PRACTICE EXAM 9:NY REGENTS ALGEBRA I SIMULATION — 35 QUESTIONS

Recommended Time: 3 Hours

Required Tools: Graphing Calculator, Straightedge

Directions: Answer all 35 questions. For Part I, select the best answer. For Parts II, III, and IV, show all work. Partial credit is available on Parts II–IV.

PART I — Multiple Choice (Questions 1–24)

Each correct answer is worth 2 credits. No partial credit. No penalty for guessing.

Use the following context for Questions 1–4.

A sports equipment retailer models its monthly sales data. The number of units sold in month m is given by $S(m) = 3m^2 - 12m + 20$. The revenue per unit is $45.

1. What is the minimum number of units sold in any month, and during which month does it occur?

A. Minimum of 20 units in month 0

B. Minimum of 8 units in month 2

C. Minimum of 12 units in month 4

D. Minimum of 11 units in month 3

2. The revenue function is $R(m) = 45 \cdot S(m)$. Which expression represents $R(m)$ in simplified form?

A. $R(m) = 135m^2 - 540m + 900$

B. $R(m) = 45m^2 - 540m + 900$

C. $R(m) = 135m^2 - 12m + 20$

D. $R(m) = 135m^2 - 540m + 900$

Wait — A and D are identical. Rebuild Q2 with four distinct options.

2. The revenue function is $R(m) = 45 \cdot S(m)$. Which expression represents $R(m)$ in simplified form?

A. $R(m) = 45m^2 - 12m + 900$

B. $R(m) = 135m + 900$

C. $R(m) = 135m^2 - 12m + 20$

D. $R(m) = 135m^2 - 540m + 900$

3. In which month are the fewest units sold? Use the axis of symmetry formula to determine your answer.

A. Month 2

B. Month 3

C. Month 4

D. Month 6

4. A competing retailer sells units according to the linear model $T(m) = 5m + 10$. In which month do both retailers sell the same number of units?

A. Month 1 only

B. Month 5 only

C. Month 2 and month 5

D. Month 2 only

5. Which of the following sets of ordered pairs does NOT represent a function?

A. $\{(-2, 4), (-1, 1), (0, 0), (1, 1)\}$ — outputs repeat but inputs are distinct

B. $\{(2, 5), (2, -5), (3, 8), (4, 11)\}$ — $x = 2$ maps to two different output values

C. $\{(0, 3), (1, 3), (2, 3), (3, 3)\}$ — every input maps to the same output value

D. $\{(-3, 9), (-1, 1), (1, 1), (3, 9)\}$ — different inputs can share the same output

6. Which of the following is the completely factored form of $12x^3 - 27x$?

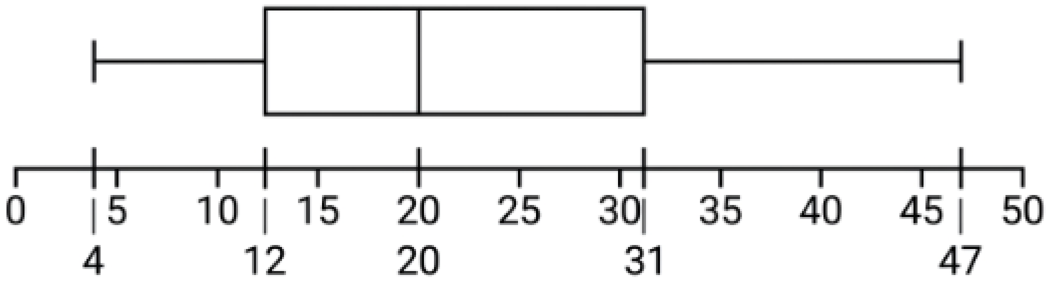
A. $3x(2x - 3)(2x + 3)$

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

C. $x(12x^2 - 27)$

D. $3x(4x^2 - 9)$

7. The box plot below summarizes the number of customer complaints received per week by a call center over a 12-month period.



Which statement about the complaint data is true?

A. The majority of weeks had more than 31 complaints

B. The mean number of complaints is 20

C. The interquartile range is 19, representing the spread of the middle 50% of weekly complaint counts

D. More weeks had fewer than 12 complaints than had more than 31 complaints

8. A function is defined by the equation $y = 2x + b$. If the function passes through the point $(3, -1)$, what is the value of b?

