PRACTICE EXAM 35

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

A. $x = 5$

B. $x = 3$

C. $x = 34/7$

D. $x = 4$

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

A. -28

B. −10

C. 8

D. 26

3. Solve the system using elimination: $3x + 4y = 18$ and $5x − 4y = 14$.

A. (2, 1)

B. (3, 2)

C. (5, 3/4)

D. (4, 3/2)

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

A. $8x^2 + 15x − 15$

B. $8x^2 + 14x − 15$

C. $8x^2 − 14x + 15$

D. $6x^2 + 14x − 8$

5. Two trains leave the same station traveling in opposite directions. One train travels at 50 mph and the other at 70 mph. After how many hours will they be 360 miles apart?

A. 2

B. 4

C. 3

D. 5

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

A. $10x^7$

B. $10x^{12}$

C. $7x^7$

D. $10x^3$

7. A solution contains 30% acid. How many liters of pure acid must be added to 20 liters of this solution to obtain a solution that is 50% acid?

A. 4 liters

B. 8 liters

C. 10 liters

D. 12 liters

8. What is the solution to the equation $(x + 3)/2 = (2x - 1)/3$?

A. $x = 5$

B. $x = 7$

C. $x = 9$

D. $x = 11$

9. Which expression is the completely factored form of $12x^2 - 27$?

A. $(6x - 9)(2x + 3)$

B. $(4x - 9)(3x + 3)$

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

D. $(12x - 27)(x + 1)$

10. A geometric sequence has a first term of 5 and a common ratio of 3. What is the sum of the first three terms?

A. 65

B. 45

C. 35

D. 75

11. Which equation represents a parabola with x-intercepts at $x = -2$ and $x = 6$?

A. $y = x^2 + 4x - 12$

B. $y = x^2 - 4x + 12$

C. $y = x^2 + 4x + 12$

D. $y = x^2 - 4x - 12$

12. Solve for x: $2(3x + 1) > 4x - 6$.

A. $x > -2$

B. $x > -4$

C. $x < -4$

D. $x < -2$

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

A. $a^2 + 1$

B. $a^2 + 2a - 1$

C. $a^2 - 1$

D. $a^2 - 2a + 1$

14. A car travels 240 miles using 8 gallons of fuel. At this rate, how many gallons are needed to travel 420 miles?

A. 14

B. 12

C. 16

D. 10

15. Which inequality represents the solution to $(1 - x)/2 \geq -3$ and $(1 - x)/2 < 4$?

A. $x > 7$

B. $x < 7$

C. $x \leq 7$

D. $-7 < x \leq 7$

16. A line of best fit is $\hat{y} = 2.4x + 5$. The observed value at $x = 5$ is 14. What is the residual?

A. 17

B. −3

C. 3

D. 11

17. Which is the completely factored form of $5x^2 - 20x - 105$?

A. $5(x - 7)(x + 3)$

B. $(5x - 21)(x + 5)$

C. $5(x + 7)(x - 3)$

D. $(x - 7)(5x + 15)$

18. The roots of the quadratic $2x^2 + 5x - 3 = 0$ are:

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

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

C. $x = 1/2$ and $x = -3$

D. $x = -1/2$ and $x = 3$

19. The arithmetic sequence with $a_1 = 12$ and $d = -4$ has what value for a_8?

A. −24

B. −12

C. −16

D. −20

20. A line passes through (4, 7) and has a slope of −2. What is its y-intercept?

A. (0, 1)

B. (0, 15)

C. (0, −1)

D. (0, 11)

21. Solve for x: 3^(x+1) = 81.

A. x = 3

B. x = 4

C. x = 5

D. x = 2

22. Which expression is equivalent to $(x^5)/(x^2)$?

A. $x^{2.5}$

B. x^7

C. x^{10}

D. x^3

23. A circle has a radius of 6 cm. What is the area, in terms of π?

A. 12π cm²

B. 24π cm²

C. 36π cm²

D. 144π cm²

24. What are the solutions to the equation $x^2 + 4x = 12$?

A. $x = 6$ and $x = 2$

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

C. $x = -2$ and $x = -6$

D. $x = 12$ and $x = 0$

25. A worker is paid $14 per hour for the first 40 hours and $21 per hour for any additional hours. If the worker earns $623 in one week, how many hours of overtime did the worker work?

A. 3

B. 5

C. 4

D. 6

26. Two functions are defined as $f(x) = 3x - 2$ and $g(x) = x^2 + 1$. What is $f(g(2))$?

A. 11

B. 7

C. 13

D. 16

27. A bag contains 3 red, 5 blue, and 2 green marbles. What is the probability of drawing a red marble first, then drawing a blue marble without replacement?

A. 15/100

B. 3/10

C. 1/15

D. 1/6

28. A linear function passes through $(-2, 5)$ and $(4, -7)$. What is the slope?

A. $-1/2$

B. −2

C. 2

D. 1/2

29. A car's value depreciates according to V(t) = 25000(0.92)^t. What percent of its value does the car retain each year?

