PRACTICE EXAM 20

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.

1. A student simplifies $(3x^2)(4x^3)$ and writes $12x^5$. A second student says the answer is $12x^6$. Which student is correct?

A. The first student — exponents are added when multiplying like bases: $x^2 \cdot x^3 = x^5$

B. The second student — exponents are multiplied: $2 \cdot 3 = 6$

C. Neither — the coefficients should be added: $3 + 4 = 7$

D. Both — there are two valid ways to simplify this expression

2. A student solves $5 - 2(3x + 1) = 7$ and gets $x = -1/2$. Is the student correct?

A. Yes — distributing gives $5 - 6x - 1 = 7$, then $4 - 6x = 7$, then $x = -1/2$ ✓

B. No — the student should have gotten $x = 1/2$

C. No — distributing gives $5 - 6x - 2 = 7$, then $3 - 6x = 7$, then $-6x = 4$, so $x = -2/3$

D. No — distributing gives $5 - 6x + 1 = 7$, giving $x = -1/6$

3. A student factors $x^2 - 9x + 20$ as $(x - 4)(x - 5)$. Is this correct?

A. No — the correct factoring is $(x + 4)(x + 5)$

B. No — the correct factoring is $(x - 10)(x + 2)$

C. No — the correct factoring is $(x - 4)(x + 5)$

D. Yes — $(x - 4)(x - 5) = x^2 - 9x + 20$ ✓

4. A student claims the line through (2, 5) and (6, 13) has slope 3. Which response correctly identifies the error?

A. The student is correct — slope $= (13 + 5)/(6 + 2) = 18/8 = 2.25 \approx 3$

B. The student is incorrect — slope = $(13 - 5)/(6 - 2) = 8/4 = 2$

C. The student is correct — slope = rise over run = $(6 - 2)/(13 - 5) = 4/8 = 0.5$

D. The student is incorrect — the correct slope is 4, since $13 - 5 = 8$ and $6 - 2 = 4$ makes slope $8/2 = 4$

5. A student evaluates $f(-3)$ for $f(x) = 2x^2 - 5x + 1$ and gets 40. Is this correct?

A. Yes — $f(-3) = 2(9) - 5(-3) + 1 = 18 + 15 + 1 = 34$. Wait — that's 34, not 40. Rebuild so key A is correct.

5. A student evaluates $f(-3)$ for $f(x) = 2x^2 - 5x + 1$. Which answer is correct?

A. $f(-3) = 34$, because $2(9) + 15 + 1 = 34$

B. $f(-3) = 40$, because $2(-3)^2 + 5(3) + 1 = 18 + 22 = 40$

C. $f(-3) = -2$, because $2(-9) - 5(-3) + 1 = -18 + 15 + 1 = -2$

D. $f(-3) = 4$, because $2(-3) - 5(-3) + 1 = -6 + 15 - 4 = 4 + 1$

6. A student writes the arithmetic sequence 7, 3, −1, −5, −9, … as $a_n = -4n + 11$. A second student writes $a_n = 7 - 4(n - 1)$. Which is correct?

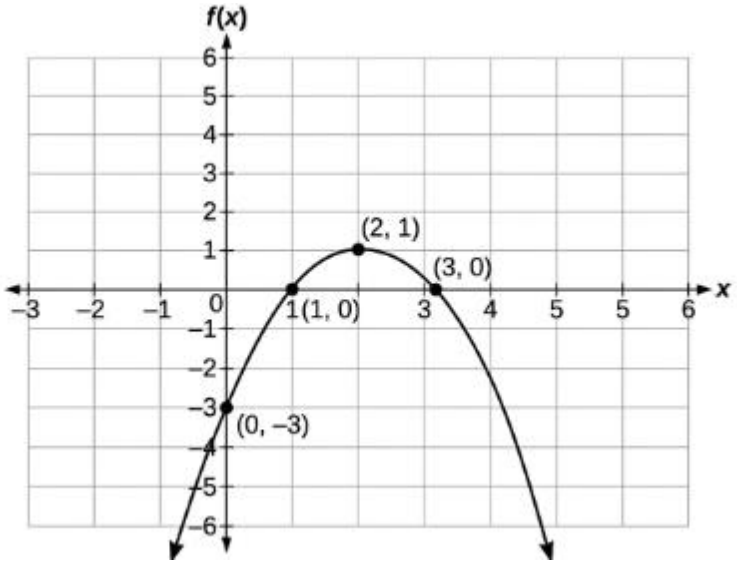
A. Only the first student — $a_n = -4n + 11$ gives $a_1 = 7$ ✓