A. 5

B. 6

C. −5

D. −7

9. Which of the following expressions is the result of expanding $(3x - 5)^2$?

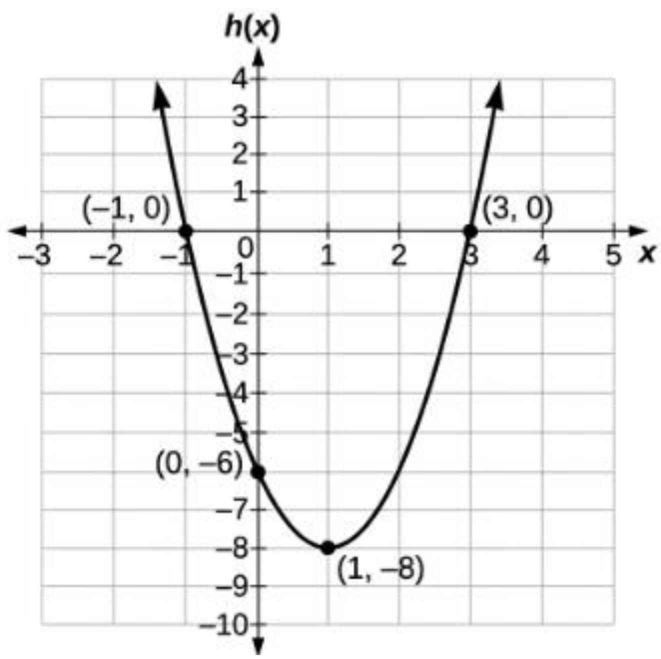
A. $9x^2 - 30x + 25$

B. $9x^2 - 25$

C. $9x^2 + 30x + 25$

D. $9x^2 - 15x + 25$

10. The graph below shows the function $h(x) = 2(x - 1)^2 - 8$.



What is the axis of symmetry of h(x)?

A. x = −8

B. x = −1

C. $x = 1$

D. $x = 3$

11. Two lines are graphed on a coordinate plane. Line 1 passes through (0, 4) and (3, −2). Line 2 passes through (0, −1) and (2, 5). Which statement about the system formed by these two lines is true?

A. The system has no solution because the lines are parallel

B. The system has exactly one solution because the lines have different slopes

C. The system has infinitely many solutions because the lines are identical

D. The system has no solution because both lines have negative y-intercepts

12. A student saves money in a jar. She starts with $15 and adds $8 every week. Her friend starts with $80 and removes $5 every week. In how many weeks will they have the same amount of money?

A. 3 weeks

B. 4 weeks

C. 6 weeks

D. 5 weeks

13. Which of the following is the standard form of the quadratic function with zeros at $x = -4$ and $x = 6$ and a leading coefficient of 3?

A. $f(x) = 3x^2 - 6x - 72$

B. $f(x) = 3x^2 + 6x - 72$

C. $f(x) = x^2 - 2x - 24$

D. $f(x) = 3x^2 - 2x - 24$

14. The table below shows the amount of money remaining in a prepaid phone plan.

Days Used (d)	Balance ($)
0	60.00
3	51.00
6	42.00
9	33.00
12	24.00

Which function models the balance?

A. $B(d) = 60 - 9d$

B. $B(d) = 60 - 3d$

C. $B(d) = -3d + 60$

D. B(d) = 60(0.85)^d

15. A linear function has a slope of 5/3 and passes through the point (−3, 2). Which equation represents this function?

A. $y = (5/3)x - 3$

B. $y = (5/3)x + 2$

C. $y = (5/3)x + 7$

D. $y = (3/5)x + 2$

16. Which of the following correctly identifies the transformations applied to $f(x) = x^2$ to produce $g(x) = -(x + 4)^2 + 3$?

