PRACTICE EXAM 28: ALEKS PPL SIMULATION

1. A car travels 2.5 hours at 64 mph. How far does it travel?

A. 120 miles

B. 140 miles

C. 160 miles

D. 180 miles

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

A. $-x + 12$

B. $-x - 12$

C. $5x + 12$

D. $x + 12$

3. What is the midpoint of $(-3, 5)$ and $(7, -1)$?

A. $(-5, 3)$

B. $(5, 4)$

C. $(4, 3)$

D. $(2, 2)$

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

A. $x = 5$

B. $x = 7$

C. $x = 9$

D. $x = 11$

5. Simplify: $\sqrt{12} + \sqrt{27}$.

A. $5\sqrt{3}$

B. $6\sqrt{3}$

C. $3\sqrt{39}$

D. $\sqrt{39}$

6. A triangle has a base of 10 and a height of 7. What is its area?

A. 17

B. 70

C. 35

D. 140

7. Solve: $2^x = 64$.

A. $x = 2$

B. $x = 4$

C. $x = 5$

D. $x = 6$

8. If $f(x) = 5x - 2$, what is $f(3)$?

A. 11

B. 13

C. 15

D. 17

9. Simplify: $(a^3)^2/(a^2)$.

A. a^4

B. a^6

C. a^3

D. $a^{(-1)}$

10. A cylinder has radius 2 and height 6. What is its volume? (Use π.)

A. 12π

B. 18π

C. 24π

D. 48π

11. What is $\log(10^5)$?

A. 2

B. 3

C. 4

D. 5

12. Factor: $x^2 - 7x + 12$.

A. $(x - 2)(x - 6)$

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

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

D. $(x - 12)(x - 1)$

13. Solve for y: $3x + y = 9$.

A. $y = 9 - 3x$

B. $y = 3x - 9$

C. $y = 9 + 3x$

D. $y = 3 - 9x$

14. A fair coin is flipped 4 times. What is the probability of getting exactly 2 heads?

A. 1/4

B. 1/2

C. 3/8

D. 4/16

15. What is the equation of a circle with center (0, 0) and radius 7?

A. $x^2 + y^2 = 7$

B. $x^2 + y^2 = 14$

C. $x^2 - y^2 = 49$

D. $x^2 + y^2 = 49$

16. A trapezoid has parallel sides 5 and 11 and height 4. What is its area?

A. 32

B. 44

C. 64

D. 80

17. Simplify: $(3a^2 - 2ab) - (a^2 - ab)$.

A. $4a^2 - 3ab$

B. $2a^2 - ab$

C. $2a^2 - 3ab$

D. $4a^2 - ab$

18. What is the exact value of $\cos(45°)$?

A. 1/2

B. $\sqrt{3}/2$

C. 1

D. $\sqrt{2}/2$

19. A cone has volume 36π and radius 3. What is its height?

A. 4

B. 6

C. 12

D. 9

20. Solve: $3(x + 2) \geq x + 8$.

A. $x \geq 1$

B. $x \geq 2$

C. $x \leq 1$

D. $x \leq 2$

21. Simplify: $(x + 1)/(x^2 - 1)$, assuming $x \neq \pm 1$.

A. $1/(x + 1)$

B. $1/(x - 1)$

C. $x - 1$

D. $x + 1$

22. A rectangular garden is 16 m by 9 m. What is its area?

A. 25 m^2

B. 50 m^2

C. 72 m^2

D. 144 m^2

23. Solve: $2x + 5 = 3x - 4$.

A. $x = 9$

B. $x = 1$

C. $x = 3$

D. $x = -9$

24. Simplify: $\log(x^2) - \log(x)$.

A. 1

B. $\log(2x)$

C. $\log(x)$

D. 2

25. A rectangle has length 9 cm and width 4 cm. What is the length of its diagonal?

A. 5 cm

B. $\sqrt{97}$ cm

C. 13 cm

D. 6 cm

26. Evaluate: $(2^3)^2 - (2^2)^3$.

A. 16

B. 32

C. 64

D. 0

27. What is the y-intercept of $3x + 5y = 15$?

A. 3

B. 5

C. 15

D. -3

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

A. $4x^2 + 9$

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

C. $4x^2 - 9$

D. $2x^2 - 9$

29. A line passes through (2, 5) with slope −1. What is its equation?

A. $y = -x - 3$

B. $y = -x + 3$

C. $y = x + 7$

D. $y = -x + 7$

30. A box has a length 3 times its width and a height 2 times its width. If width = 4, what is the volume?

A. 96

B. 384

C. 256

D. 192

PRACTICE EXAM 28: ANSWER KEY AND EXPLANATIONS

1. C — 160 miles, calculated by multiplying rate by time. Distance = 64 mph × 2.5 hr = 160 miles. Rate problems always follow the distance-rate-time relationship when units are consistent. Always verify that the time units match the rate units — here, hours matches miles per hour.

