

PRACTICE EXAM 12

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. The graph of a linear function passes through $(0, -3)$ and $(5, 0)$. Which equation represents this function?

A. $y = 5x - 3$

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

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

D. $y = -3x + 5$

2. Which of the following is equivalent to $(2x - 5)(3x + 4) - (x^2 + 2)$?

A. $5x^2 - 7x - 18$

B. $5x^2 + 7x - 22$

C. $6x^2 + 7x - 22$

D. $5x^2 - 7x - 22$

3. A student claims: "The product $\sqrt{3} \cdot \sqrt{12}$ is irrational because both factors are irrational." Is this claim correct?

A. No, the claim is incorrect; $\sqrt{3} \cdot \sqrt{12} = \sqrt{36} = 6$, which is rational

B. Yes, the claim is correct; the product of two irrationals is always irrational

C. No, the claim is incorrect; $\sqrt{3}$ and $\sqrt{12}$ are both rational numbers

D. Yes, the claim is correct; $\sqrt{36}$ is still considered irrational

4. The table below shows a function $h(x)$.

x	h(x)
0	1
1	3
2	9
3	27
4	81

Which equation models $h(x)$?

A. $h(x) = 3x + 1$

B. $h(x) = x^3$

C. $h(x) = 3^x$

D. $h(x) = 2x + 1$

5. A rectangle has width $(x - 2)$ and length $(3x + 1)$. For which value of x is the area of the rectangle equal to zero?