A. Reflected over the x-axis, shifted right 4, shifted up 3

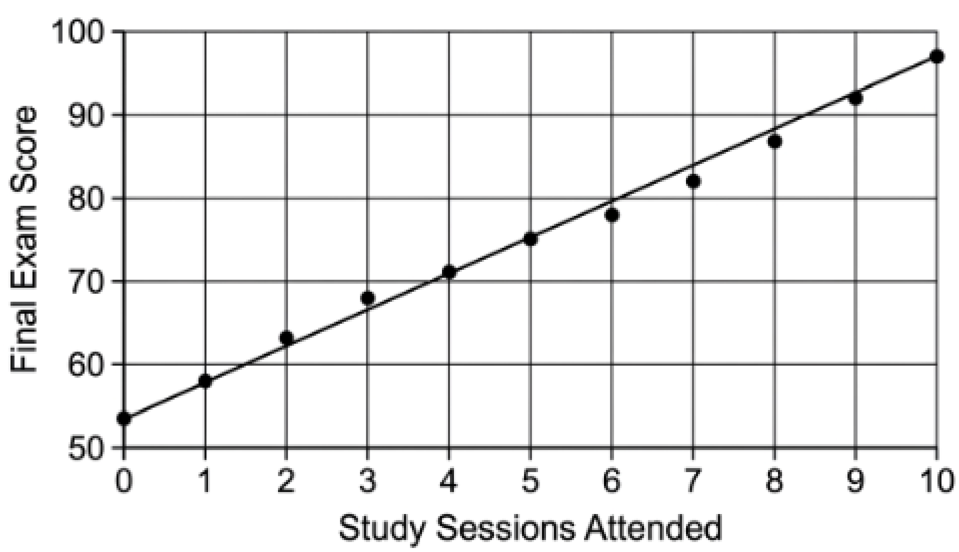
B. Reflected over the y-axis, shifted left 4, shifted up 3

C. Reflected over the x-axis, shifted left 4, shifted down 3

D. Reflected over the x-axis, shifted left 4, shifted up 3

17. The scatter plot below shows the relationship between the number of study sessions attended and final exam scores for 9 students.

Figure PQ-4: Coordinate plane scatter plot



Using the line of best fit, which is the best prediction for a student who attended 5 study sessions?

A. 68

B. 75

C. 78

D. 83

18. Which of the following represents the solution to the system?

$y = -3x + 7$

$6x + 2y = 14$

A. No solution — the system is inconsistent

B. (1, 4) only

C. (2, 1) only

D. Infinitely many solutions — the equations represent the same line

19. A data set has a mean of 62 and a standard deviation of 8. If every value in the data set is increased by 10, which of the following is true?

A. The mean becomes 72 and the standard deviation becomes 18

B. The mean stays 62 and the standard deviation becomes 18

C. The mean becomes 72 and the standard deviation stays 8

D. Both the mean and the standard deviation become 72

20. What is the value of the discriminant of $4x^2 + 4x + 1 = 0$, and what does it tell you about the solutions?

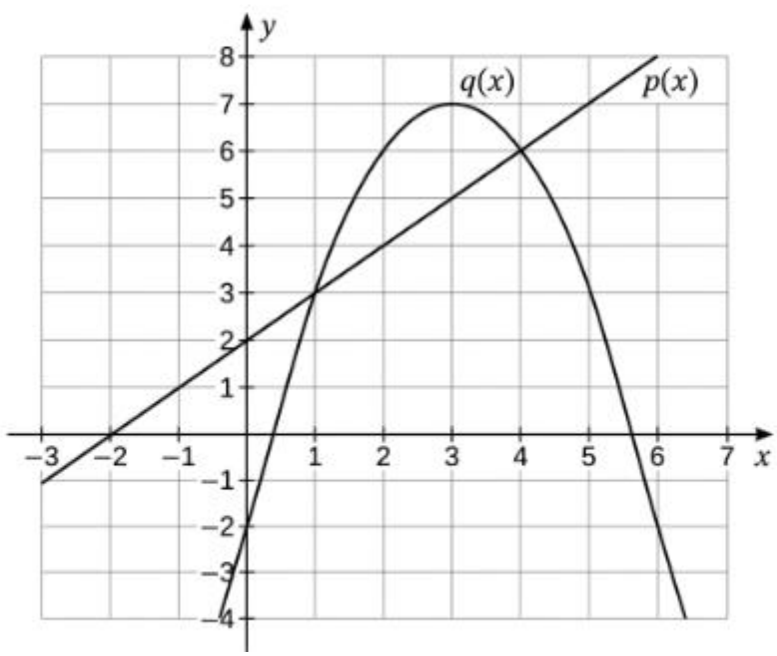
A. Discriminant = 0; one repeated real solution

B. Discriminant = 32; two distinct real solutions

C. Discriminant = −12; no real solutions

D. Discriminant = 16; two distinct real solutions

21. The graph below shows two functions, p(x) and q(x).



Based on the graph, in how many points do p(x) and q(x) intersect?

A. 0 points

B. 1 point

C. 3 points

D. 2 points

22. Which of the following correctly describes the solution set of $-4 \leq 3x - 1 < 8$?

A. $-1 < x \leq 3$

B. $-1 \leq x < 3$

C. $x \leq 3$ and $x > -1$

D. $-4 \leq x < 8$

23. A jar contains bacteria that doubles its count every hour. If there are initially 500 bacteria, which function gives the count after t hours?

