PRACTICE EXAM 26: ALEKS PPL SIMULATION

1. A swimming pool is being filled at a rate of 25 gallons per minute. How many gallons are in the pool after 3 hours?

A. 75 gallons

B. 750 gallons

C. 1,500 gallons

D. 4,500 gallons

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

A. $2x - 8$

B. $2x + 2$

C. $6x - 8$

D. $2x + 8$

3. What is the slope of the line through $(4, -1)$ and $(2, 7)$?

A. 3

B. -3

C. -4

D. 4

4. A rectangle has length 12 cm and width 5 cm. What is its diagonal?

A. 11 cm

B. 13 cm

C. 17 cm

D. 60 cm

5. Solve: $6x - 5 = 4x + 9$.

A. $x = 2$

B. $x = 5$

C. $x = 4$

D. $x = 7$

6. A regular hexagon has side length 4 cm. What is its perimeter?

A. 24 cm

B. 18 cm

C. 16 cm

D. 32 cm

7. What is the exact value of $\sin(60°)$?

A. $1/2$

B. $\sqrt{2}/2$

C. $\sqrt{3}/2$

D. 1

8. Solve: $(x + 2)(x - 4) = 0$.

A. $x = 2$ or $x = 4$

B. $x = -2$ or $x = 4$

C. $x = 2$ or $x = -4$

D. $x = -2$ or $x = -4$

9. A circle has diameter 14. What is its area? (Use π.)

A. 49π

B. 196π

C. 14π

D. 28π

10. Simplify: $\log(8) - \log(2)$.

A. $\log(6)$

B. $8/2$

C. 4

D. $\log(4)$

11. If $f(x) = x^2 - 4x + 3$, what is $f(1)$?

A. 1

B. 0

C. -2

D. 4

12. Solve: $5x^2 = 80$.

A. $x = 8$

B. $x = \pm 8$

C. $x = 16$

D. $x = \pm 4$

13. What is the equation of the line passing through (0, 0) and (3, 6)?

A. $y = 2x$

B. $y = 3x$

C. $y = x$

D. $y = 6x$

14. A bag has 8 marbles: 3 red, 2 blue, 3 green. What is the probability of drawing a green marble?

A. 1/8

B. 1/4

C. 3/8

D. 1/2

15. Simplify: $(3x^2)(4x^3)$.

A. $7x^5$

B. $12x^5$

C. $12x^6$

D. $7x^6$

16. A box has volume 120 cm^3. If its base area is 15 cm^2, what is its height?

A. 10 cm

B. 5 cm

C. 6 cm

D. 8 cm

17. Solve: $4(x - 1) = 3x + 2$.

A. $x = 6$

B. $x = 5$

C. $x = 3$

D. $x = 2$

18. What is the y-intercept of the line $2x + 3y = 12$?

A. 12

B. 6

C. 2

D. 4

19. Simplify: $(x + 4)(x - 4) + 16$.

A. $x^2 - 32$

B. $x^2 + 16$

C. x^2

D. $x^2 + 32$

20. A right triangle has legs of 3 and 4. What is the perimeter?

A. 12

B. 7

C. 14

D. 15

21. What is the value of $5! \div 3!$?

A. 5

B. 15

C. 20

D. 120

22. Solve: $x - 3 \geq 7$.

A. $x \geq 10$

B. $x \geq 4$

C. $x \leq 10$

D. $x \leq 4$

23. Simplify: $(x^3 \cdot x^2) / x^4$.

A. x^9

B. x^2

C. x^3

D. x

24. A line has slope −3 and passes through (1, 4). What is its equation?

A. $y = -3x - 1$

B. $y = -3x + 7$

C. $y = 3x + 1$

D. $y = -3x + 4$

25. The mean of 6 numbers is 12. What is the sum of the numbers?

A. 72

B. 60

C. 18

D. 6

26. Simplify: $\cos^2\theta + \sin^2\theta + 1$.

A. 0

B. 1

C. 2

D. $\cos\theta$

27. A car depreciates 20% in value each year. If it cost $20,000 originally, what is it worth after 1 year?

A. $4,000

B. $24,000

C. $19,500

D. $16,000

28. What is $\sqrt{(225)}$?

A. 15

B. 25

C. 12.5

D. 14

29. Factor: $x^2 - 11x + 24$.

A. $(x - 4)(x - 6)$

B. $(x - 8)(x - 3)$

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

D. $(x + 8)(x + 3)$

30. Convert 270° to radians.

A. $\pi/2$

B. $3\pi/4$

C. $3\pi/2$

D. $5\pi/3$

PRACTICE EXAM 26: ANSWER KEY AND EXPLANATIONS

1. D — 4,500 gallons, calculated by converting hours to minutes and multiplying by the flow rate. 3 hours × 60 minutes per hour = 180 minutes; 180 × 25 gallons per minute = 4,500 gallons. Rate problems always require consistent units — converting hours to minutes before multiplying is the critical step. Skipping unit conversion produces answers off by a factor of 60.