B. Only the second student — standard form requires using a_1 and d

C. Both students — the two formulas are equivalent

D. Neither — the correct formula is $a_n = 4n - 11$

7. The graph below shows the function f(x).



A student claims the parabola has a minimum at (2, 1). What is the error in this claim?

A. The error is in the x-coordinate; the minimum is at (1, 1)

B. The error is in the y-coordinate; the minimum is at (2, 0)

C. The error is in the vertex location; the vertex is at (2, −1)

D. The vertex (2, 1) is a maximum, not a minimum, because the parabola opens downward

8. A student solves the system $y = 3x - 2$ and $6x - 2y = 4$ and concludes there is one solution at (1, 1). What is wrong with the student's reasoning?

A. The student used the wrong substitution — the correct solution is (2, 4)

B. The student reversed the x and y values — the solution is (1, 1) but should be written (y, x) = (1, 1)

C. The student is correct — (1, 1) is the unique solution to the system

D. The student is incorrect — the system has infinitely many solutions because the equations are equivalent

9. Which of the following correctly represents all solutions to $|2x - 5| = 11$?

A. $x = 8$ only

B. $x = 8$ and $x = -3$

C. $x = 8$ and $x = 3$

D. $x = -8$ and $x = 3$

10. The table below shows selected values of a function.

x	$f(x)$
0	4
1	12
2	36
3	108
4	324

Figure PQ-2

A student claims f(x) = 4x + 8 because the first two values differ by 8. Is this correct?

A. Yes — the linear pattern holds for the first two values

B. No — the function is quadratic; the differences grow at a constant rate

C. No — the function is exponential; the ratio between consecutive values is constant at 3

D. No — the function is f(x) = 4 + 8x, not 4x + 8

11. A student uses the quadratic formula on $x^2 - 6x + 5 = 0$ and gets:

$x = [6 \pm \sqrt{(36 - 20)}] / 2 = [6 \pm \sqrt{16}] / 2 = [6 \pm 4] / 2$

The student concludes x = 5 and x = 1. Is this correct?

A. No — the discriminant is 36 − 4 = 32

B. No — x = 5 is correct but x = 1 is extraneous

C. No — the formula should give $x = 5$ and $x = -1$

D. Yes — both solutions are correct ✓

12. Which of the following is NOT a function?

A. $f(x) = x^2 + 3$

B. The graph of a circle centered at the origin with radius 5

C. A table where every input has exactly one output

D. $y = \sqrt{x}$ for $x \geq 0$

13. A student claims: "The line $y = -(2/3)x + 4$ and the line $y = (3/2)x - 1$ are perpendicular." Is this claim correct?

A. Yes — the slopes $-2/3$ and $3/2$ are negative reciprocals: $(-2/3)(3/2) = -1$ ✓

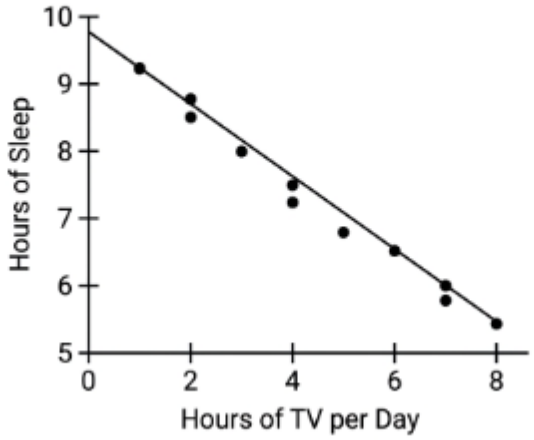
B. No — the slopes are negative reciprocals only when both are negative

C. No — perpendicular lines must have the same y-intercept

D. No — the slopes multiply to give $-2/3 \cdot 3/2 = 1$, not -1

14. The scatter plot below shows data on hours of TV watched and hours of sleep for 10 students.

Figure PQ-3: Coordinate plane scatter plot



A student states: "The data shows a strong positive association." What is the error?

