PRACTICE EXAM 31: ALEKS PPL SIMULATION

1. A concert sold 240 tickets. Adult tickets cost $25 and student tickets cost $15. Total revenue was $4,800. How many adult tickets were sold?

A. 60

B. 96

C. 144

D. 120

2. Simplify: $4x^2 - (x^2 - 3x + 1)$.

A. $3x^2 - 3x + 1$

B. $3x^2 + 3x - 1$

C. $5x^2 + 3x - 1$

D. $3x^2 - 3x - 1$

3. Solve: $6x - 2(x + 3) = 10$.

A. $x = 4$

B. $x = 2$

C. $x = 5$

D. $x = 3$

4. What is the circumference of a circle with diameter 20? (Use π.)

A. 10π

B. 40π

C. 20π

D. 400π

5. Factor: $x^2 - 14x + 49$.

A. $(x + 7)^2$

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

C. $(x - 14)(x + 7)$

D. $(x - 7)^2$

6. A rectangular prism has dimensions $4 \times 5 \times 6$. What is the volume?

A. 120

B. 90

C. 74

D. 180

7. Simplify: $3\sqrt{(50)}$.

A. $3\sqrt{50}$

B. $15\sqrt{2}$

C. 15

D. $50\sqrt{3}$

8. Solve: $2^{(x + 1)} = 32$.

A. $x = 2$

B. $x = 3$

C. $x = 4$

D. $x = 5$

9. What is the slope of the line through (−2, 3) and (2, 11)?

A. 1

B. 4

C. 3

D. 2

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

A. 11

B. 7

C. 9

D. 5

11. A bag has 12 coins: 4 pennies, 4 nickels, 4 dimes. What is the probability of drawing a dime?

A. 1/3

B. 1/4

C. 1/2

D. 1/6

12. Simplify: $(a + b)(a - b)$.

A. $a^2 + 2ab + b^2$

B. $a^2 - 2ab + b^2$

C. $a^2 - b^2$

D. $a^2 + b^2$

13. Evaluate: $5(2)^2 - 3(4) + 6$.

A. 10

B. 12

C. 16

D. 14

14. A cone has radius 6 and height 8. What is its slant height?

A. 12

B. 10

C. 14

D. 16

15. What is $\log(0.01)$?

A. −2

B. −1

C. 1

D. 2

16. Simplify: $(x + 3)/(x^2 + 3x)$, assuming $x \neq 0, -3$.

A. $x + 3$

B. $x/(x + 3)$

C. $1/x$

D. x

17. Solve: $3x - 5 = 2(x + 4)$.

A. $x = 3$

B. $x = 7$

C. $x = 9$

D. $x = 13$

18. A triangle has sides 10, 24, 26. Is it a right triangle?

A. No, because the sides are not equal

B. Yes, because $10^2 + 24^2 = 26^2$

C. No, because the largest side is 26

D. Yes, because it is equilateral

19. The equation $y = -2x + 10$ has what y-intercept?

A. 10

B. -2

C. 2

D. -10

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

A. 0

B. 8x

C. −8x

D. 16x

21. A right triangle has one acute angle of 30° and the side opposite it is 5. What is the hypotenuse?

A. $5\sqrt{3}$

B. 10

C. $5\sqrt{2}$

D. $10\sqrt{3}$

22. Factor: $3x^2 + 10x + 8$.

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

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

C. $(3x + 8)(x + 1)$

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

23. A spinner has 10 equal sectors numbered 1 to 10. What is the probability of spinning a number greater than 7?

A. 3/10

B. 2/10

C. 1/10

D. 4/10

24. Simplify: $(x^2 - 4x + 4)/(x - 2)$, assuming $x \neq 2$.

A. $x + 2$

B. 2

C. $x - 2$

D. $(x - 2)^2$

25. A line passes through (3, 2) with slope 4. What is the equation in slope-intercept form?

A. $y = 4x + 2$

B. $y = 4x - 14$

C. $y = 4x + 14$

D. $y = 4x - 10$

26. The sum of the first 5 positive even integers is:

A. 25

B. 30

C. 40

D. 50

27. Solve: $(x - 3)/2 = 5$.

A. $x = 13$

B. $x = 10$

C. $x = 7$

D. $x = 8$

28. A sphere has surface area 144π. What is the radius?

A. 12

B. 8

C. 9

D. 6

29. Simplify: $\csc \theta \cdot \sin \theta$.

A. 0

B. $\cos \theta$

C. 1

D. $\tan \theta$

30. Solve the system: $x + y = 10$ and $x - y = 4$.

A. (5, 5)

B. (7, 3)

C. (4, 6)

D. (8, 2)

PRACTICE EXAM 31: ANSWER KEY AND EXPLANATIONS

1. D — 120 adult tickets, obtained by setting up a two-variable ticket equation. Let a = adult tickets; student tickets = $240 - a$. Revenue: $25a + 15(240 - a) = 4800 \rightarrow 10a + 3600 = 4800 \rightarrow 10a = 1200 \rightarrow a = 120$. Two-price ticket problems always reduce to a single equation in one variable once the total count is known.