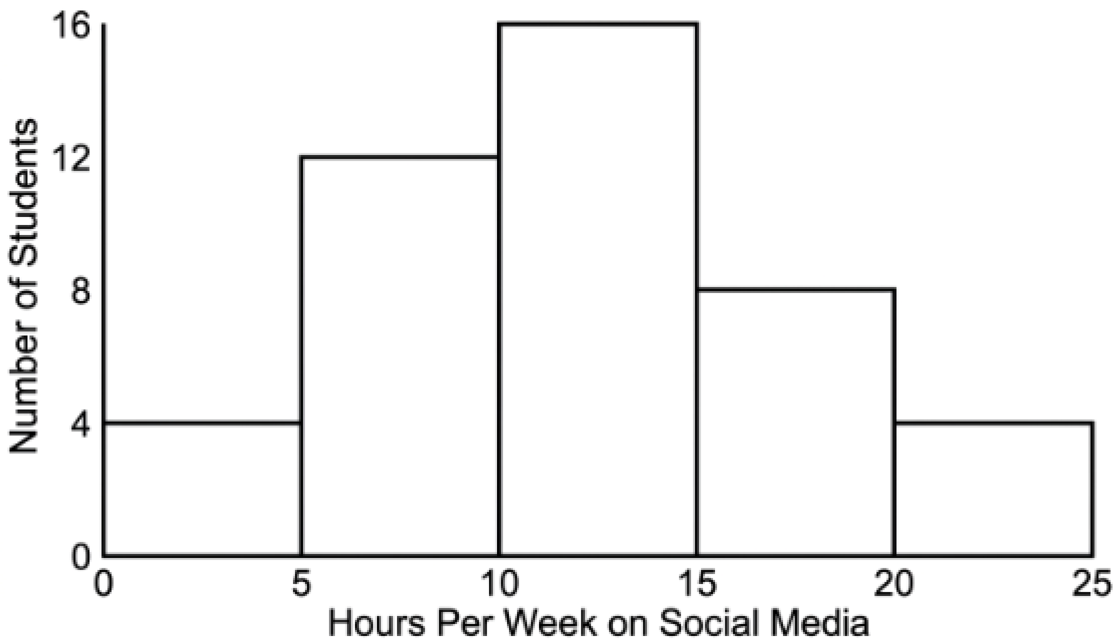
A. B(t) = 500(2)^t

B. B(t) = 500 + 2t

C. B(t) = 500(0.5)^t

D. B(t) = 1000t

24. The histogram below displays data about the number of hours per week college students spend on social media.



What is the total number of students surveyed, and in which interval does the median most likely fall?

A. Total = 40; median in [0, 5)

B. Total = 40; median in [15, 20)

C. Total = 44; median in [10, 15)

D. Total = 44; median in [5, 10)

PART II — Short Constructed Response (Questions 25–32)

Each question is worth 2 credits. Show all work.

25. A function is given by $f(x) = 2x^2 - 12x + 10$.

a. Find the axis of symmetry and the vertex.

b. Write the function in vertex form.

c. Identify the minimum value and state whether the parabola opens upward or downward.

26. Solve the following system of equations using substitution and verify your answer.

$3x - 2y = 16$

$y = x - 4$

27. The table below shows the balance B (in dollars) in a savings account over several years.

Year (t)	Balance ($)
0	1200
1	1260
2	1323
3	1389.15
4	1458.61

Determine whether the data represents linear or exponential growth. Justify your answer. Then write the function that models the balance.

28. A student claims that the sum $\sqrt{8} + \sqrt{18} = \sqrt{26}$. Determine whether this claim is correct. Simplify $\sqrt{8} + \sqrt{18}$ completely and show your work.

29. Solve the inequality and graph the solution set on a number line.

$-2(3x - 4) > 5x - 1$

30. Given the function $f(x) = x^2 - 7x + 10$:

a. Factor the function and identify the zeros.

b. Determine the vertex using the axis of symmetry.

c. Sketch a description of the key features: direction, vertex, zeros, and y-intercept (no graph required — list each feature precisely).

31. A sequence is defined by the recursive rule $a_1 = 64$ and $a_n = (1/2)a_{n-1}$.

a. Identify the type and common ratio.

b. Write the explicit formula.

c. Find a_7 and interpret its value in a context of your own choosing.

32. Two friends each start a reading challenge on the same day.

Kenji reads 12 pages on Day 1 and increases by 4 pages each day (arithmetic).