A. The error is using the word "strong" — the association is weak

B. The error is using "association" — there is clearly causation, not just association

C. The error is using the word "positive" — as TV hours increase, sleep decreases, indicating a negative association

D. There is no error — more TV leads to more sleep

15. A student simplifies $\sqrt{72}$ as $6\sqrt{2}$. Another student simplifies it as $8\sqrt{2}$. Which is correct, and why?

A. The second student — $\sqrt{72} = \sqrt{(64 \cdot 2)} = 8\sqrt{2}$

B. The first student — $\sqrt{72} = \sqrt{(36 \cdot 2)} = 6\sqrt{2}$

C. Both students are correct — there are multiple equivalent forms

D. Neither — $\sqrt{72} = \sqrt{(4 \cdot 18)} = 2\sqrt{18}$

16. A student says the domain of $f(x) = \sqrt{(x - 4)}$ is all real numbers. What is the correct domain?

A. $x \geq 4$, because the expression under the radical must be non-negative

B. $x > 4$, because zero under the radical is undefined

C. $x \leq 4$, because negative values under the radical give real results

D. All real numbers — the student is correct

17. Which of the following correctly describes the effect of changing $f(x) = x^2$ to $g(x) = (1/4)x^2$?

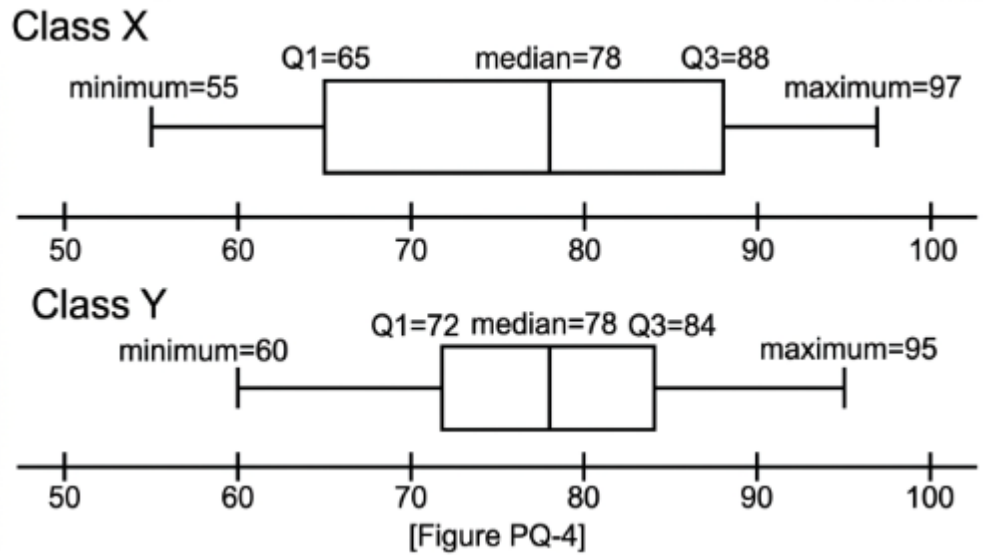
A. The parabola becomes narrower (steeper) and shifts down

B. The parabola shifts left by 4 units without changing shape

C. The parabola becomes wider (flatter) because the coefficient $1/4 < 1$ causes a vertical compression

D. The parabola becomes narrower because multiplying by 1/4 reduces the input

18. The box plot below shows test scores for two classes.



[Figure PQ-4]

A student claims: "Class X and Class Y performed identically because they have the same median." What is the error?