2. B — $3x^2 + 3x - 1$, obtained by distributing the negative sign through the second polynomial and combining like terms. $4x^2 - (x^2 - 3x + 1) = 4x^2 - x^2 + 3x - 1 = 3x^2 + 3x - 1$. Always distribute the subtraction across every term inside the parentheses, flipping each sign to avoid the most common algebra error.

3. A — $x = 4$, obtained by distributing and solving the linear equation. $6x - 2x - 6 = 10 \rightarrow 4x - 6 = 10 \rightarrow 4x = 16 \rightarrow x = 4$. Always distribute through parentheses before combining like terms, and isolate the variable with basic inverse operations.

4. C — 20π, calculated using the formula $C = \pi d$ with diameter 20. $C = \pi(20) = 20\pi$. Always identify whether the given measurement is radius or diameter before applying the circumference formula. Diameter times π gives circumference; radius times 2π also works.

5. D — $(x - 7)^2$, recognizing a perfect square trinomial. Check: $\sqrt{(x^2)} = x$, $\sqrt{49} = 7$, and $2(x)(7) = 14x$ (matches the middle term with negative sign). Factored: $(x - 7)^2$. Perfect square trinomials factor into $(a \pm b)^2$ when the middle coefficient equals ± 2 times the product of the square roots.

6. A — 120, calculated by multiplying all three dimensions of the rectangular prism. $V = l \times w \times h = 4 \times 5 \times 6 = 120$ cubic units. Volume of a rectangular prism always equals the product of its three edge lengths, measured in cubic units.

7. B — $15\sqrt{2}$, obtained by simplifying the radical first and then multiplying. $\sqrt{50} = \sqrt{(25 \cdot 2)} = 5\sqrt{2}$. Multiply by 3: $15\sqrt{2}$. Always extract perfect-square factors from a radicand before multiplying by any coefficient outside the radical.

8. C — $x = 4$, because 32 can be rewritten as 2^5, matching the base on the left. $2^{(x + 1)} = 2^5 \rightarrow x + 1 = 5 \rightarrow x = 4$. Matching bases allows direct equating of exponents, eliminating the need for logarithms when the numerical side can be rewritten as a power of the base.

9. D — 2, calculated using the slope formula $m = (y_2 - y_1)/(x_2 - x_1)$. Substitute: $(11 - 3)/(2 - (-2)) = 8/4 = 2$. A positive slope indicates a line rising from left to right. Always subtract y-values over x-values in the same order.

10. A — 11, found by substituting $x = -3$ into the function. $f(-3) = (-3)^2 + 2 = 9 + 2 = 11$. Always wrap negative inputs in parentheses to preserve the sign — squaring always produces a positive result regardless of the original sign.

11. A — 1/3, calculated by dividing favorable outcomes by total outcomes. Dimes: 4. Total coins: 12. Probability = 4/12 = 1/3. Always reduce probability fractions to simplest form before submitting. Probability equals favorable outcomes divided by total outcomes.

12. C — $a^2 - b^2$, applying the difference of squares pattern $(a + b)(a - b)$. The cross terms $+ab$ and $-ab$ cancel when expanded, leaving only $a^2 - b^2$. This is the most frequently tested special product in algebra — recognize it instantly.

13. D — 14, obtained by applying PEMDAS in correct order. Exponents first: $2^2 = 4$. Multiplication: $5(4) = 20$; $3(4) = 12$. Sum: $20 - 12 + 6 = 14$. Always respect the order of operations: exponents before multiplication and division, and those before addition and subtraction.

14. B — 10, calculated using the Pythagorean theorem on the cone's radius and height. $\ell^2 = r^2 + h^2 = 36 + 64 = 100 \rightarrow \ell = 10$. The slant height is always the hypotenuse of the right triangle formed by radius and perpendicular height.

