 2)^2]} = \sqrt{(9 + 16)} = \sqrt{25} = 5$ . Squaring the differences before adding and then taking the square root applies the Pythagorean theorem to coordinate geometry.
22. C —  $-3$ . Substituting  $(2, 5)$  into  $y = 4x + b$  gives  $5 = 8 + b$ , so  $b = -3$ . The y-intercept is recovered by solving for the constant term once the slope and a point are known.
23. D — 14. The range is the difference between the maximum and minimum values:  $22 - 8 = 14$ . The range measures the total spread of a data set, ignoring all values in between.
24. B —  $x \leq 3$ . Adding 3 gives  $5x \leq 15$ , and dividing by 5 yields  $x \leq 3$ . Dividing by a positive number preserves the direction of the inequality, and the  $\leq$  symbol carries through from the original problem.
25. C —  $-1/4$ . Isolating y in  $x + 4y = 12$  gives  $4y = -x + 12$ , so  $y = -x/4 + 3$ , revealing a slope of  $-1/4$ . Converting standard form to slope-intercept form exposes the coefficient of x as the slope.
26. A — 8 cups. Setting up the proportion  $2/3 = x/12$  and cross-multiplying gives  $3x = 24$ , so  $x = 8$ . A proportional relationship preserves the ratio between two quantities across scalings.
27. D —  $(2x - 3)(2x + 3)$ . The expression is a difference of squares since  $4x^2 = (2x)^2$  and  $9 = 3^2$ , factoring directly as  $(2x - 3)(2x + 3)$ . Recognizing perfect-square coefficients identifies the pattern for one-step factoring.
28. B — A strong negative linear relationship. The magnitude  $|-0.92|$  is close to 1, indicating a strong association, and the negative sign indicates a downward direction. Strength is read from the absolute value of r, while direction is read from the sign.
29. A — 128. Multiplying like bases adds the exponents:  $2^3 \cdot 2^4 = 2^7 = 128$ . The product-of-powers rule combines the exponents rather than multiplying them.
30. C —  $x \leq 4$  or  $x > 8$ . Solving the first part gives  $x \leq 4$  and the second gives  $x > 8$ ; the connector "or" preserves both intervals as the combined solution. The "or" connector keeps the union of the two solution sets rather than their intersection.
31. B — Exponential and increasing. With base 2 greater than 1, the function  $2^x$  grows by repeated multiplication and rises continuously as x increases. An exponential function has a constant ratio between outputs, distinguishing it from a linear or quadratic function.
32. D —  $7/8$ . The probability of three heads is  $(1/2)^3 = 1/8$ , and the complement is  $1 - 1/8 = 7/8$ . The probability of an event NOT occurring equals 1 minus the probability that it does occur.

33. A —  $h = V/(\pi r^2)$ . Dividing both sides of  $V = \pi r^2 h$  by  $\pi r^2$  isolates  $h$ , giving  $h = V/(\pi r^2)$ . Reversing the multiplication applied to the target variable is the core step in solving a literal equation.
34. C —  $g(x)$  eventually exceeds  $f(x)$  for large  $x$ . Exponential functions grow through repeated multiplication, which ultimately outpaces the multiplicative-additive growth of any polynomial function. For sufficiently large  $x$ , exponential growth dominates polynomial growth regardless of the polynomial's degree.
35. B —  $(2, -7)$ . The vertex  $x$ -coordinate is  $-b/(2a) = 12/6 = 2$ , and substituting gives  $3(4) - 12(2) + 5 = 12 - 24 + 5 = -7$ . The vertex marks the minimum of this upward-opening parabola.