A. 8%

B. 25%

C. 92%

D. 1.92%

30. A right triangle has legs of length 9 and 12. What is the length of the hypotenuse?

A. 15

B. 21

C. 17

D. 18

31. Which equation, in vertex form, has a vertex at (4, −7) and opens upward?

A. $y = -(x - 4)^2 + 7$

B. $y = (x + 4)^2 - 7$

C. $y = (x - 4)^2 + 7$

D. $y = (x - 4)^2 - 7$

32. What is the y-intercept of the function f(x) = 3(2)^x − 5?

A. (0, 3)

B. (0, −2)

C. (0, 1)

D. (0, −5)

33. Three consecutive integers have a sum of 87. What is the largest of the three integers?

A. 28

B. 29

C. 30

D. 31

34. A 10-foot ladder leans against a wall. The base of the ladder is 6 feet from the wall. How high up the wall does the ladder reach?

A. 8 feet

B. 4 feet

C. 16 feet

D. 12 feet

35. Two data sets are described below.

Data Set X: mean = 50, standard deviation = 4

Data Set Y: mean = 50, standard deviation = 12

Which statement best compares the two data sets?

A. Set Y has a smaller spread of values

B. Both sets have identical distributions

C. Set X values cluster less tightly around the mean

D. Set X values cluster more tightly around the mean

ANSWER KEY WITH EXPLANATIONS — PRACTICE EXAM 35

1. C — $x = 34/7$. Distributing gives $10x - 15 - 4 = 3x + 15$, which simplifies to $10x - 19 = 3x + 15$, and isolating x yields $7x = 34$, so $x = 34/7$. Not every linear equation produces an integer solution, and the test-taker must report the exact fractional value.
2. A — -28. Substituting $x = -3$ gives $-2(9) + 3(-3) - 1 = -18 - 9 - 1 = -28$. Squaring the negative input before applying the leading coefficient, and tracking each sign, avoids the arithmetic slips behind the distractors.
3. D — (4, 3/2). Adding the equations eliminates y to give $8x = 32$, so $x = 4$, and substituting into $3x + 4y = 18$ gives $4y = 6$, so $y = 3/2$. Elimination works cleanly when the opposite coefficients on y already cancel upon addition.
4. B — $8x^2 + 14x - 15$. Using FOIL gives $(4x)(2x) + (4x)(5) + (-3)(2x) + (-3)(5) = 8x^2 + 20x - 6x - 15 = 8x^2 + 14x - 15$. Combining the outer and inner products produces the correct middle term.
5. C — 3. The trains move apart at a combined rate of $50 + 70 = 120$ mph, so 360 miles ÷ 120 mph = 3 hours. When two objects move in opposite directions, the rate of separation is the sum of their individual speeds.
6. A — $10x^7$. Multiplying coefficients gives $2 \times 5 = 10$, and the product of powers rule $x^3 \cdot x^4 = x^7$ gives the variable part. Multiplying like bases adds the exponents, not multiplies them.
7. B — 8 liters. Letting x be the liters of pure acid added, the equation $6 + x = 0.50(20 + x)$ gives $6 + x = 10 + 0.5x$, so $0.5x = 4$ and $x = 8$. Tracking the amount of acid (not solution) before and after lets the mixture equation be set up correctly.
8. D — $x = 11$. Cross-multiplying gives $3(x + 3) = 2(2x - 1)$, so $3x + 9 = 4x - 2$, and isolating x yields $x = 11$. Cross-multiplication clears both denominators in one step.
9. C — $3(2x - 3)(2x + 3)$. Factoring out the GCF 3 leaves $4x^2 - 9$, a difference of squares that factors into $(2x - 3)(2x + 3)$. The completely factored form requires removing the GCF first so the remaining binomial can be split.