2. A — $-x + 12$, obtained by distributing the -3 and combining like terms. $-3(x - 4) = -3x + 12$. Add 2x: $-3x + 12 + 2x = -x + 12$. Always distribute a negative coefficient to every term inside the parentheses, flipping each sign. Missing sign flips is the most frequent error in this type of problem.

3. D — (2, 2), calculated by averaging both x-coordinates and both y-coordinates. Midpoint = $((-3 + 7)/2, (5 + (-1))/2) = (4/2, 4/2) = (2, 2)$. The midpoint formula averages each coordinate independently. Addition — not subtraction — distinguishes the midpoint from the distance formula.

4. B — x = 7, obtained by distributing both sides and isolating x. $4x - 12 = 2x + 2 \rightarrow 2x = 14 \rightarrow x = 7$. Always distribute through parentheses on both sides before combining like terms, then move variables to one side and constants to the other.

5. A — $5\sqrt{3}$, obtained by simplifying each radical and combining like terms. $\sqrt{12} = 2\sqrt{3}$; $\sqrt{27} = 3\sqrt{3}$. Sum: $2\sqrt{3} + 3\sqrt{3} = 5\sqrt{3}$. Like radicals must share the same radicand after simplification before combining their coefficients. Always extract perfect-square factors first.

6. C — 35, calculated using the triangle area formula (1/2)(base)(height). Substitute: $(1/2)(10)(7) = 35$. Always use the perpendicular height when applying the triangle area formula. Always include the one-half factor — omitting it doubles the intended answer.

7. D — x = 6, because $2^6 = 64$ matches the base of 2 on the left side. When exponential bases match on both sides, the exponents must be equal. Memorizing small powers of 2 (up to $2^{10} = 1024$) allows instant recognition for base-matching in exponential equations.

8. B — 13, found by substituting x = 3 into the function. $f(3) = 5(3) - 2 = 15 - 2 = 13$. Always apply order of operations when evaluating functions: multiplication before subtraction, addition, or other operations.

9. A — a^4, obtained by applying the power rule and then the quotient rule. $(a^3)^2 = a^6$ (multiply exponents). Then $a^6/a^2 = a^{(6-2)} = a^4$ (subtract exponents). Always simplify powers of powers before dividing or multiplying different base expressions.

10. C — 24π, calculated using the cylinder volume formula $\pi r^2 h$. Substitute: $\pi(2^2)(6) = \pi(4)(6) = 24\pi$ cubic units. Always square the radius before multiplying by the height and π. Keeping π symbolic preserves precision.

11. D — 5, because $\log(10^5) = 5$ directly applies the inverse relationship between log base 10 and powers of 10. log_b(b^x) = x for any base b. The common log (base 10) of any power of 10 equals that power.

12. B — $(x - 3)(x - 4)$, found by identifying two numbers that multiply to 12 and add to −7. The pair is −3 and −4. Both are negative because the product is positive but the sum is negative. Always verify by expanding the factored form.

13. A — $y = 9 - 3x$, obtained by subtracting 3x from both sides. $3x + y = 9 \rightarrow y = 9 - 3x$. This equivalent form expresses y as a function of x. Rearranging equations to solve for a specific variable is a fundamental algebraic skill.

14. C — 3/8, calculated using combinations for the number of ways to get exactly 2 heads. Favorable: $C(4, 2) = 6$. Total outcomes: $2^4 = 16$. Probability = 6/16 = 3/8. Combinations formula counts arrangements when order does not matter — necessary for exactly-k-successes problems.

15. D — $x^2 + y^2 = 49$, from the standard form $x^2 + y^2 = r^2$ with $r = 7$. Square the radius: $r^2 = 49$. The standard form reflects the Pythagorean theorem, with the radius as the hypotenuse of a right triangle with legs x and y.