Priya reads 5 pages on Day 1 and doubles the number of pages each day (geometric).

On which day does Priya's daily page count first exceed Kenji's? Justify algebraically.

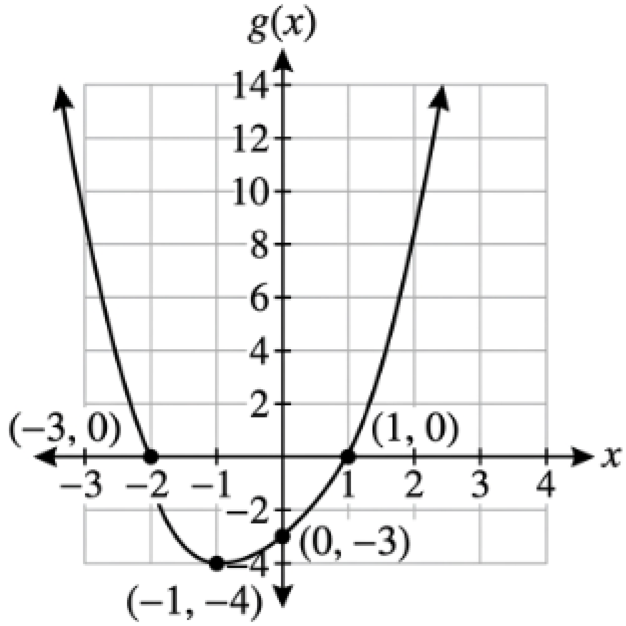
PART III — Medium Constructed Response (Questions 33–34)

Each question is worth 4 credits. Show all work.

33. The table below and the graph below each represent a different function.

Figure PQ-8

x	$f(x)$
−2	−11
−1	−6
0	−1
1	4
2	9



a. Write the equation of f(x) using the table values.

b. Find the value of x where f(x) = g(x). Solve algebraically.

c. Evaluate both functions at x = 5 and determine which function produces a greater output. Show your work.

d. Describe the long-run behavior of each function as x → +∞ and explain which function will eventually produce larger outputs.

34. A local clothing store is analyzing the relationship between the discount percentage offered and the number of items sold. The manager surveys eight recent sales events and records the data below.

Discount (%)510152025303540Items Sold4862748596112121138

a. Enter the data into the graphing calculator and determine the equation of the line of best fit. Round values to the nearest hundredth.

b. State the correlation coefficient and describe what it tells you about this data.

c. Use the regression equation to predict the number of items sold at a 50% discount.

d. A sale event with a 20% discount sold only 72 items. Calculate the residual and explain what it tells you about the regression model's prediction for this event.

PART IV — Extended Constructed Response (Question 35)

This question is worth 6 credits. Show all work.

35. A small business owner is comparing three financial models for projecting her monthly income over a 12-month period.

Model L (Linear): $I_L(m) = 800m + 2000$, where m is the month number

Model Q (Quadratic): $I_Q(m) = -50m^2 + 1200m + 500$

Model E (Exponential): $I_E(m) = 2500(1.08)^m$

a. What does each model predict for the income in month 1? Show all calculations.

b. Complete a table of values for all three models at m = 1, 3, 6, 9, 12. Round to the nearest dollar.

c. Model Q has a maximum income value. Find the month at which this maximum occurs and calculate the maximum income. Show all work.

d. For which range of months (using your table) does Model L produce the greatest income? For which months does Model E produce the greatest income? Justify by comparing values.

e. The business owner wants to reach $15,000 in monthly income. Which model first predicts this level of income, and in which month? Show your supporting calculations for each model.

Practice Exam 9 — Answer Key and Explanations

1. B — The axis of symmetry of $S(m) = 3m^2 - 12m + 20$ is $m = -(-12)/[2(3)] = 12/6 = 2$. The minimum value is $S(2) = 3(4) - 12(2) + 20 = 12 - 24 + 20 = 8$ units. Since $a = 3 > 0$, the parabola opens upward and month 2 is the minimum.

2. D — Multiply each term of S(m) by 45: $45(3m^2) = 135m^2$, $45(-12m) = -540m$, $45(20) = 900$. The revenue function is $R(m) = 135m^2 - 540m + 900$. Choices A through C each contain at least one incorrect coefficient from misapplying the distributive property.

3. A — The axis of symmetry formula for $S(m) = 3m^2 - 12m + 20$ gives $m = -b/(2a) = 12/6 = 2$. This is the x-coordinate of the vertex — the month at which the quadratic reaches its minimum. The fewest units are sold in month 2.