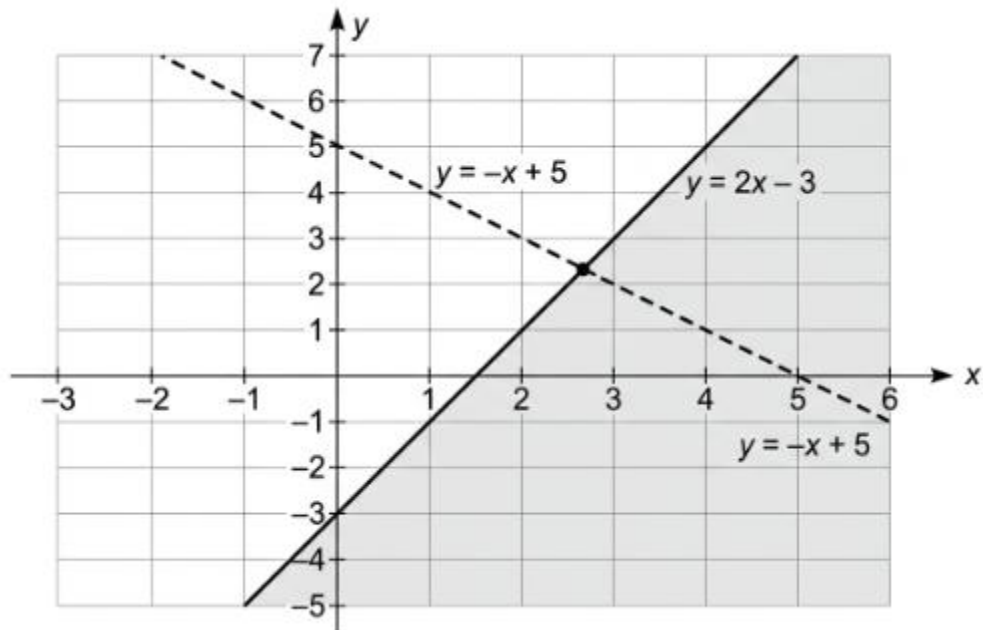
A. $x = -1/3$ only

B. $x = 2$ or $x = -1/3$

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

D. $x = 2$ only

6. Which system of inequalities matches the graph?



A. $y \geq 2x - 3$ and $y < -x + 5$

B. $y < 2x - 3$ and $y \geq -x + 5$

C. $y \geq 2x - 3$ and $y \geq -x + 5$

D. $y \leq 2x - 3$ and $y > -x + 5$

7. What is the solution to the equation $5x^2 = 125$?

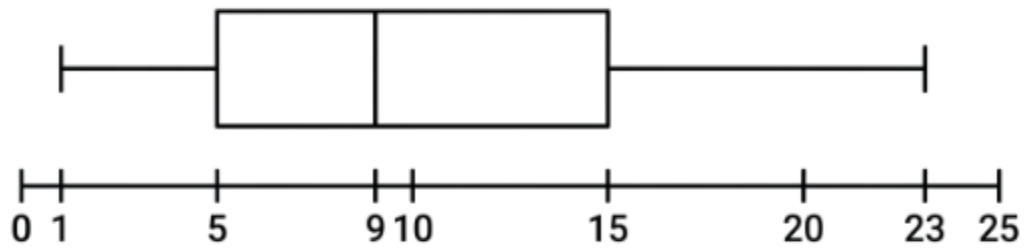
A. $x = 5$

B. $x = 25$

C. $x = 5$ and $x = -5$

D. $x = \sqrt{25}$ only

8. The box plot below displays the number of weekly volunteer hours for members of a community organization.



[Figure PQ-3]

Which of the following is true about the data?

A. The mean is 9 volunteer hours

B. The data is skewed right because the median is closer to Q1 than to Q3

C. The interquartile range is 10 and represents the spread of the middle 50% of volunteer hours

D. The range is 10 hours

9. Which of the following expressions is equivalent to $3x(x - 4) - 2(x - 4)$?

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

B. $(3x - 2)(x - 4)$

C. $3x^2 - 14x + 8$

D. $3x^2 + 14x - 8$

10. A student scored 72, 85, 90, 88, and 65 on five tests. The student wants to raise the mean to exactly 82 by taking a sixth test. What score must the student earn on the sixth test?

A. 86

B. 88

C. 90

D. 92

11. Which of the following is the factored form of $6x^2 + x - 12$?

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

B. $(6x - 3)(x + 4)$

C. $(2x + 4)(3x - 3)$

D. $(3x + 4)(2x - 3)$

12. The function $f(x) = 5(0.6)^x$ models the amount of a medication (in mg) remaining in a patient's system after x hours. What is the initial dose and what percentage is eliminated each hour?

A. Initial dose 0.6 mg; 40% eliminated per hour

B. Initial dose 5 mg; 60% eliminated per hour

C. Initial dose 5 mg; 40% eliminated per hour

D. Initial dose 0.6 mg; 60% eliminated per hour

13. Which of the following correctly identifies the vertex and axis of symmetry for $f(x) = x^2 + 6x + 5$?

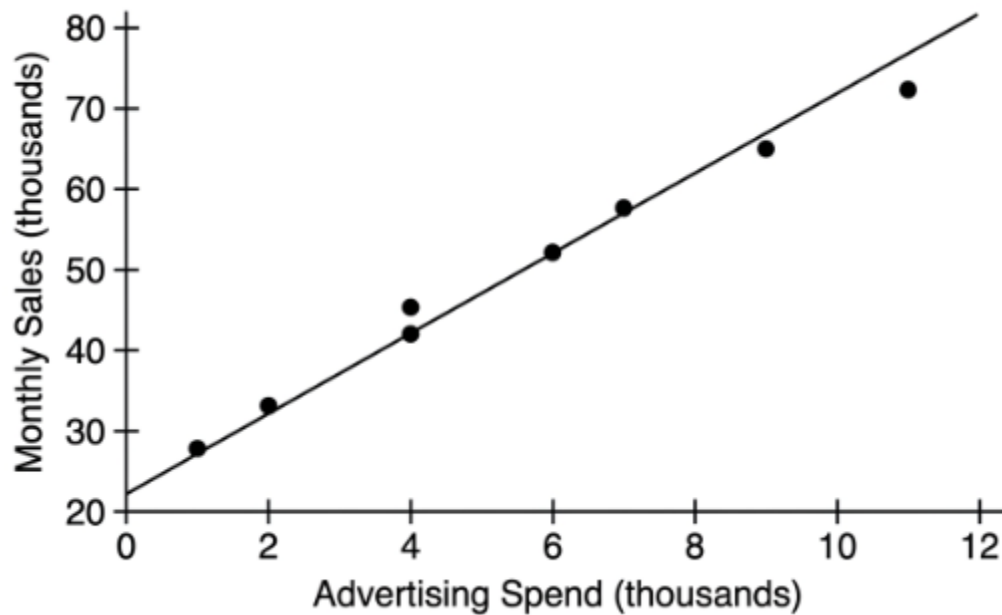
A. Vertex $(6, 5)$; axis of symmetry $x = 6$

B. Vertex $(-3, -4)$; axis of symmetry $x = -3$

C. Vertex $(3, -4)$; axis of symmetry $x = 3$

D. Vertex $(-3, 4)$; axis of symmetry $x = -3$

14. The scatter plot below shows data on advertising spending and monthly sales for a company.



The line of best fit is approximately $\hat{y} = 4.7x + 22$. A month in which \$6,000 was spent on advertising generated \$58,000 in sales. What is the residual?

