PRACTICE EXAM 17: ALEKS PPL SIMULATION

1. Simplify: $(x + 4)(x - 4) - (x^2 - 20)$.

A. 0

B. 4

C. −4

D. 20

2. A class has 30 students. If 40% are boys, how many girls are in the class?

A. 12

B. 15

C. 10

D. 18

3. Solve for x: $4x - 7 = 2x + 9$.

A. $x = 8$

B. $x = 4$

C. $x = 1$

D. $x = 16$

4. A trapezoid has bases of 10 and 14 cm and a height of 6 cm. What is its area?

A. 60 cm^2

B. 84 cm^2

C. 72 cm^2

D. 144 cm^2

5. If $\log_5(x) = 2$, what is x?

A. 10

B. 25

C. 125

D. 5

6. Simplify: $\sqrt{(50)} - \sqrt{(8)}$.

A. $3\sqrt{2}$

B. $4\sqrt{2}$

C. $\sqrt{42}$

D. $6\sqrt{2}$

7. A rectangle's length is 10 cm and width is w. What is the length of its diagonal in terms of w?

A. $w + 10$

B. $\sqrt{(w^2 + 10)}$

C. $w + \sqrt{10}$

D. $\sqrt{(w^2 + 100)}$

8. The graph of $y = -3x + 5$ has what y-intercept?

A. −3

B. 3

C. 5

D. −5

9. Find the slope of a line passing through (−2, 3) and (4, −9).

A. 2

B. −2

C. −1/2

D. 1/2

10. Solve: $|x - 3| < 5$.

A. $-2 < x < 8$

B. $x > 8$ or $x < -2$

C. $x < 8$

11. What is the value of $\sqrt{(-64)}$, assuming complex numbers are allowed?

A. −8

B. 8

C. 8i

D. −8i

12. Simplify: $\tan \theta \cdot \cos \theta$.

A. $\sin \theta$

B. 1

C. $\cos^2\theta$

D. $\sec \theta$

13. A cone has a radius of 5 cm and a height of 12 cm. What is its slant height?

A. 7 cm

B. 10 cm

C. 17 cm

D. 13 cm

14. Solve: 2^(x) + 2^(x) = 32.

A. $x = 3$

B. $x = 4$

C. $x = 5$

D. $x = 6$

15. If $f(x) = x - 3$ and $g(x) = x^2$, find $(g \circ f)(5)$.

A. 22

B. 23

C. 25

D. 4

16. Find the sum of the first 20 positive integers.

A. 190

B. 200

C. 210

D. 220

17. The equation of a line is $y = (1/2)x + 3$. What is the x-intercept?

A. −6

B. 3

C. 6

D. −3

18. What is the exact value of $\cos(30°)$?

A. 1/2

B. $\sqrt{2}/2$

C. $\sqrt{3}/2$

D. 1

19. Simplify: $(x^2 + 7x + 12)/(x^2 + 5x + 6)$, assuming $x \neq -2, -3$.

A. $(x + 4)/(x + 3)$

B. $(x + 4)/(x + 2)$

C. $(x + 3)/(x + 2)$

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

20. A jar contains 7 red, 5 blue, and 8 green marbles. What is the probability of drawing a blue marble?

A. 7/20

B. 2/5

C. 8/20

D. 1/4

21. A square has an area of 144 in^2. What is the length of its diagonal?

A. 12 in

B. $6\sqrt{2}$ in

C. 144 in

D. $12\sqrt{2}$ in

22. Simplify: $x^2 \cdot x^{-5} \cdot x^3$.

A. x^0 or 1

B. x^2

C. x^{-5}

D. x^{-1}

23. Solve: $3x^2 - 12 = 0$.

A. $x = 4$ only

B. $x = -2$ only

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

D. $x = \pm\sqrt{12}$

24. A pentagon has a perimeter of 40 cm. If each side is the same length, what is the length of one side?

A. 8 cm

B. 5 cm

C. 6 cm

D. 10 cm

25. If $f^{-1}(x) = 2x + 1$, what is $f(x)$?

A. $2x - 1$

B. $(x - 1)/2$

C. $(x + 1)/2$

D. $x/2 - 1$

26. Evaluate: $4 + 6 \times 2 - 3$.

A. 17

B. 12

C. 10

D. 13

27. A line has slope 2 and passes through (0, 4). What is its equation?

A. $y = 2x + 4$

B. $y = 2x - 4$

C. $y = 4x + 2$

D. $y = 4x - 2$

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

A. $4x^2 - 12x + 9$

B. $4x^2 + 12x - 9$

C. $4x^2 - 9$

D. $4x^2 + 9$

29. The surface area of a cube is 150 cm^2. What is the volume?

A. 75 cm^3

B. 125 cm^3

C. 25 cm^3

D. 250 cm^3

30. Solve: $\ln(x) = \ln(3) + \ln(4)$.

A. $x = 7$

B. $x = 3/4$

C. $x = 4/3$

D. $x = 12$

PRACTICE EXAM 17: ANSWER KEY AND EXPLANATIONS

1. B — Apply the difference of squares pattern: $(x + 4)(x - 4) = x^2 - 16$. Subtract $(x^2 - 20)$: $(x^2 - 16) - (x^2 - 20) = 4$. The x^2 terms cancel, leaving a constant difference.

2. D — Boys: $0.40 \times 30 = 12$. Girls: $30 - 12 = 18$. Always compute the specified category first, then subtract from the total for the complementary category.

3. A — Subtract 2x: $2x - 7 = 9$. Add 7: $2x = 16$, so $x = 8$. Always move variables to one side and constants to the other before isolating.

4. C — Trapezoid area = $(1/2)(b_1 + b_2)(h) = (1/2)(10 + 14)(6) = (1/2)(24)(6) = 72$ cm². The formula averages the two parallel sides, then multiplies by the height.

