PRACTICE EXAM 25: ALEKS PPL SIMULATION

1. A team wins 18 of its 24 games. What percent of games did the team win?

A. 75%

B. 72%

C. 80%

D. 66.7%

2. Simplify: $x^2 - (x - 3)(x + 2)$.

A. 5

B. $x - 6$

C. $x + 6$

D. 6

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

A. $x = 2$

B. $x = 5$

C. $x = 6$

D. $x = 3$

4. A 15-foot ladder leans against a wall, reaching a height of 12 feet. How far is the base from the wall?

A. 6 ft

B. 7 ft

C. 8 ft

D. 9 ft

5. What is the exact value of tan(60°)?

A. 1

B. $\sqrt{3}$

C. $1/\sqrt{3}$

D. $\sqrt{3}/2$

6. Simplify: $(2 + \sqrt{3})(2 - \sqrt{3})$.

A. 1

B. 4

C. $\sqrt{3}$

D. 7

7. A trapezoid has parallel sides of 8 and 14, and height 6. What is its area?

A. 44

B. 60

C. 72

D. 66

8. Solve: $3^{(x - 2)} = 27$.

A. $x = 2$

B. $x = 4$

C. $x = 5$

D. $x = 3$

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

A. 14

B. 10

C. 12

D. 16

10. Simplify: $\log(5) + \log(20)$.

A. $\log(25)$

B. $\log(100)$

C. 2

D. $\log(15)$

11. A jar contains 10 coins: 3 pennies, 4 nickels, 3 dimes. What is the probability of drawing a nickel?

A. 3/10

B. 1/3

C. 2/5

D. 1/2

12. A square has a perimeter of 32 cm. What is its area?

A. 16 cm^2

B. 64 cm^2

C. 128 cm^2

D. 256 cm^2

13. Solve: $2x^2 - 8 = 0$.

A. $x = 4$

B. $x = \pm 4$

C. $x = 2$

D. $x = \pm 2$

14. What is the slope of the line $5x - y = 10$?

A. 5

B. -5

C. 1/5

D. 10

15. Evaluate: $|3 - 7| + |-2|$.

A. 2

B. 4

C. 6

D. 9

16. A rectangular garden has dimensions 15 ft by 10 ft. What is its perimeter?

A. 150 ft

B. 25 ft

C. 75 ft

D. 50 ft

17. Simplify: $(a^2b)^3$.

A. a^6b

B. a^6b^3

C. a^5b^3

D. a^5b

18. A car travels 240 miles on 8 gallons of gas. How many miles per gallon?

A. 240 mpg

B. 8 mpg

C. 45 mpg

D. 30 mpg

19. What is the y-intercept of $y = -2x + 5$?

A. 5

B. −2

C. 2

D. −5

20. Simplify: $\sin^2\theta / \sin\theta$.

A. 1

B. $\cos\theta$

C. $\sin\theta$

D. $\csc\theta$

21. The equation of a circle is $x^2 + y^2 = 16$. What is the radius?

A. 4

B. 16

C. 8

D. 2

22. A cylinder has radius 3 and height 7. What is its volume? (Use π.)

A. 21π

B. 42π

C. 147π

D. 63π

23. Factor completely: $x^2 + 10x + 21$.

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

B. $(x + 7)(x + 3)$

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

D. $(x - 7)(x + 3)$

24. Solve: $5x + 3 \leq 2x + 18$.

A. $x \leq 5$

B. $x \geq 5$

C. $x \leq 7$

D. $x \geq 7$

25. Simplify: $(x + 2)^2/(x + 2)$, assuming $x \neq -2$.

A. 1

B. $x^2 + 4x + 4$

C. $x + 2$

D. $(x + 2)^2$

26. A cone has a volume of 60π cm³ and a radius of 3 cm. What is the height?

A. 10 cm

B. 15 cm

C. 6 cm

D. 20 cm

27. What is 20% of 250?

A. 40

B. 50

C. 60

D. 70

28. Simplify: $(3x + 1)(x - 2)$.

A. $3x^2 - 5x - 2$

B. $3x^2 + 5x - 2$

C. $3x^2 + 5x + 2$

D. $3x^2 - 7x - 2$

29. What is the domain of $f(x) = (x - 3)/(x + 2)$?

A. $x > 3$

B. $x \neq 3$

C. $x \geq -2$

D. $x \neq -2$

30. Solve: $2 \log(x) = \log(9)$.

A. $x = \pm 3$

B. $x = 9$

C. $x = 3$

D. $x = -3$

PRACTICE EXAM 25: ANSWER KEY AND EXPLANATIONS

1. A — 75%, calculated by dividing wins by total games and converting to a percentage. The ratio 18/24 simplifies to 3/4, or 0.75, which equals 75%. Always express percentages as the ratio of favorable outcomes to total outcomes, multiplied by 100. Percentage problems require careful identification of the "part" and the "whole" before computing.