10. A — 65. The first three terms are 5, 15, and 45, and their sum is 5 + 15 + 45 = 65. Each term is the previous multiplied by the common ratio, and the partial sum totals only the listed terms.
11. D — $y = x^2 - 4x - 12$. Roots of −2 and 6 correspond to factors $(x + 2)(x - 6)$, and expanding gives $x^2 - 4x - 12$. Each root r contributes a factor $(x - r)$, and the product determines the standard form.
12. B — $x > -4$. Distributing gives $6x + 2 > 4x - 6$; subtracting 4x and 2 gives $2x > -8$, so $x > -4$. Dividing by a positive number preserves the direction of the inequality.
13. C — $a^2 - 1$. Substituting $(a + 1)$ gives $(a + 1)^2 - 2(a + 1) = a^2 + 2a + 1 - 2a - 2 = a^2 - 1$. Function notation replaces every instance of x with the given input expression, which then expands.
14. A — 14. The unit rate is 240 miles ÷ 8 gallons = 30 mpg, so 420 miles ÷ 30 mpg = 14 gallons. A proportional relationship uses one rate to convert between paired quantities.
15. D — $-7 < x \leq 7$. From $(1 - x)/2 \geq -3$: $1 - x \geq -6$, so $x \leq 7$; from $(1 - x)/2 < 4$: $1 - x < 8$, so $x > -7$. Combining the two parts gives the compound inequality $-7 < x \leq 7$.
16. B — −3. The predicted value is 2.4(5) + 5 = 17, and the residual is observed minus predicted: 14 − 17 = −3. A negative residual means the actual data point lies below the line of best fit.
17. A — $5(x - 7)(x + 3)$. Factoring out the GCF 5 leaves $x^2 - 4x - 21$, which factors into $(x - 7)(x + 3)$ since −7 and 3 multiply to −21 and add to −4. Removing the GCF first ensures the answer is in completely factored form.
18. C — $x = 1/2$ and $x = -3$. Factoring $2x^2 + 5x - 3$ gives $(2x - 1)(x + 3) = 0$, so $x = 1/2$ or $x = -3$. Setting each factor equal to zero applies the zero-product property.
19. C — −16. The eighth term of an arithmetic sequence is $a_1 + (n - 1)d = 12 + 7(-4) = 12 - 28 = -16$. The exponent on the common difference is one less than the term number, since the first term is already counted as a_1.
20. B — (0, 15). Using point-slope: $y - 7 = -2(x - 4)$ gives $y = -2x + 8 + 7 = -2x + 15$, so the y-intercept is (0, 15). Plugging $x = 0$ into the resulting equation isolates the intercept directly.
21. A — $x = 3$. Writing 81 as 3^4 gives $3^(x + 1) = 3^4$, so $x + 1 = 4$ and $x = 3$. When the bases are equal, the exponents must be equal.
22. D — x^3. The quotient rule for exponents subtracts the powers when dividing like bases: $x^(5 - 2) = x^3$. Subtracting exponents on division mirrors adding them on multiplication.
23. C — 36π cm². The area of a circle is $\pi r^2 = \pi(6)^2 = 36\pi$. The radius is squared before multiplying by π, which separates the answer from the circumference-style distractors.
24. B — $x = 2$ and $x = -6$. Rewriting as $x^2 + 4x - 12 = 0$ and factoring gives $(x - 2)(x + 6) = 0$, so $x = 2$ or $x = -6$. Moving all terms to one side is required before applying the zero-product property.
25. A — 3. Regular pay for 40 hours is 40 × 14 = $560, leaving $63 in overtime pay, and $63 ÷ $21 per hour = 3 hours. Separating the two pay rates produces a tractable two-step calculation.
26. C — 13. Inside-out composition gives $g(2) = 4 + 1 = 5$, then $f(5) = 3(5) - 2 = 13$. Function composition evaluates the inner function first, then feeds its output into the outer function.
27. D — 1/6. The probability is (3/10) × (5/9) = 15/90 = 1/6. Dependent events without replacement reduce the denominator by one after the first draw, since one marble has already been removed.

28. B — −2. The slope is $(-7 - 5)/(4 - (-2)) = -12/6 = -2$. Keeping the coordinates in matching order in numerator and denominator prevents the sign error that produces the positive distractor.
29. C — 92%. In V(t) = 25000(0.92)^t, the decay factor 0.92 represents the proportion retained each year, which is 92%. The rate of loss would be 1 − 0.92 = 8%, but the question asks what the car retains.
30. A — 15. The Pythagorean theorem gives $c^2 = 9^2 + 12^2 = 81 + 144 = 225$, so c = 15. The hypotenuse is always the longest side and is recovered by taking the square root of the sum of squared legs.
31. D — $y = (x - 4)^2 - 7$. Vertex form $a(x - h)^2 + k$ uses h = 4 and k = −7, and a positive coefficient produces an upward-opening parabola. The sign of h is flipped inside the parentheses, so a vertex x-coordinate of 4 appears as (x − 4).
32. B — (0, −2). At x = 0, $f(0) = 3(2)^0 - 5 = 3(1) - 5 = -2$. Any nonzero base raised to the zero power equals 1, so the coefficient is added to the vertical shift.
33. C — 30. Letting the integers be n, n + 1, n + 2, the sum 3n + 3 = 87 gives n = 28, so the largest is 30. Defining consecutive integers with successive offsets allows a single-variable equation.
34. A — 8 feet. The ladder is the hypotenuse: $10^2 - 6^2 = 100 - 36 = 64$, so the vertical height is $\sqrt{64} = 8$ feet. The Pythagorean theorem applies to the right triangle formed by the ladder, the wall, and the ground.
35. D — Set X values cluster more tightly around the mean. Standard deviation measures spread around the mean, so the smaller SD of 4 in Set X indicates tighter clustering than Set Y's SD of 12. A larger standard deviation always corresponds to greater variability.