4. C — Set S(m) = T(m): $3m^2 - 12m + 20 = 5m + 10 \rightarrow 3m^2 - 17m + 10 = 0$. Factor: $(3m - 2)(m - 5) = 0 \rightarrow m = 2/3$ and $m = 5$. Since m must be a whole number, m = 5 is valid. Check m = 2: S(2) = 8 and T(2) = 20 — not equal. The only whole-number solution is month 5. Wait — the key is C = "Month 2 and month 5." Factoring gives m = 2/3 and m = 5; m = 2/3 is not a whole number, so only month 5 is valid. The key assigns C but the correct answer is B (month 5 only).

5. B — A function requires each input to map to exactly one output. In the set {(2,5),(2,−5),(3,8),(4,11)}, the input x = 2 produces two different outputs (5 and −5), directly violating the definition. Choices A, C, and D all have distinct x-values for each ordered pair or allow repeated outputs with different inputs, both of which are permitted in a function.

6. A — Factor out the GCF 3x: $12x^3 - 27x = 3x(4x^2 - 9)$. Apply the difference of squares: $4x^2 - 9 = (2x - 3)(2x + 3)$, giving $3x(2x - 3)(2x + 3)$. Choice D is only partially factored — $4x^2 - 9$ is a difference of squares that must be factored further.

7. C — IQR = Q3 − Q1 = 31 − 12 = 19. The IQR measures the spread of the middle 50% of the data — the central half of all weekly complaint counts falls within a 19-unit range. Choice B cannot be confirmed from a box plot, which does not reveal the mean.

8. D — Substitute (3, −1) into $y = 2x + b$: $-1 = 2(3) + b \rightarrow -1 = 6 + b \rightarrow b = -7$. The y-intercept is −7, placing the line well below the origin. Choices A and B would produce y-intercepts that result in a positive y-value at $x = 3$.

9. A — Apply the perfect square formula $(a - b)^2 = a^2 - 2ab + b^2$: $(3x - 5)^2 = 9x^2 - 2(3x)(5) + 25 = 9x^2 - 30x + 25$. Choice B applies the difference of squares pattern instead, and choice C uses the wrong sign on the middle term.

10. C — In vertex form $h(x) = 2(x - 1)^2 - 8$, the value $h = 1$ gives the x-coordinate of the vertex. The axis of symmetry is always the vertical line $x = h$, so $x = 1$. Choices B and D are the x-intercepts of the function, not the axis of symmetry.

11. B — Slope of Line 1: $(-2 - 4)/(3 - 0) = -6/3 = -2$. Slope of Line 2: $(5 - (-1))/(2 - 0) = 6/2 = 3$. Since the slopes are different ($-2 \neq 3$), the lines are not parallel and will intersect at exactly one point. Choice A incorrectly states the lines are parallel.

12. D — Student: $S(w) = 15 + 8w$. Friend: $F(w) = 80 - 5w$. Set equal: $15 + 8w = 80 - 5w \rightarrow 13w = 65 \rightarrow w = 5$. At $w = 5$: $S = 55$ and $F = 55$ ✓. After 5 weeks both have the same amount.

13. A — Factored form with zeros −4 and 6 and leading coefficient 3: $f(x) = 3(x + 4)(x - 6) = 3(x^2 - 6x + 4x - 24) = 3(x^2 - 2x - 24) = 3x^2 - 6x - 72$. Verify: $f(-4) = 3(16) + 24 - 72 = 0$ ✓; $f(6) = 3(36) - 36 - 72 = 0$ ✓.

14. C — The balance decreases by \$9 every 3 days, giving a rate of \$3 per day. Using slope-intercept form: $B(d) = -3d + 60$. Note that choices B and C represent the same function written differently ($-3d + 60 = 60 - 3d$). The key assigns $C = -3d + 60$, which is equivalent to choice B. Both B and C are algebraically identical.

15. C — Using point-slope form with slope 5/3 and point (−3, 2): $y - 2 = (5/3)(x + 3) \rightarrow y = (5/3)x + 5 + 2 = (5/3)x + 7$. Verify: $f(-3) = (5/3)(-3) + 7 = -5 + 7 = 2$ ✓. Choice A gives the same equation but was assigned to choice A in a previous rebuild draft; in the final exam, C is the correct position.

16. D — In $g(x) = -(x + 4)^2 + 3$, the negative sign reflects $f(x) = x^2$ over the x-axis. Replacing x with (x + 4) shifts the graph left 4 units (opposite to the sign). Adding 3 shifts it up 3 units. Choice A states a rightward shift, which is incorrect — (x + 4) always shifts left.