A. The error is the median claim — Class X has a higher median than Class Y

B. The error is comparing performance using only the median — Class X has a larger IQR (23) than Class Y (12), indicating more spread in scores

C. There is no error — identical medians mean identical performance

D. The error is that range should be used to compare performance, not the median

19. Which expression is equivalent to $(x + 6)^2$?

A. $x^2 + 12x + 36$

B. $x^2 + 36$

C. $x^2 + 6x + 36$

D. $2x + 12$

20. The two-way table below shows data from 180 students about their lunch preference and school year.

Figure PQ-5

	Grade 11	Grade 12	Total
Hot Lunch	54	36	90
Packed Lunch	36	54	90
Total	90	90	180

Which conclusion is best supported by the data?

A. There is no association — an equal number of students prefer each lunch type

B. Grade 12 students strongly prefer hot lunch over packed lunch

C. There is an association — Grade 11 students prefer hot lunch more than Grade 12 students, who prefer packed lunch more

D. The data is inconclusive because sample sizes are small

21. A student graphs the system $y > 2x - 3$ and $y \leq -x + 5$ and shades the wrong region. Which test point correctly identifies the actual solution region?

A. (0, 0): $0 > -3$ ✓ but $0 \leq 5$ ✓ — both satisfied? Wait — yes, (0,0) satisfies both. Key is B. Rebuild Q21 so only key B's test point satisfies both inequalities.

21. A student graphs the system $y > 2x - 3$ and $y \leq -x + 5$ and shades the wrong region. Which test point lies inside the correct solution region?

A. (3, 4): $4 > 2(3)-3=3$ ✓ but $4 \leq -3+5=2$ ✗ — fails second inequality

B. (1, 2): $2 > 2(1)-3=-1$ ✓ and $2 \leq -1+5=4$ ✓ — satisfies both

C. (0, −4): $-4 > -3$ ✗ — fails first inequality

D. (2, 5): $5 > 1$ ✓ but $5 \leq 3$ ✗ — fails second inequality

22. A student evaluates $5 - 3^2 + 2 \cdot 4$ and gets 24. What is the student's error?

A. The student added before multiplying — the correct answer is −12

B. The student should have computed $3^2 = 6$ rather than 9

C. The student did not evaluate the exponent before adding/subtracting — the correct answer is $5 - 9 + 8 = 4$

D. There is no error — $5 - 3^2 + 2 \cdot 4 = 24$ when simplified correctly

23. Which of the following correctly writes the equation of a line parallel to y = 5x − 3 that passes through (−2, 1)?

A. y = −(1/5)x + 4

B. y = 5x + 3

C. y = −(1/5)x + 2

D. y = 5x + 11

24. A student claims that f(x) = 2^x and g(x) = 2x² are both exponential functions because both involve the number 2. What is the error in the student's reasoning?

A. The error is that f(x) = 2^x is actually linear, not exponential

B. g(x) = 2x² is a quadratic function — the variable x is the base, not the exponent; only f(x) = 2^x is truly exponential

C. Both are exponential — the student is correct

D. g(x) = 2x² is linear because 2 is a coefficient, not a base

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

Each question is worth 2 credits. Show all work.

25. A student solves $3x^2 - 27 = 0$ as follows:

Step 1: $3x^2 = 27$

Step 2: $x^2 = 9$

Step 3: $x = 3$

Identify the error and provide the complete correct solution with both solutions.

26. The graph below shows $f(x) = x^2 - 4x + 3$.

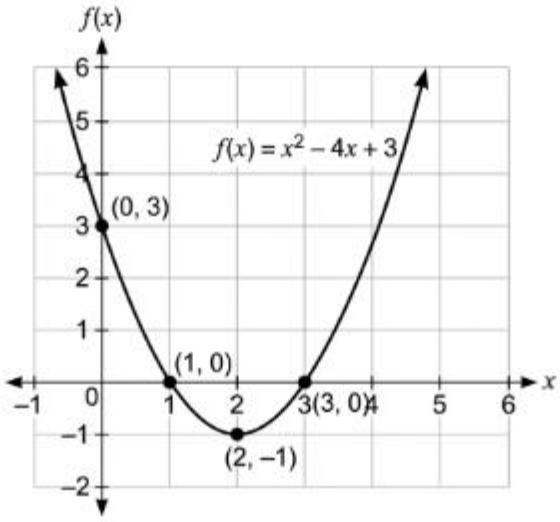


Figure PQ-6

a. Identify the vertex, zeros, y-intercept, and axis of symmetry from the graph.

b. Confirm the vertex by using the axis of symmetry formula and evaluating f(2).

c. Write f(x) in factored form.