15. A — −2, because $0.01 = 10^{-2}$ directly identifies the exponent. $\log(0.01) = \log(10^{-2}) = -2$. Common logs of powers of 10 always equal the exponent. Memorizing this relationship for positive and negative powers accelerates logarithm computation.

16. C — $1/x$, obtained by factoring the denominator and canceling the common factor. Denominator: $x^2 + 3x = x(x + 3)$. Then $(x + 3)/[x(x + 3)] = 1/x$. Always factor denominators completely before attempting cancellation — only factors connected by multiplication can be canceled.

17. D — $x = 13$, obtained by distributing and isolating the variable. $3x - 5 = 2x + 8 \rightarrow x = 13$. Always distribute through parentheses on the side that contains them, then move variables to one side and constants to the other.

18. B — Yes, because $10^2 + 24^2 = 26^2$, confirming the Pythagorean theorem. Calculation: $100 + 576 = 676 = 26^2$. The (10, 24, 26) triple is a multiple of (5, 12, 13) by a factor of 2. Recognizing Pythagorean triples saves computation time.

19. A — 10, because in $y = mx + b$ form, b is the y-intercept. For $y = -2x + 10$, $b = 10$. 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 — $-8x$, applying the identity $(a - b)^2 - (a + b)^2 = -4ab$ with $a = 2x$, $b = 1$: $-4(2x)(1) = -8x$. Direct expansion also works: $(4x^2 - 4x + 1) - (4x^2 + 4x + 1) = -8x$. The squared and constant terms cancel, leaving only the negative middle cross terms.

21. B — 10, derived from the 30-60-90 triangle ratio $1 : \sqrt{3} : 2$. The side opposite 30° is 5, so the hypotenuse is $2 \times 5 = 10$. Memorizing standard triangle ratios eliminates trigonometric calculation — the hypotenuse is always twice the shortest leg in a 30-60-90 triangle.

22. D — $(3x + 4)(x + 2)$, found by the AC method. Multiply $a \times c = 3 \times 8 = 24$. Find two numbers multiplying to 24 and adding to 10: 6 and 4. Rewrite: $3x^2 + 6x + 4x + 8 = 3x(x + 2) + 4(x + 2) = (3x + 4)(x + 2)$. Verify by expanding.

23. A — 3/10, calculated by dividing favorable outcomes by total outcomes. Numbers greater than 7: 8, 9, 10 = 3 favorable. Total: 10. Probability = 3/10. Always identify the specific numbers that satisfy the condition before forming the probability ratio.

24. C — $x - 2$, obtained by factoring the numerator as a perfect square and canceling. Numerator: $x^2 - 4x + 4 = (x - 2)^2$. Divided by $(x - 2)$: result is $x - 2$. Perfect square trinomials factor into $(a \pm b)^2$ when the middle term is ±2 times the product of the square roots.

25. D — $y = 4x - 10$, derived using point-slope form. $y - 2 = 4(x - 3)$. Distribute: $y - 2 = 4x - 12$. Add 2: $y = 4x - 10$. Always simplify to slope-intercept form for standard presentation and verify by substituting the given point.

26. B — 30, obtained by summing the first 5 positive even integers. Sum = 2 + 4 + 6 + 8 + 10 = 30. Alternatively, the sum of the first n positive even integers equals $n(n + 1)$, so $5(6) = 30$. Recognizing arithmetic series formulas saves computation time.

27. A — $x = 13$, obtained by multiplying both sides by 2 and adding 3. $(x - 3)/2 = 5 \rightarrow x - 3 = 10 \rightarrow x = 13$. Always clear fractions first by multiplying both sides by the denominator, then proceed with standard linear equation steps.

28. D — 6, derived from the sphere surface area formula $4\pi r^2 = 144\pi$. Divide both sides by 4π: $r^2 = 36$. Take the positive square root: $r = 6$. Always divide by 4π first before taking the square root, and reject the negative root for a geometric radius.

29. C — 1, because csc and sin are reciprocal functions. $\csc \theta = 1/\sin \theta$, so $\csc \theta \cdot \sin \theta = (1/\sin \theta)(\sin \theta) = 1$ (provided $\sin \theta \neq 0$). Reciprocal pairs always multiply to 1 within their common domain. The pairs are sin/csc, cos/sec, and tan/cot.

30. B — (7, 3), obtained by adding the two equations to eliminate y. $(x + y) + (x - y) = 10 + 4 \rightarrow 2x = 14 \rightarrow x = 7$. Then $y = 10 - 7 = 3$. Adding or subtracting equations to eliminate a variable is the most efficient approach for systems with opposite coefficients.