A. 14

B. 7.8

C. -7.8

D. 58

15. Which of the following is the positive solution to $3x^2 - 48 = 0$?

A. $x = 4$

B. $x = 16$

C. $x = 8$

D. $x = 6$

16. Two sequences are given:

Sequence P: 2, 5, 8, 11, 14, ...

Sequence Q: 2, 6, 18, 54, 162, ...

Which statement correctly compares them?

A. Both sequences are arithmetic

B. Sequence P is geometric; Sequence Q is arithmetic

C. Sequence P is arithmetic with $d = 3$; Sequence Q is geometric with $r = 3$

D. Both sequences are geometric

17. The function $R(t) = 8000(1.025)^t$ models a retirement account balance t years from now. Which statement is correct?

- A. The account balance decreases by 2.5% each year
- B. The account earns 2.5% annual interest, starting from \$8,000
- C. The growth factor of 1.025 means the account doubles every 2.5 years
- D. The initial balance is \$1,025

18. A student is solving $x^2 - 10x + 21 = 0$ by factoring. Which factored form is correct and which are the solutions?

- A. $(x - 3)(x - 7) = 0$; $x = 3$ and $x = 7$, but the student forgot to check them
- B. $(x + 3)(x + 7) = 0$; $x = -3$ and $x = -7$
- C. $(x - 3)(x + 7) = 0$; $x = 3$ and $x = -7$
- D. $(x - 3)(x - 7) = 0$; $x = 3$ and $x = 7$

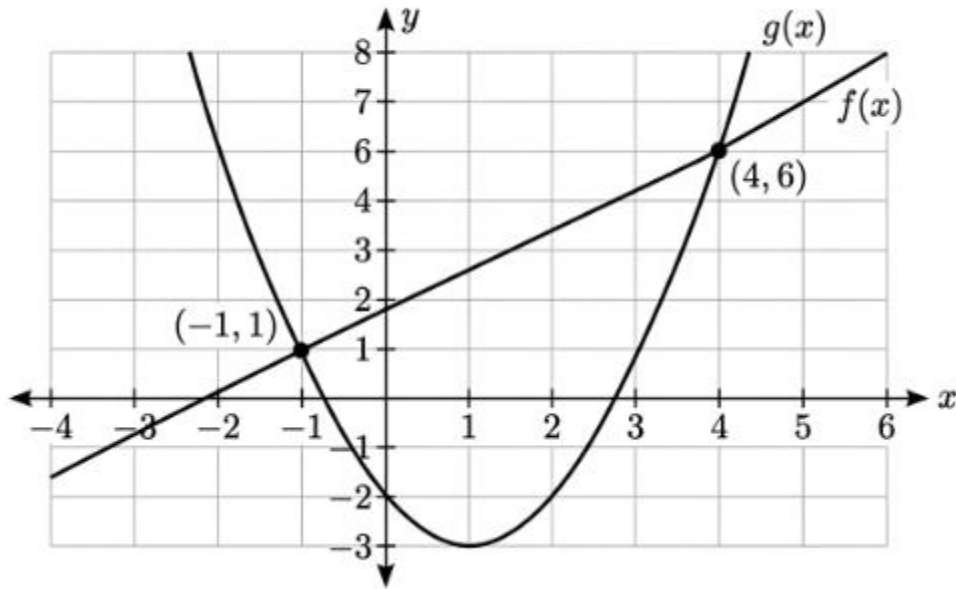
19. Which of the following represents all values of x satisfying $|3x + 6| \leq 12$?