16. A — 32, calculated using the trapezoid area formula $(1/2)(b_1 + b_2)(h)$. Substitute: $(1/2)(5 + 11)(4) = (1/2)(16)(4) = 32$ square units. Always average the two parallel sides first, then multiply by the perpendicular height.

17. B — $2a^2 - ab$, obtained by distributing the negative sign and combining like terms. $(3a^2 - 2ab) - (a^2 - ab) = 3a^2 - 2ab - a^2 + ab = (3a^2 - a^2) + (-2ab + ab) = 2a^2 - ab$. Always distribute the subtraction across every term in the second polynomial.

18. D — $\sqrt{2}/2$, a memorized unit-circle value for cos(45°). The 45-45-90 triangle has equal legs, so sine and cosine both equal $\sqrt{2}/2$ at 45°. Memorize these five values: sin and cos of 0°, 30°, 45°, 60°, 90°.

19. C — 12, derived from the cone volume formula $V = (1/3)\pi r^2 h$. Substitute: $36\pi = (1/3)\pi(9)h = 3\pi h$. Divide by 3π: $h = 12$ units. Always isolate h by dividing by the coefficient $(1/3)\pi r^2$ before solving.

20. A — $x \geq 1$, obtained by distributing and solving the inequality. $3x + 6 \geq x + 8 \rightarrow 2x \geq 2 \rightarrow x \geq 1$. Dividing by a positive number preserves the inequality direction. Always isolate the variable with the positive coefficient for clean arithmetic.

21. B — $1/(x - 1)$, obtained by factoring the denominator as a difference of squares and canceling. Denominator: $x^2 - 1 = (x + 1)(x - 1)$. Cancel $(x + 1)$: result is $1/(x - 1)$. Always factor denominators completely before attempting cancellation.

22. D — 144 m^2, calculated by multiplying length by width. Area of rectangle = $l \times w = 16 \times 9 = 144$ m^2. Area is always measured in square units. Verify dimensions before computing to avoid unit confusion.

23. A — $x = 9$, obtained by moving variables to one side and constants to the other. Add 4 and subtract 2x: $5 + 4 = x \rightarrow 9 = x$. Always verify the final answer by substitution: $2(9) + 5 = 23 = 3(9) - 4 = 23$. ✓

24. C — $\log(x)$, obtained by applying the quotient law of logarithms. $\log(x^2) - \log(x) = \log(x^2/x) = \log(x)$. The quotient law converts a difference of logs into a log of a quotient. Always condense logs to a single expression before further simplification.

25. B — $\sqrt{97}$ cm, calculated using the Pythagorean theorem on rectangle sides. Diagonal = $\sqrt{(l^2 + w^2)} = \sqrt{(81 + 16)} = \sqrt{97}$ cm. Simplify only when the radicand has perfect-square factors — $\sqrt{97}$ has no such factors and remains in simplest form.

26. D — 0, because both $(2^3)^2$ and $(2^2)^3$ equal $2^6 = 64$, producing a difference of zero. $(2^3)^2 = 2^{(3\cdot2)} = 2^6$. $(2^2)^3 = 2^{(2\cdot3)} = 2^6$. Subtract: $64 - 64 = 0$. The power-of-power rule commutes: the order of exponents doesn't matter.

27. A — 3, found by setting $x = 0$ and solving for y. $5y = 15 \rightarrow y = 3$. The y-intercept is always found by setting x to zero. In standard form $Ax + By = C$, the y-intercept equals C/B.

28. C — $4x^2 - 9$, applying the difference of squares pattern $(a + b)(a - b) = a^2 - b^2$. With $a = 2x$, $b = 3$: $(2x)^2 - 3^2 = 4x^2 - 9$. Conjugate pairs always produce a clean result with no middle term.

29. D — $y = -x + 7$, derived using point-slope form. $y - 5 = -1(x - 2)$. Distribute: $y - 5 = -x + 2$. Add 5: $y = -x + 7$. Always simplify to slope-intercept form for standard presentation and verify by substitution.

30. B — 384, calculated by finding all three dimensions and multiplying. Width = 4; length = 3(4) = 12; height = 2(4) = 8. Volume = $12 \times 4 \times 8 = 384$ cubic units. Always identify each dimension individually based on the given relationships before computing volume.