PRACTICE EXAM 27: ALEKS PPL SIMULATION

1. A store has a 25% off sale. If a shirt's sale price is $30, what was the original price?

A. $37.50

B. $40.00

C. $35.00

D. $45.00

2. Simplify: $3(2x + 1) - 5(x - 2)$.

A. $x - 7$

B. $11x - 7$

C. $x - 13$

D. $x + 13$

3. What is the value of the expression $4^2 + 3^2 - 5^2$?

A. 0

B. 8

C. 10

D. 14

4. A cone has radius 6 and slant height 10. What is its lateral surface area? (Use π.)

A. 30π

B. 48π

C. 60π

D. 100π

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

A. $x = 4$

B. $x = 5$

C. $x = 7$

D. $x = 8$

6. What is the distance between (1, 2) and (4, 6)?

A. 5

B. 7

C. 25

D. $\sqrt{5}$

7. Simplify: $(x^2y)^2 \cdot (xy^2)^3$.

A. x^4y^5

B. x^5y^8

C. x^5y^7

D. x^7y^8

8. Factor: $x^2 - 81$.

A. $(x + 9)^2$

B. $(x - 9)^2$

C. $(x + 9)(x - 9)$

D. $(x - 81)(x + 1)$

9. A cylinder has radius 5 and height 8. What is its surface area? (Use π.)

A. 80π

B. 130π

C. 200π

D. 400π

10. What is the slope of a horizontal line?

A. 0

B. 1

C. Undefined

D. -1

11. Solve: $2x^2 + 3x - 2 = 0$.

A. $x = 1/2$ or $x = -2$

B. $x = -1/2$ or $x = 2$

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

D. $x = 1$ or $x = -2$

12. A fair die is rolled twice. What is the probability of rolling two 6s?

A. 1/12

B. 1/6

C. 1/36

D. 1/72

13. Simplify: ln(e^3).

A. e

B. 1

C. 3e

D. 3

14. What is the area of a triangle with sides 6, 8, and 10?

A. 24

B. 30

C. 40

D. 48

15. Simplify: x^(3/2) · x^(1/2).

A. x^(3/4)

B. x^(1/4)

C. x^(1/2)

D. x^2

16. A rectangle has area 48 and length 8. What is the perimeter?

A. 20

B. 28

C. 24

D. 32

17. Solve: $3 - x \geq 1$.

A. $x \geq 2$

B. $x \geq -2$

C. $x \leq 2$

D. $x \leq -2$

18. A 45-45-90 triangle has legs of length 6. What is the hypotenuse?

A. $6\sqrt{2}$

B. 12

C. $6\sqrt{3}$

D. $3\sqrt{2}$

19. What is the domain of $f(x) = \sqrt{(9 - x^2)}$?

A. $x \geq 3$

B. $x \leq -3$

C. all real numbers

D. $-3 \leq x \leq 3$

20. A square pyramid has base side 5 and height 9. What is its volume?

A. 45

B. 75

C. 225

D. 90

21. Solve: $|2x - 1| = 7$.

A. $x = 4$ only

B. $x = -3$ only

C. $x = 4$ or $x = 3$

D. $x = 4$ or $x = -3$

22. Simplify: $(3x - 2)/(9x^2 - 4)$, assuming $x \neq \pm 2/3$.

A. $1/(3x + 2)$

B. $3x + 2$

C. $3x - 2$

D. $1/(3x - 2)$

23. What is $\cos(180°)$?

A. 1

B. 0

C. -1

D. $\sqrt{2}/2$

24. A bag contains 4 red and 6 blue balls. Two balls are drawn without replacement. What is the probability both are blue?

A. 3/10

B. 1/3

C. 2/5

D. 3/5

25. Simplify: $(x^2 + 6x + 9)/(x + 3)$, assuming $x \neq -3$.

A. $x - 3$

B. $(x + 3)^2$

C. $x^2 + 3$

D. $x + 3$

26. A line has equation $y = 2x - 4$. What is the x-intercept?

A. 2

B. −2

C. 4

D. −4

27. If $\log_2(x) = 4$, what is x?

A. 8

B. 10

C. 16

D. 24

28. A rectangle has dimensions $x + 1$ and $x - 3$. If the area is 21, find x.

A. 3

B. 6

C. 5

D. 4

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

A. 1

B. 0

C. $\tan \theta$

D. $\cos \theta$

30. Evaluate: $(1/2)^{-3}$.

A. 1/8

B. −8

C. 3/2

D. 8

PRACTICE EXAM 27: ANSWER KEY AND EXPLANATIONS

1. B — $40.00, obtained by dividing the sale price by the remaining percentage. A 25% discount means 75% of the original remains: Original × 0.75 = 30, so Original = 30 ÷ 0.75 = 40. Discount problems always use the complement (1 − discount rate) as the multiplier, and solving for the original requires division by this factor rather than multiplication.

2. D — x + 13, obtained by distributing both parenthetical expressions and combining like terms. $3(2x + 1) = 6x + 3$; $-5(x - 2) = -5x + 10$. Combine: $(6x - 5x) + (3 + 10) = x + 13$. Always distribute completely — including the negative sign — before combining. Missing a sign flip during distribution is the most common error.