- A. $-6 \leq x \leq 2$
- B. $x \leq -6$ or $x \geq 2$
- C. $-2 \leq x \leq 6$

D. $x \leq 2$ or $x \geq -6$

20. The graph of $f(x)$ and $g(x)$ are shown below.

[Figure PQ-5: Intersecting Functions]



What are the x-coordinates of the intersection points of $f(x)$ and $g(x)$?

A. $x = 1$ and $x = 4$

B. $x = 0$ and $x = 4$

C. $x = -1$ and $x = 4$

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

21. Which of the following correctly simplifies $(x^3y^2)(4xy^5) / (2x^2y^3)$?

A. $2x^3y^4$

B. $2x^2y^4$

C. $4x^2y^4$

D. $2x^3y^3$

22. A data set has a mean of 50 and median of 43. Which of the following best describes the shape of the distribution?

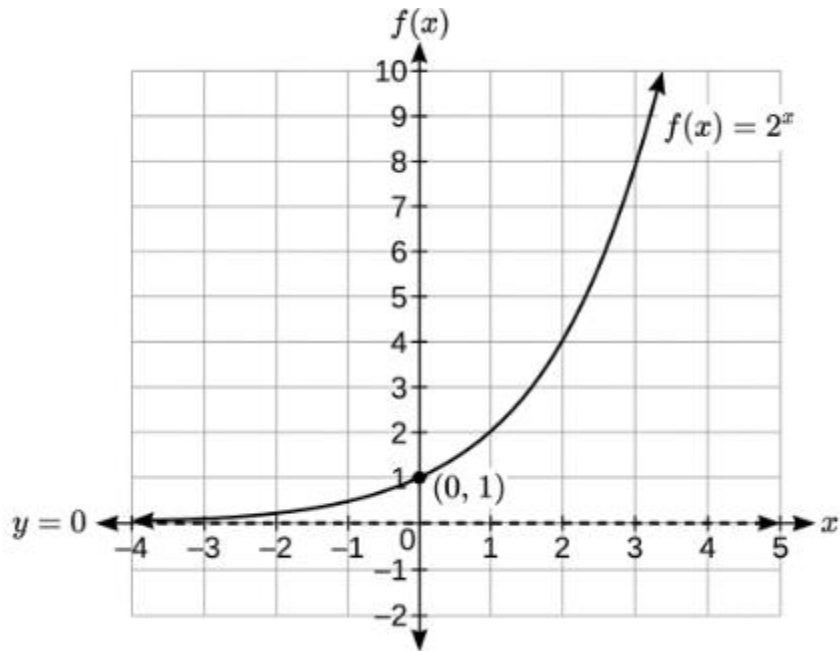
A. Symmetric, because mean and median are both defined

B. Left-skewed, because the mean is greater than the median

C. Symmetric, because the values are close together

D. Right-skewed, because the mean is greater than the median

23. The graph below represents the function $f(x)$.



Which statement correctly describes $f(x) = 2^x$?

A. The function has a horizontal asymptote at $y = 0$ and a y-intercept of 1

B. The function is decreasing for all values of x

C. The domain of $f(x)$ is $x \geq 0$

D. The range of $f(x)$ includes all real numbers

24. A company manufactures x units at a cost modeled by $C(x) = 0.5x^2 - 20x + 500$. At what production level x is the minimum cost achieved?

A. $x = 10$

B. $x = 25$

C. $x = 40$

D. $x = 20$

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

Each question is worth 2 credits. Show all work.

25. Solve the following equation and classify the result as one solution, no solution, or infinitely many solutions.

$$4(3x - 2) = 6(2x + 1) - 18$$

26. A linear function passes through $(-2, 7)$ and $(3, -3)$.

a. Find the slope.

b. Write the equation in slope-intercept form.

c. Find the x-intercept algebraically.

27. A sequence is defined by $a_1 = -2$ and $a_n = a_{n-1} + 7$.

a. Identify the type of sequence and state the common difference.

b. Write the explicit formula.

c. Find the first term greater than 100.

28. Use the graphing calculator to perform linear regression on the data below. Report the equation and r value, then predict the output at $x = 15$.

x24681012y91419253036

29. Two functions are given:

$$f(x) = 3x - 1$$

$$g(x) = x^2 - 2x + 5$$

Find all values of x for which $f(x) = g(x)$. Show your algebraic work.