2. C — x + 6, obtained by expanding the product and subtracting from x^2. $(x - 3)(x + 2) = x^2 - x - 6$. Subtract: $x^2 - (x^2 - x - 6) = x^2 - x^2 + x + 6 = x + 6$. Always distribute the subtraction across every term inside the parentheses, flipping each sign.

3. B — x = 5, found by distributing and isolating the variable. $4x - 2 = 3x + 3 \rightarrow x = 5$. Always distribute through parentheses before combining like terms, and move variables to one side of the equation. Verify by substitution: $4(5) - 2 = 18 = 3(5) + 3$. ✓

4. D — 9 feet, calculated using the Pythagorean theorem. The ladder acts as the hypotenuse (15 ft), the wall height is one leg (12 ft), and the unknown base is the other leg: $\sqrt{(15^2 - 12^2)} = \sqrt{(225 - 144)} = \sqrt{81} = 9$. The (9, 12, 15) triple is a multiple of the (3, 4, 5) triple — recognizing it saves computation.

5. B — $\sqrt{3}$, which is a memorized unit-circle value for tan(60°). The standard first-quadrant angles (0°, 30°, 45°, 60°, 90°) must be known by heart for every trigonometric function. $\tan(60°) = \sin(60°)/\cos(60°) = (\sqrt{3}/2)/(1/2) = \sqrt{3}$.

6. A — 1, obtained by applying the difference of squares pattern $(a + b)(a - b) = a^2 - b^2$. With a = 2, $b = \sqrt{3}$: $2^2 - (\sqrt{3})^2 = 4 - 3 = 1$. Conjugate pairs always produce rational results because squaring eliminates the radicals — this is the foundation of rationalizing denominators.

7. D — 66, calculated using the trapezoid area formula $(1/2)(b_1 + b_2)(h)$. Substitute: $(1/2)(8 + 14)(6) = (1/2)(22)(6) = 66$. The formula averages the two parallel sides before multiplying by the perpendicular height. Always use the height perpendicular to the parallel sides, not a slant side.

8. C — x = 5, because $3^3 = 27$ matches the right side of the equation. Rewrite as $3^{(x - 2)} = 3^3$, giving $x - 2 = 3$ and x = 5. Matching bases allows direct equating of exponents — the most efficient method for exponential equations with recognizable base relationships.

9. A — 14, found by substituting x = 3 into the function. $f(3) = (3)^2 + 2(3) - 1 = 9 + 6 - 1 = 14$. Substitute carefully, applying order of operations to each term before combining. Squaring must precede multiplication and addition in the evaluation sequence.

10. B — log(100), obtained by applying the product law of logarithms. log(5) + log(20) = log(5 × 20) = log(100). The product law converts the sum of logs into the log of a product — a fundamental simplification tool. Since log(100) = 2 (assuming base 10), this could also be written as 2.

11. C — 2/5, derived by dividing favorable outcomes by total outcomes. Nickels: 4. Total coins: 10. Probability = 4/10 = 2/5. Always reduce probability fractions to simplest form before submitting. Probability is always a number between 0 and 1.

12. B — 64 cm^2, calculated by finding the side length and then the area. Perimeter = 4s = 32, so side = 8 cm. Area = s^2 = 64 cm^2. The square formula uses side squared for area; perimeter uses 4 times side. Distinguishing these formulas is essential.

13. D — $x = \pm 2$, obtained by isolating x^2 and taking the square root. Add 8 to both sides: $2x^2 = 8$. Divide by 2: $x^2 = 4$. Take the square root: $x = \pm 2$. Always include both positive and negative roots when solving by the square root method.

14. A — 5, found by rewriting the equation in slope-intercept form. $5x - y = 10 \rightarrow y = 5x - 10$. The coefficient of x is the slope: 5. Always isolate y before reading the slope — the sign and magnitude come from the resulting expression.