2. A — $2x - 8$, obtained by distributing the negative sign through the second polynomial and combining like terms. $(4x - 3) - (2x + 5) = 4x - 3 - 2x - 5 = 2x - 8$. The negative sign must apply to every term inside the subtracted parentheses, flipping both signs. Missing this distribution is one of the most common algebra errors.

3. C — -4, found by applying the slope formula $m = (y_2 - y_1)/(x_2 - x_1)$. Substitute: $(7 - (-1))/(2 - 4) = 8/(-2) = -4$. Always subtract y-values over x-values in the same order. A negative slope indicates the line falls from left to right.

4. B — 13 cm, calculated using the Pythagorean theorem on the rectangle sides. Diagonal = $\sqrt{(12^2 + 5^2)} = \sqrt{(144 + 25)} = \sqrt{169} = 13$. The (5, 12, 13) Pythagorean triple is one of the most frequently tested combinations — memorize it for instant recognition.

5. D — $x = 7$, obtained by moving variables to one side and constants to the other. Subtract $4x$: $2x - 5 = 9$. Add 5: $2x = 14$. Divide by 2: $x = 7$. Always move the variable with the smaller coefficient to avoid negative leading coefficients.

6. A — 24 cm, calculated by multiplying the number of sides by the length of each side. A regular hexagon has 6 equal sides: $6 \times 4 = 24$ cm. Any regular polygon's perimeter equals the number of sides times the side length — a foundational formula for equilateral shapes.

7. C — $\sqrt{3}/2$, a memorized unit-circle value for $\sin(60°)$. The standard first-quadrant angles (0°, 30°, 45°, 60°, 90°) must be memorized for every trigonometric function. Sine of 60° corresponds to the y-coordinate of the unit-circle point at that angle, which is $\sqrt{3}/2$.

8. B — $x = -2$ or $x = 4$, obtained by applying the zero product property. Set each factor equal to zero: $x + 2 = 0$ gives $x = -2$; $x - 4 = 0$ gives $x = 4$. The zero product property is the foundation of factor-based quadratic solving — one factor being zero satisfies the entire equation.

9. A — 49π, calculated using the circle area formula πr^2. Diameter 14 → radius 7. Area = $\pi(7)^2 = 49\pi$ square units. Always halve the diameter to find the radius before substituting into the area formula. Keeping π symbolic preserves precision.

10. D — log(4), obtained by applying the quotient law of logarithms. log(8) − log(2) = log(8/2) = log(4). The quotient law converts a difference of logs into a single log of a quotient — always condense logs to a single expression before evaluating.

11. B — 0, found by substituting x = 1 into the function. f(1) = 1^2 − 4(1) + 3 = 1 − 4 + 3 = 0. Always apply order of operations carefully, evaluating the square first. The output of zero indicates that x = 1 is a root of the function.

12. D — x = ±4, obtained by isolating x^2 and taking the square root. Divide by 5: x^2 = 16. Take the square root: x = ±4. Always include both positive and negative roots when solving by the square root method — dropping the negative loses half the solution.

13. A — y = 2x, calculated by finding the slope from the two points. Slope = (6 − 0)/(3 − 0) = 2. With y-intercept 0 (from the origin): y = 2x. All lines through the origin have the form y = mx, with y-intercept zero.