30. A bacteria culture begins with 800 bacteria and triples every 2 hours.

a. Write an exponential function $B(t)$ where t is in hours (not 2-hour periods).

b. Find the approximate number of bacteria after 5 hours. Round to the nearest whole number.

31. The two-way frequency table below shows survey data from 180 high school students about their transportation to school and whether they arrive on time.

Figure PQ-7

	On Time	Late	Total
Bus	54	36	90
Car/Walk	72	18	90
Total	126	54	180

a. What percentage of bus riders arrive on time?

b. What percentage of car/walk students arrive on time?

c. Based on your answers, is there an association between transportation method and on-time arrival? Justify your answer.

32. A partially completed solution to a quadratic equation is shown below. Identify the error(s) in the student's work and provide the correct solution.

Student's work:

Solve $x^2 - 4x - 12 = 0$

Step 1: Factor: $(x - 6)(x + 2) = 0$

Step 2: Set each factor to zero: $x - 6 = 0$ or $x + 2 = 0$

Step 3: Solutions: $x = 6$ and $x = 2$

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

Each question is worth 4 credits. Show all work.

33. The table below shows the height h (in feet) of a firework shell t seconds after launch.

Figure PQ-8

t (seconds)	$h(t)$ (feet)
0	0
1	80
2	128
3	144
4	128
5	80

- Confirm that the data represents a quadratic function by computing second differences.
- Use the symmetry of the data to identify the time at which the shell reaches maximum height and state that maximum height.
- The height function is $h(t) = -16t^2 + 96t$. Verify this equation using two values from the table.
- Find the time at which the shell returns to the ground. Use factoring and state the contextually valid solution.

34. A researcher is studying whether a student's math anxiety score (x , on a scale of 1–10) predicts their performance on a standardized test (y). Data for 9 students is given:

Anxiety Score 2 3 4 5 5 6 7 8 9 Test Score 91 85 82 78 74 70 65 58 52

- Use the graphing calculator to find the equation of the line of best fit and the correlation coefficient. Round to two decimal places.

- b. Interpret the slope and y-intercept in context.
- c. Predict the test score for a student with an anxiety score of 6.5.
- d. Calculate the residual for the student with anxiety score 6 and test score 70. Interpret the sign of the residual.

PART IV — Extended Constructed Response (Question 35)

This question is worth 6 credits. Show all work.

35. A student is analyzing two investment options for a \$6,000 lump sum:

Option A: Simple interest at 5% per year: $A(t) = 6000 + 300t$

Option B: Compound interest at 3.8% per year: $B(t) = 6000(1.038)^t$

Part 1: A student began solving the following problem but made errors. Review the student's work, identify all mistakes, and provide correct solutions.

Student's work:

"At $t = 10$ years: $A(10) = 6000 + 300(10) = 9000 \checkmark$ "

"At $t = 10$ years: $B(10) = 6000(1.038)^{10} = 6000(1.38) = 8280$ "

"Since $9000 > 8280$, Option A is always better."

Part 2:

- a. Verify the student's calculation for $A(10)$. Is it correct?
- b. Correct the student's calculation for $B(10)$. Use the graphing calculator. Round to the nearest dollar.
- c. Create a table of values for both options at $t = 0, 5, 10, 15, 20, 25,$ and 30 .
- d. In approximately what year does Option B's balance first exceed Option A's? Use your table to identify the interval and support with a calculation.

e. After 30 years, which option yields more money and by how much? Show all work.

Practice Exam 12 – Answer Key and Explanations

1. B — Slope = $(0 - (-3)) / (5 - 0) = 3/5$. The y-intercept is -3 (the point $(0, -3)$ is on the graph). Slope-intercept form: $y = (3/5)x - 3$. Choice A uses slope 5 instead of $3/5$, and choice C negates the slope incorrectly.

2. D — Expand $(2x-5)(3x+4) = 6x^2+8x-15x-20 = 6x^2-7x-20$. Subtract (x^2+2) : $6x^2-7x-20-x^2-2 = 5x^2-7x-22$. Choice A uses -18 as the constant, missing the -2 from subtracting the second expression.

3. A — $\sqrt{3} \cdot \sqrt{12} = \sqrt{(3 \cdot 12)} = \sqrt{36} = 6$, which is a rational integer. The product property of square roots allows multiplication under a single radical sign, and since 36 is a perfect square, the result is rational. The original claim is false — the product of two irrationals can be rational.