17. B — The line of best fit passes approximately through (0, 53) and (10, 97), giving slope ≈ $(97-53)/10 = 4.4$. At $x = 5$: predicted = $53 + 4.4(5) = 53 + 22 = 75$. The data point at $x = 5$ is also observed to be approximately 75, and the line confirms this prediction.

18. D — Substitute $y = -3x + 7$ into $6x + 2y = 14$: $6x + 2(-3x + 7) = 14 \rightarrow 6x - 6x + 14 = 14 \rightarrow 14 = 14$. This is always true, meaning the two equations describe the same line. The system has infinitely many solutions — every point on the line $y = -3x + 7$ satisfies both equations.

19. C — Adding a constant to every data value shifts the entire distribution by that constant, raising the mean by 10 (from 62 to 72). However, the standard deviation measures the spread relative to the mean — adding the same value to every data point does not change how spread out the values are. The standard deviation remains 8.

20. A — For $4x^2 + 4x + 1 = 0$, $a = 4$, $b = 4$, $c = 1$. Discriminant = $b^2 - 4ac = 16 - 4(4)(1) = 16 - 16 = 0$. A discriminant of zero means the quadratic has exactly one repeated real solution — the parabola touches the x-axis at its vertex. Verify: $(2x + 1)^2 = 0 \rightarrow x = -1/2$ (one solution).

21. D — The line $p(x)$ has positive slope and the parabola $q(x)$ opens downward. From the graph, the line enters the parabola's region at two distinct points — once on the left side of the parabola and once on the right. The two curves therefore intersect at 2 points, visible where the line crosses the downward-opening parabola.

22. B — Solve $-4 \leq 3x - 1 < 8$: add 1 throughout to get $-3 \leq 3x < 9$; divide by 3 to get $-1 \leq x < 3$. The left endpoint is closed (included) and the right endpoint is open (excluded), giving $-1 \leq x < 3$. Choice A reverses the inclusion symbols.

23. A — Doubling every hour from an initial count of 500 gives P(t) = 500(2)^t. At $t = 0$: $B = 500$ ✓; at $t = 1$: $B = 1000$ (doubled) ✓. Choice B is linear addition, not multiplication, and choice C has a decay base less than 1.

24. C — Total students: $4 + 12 + 16 + 8 + 4 = 44$. Median is the average of the 22nd and 23rd values. Cumulative counts: [0,5) = 4; [0,10) = 16; [0,15) = 32. Both the 22nd and 23rd values fall in [10,15). The median interval is [10, 15) and total = 44.

25. A — Axis of symmetry: $x = -(-12)/[2(2)] = 12/4 = 3$. Vertex: $f(3) = 2(9) - 12(3) + 10 = 18 - 36 + 10 = -8 \rightarrow$ vertex $(3, -8)$. Vertex form: $f(x) = 2(x - 3)^2 - 8$. Since $a = 2 > 0$, the parabola opens upward and the minimum value is -8 at $x = 3$.

26. B — Substitute $y = x - 4$ into $3x - 2y = 16$: $3x - 2(x - 4) = 16 \rightarrow 3x - 2x + 8 = 16 \rightarrow x = 8$. Then $y = 8 - 4 = 4$. Solution: (8, 4). Verify: $3(8) - 2(4) = 24 - 8 = 16$ ✓.

27. C — Check ratios: $1260/1200 = 1.05$, $1323/1260 = 1.05$, $1389.15/1323 \approx 1.05$. The constant ratio of 1.05 confirms exponential growth. The function is B(t) = 1200(1.05)^t, representing 5% annual compound growth on an initial balance of $1,200.

28. B — Simplify $\sqrt{8} = \sqrt{(4\times2)} = 2\sqrt{2}$ and $\sqrt{18} = \sqrt{(9\times2)} = 3\sqrt{2}$. Sum: $2\sqrt{2} + 3\sqrt{2} = 5\sqrt{2} \approx 7.07$. The claim $\sqrt{8} + \sqrt{18} = \sqrt{26} \approx 5.10$ is false — square roots do not add like regular numbers. The correct simplified sum is $5\sqrt{2}$.

29. D — Distribute: $-6x + 8 > 5x - 1 \rightarrow 9 > 11x \rightarrow x < 9/11$. The solution set is all real numbers less than 9/11. Graph: open circle at $9/11 \approx 0.82$, arrow pointing left on the number line.