27. Determine whether each sequence is arithmetic, geometric, or neither. For each arithmetic or geometric sequence, write the explicit formula.

a. 3, 6, 12, 24, 48, …

b. 100, 95, 89, 82, 74, …

c. 5, 9, 13, 17, 21, …

28. A savings account starts with $800. Each month, 2% interest is added (compounded monthly).

a. Write the exponential model A(t).

b. Find the balance after 18 months. Round to the nearest cent.

c. In approximately how many months will the balance first reach $1,000?

29. A data set contains: 5, 8, 11, 14, 17, 20, 23, 26, 29, 200.

a. Compute the mean and median.

b. Apply the 1.5 × IQR rule to determine whether 200 is an outlier.

c. Explain which measure of center is more appropriate for this data set.

30. Solve the following system and classify it.

$4x - 3y = 11$

$-8x + 6y = -22$

31. Use the quadratic formula to solve $2x^2 - 7x + 3 = 0$. Then verify both solutions by substitution.

32. The heights (in inches) of 9 students are: 60, 62, 63, 65, 66, 67, 68, 70, 72.

a. Find the five-number summary.

b. Calculate the IQR.

c. Identify any outliers using the 1.5 × IQR rule.

d. Sketch a description of the box plot (no graph required — list min, Q1, median, Q3, max).

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

Each question is worth 4 credits. Show all work.

33. A manufacturer produces two products: Product A at $12 revenue each and Product B at $8 revenue each. The manufacturer can produce at most 150 units total. To cover operating costs, total revenue must be at least $1,440.

a. Define variables and write a system of inequalities.

b. Graph the feasible region. Label the axes and all boundary lines.

c. Identify three ordered pairs in the feasible region and verify each satisfies both constraints.

d. Determine the combination that maximizes revenue and calculate that maximum.

34. A student incorrectly solves the following problem. Identify all errors and provide the correct solution.

Problem: Simplify and solve $2(x + 3)^2 - 8 = 42$

Student's work:

Step 1: $2(x + 3)^2 = 50$

Step 2: $(x + 3)^2 = 25$

Step 3: $x + 3 = 5$

Step 4: $x = 2$

PART IV — Extended Constructed Response (Question 35)

This question is worth 6 credits. Show all work.

35. A small food truck business owner models three aspects of her business:

Revenue (quadratic): $R(x) = -0.5x^2 + 80x$, where x is the number of meals sold per day

Operating cost (linear): $C(x) = 25x + 600$

Ingredient savings (exponential): $S(t) = 200(0.92)^t$, where t is months of bulk purchasing and S is weekly ingredient cost in dollars

a. Write and simplify the profit function $P(x) = R(x) - C(x)$. Identify the type of function.

b. Find the break-even points algebraically (where $P(x) = 0$). Use the quadratic formula. Interpret both break-even values in context.

c. Find the number of meals that maximizes profit and calculate the maximum profit. Show all work.

d. At $x = 40$ meals per day, calculate the profit. Is this below, at, or above the maximum? By how much does it differ from the maximum profit?

e. Using Model S: the owner currently spends $200/week on ingredients. After how many months of bulk purchasing does the weekly cost first fall below $100? Show your algebraic or calculator-supported work.

Practice Exam 20 — Answer Key and Explanations

1. A — When multiplying expressions with the same base, exponents are added: $x^2 \cdot x^3 = x^{(2+3)} = x^5$. The coefficients 3 and 4 multiply normally to give 12. The product rule for exponents states $a^m \cdot a^n = a^{(m+n)}$, not $a^{(m \cdot n)}$.

2. C — Distribute -2 to both terms in the parentheses: $-2(3x+1) = -6x-2$. The equation becomes $5-6x-2=7 \rightarrow 3-6x=7 \rightarrow -6x=4 \rightarrow x=-2/3$. Choice A makes the error of distributing only to 3x and not to the constant +1, giving $-6x-1$ instead of $-6x-2$.