14. C — 3/8, derived by dividing favorable outcomes by total outcomes. Green marbles: 3. Total marbles: 8. Probability = 3/8. Always reduce probability fractions to simplest form, though 3/8 is already in lowest terms.

15. B — $12x^5$, obtained by multiplying coefficients and adding exponents with the same base. (3)(4) = 12; $x^2 \cdot x^3 = x^{(2+3)} = x^5$. Combined: $12x^5$. Always apply the product rule separately to coefficients and variables.

16. D — 8 cm, derived from the relationship V = base × height for prisms. Substitute: 120 = 15 × h, so h = 8 cm. Always isolate the unknown dimension by dividing the volume by the given measurements.

17. A — x = 6, obtained by distributing and isolating the variable. 4x − 4 = 3x + 2 → x = 6. Always distribute through parentheses before combining like terms, and move variables to the side with the larger coefficient for cleaner arithmetic.

18. D — 4, found by setting x = 0 and solving for y. 2(0) + 3y = 12 → 3y = 12 → y = 4. The y-intercept is always found by setting x to zero. In standard form Ax + By = C, the y-intercept equals C/B.

19. C — x^2, obtained by applying the difference of squares pattern and then combining constants. (x + 4)(x − 4) = x^2 − 16; add 16: x^2 − 16 + 16 = x^2. The constant terms cancel cleanly, leaving only the squared variable.

20. A — 12, calculated by finding the hypotenuse and summing all three sides. Hypotenuse = √(9 + 16) = √25 = 5. Perimeter = 3 + 4 + 5 = 12. The (3, 4, 5) Pythagorean triple is the most fundamental right triangle pattern.

21. C — 20, obtained by evaluating each factorial and dividing. 5! = 120; 3! = 6. Divide: 120/6 = 20. Alternatively, 5!/3! = 5 × 4 = 20 (cancel the 3! in the denominator with the trailing 3 × 2 × 1 in 5!).

22. A — $x \geq 10$, obtained by adding 3 to both sides of the inequality. $x - 3 \geq 7 \rightarrow x \geq 10$. Adding a positive number to both sides preserves the inequality direction. Only division or multiplication by negatives requires flipping the sign.

23. D — x, found by applying exponent rules for multiplication and division. Numerator: $x^3 \cdot x^2 = x^5$ (add exponents). Divide by x^4: x^(5−4) = x. Always combine the numerator completely before dividing by the denominator.

24. B — $y = -3x + 7$, derived using point-slope form. $y - 4 = -3(x - 1)$. Distribute: $y - 4 = -3x + 3$. Add 4: $y = -3x + 7$. Always simplify to slope-intercept form for standard presentation. Verify by substituting the given point.

25. A — 72, calculated by multiplying the mean by the count. Sum = mean × count = 12 × 6 = 72. The mean represents the average per element, so the total sum equals the mean times the number of elements.

26. C — 2, obtained by recognizing that $\cos^2\theta + \sin^2\theta = 1$ (the Pythagorean identity), then adding 1. Result: 1 + 1 = 2. Always look for identity simplifications first in trig expressions — the sum of squared sine and squared cosine is the most frequently used identity.

27. D — $16,000, calculated by applying the complement of the depreciation rate. After 20% loss, 80% of the original value remains: 20,000 × 0.80 = 16,000. Always use (1 − depreciation rate) when computing the remaining value after a percentage loss.

28. A — 15, because $15^2 = 225$ confirms the square root. Memorize perfect squares through 225 to recognize them instantly. The principal square root is always non-negative, so reject the negative root.

29. B — $(x - 8)(x - 3)$, found by identifying two numbers that multiply to 24 and add to −11. The pair is −8 and −3. Both are negative because the product is positive but the sum is negative. Factoring trinomials always requires this sign-discipline check.

30. C — $3\pi/2$, calculated by multiplying degrees by $\pi/180$. $270 \times \pi/180 = 270\pi/180 = 3\pi/2$. Simplify the fraction by dividing both by 90. Memorize common radian-degree conversions for rapid evaluation.