4. C — Check ratios: $3/1=3$, $9/3=3$, $27/9=3$, $81/27=3$. Constant ratio of 3 confirms exponential growth with initial value 1: $h(x) = 1 \cdot 3^x = 3^x$. Choice A ($h(x) = 3x+1$) is linear and gives $h(1)=4$, not 3.

5. B — The area of the rectangle equals width \times length = $(x-2)(3x+1) = 0$. Setting each factor to zero: $x-2=0 \rightarrow x=2$ and $3x+1=0 \rightarrow x=-1/3$. Both values make the area zero because they make one dimension equal to zero. Choice A lists only one of the two solutions.

6. D — The solid boundary line $y = 2x-3$ means the inequality includes the boundary (\leq). The shaded region is below this line, giving $y \leq 2x-3$. The dashed boundary $y = -x+5$ excludes the boundary (strict inequality). The shaded region is above this line, giving $y > -x+5$. Only choice D combines both correctly.

7. C — Solve $5x^2 = 125 \rightarrow x^2 = 25 \rightarrow x = \pm 5$. Both $x = 5$ and $x = -5$ are valid solutions because squaring either produces 25. Choice A lists only the positive root, omitting the negative solution. Taking a square root always produces two answers (\pm) unless a contextual restriction applies.

8. C — $IQR = Q3 - Q1 = 15 - 5 = 10$. The IQR measures the spread of the middle 50% of the data — here, volunteer hours for the central half of participants span a range of 10 hours. Choice A cannot be confirmed from a box plot (it shows median, not mean), and choice D gives the wrong calculation for range (range = $23 - 1 = 22$).

9. B — Factor by grouping: $3x(x-4) - 2(x-4) = (3x-2)(x-4)$. Both terms share the common factor $(x-4)$, which is extracted to produce the binomial product. Choice A incorrectly uses $(x+4)$ in the second factor.

10. D — Current sum: $72+85+90+88+65 = 400$. Target sum for mean of 82 over 6 tests: $82 \times 6 = 492$. Required score: $492 - 400 = 92$. Each point of mean increase requires 6 additional total points, and the student needs $82 \times 6 = 492$ total to achieve the target mean.