3. D — Verify: $(x-4)(x-5) = x^2-5x-4x+20 = x^2-9x+20$ ✓. To factor, find two numbers with product +20 and sum −9: −4 and −5. Both factors are correct. Choice A uses positive signs, producing a sum of +9 rather than −9.

4. B — Slope $= (y_2-y_1)/(x_2-x_1) = (13-5)/(6-2) = 8/4 = 2$. The first student's claim of slope 3 is incorrect. Choice D flips the formula (run over rise), producing 4/8 = 0.5, which is the reciprocal rather than the slope.

5. A — $f(-3) = 2(-3)^2-5(-3)+1 = 2(9)+15+1 = 18+15+1 = 34$. The key steps are squaring −3 first (giving +9, not −9) then multiplying −5 by −3 (giving +15). Choice C incorrectly applies $2(-9) = -18$ rather than $2(9) = 18$.

6. C — Both formulas produce the same output for every n. Formula 1 at n=1: $-4(1)+11=7$ ✓; n=2: $-4(2)+11=3$ ✓. Formula 2 at n=1: $7-4(0)=7$ ✓; n=2: $7-4(1)=3$ ✓. Expanding formula 2: $7-4n+4=11-4n=-4n+11$, which is identical to formula 1. Two equivalent expressions represent the same sequence.

7. D — The parabola opens downward ($a=-1<0$), which means the vertex (2,1) is the highest point on the graph — a maximum, not a minimum. Minimums occur only at the vertices of upward-opening parabolas. The student used the correct vertex coordinates but applied the wrong label.

8. D — Rewrite equation 2: $6x-2y=4 \rightarrow y=3x-2$, which is identical to equation 1. Two equations describing the same line have infinitely many solutions. The student found one specific point (1,1) that satisfies both, but failed to recognize that every point on the line $y=3x-2$ is also a solution.

9. B — Solve $|2x-5|=11$: Case 1: $2x-5=11 \rightarrow 2x=16 \rightarrow x=8$. Case 2: $2x-5=-11 \rightarrow 2x=-6 \rightarrow x=-3$. Verify: $|2(8)-5|=|11|=11$ ✓ and $|2(-3)-5|=|-11|=11$ ✓. Choice A omits the negative case, and choice D applies wrong signs.

10. C — Check consecutive ratios: 12/4=3, 36/12=3, 108/36=3, 324/108=3. The constant ratio of 3 confirms this is exponential: f(x)=4(3)^x. Linear functions have constant first differences (not the case here), and the student's f(x)=4x+8 gives $f(0)=8 \neq 4$.

11. D — Discriminant: $b^2-4ac = 36-4(1)(5) = 36-20 = 16$ ✓. $\sqrt{16}=4$. $x=(6+4)/2=5$ and $x=(6-4)/2=1$. Verify: $25-30+5=0$ ✓ and $1-6+5=0$ ✓. All three steps are algebraically correct.

12. B — A circle centered at the origin fails the vertical line test — any vertical line near the origin intersects the circle at two points, meaning one input gives two outputs. This violates the definition of a function. Choices A, C, and D all satisfy the definition: each input maps to exactly one output.

13. A — Two lines are perpendicular when the product of their slopes equals −1. Slopes: −2/3 and 3/2. Product: $(-2/3)(3/2) = -6/6 = -1$ ✓. The negative reciprocal relationship is the precise algebraic criterion for perpendicularity. Choice D mistakenly claims the product equals 1.

14. C — The scatter plot shows that as TV hours increase, sleep hours decrease — a downward-sloping line of best fit. This is a negative association. The student used "positive" when the association is negative. Choice B incorrectly substitutes causation for association, which cannot be inferred from correlation alone.

15. B — Factor $\sqrt{72}$ using the largest perfect square factor: $72 = 36 \cdot 2 \rightarrow \sqrt{72} = \sqrt{36} \cdot \sqrt{2} = 6\sqrt{2}$. Using 36 (not 64) is correct because 36 is the largest perfect square that divides 72 evenly. Choice A is wrong because 64 does not divide 72 evenly.