15. C — 6, obtained by evaluating each absolute value independently and adding. $|3 - 7| = |-4| = 4$; $|-2| = 2$. Sum: 4 + 2 = 6. Absolute value measures distance from zero and is always non-negative. Always evaluate inside the bars first, then apply the absolute value.

16. D — 50 ft, calculated using the rectangle perimeter formula. P = 2l + 2w = 2(15) + 2(10) = 30 + 20 = 50. Always distribute the 2 to both dimensions separately before adding. Perimeter is a one-dimensional measure, not a two-dimensional one.

17. B — a^6b^3, obtained by applying the power rule to each factor. $(a^2)^3 = a^6$ (multiply exponents). b^3 stays the same. Combined: a^6b^3. Always apply the outer exponent to every factor inside the parentheses, multiplying inner exponents separately.

18. D — 30 mpg, found by dividing total miles by total gallons. 240 ÷ 8 = 30 miles per gallon. Rate problems always divide the larger unit (miles) by the smaller unit (gallons) to express the rate in per-unit terms. Rate calculations are the foundation of proportional reasoning.

19. A — 5, because in y = mx + b form, b is the y-intercept. For $y = -2x + 5$, b = 5. The y-intercept is always the constant term when the equation is in slope-intercept form — it represents where the line crosses the y-axis.

20. C — sin θ, obtained by dividing the numerator by the denominator. $\sin^2\theta / \sin\theta = \sin\theta$ (provided $\sin\theta \neq 0$). This is a direct application of exponent rules: when the same base is divided, exponents subtract, and $\sin^2\theta / \sin^1\theta = \sin^{(2-1)}\theta = \sin^1\theta = \sin\theta$.

21. A — 4, derived from the standard circle equation $x^2 + y^2 = r^2$ with $r^2 = 16$, so $r = 4$. Always take the positive square root for radius. For circles centered at the origin, the right side of the standard form equals the radius squared.

22. D — 63π, calculated using the cylinder volume formula $V = \pi r^2 h$. $V = \pi(9)(7) = 63\pi$ cubic units. Always square the radius before multiplying by height and π. Cubic units apply to all volume measurements.

23. B — $(x + 7)(x + 3)$, found by identifying two numbers that multiply to 21 and add to 10. The pair is 7 and 3. Both are positive because both the product (21) and the sum (10) are positive. Factoring trinomials with a leading coefficient of 1 always requires finding this pair.

24. A — $x \leq 5$, obtained by moving variables to one side and constants to the other. Subtract $2x$: $3x + 3 \leq 18$. Subtract 3: $3x \leq 15$. Divide by 3: $x \leq 5$. Dividing by a positive number preserves the inequality direction.

25. C — $x + 2$, obtained by canceling one $(x + 2)$ from the numerator and denominator. $(x + 2)^2/(x + 2) = (x + 2)^{(2 - 1)} = x + 2$. Only factors connected by multiplication can be canceled — here, one of the two identical $(x + 2)$ factors cancels cleanly.

26. D — 20 cm, derived from the cone volume formula $V = (1/3)\pi r^2 h$. Substitute: $60\pi = (1/3)\pi(9)h \rightarrow 60 = 3h \rightarrow h = 20$ cm. Always isolate h by dividing by the coefficient $(1/3)\pi r^2$ before solving. Include proper units in the final answer.

27. B — 50, obtained by converting 20% to decimal and multiplying. $0.20 \times 250 = 50$. Alternatively, recognize that 20% is 1/5 and compute $250/5 = 50$. Percent of a value problems always reduce to multiplying the decimal form of the percent by the value.

28. A — $3x^2 - 5x - 2$, obtained by applying FOIL. First: $3x \cdot x = 3x^2$. Outer: $3x \cdot (-2) = -6x$. Inner: $1 \cdot x = x$. Last: $1 \cdot (-2) = -2$. Combine: $3x^2 - 6x + x - 2 = 3x^2 - 5x - 2$. The outer and inner products combine to form the middle coefficient.

29. D — $x \neq -2$, determined by setting the denominator equal to zero. $x + 2 = 0$ gives $x = -2$, which must be excluded. Domain restrictions for rational functions always come from values that make the denominator zero. The numerator plays no role in determining domain.

30. C — $x = 3$, obtained by applying the power law of logarithms and solving. Power law: $2 \log(x) = \log(x^2) = \log(9)$, so $x^2 = 9$ and $x = \pm 3$. However, $\log(-3)$ is undefined in the real number system, so reject the negative. Always check that logarithmic arguments remain positive in the original equation.