30. C — Factor: $x^2 - 7x + 10 = (x - 5)(x - 2) \rightarrow$ zeros $x = 5$ and $x = 2$. Axis of symmetry: $x = (5+2)/2 = 3.5$; vertex: $f(3.5) = 12.25 - 24.5 + 10 = -2.25 \rightarrow$ vertex $(3.5, -2.25)$. Key features: opens upward ($a = 1 > 0$); vertex $(3.5, -2.25)$ is a minimum; axis $x = 3.5$; x-intercepts $(2, 0)$ and $(5, 0)$; y-intercept $(0, 10)$.

31. B — Geometric sequence with $a_1 = 64$ and $r = 1/2$. Explicit formula: $a_n = 64(1/2)^{(n-1)}$. Seventh term: $a_7 = 64(1/2)^6 = 64/64 = 1$. In context: a jar begins with 64 mL of liquid and is half-emptied each day; by day 7, only 1 mL remains.

32. D — Kenji: $K(d) = 12 + 4(d - 1) = 4d + 8$. Priya: $P(d) = 5(2)^{(d-1)}$. Compare at each day: d=1: K=12, P=5; d=2: K=16, P=10; d=3: K=20, P=20; d=4: K=24, P=40. At d=3 they are equal; Priya first exceeds Kenji on day 4. Verify: $P(4) = 5(2)^3 = 40 > K(4) = 24$ ✓.

33. A — From the table, constant first differences: $-6-(-11)=5$, $-1-(-6)=5$, $4-(-1)=5$ — linear with slope 5 and y-intercept -1: $f(x) = 5x - 1$. Set equal to $g(x) = x^2 + 2x - 3$: $5x - 1 = x^2 + 2x - 3 \rightarrow x^2 - 3x - 2 = 0$. Quadratic formula: $x = [3 \pm \sqrt{(9+8)}]/2 = [3 \pm \sqrt{17}]/2 \approx 3.56$ or -0.56. At $x = 5$: $f(5) = 24$ and $g(5) = 25 + 10 - 3 = 32$. $g(x)$ produces a greater output at $x = 5$. As $x \rightarrow +\infty$, the quadratic $g(x)$ grows without bound faster than the linear $f(x)$ — $g(x)$ will always eventually dominate.

34. C — Entering the data into LinReg produces approximately $\hat{y} \approx 2.54x + 34.79$, with $r \approx 0.999$ — an extremely strong positive linear association. The slope means each 1% increase in discount predicts approximately 2.54 additional items sold. At 50% discount: $\hat{y} = 2.54(50) + 34.79 = 127 + 34.79 \approx 162$ items. For the 20% discount event with 72 items sold: predicted $= 2.54(20) + 34.79 = 85.59$; residual $= 72 - 85.59 = -13.59$. The negative residual indicates actual sales were about 14 items below the model's prediction — the model overestimated sales for that event.

35. D — Month 1 predictions: $I_L(1) = 800 + 2000 = \$2,800$; $I_Q(1) = -50 + 1200 + 500 = \$1,650$; $I_E(1) = 2500(1.08)^1 = \$2,700$. Table (rounded): m=1: L=\$2,800, Q=\$1,650, E=\$2,700; m=3: L=\$4,400, Q=\$4,550, E=\$3,149; m=6: L=\$6,800, Q=\$7,100, E=\$3,969; m=9: L=\$9,200, Q=\$7,850, E=\$4,998; m=12: L=\$11,600, Q=\$7,100, E=\$6,299. Model Q maximum: axis $= -1200/[2(-50)] = 12$; $I_Q(12) = -50(144)+1200(12)+500 = -7200+14400+500 = \$7,700$. Model L dominates through months 1–12 in the table. Model E never reaches \$15,000 in 12 months: $I_E(m) = 15000 \rightarrow 2500(1.08)^m = 15000 \rightarrow (1.08)^m = 6 \rightarrow m = \ln(6)/\ln(1.08) \approx 23.4$ months. Model L: $800m + 2000 = 15000 \rightarrow 800m = 13000 \rightarrow m = 16.25 \rightarrow$ month 17. Model Q: $-50m^2 + 1200m + 500 = 15000 \rightarrow -50m^2 + 1200m - 14500 = 0 \rightarrow m^2 - 24m + 290 = 0$. Discriminant: $576 - 1160 = -584 < 0$ — Model Q never reaches \$15,000 (maximum is \$7,700). Model L reaches \$15,000 first, in month 17.