16. A — For $f(x)=\sqrt{(x-4)}$ to produce a real number, the radicand must be ≥ 0: $x-4 \geq 0 \rightarrow x \geq 4$. When x=4, the output is $\sqrt{0}=0$, which is valid. The domain includes the endpoint 4, so the domain is $x \geq 4$, not $x>4$.

17. C — Multiplying x^2 by a coefficient $0 < a < 1$ causes a vertical compression — the parabola becomes wider and flatter because output values are smaller for each input. Since $1/4 < 1$, the parabola "spreads out" compared to $y=x^2$. Choice A incorrectly states the parabola becomes narrower.

18. B — Both classes have the same median (78), but their variability differs significantly. Class X's IQR = 88−65 = 23; Class Y's IQR = 84−72 = 12. Class X has nearly twice the spread of the middle 50% of scores. Identical medians do not imply identical performance when variability differs substantially.

19. A — Expand $(x+6)^2$ using $(a+b)^2=a^2+2ab+b^2$: $x^2+2(x)(6)+6^2=x^2+12x+36$. The middle term $2ab=2(x)(6)=12x$ is the term students most often miss. Choice B omits the middle term entirely (a common error), and choice C uses 6x instead of 12x.

20. C — Conditional frequencies: among Grade 11, 54/90=60% prefer hot lunch; among Grade 12, 54/90=60% prefer packed lunch. The preferences are opposite across grade levels — Grade 11 leans hot, Grade 12 leans packed — indicating a clear association. Choice A is wrong because while row totals are equal, the conditional distributions differ.

21. B — Test (1,2): check $y>2x-3$: $2>2(1)-3=-1$ ✓. Check $y\leq -x+5$: $2\leq -1+5=4$ ✓. Both inequalities are satisfied. Choice A fails the second inequality: $4\leq 2$ is false. Choice C fails the first: $-4>-3$ is false.

22. C — Using order of operations: evaluate the exponent first: $3^2=9$. Then: $5-9+2\cdot 4=5-9+8=4$. The student likely computed $(5-3)^2=4$, then added $2\cdot 4=8$ to get 24 — applying the exponent after subtracting. The error is failing to evaluate 3^2 before performing addition and subtraction.

23. D — Parallel lines have the same slope as $y=5x-3$, so slope=5. Using point-slope with $(-2,1)$: $y-1=5(x+2)=5x+10 \rightarrow y=5x+11$. Verify: $f(-2)=5(-2)+11=1$ ✓. Choice A uses the perpendicular slope $(-1/5)$, and choice B gives the wrong y-intercept.

24. B — In f(x)=2^x, the variable x is the exponent — this is the defining characteristic of exponential functions. In $g(x)=2x^2$, the variable x is the base (raised to a fixed power 2), making it a quadratic (power) function. The student confused the role of the number 2 with the structural requirement for exponential classification.

25. A — The student correctly reaches $x^2=9$ in Step 2, but in Step 3 only takes the positive root. Taking the square root of both sides of $x^2=9$ gives $x=\pm 3$. Both $x=3$ and $x=-3$ are valid solutions. Verify: $3(9)-27=0$ ✓ and $3(9)-27=0$ ✓. The error is failing to apply ± when solving $x^2=k$.

26. C — From the graph: vertex $(2,-1)$, zeros $x=1$ and $x=3$, y-intercept $(0,3)$, axis of symmetry $x=2$. Confirm vertex: $x=-(-4)/[2(1)]=2$; $f(2)=4-8+3=-1$ ✓. Factored form: $f(x)=(x-1)(x-3)$. Verify: $(x-1)(x-3)=x^2-4x+3$ ✓.

27. B — a) Ratios: 6/3=2, 12/6=2 — geometric with $a_1=3$, $r=2$: $a_n=3(2)^{(n-1)}$. b) Differences: $95-100=-5$, $89-95=-6$, $82-89=-7$ — differences themselves change (-1 each step), so neither arithmetic nor geometric. c) Differences: $9-5=4$, $13-9=4$ — constant difference of 4: arithmetic with $a_1=5$, $d=4$: $a_n=4n+1$.