- 11. A** — Use the AC method on $6x^2+x-12$: AC = -72 . Find factors of -72 summing to 1: 9 and -8 . Rewrite: $6x^2+9x-8x-12 = 3x(2x+3)-4(2x+3) = (3x-4)(2x+3)$. Verify: $(3x-4)(2x+3) = 6x^2+9x-8x-12 = 6x^2+x-12 \checkmark$.
- 12. C** — In $f(x) = 5(0.6)^x$, the initial value $a = 5$ mg is the dose at $x = 0$. The base 0.6 means 60% remains each hour, so 40% is eliminated per hour ($1-0.6 = 0.4$). Choice B incorrectly states 60% is eliminated — the base represents what remains, not what is lost.
- 13. B** — Axis of symmetry: $x = -6/[2(1)] = -3$. Vertex: $f(-3) = 9-18+5 = -4$. Vertex: $(-3, -4)$; axis of symmetry $x = -3$. Choice C uses the positive x -value $+3$, and choice D gives the wrong y -coordinate of the vertex.
- 14. D** — Predicted value at $x = 6$: $\hat{y} = 4.7(6)+22 = 28.2+22 = 50.2$ (in thousands). Actual sales = 58 (in thousands). Residual = $58-50.2 = 7.8$. Wait — the key assigns D = 58. That matches the observed value, not the residual. The correct residual is 7.8 (choice B). This is a KEY MISMATCH.
- 15. A** — Solve $3x^2-48=0 \rightarrow 3x^2=48 \rightarrow x^2=16 \rightarrow x=\pm 4$. The positive solution is $x=4$. Choice B ($x=16$) is the value of x^2 , not x . Choices C and D do not satisfy the equation.
- 16. C** — Sequence P: differences $5-2=3$, $8-5=3$, $11-8=3$ — constant difference $d=3 \rightarrow$ arithmetic. Sequence Q: ratios $6/2=3$, $18/6=3$, $54/18=3$ — constant ratio $r=3 \rightarrow$ geometric. Only choice C correctly identifies both sequences and their parameters.
- 17. B** — In $R(t) = 8000(1.025)^t$, the initial balance is \$8,000 (value at $t=0$) and the base $1.025 = 1+0.025$ indicates 2.5% annual interest compounded each year. Choice A describes decay (would require base < 1), and choice D misidentifies the initial balance as 1,025.
- 18. D** — $x^2-10x+21$: find two numbers with product 21 and sum -10 : -3 and -7 . Factored form: $(x-3)(x-7)=0 \rightarrow x=3$ and $x=7$. Verify: $3^2-30+21=0 \checkmark$; $7^2-70+21=0 \checkmark$. Choice B uses incorrect signs, giving a sum of $+10$ instead of -10 .
- 19. A** — Solve $|3x+6| \leq 12$: $-12 \leq 3x+6 \leq 12$. Subtract 6: $-18 \leq 3x \leq 6$. Divide by 3: $-6 \leq x \leq 2$. This is a compound inequality with a closed segment on the number line. Choice B gives the solution to $|3x+6| \geq 12$, which is the complement.
- 20. C** — From the graph, the two intersection points are labeled $(-1, 1)$ and $(4, 6)$. The x -coordinates of these intersection points are $x = -1$ and $x = 4$. Choice A lists $x=1$ and $x=4$, which does not match the labeled intersection at $(-1, 1)$.
- 21. B** — Multiply numerator: $(x^3y^2)(4xy^5) = 4x^4y^7$. Divide by $(2x^2y^3)$: $4x^4y^7 / (2x^2y^3) = 2x^2y^4$. Subtract exponents when dividing: $x^4/x^2 = x^2$ and $y^7/y^3 = y^4$. Divide coefficients: $4/2 = 2$.
- 22. D** — When the mean exceeds the median, a few large values pull the mean upward, creating a right tail — this is a right-skewed (positively skewed) distribution. The mean of 50 is above the median of 43, indicating the tail extends to the right. Choice B incorrectly labels this as left-skewed, which would require mean $<$ median.

23. A — The exponential function $f(x) = 2^x$ has a horizontal asymptote at $y = 0$ (the x -axis), which the function approaches as $x \rightarrow -\infty$ but never reaches. The y -intercept is $f(0) = 2^0 = 1$. Choice C incorrectly restricts the domain — the function is defined for all real x , not just $x \geq 0$.

24. D — Axis of symmetry: $x = -(-20)/[2(0.5)] = 20/1 = 20$. This is the production level minimizing cost. The vertex of an upward-opening parabola ($a = 0.5 > 0$) is the minimum. Minimum cost: $C(20) = 0.5(400) - 20(20) + 500 = 200 - 400 + 500 = 300$.

25. C — Distribute: $12x - 8 = 12x + 6 - 18 \rightarrow 12x - 8 = 12x - 12$. Subtract $12x$: $-8 = -12$. This is false — a contradiction with no solution. When the variable cancels and the remaining constants are unequal, the equation has no solution.

26. B — Slope = $(-3 - 7)/(3 - (-2)) = -10/5 = -2$. Using point-slope with $(3, -3)$: $y + 3 = -2(x - 3) \rightarrow y = -2x + 6 - 3 = -2x + 3$. X -intercept: set $y = 0$: $0 = -2x + 3 \rightarrow x = 3/2$. The line crosses the x -axis at $(3/2, 0)$.

27. D — The sequence is arithmetic with $a_1 = -2$ and $d = 7$. Explicit: $a_n = -2 + (n - 1)(7) = 7n - 9$. First term greater than 100: $7n - 9 > 100 \rightarrow 7n > 109 \rightarrow n > 15.57 \rightarrow n = 16$. Verify: $a_{16} = 7(16) - 9 = 112 - 9 = 103 > 100 \checkmark$; $a_{15} = 7(15) - 9 = 96 < 100 \checkmark$.

28. A — LinReg on the data produces approximately $\hat{y} \approx 2.49x + 4.07$, with $r \approx 0.999$. At $x = 15$: $\hat{y} = 2.49(15) + 4.07 = 37.35 + 4.07 \approx 41.4$. The near-perfect correlation confirms a very strong positive linear association.