5. B — $\log_5(x) = 2$ converts to exponential form: $x = 5^2 = 25$. A logarithm is an exponent — the answer is always the base raised to the logarithm's value.

6. A — Simplify each radical: $\sqrt{50} = 5\sqrt{2}$, $\sqrt{8} = 2\sqrt{2}$. Subtract: $5\sqrt{2} - 2\sqrt{2} = 3\sqrt{2}$. Like radicals must share the same radicand after simplification before combining.

7. D — Diagonal of rectangle = $\sqrt{(l^2 + w^2)}$. With $l = 10$: diagonal = $\sqrt{(100 + w^2)}$. The Pythagorean theorem applied to a rectangle's sides yields the diagonal formula directly.

8. C — In $y = mx + b$ form, b is the y-intercept. For $y = -3x + 5$, $b = 5$. The y-intercept is the constant term when the equation is in slope-intercept form.

9. B — Slope = $(y_2 - y_1)/(x_2 - x_1) = (-9 - 3)/(4 - (-2)) = -12/6 = -2$. Consistency in the subtraction order of both numerator and denominator is critical.

10. A — Absolute value "less than" becomes a compound AND: $-5 < x - 3 < 5$. Add 3 to all parts: $-2 < x < 8$. The "sandwich" pattern produces a single bounded interval.

11. C — $\sqrt{(-64)} = \sqrt{64} \cdot \sqrt{(-1)} = 8i$, where $i = \sqrt{(-1)}$ is the imaginary unit. Complex numbers extend the real number system to include square roots of negative numbers.

12. A — $\tan \theta \cdot \cos \theta = (\sin \theta/\cos \theta) \cdot \cos \theta = \sin \theta$. The $\cos \theta$ in the numerator and denominator cancel, leaving $\sin \theta$. Always rewrite tan in terms of sin and cos to simplify.

13. D — Slant height, radius, and height form a right triangle: $\ell^2 = 5^2 + 12^2 = 169$, so $\ell = 13$ cm. The (5, 12, 13) Pythagorean triple eliminates the computation.

14. B — $2^x + 2^x = 2(2^x) = 2^{(x+1)}$. Set equal to $32 = 2^5$: $x + 1 = 5$, so $x = 4$. Combining like bases before equating exponents simplifies exponential equations.

15. D — Evaluate the inner function first: $f(5) = 5 - 3 = 2$. Then $g(2) = 2^2 = 4$. Composition applies the inside function first; the output becomes the input of the outer function.

16. C — Sum of the first n positive integers = $n(n + 1)/2$. For $n = 20$: $20(21)/2 = 210$. This formula, attributed to Gauss, provides the sum without adding every term individually.

17. A — Set $y = 0$: $0 = (1/2)x + 3$. Subtract 3 and multiply by 2: $x = -6$. The x-intercept is always found by setting $y = 0$ and solving for x.

18. C — $\cos(30°) = \sqrt{3}/2$ is a memorized unit-circle value. The standard first-quadrant angles (0°, 30°, 45°, 60°, 90°) must be memorized for every trigonometric function.

19. B — Factor numerator: $x^2 + 7x + 12 = (x + 3)(x + 4)$. Factor denominator: $x^2 + 5x + 6 = (x + 2)(x + 3)$. Cancel $(x + 3)$: $(x + 4)/(x + 2)$. Always factor both before canceling common factors.

20. D — Total marbles: $7 + 5 + 8 = 20$. Favorable (blue): 5. Probability = $5/20 = 1/4$. Always reduce probability fractions to simplest form.

21. D — Side length = $\sqrt{144} = 12$. Diagonal = side × $\sqrt{2} = 12\sqrt{2}$. Every square has a diagonal equal to its side times $\sqrt{2}$, derived from the 45-45-90 triangle ratio.

22. A — Add exponents: $2 + (-5) + 3 = 0$. So $x^0 = 1$. Any nonzero base raised to the zero power equals 1, a direct consequence of the quotient rule for exponents.

23. C — Add 12: $3x^2 = 12$. Divide by 3: $x^2 = 4$. Take square root: $x = \pm 2$. Always include both ± when solving by the square root method.

24. A — Perimeter of a regular pentagon = 5s, where s is the side length. $40 = 5s$, so $s = 8$ cm. A regular polygon has all equal sides; divide the perimeter by the number of sides.

25. B — The inverse of f^{-1} is f. If $f^{-1}(x) = 2x + 1$, then f is the inverse of that: swap and solve. $x = 2y + 1$, so $y = (x - 1)/2$. Inverse pairs always undo each other — finding one from the other requires swapping and solving.

26. D — Apply PEMDAS: multiplication first ($6 \times 2 = 12$), then left-to-right addition and subtraction: $4 + 12 - 3 = 13$. Always respect the order of operations to avoid procedural errors.

27. A — Slope-intercept form $y = mx + b$ with $m = 2$ and $b = 4$ (the y-coordinate of the y-intercept) gives $y = 2x + 4$. The point (0, 4) on the y-axis is read directly as b.

28. C — Apply the difference of squares pattern $(a - b)(a + b) = a^2 - b^2$: $(2x)^2 - 3^2 = 4x^2 - 9$. Conjugate pairs always produce a clean $a^2 - b^2$ result.

29. B — $6s^2 = 150 \rightarrow s^2 = 25 \rightarrow s = 5$. Volume of cube = $s^3 = 125$ cm³. Always find side length from surface area before computing volume.

30. D — Apply the product law of logarithms in reverse: $\ln(3) + \ln(4) = \ln(3 \cdot 4) = \ln(12)$. So $\ln(x) = \ln(12)$ gives $x = 12$. When logs with the same base are equal, their arguments must be equal.