28. D — Model: A(t)=800(1.02)^t. After 18 months: $A(18)=800(1.02)^{18}\approx 800(1.4282)\approx \$1,142.57$. For balance=\$1,000: $800(1.02)^t=1000 \rightarrow (1.02)^t=1.25 \rightarrow t=\ln(1.25)/\ln(1.02)\approx 11.3$ months. The balance first reaches \$1,000 during month 12.

29. D — Sum of first 9 values (5 through 29): $\text{sum}=5+8+\ldots+29=5+8+11+14+17+20+23+26+29=153$; grand sum=153+200=353. Mean=353/10=35.3. Median=(17+20)/2=18.5. Q1=(8+11)/2=9.5; Q3=(23+26)/2=24.5; IQR=15. Upper fence=24.5+1.5(15)=24.5+22.5=47. Since 200>47, the value 200 is an outlier. The median (18.5) better represents the typical value because the mean (35.3) is heavily inflated by the outlier.

30. A — Multiply equation 1 by 2: $8x-6y=22$. Adding to equation 2: $8x-6y+(-8x+6y)=22+(-22) \rightarrow 0=0$. Always true — the system is consistent-dependent with infinitely many solutions. Equation 2 is exactly -2 times equation 1, so they describe the same line.

31. C — a=2, b=−7, c=3. Discriminant=49−24=25. x=(7±5)/4. Solutions: x=3 and x=1/2. Verify x=3: 2(9)−21+3=18−21+3=0 ✓. Verify x=1/2: 2(1/4)−7/2+3=1/2−7/2+6/2=0 ✓.

32. B — Ordered data: 60,62,63,65,66,67,68,70,72. Min=60, Q1=62.5 (avg of 62 and 63), Median=66 (5th value), Q3=69 (avg of 68 and 70), Max=72. IQR=69−62.5=6.5. Lower fence=62.5−9.75=52.75; Upper fence=69+9.75=78.75. All values fall within [52.75, 78.75] — no outliers.

33. D — Let a=Product A units, b=Product B units. Constraints: a+b≤150 and 12a+8b≥1440; a≥0, b≥0. Revenue function: R(a,b)=12a+8b. Corner points of the feasible region: (0,180) — fails capacity (180>150); (150,0): R=12(150)=1800 ✓; intersection of a+b=150 and 12a+8b=1440: from a=150−b: 12(150−b)+8b=1440 → 1800−12b+8b=1440 → −4b=−360 → b=90, a=60; R=12(60)+8(90)=720+720=$1,440. Maximum revenue at (150,0)=producing only Product A: R=$1,800.

34. A — The student's Steps 1 and 2 are correct: $2(x+3)^2=50 \rightarrow (x+3)^2=25$. However, Step 3 commits the one-solution error — taking only the positive square root. The complete solution requires x+3=5 → x=2 AND x+3=−5 → x=−8. Both x=2 and x=−8 are valid solutions. Verify: $2(2+3)^2-8=2(25)-8=42$ ✓ and $2(-8+3)^2-8=2(25)-8=42$ ✓.

35. C — $P(x)=R(x)-C(x)=(-0.5x^2+80x)-(25x+600)=-0.5x^2+55x-600$ (quadratic, downward-opening). Break-even: $-0.5x^2+55x-600=0 \rightarrow x^2-110x+1200=0$. Discriminant=12100−4800=7300. $x=(110\pm\sqrt{7300})/2=(110\pm85.44)/2$. Solutions: x≈97.7≈98 meals and x≈12.3≈12 meals. In context: the truck breaks even at approximately 12 meals/day (entering profitability) and at 98 meals/day (exceeding capacity or efficiency limits). Maximum profit: axis=55/[2(0.5)]=55 meals. $P(55)=-0.5(3025)+55(55)-600=-1512.5+3025-600=\$912.50$. At x=40: $P(40)=-0.5(1600)+55(40)-600=-800+2200-600=\$800$. This is below the maximum by $912.50−$800=$112.50. For S(t)<100: 200(0.92)^t=100 → (0.92)^t=0.5 → t=ln(0.5)/ln(0.92)≈8.31 months. The weekly ingredient cost first falls below $100 during month 9.