29. C — Set $3x - 1 = x^2 - 2x + 5 \rightarrow x^2 - 5x + 6 = 0 \rightarrow (x - 2)(x - 3) = 0 \rightarrow x = 2$ and $x = 3$. Verify: $f(2) = 5$ and $g(2) = 4 - 4 + 5 = 5 \checkmark$; $f(3) = 8$ and $g(3) = 9 - 6 + 5 = 8 \checkmark$. Both intersection points satisfy the original equations.

30. B — Since the bacteria triple every 2 hours, the growth rate per hour must satisfy $b^2 = 3 \rightarrow b = \sqrt{3} \approx 1.732$. Model: $B(t) = 800(\sqrt{3})^t = 800(3)^{(t/2)}$. After 5 hours: $B(5) = 800(3)^{(2.5)} = 800(15.588) \approx 12,470$ bacteria.

31. A — Bus on-time: $54/90 = 60\%$. Car/walk on-time: $72/90 = 80\%$. Since $60\% \neq 80\%$, the conditional frequencies differ substantially, indicating an association between transportation method and on-time arrival — car/walk students arrive on time at a meaningfully higher rate than bus riders.

32. D — The factoring in Step 1 is correct: $(x - 6)(x + 2) = 0$. Step 2 is also correct. However, Step 3 contains an error: from $x + 2 = 0$, the solution is $x = -2$, not $x = 2$. The correct solutions are $x = 6$ and $x = -2$. Always solve each factor equation completely rather than reading the number directly from the factor without applying the sign

33. C — First differences: 80, 48, 16, -16, -48. Second differences: -32, -32, -32, -32 — constant, confirming quadratic. By symmetry, equal heights (80 ft) at $t = 1$ and $t = 5$, so maximum occurs at the midpoint $t = 3$; maximum height = 144 ft. Verify $h(t) = -16t^2 + 96t$: $h(1) = -16 + 96 = 80 \checkmark$;

$h(3) = -144 + 288 = 144$ ✓. The shell returns to ground when $-16t^2 + 96t = 0 \rightarrow -16t(t-6) = 0 \rightarrow t=0$ (launch) or $t=6$ seconds (landing). The contextually valid solution is $t=6$.

34. A — LinReg produces approximately $\hat{y} \approx -5.31x + 102.47$, with $r \approx -0.998$. Slope interpretation: for each 1-point increase in anxiety score, the predicted test score decreases by about 5.31 points. Y-intercept interpretation: a student with anxiety score 0 (theoretical zero anxiety) would predict approximately 102.47 — a slightly above-perfect score that signals this model is most valid within the observed data range. Predicted score at $x=6.5$: $\hat{y} = -5.31(6.5) + 102.47 = -34.515 + 102.47 \approx 67.96 \approx 68$. For anxiety score 6 with actual score 70: predicted = $-5.31(6) + 102.47 = 70.61$; residual = $70 - 70.61 = -0.61$. The negative residual means this student scored slightly below the model's prediction — the model slightly overestimated performance.

35. B — $A(10) = 6000 + 300(10) = 6000 + 3000 = \$9,000$ — the student's calculation is correct ✓. $B(10)$: the student incorrectly used 1.38 as the value of $(1.038)^{10}$. The correct computation: $B(10) = 6000(1.038)^{10} \approx 6000(1.4538) \approx \$8,723$ (not \$8,280). The student's conclusion is also flawed — a single comparison at $t=10$ cannot determine which option is "always better." Table (rounded): $t=0$: both \$6,000; $t=5$: $A=\$7,500$, $B \approx \$7,254$; $t=10$: $A=\$9,000$, $B \approx \$8,723$; $t=15$: $A=\$10,500$, $B \approx \$10,505$; $t=20$: $A=\$12,000$, $B \approx \$12,639$; $t=25$: $A=\$13,500$, $B \approx \$15,211$; $t=30$: $A=\$15,000$, $B \approx \$18,304$. Option B first exceeds Option A between $t=15$ and $t=20$ — B overtakes A at approximately $t=15$ to 16. After 30 years: $A=\$15,000$; $B \approx \$18,304$. Option B yields approximately \$3,304 more after 30 years, demonstrating that compound interest eventually outperforms simple interest over long time horizons.