3. A — 0, found by evaluating each squared term and performing the operations in order. $4^2 = 16$; $3^2 = 9$; $5^2 = 25$. Calculate: $16 + 9 - 25 = 0$. The (3, 4, 5) Pythagorean triple pattern produces this zero result because $3^2 + 4^2 = 5^2$ by the Pythagorean theorem.

4. C — 60π, calculated using the lateral surface area formula for a cone: $\pi r\ell$. With radius 6 and slant height 10: $\pi(6)(10) = 60\pi$ square units. Lateral surface area excludes the base — add πr^2 separately if total surface area is needed. Always distinguish slant height from perpendicular height.

5. B — x = 5, obtained by multiplying both sides by 2 and then subtracting 3. $(x + 3)/2 = 4 \rightarrow x + 3 = 8 \rightarrow x = 5$. Always clear fractions first by multiplying both sides by the denominator, then proceed with standard linear-equation steps.

6. A — 5, calculated using the distance formula $\sqrt{((x_2 - x_1)^2 + (y_2 - y_1)^2)}$. Substitute: $\sqrt{((4 - 1)^2 + (6 - 2)^2)} = \sqrt{(9 + 16)} = \sqrt{25} = 5$. The (3, 4, 5) Pythagorean triple emerges from the coordinate differences. Always square differences separately before summing.

7. D — x^7y^8, obtained by applying the power rule to each factor separately, then multiplying. $(x^2y)^2 = x^4y^2$; $(xy^2)^3 = x^3y^6$. Multiply: x^(4+3) · y^(2+6) = x^7y^8. Always apply outer exponents before multiplying factors — the sequence matters for accurate simplification.

8. C — $(x + 9)(x - 9)$, applying the difference of squares pattern $a^2 - b^2 = (a + b)(a - b)$. With a = x, b = 9: $(x + 9)(x - 9)$. Recognize that both 81 and x^2 are perfect squares — this is the signature of a difference-of-squares problem.

9. B — 130π, calculated by adding the two circular bases and the lateral surface. Top and bottom: $2\pi r^2 = 2\pi(25) = 50\pi$. Lateral: $2\pi rh = 2\pi(5)(8) = 80\pi$. Total: $50\pi + 80\pi = 130\pi$ square units. Cylinder surface area combines three separate pieces — two circles and one rectangular wrap.

10. A — 0, because a horizontal line has no vertical change. Slope = rise/run, and rise is zero for a flat line. Vertical lines, in contrast, have undefined slope. Recognizing the four slope types (positive, negative, zero, undefined) is essential for line identification.

11. A — $x = 1/2$ or $x = -2$, found by factoring the quadratic or using the quadratic formula. Factor: $(2x - 1)(x + 2) = 0$, giving $2x - 1 = 0$ ($x = 1/2$) or $x + 2 = 0$ ($x = -2$). AC method or direct trial-and-error factoring always produces both solutions.

12. C — 1/36, calculated as the product of two independent 1/6 probabilities. P(first 6 and second 6) = (1/6)(1/6) = 1/36. Independent events multiply their individual probabilities — the second roll is independent of the first because each die is fair.

13. D — 3, because ln(e^x) = x for any real x. This is the fundamental inverse relationship between natural logarithm and exponential function: they undo each other. Applying ln to e^3 extracts the exponent directly.

14. A — 24, calculated using the legs of the right triangle formed by the (6, 8, 10) Pythagorean triple. Area = (1/2)(6)(8) = 24. Recognizing Pythagorean triples eliminates the verification step — the two legs serve as base and height.

15. D — x^2, obtained by adding the fractional exponents. Product rule: $x^{(3/2 + 1/2)} = x^{(4/2)} = x^2$. Fractional exponents follow the same rules as integer exponents — add exponents when multiplying like bases.

16. B — 28, calculated by finding the unknown width, then applying the perimeter formula. Width = area/length = 48/8 = 6. Perimeter = 2l + 2w = 16 + 12 = 28 units. Always derive the unknown dimension from the given area before finding the perimeter.

17. C — $x \leq 2$, obtained by subtracting 3 and multiplying by −1 with sign flip. $3 - x \geq 1 \rightarrow -x \geq -2 \rightarrow x \leq 2$. Multiplying or dividing an inequality by a negative number always reverses the direction — this is the most tested rule in inequality problems.

18. A — $6\sqrt{2}$, derived from the 45-45-90 triangle ratio. The sides are in ratio $1 : 1 : \sqrt{2}$, where the hypotenuse is leg × $\sqrt{2}$. With leg 6: hypotenuse = $6\sqrt{2}$. Memorizing standard triangle ratios eliminates trigonometric calculation for common angles.

19. D — $-3 \leq x \leq 3$, determined by the requirement that the radicand be non-negative. $9 - x^2 \geq 0 \rightarrow x^2 \leq 9 \rightarrow |x| \leq 3 \rightarrow -3 \leq x \leq 3$. Domain restrictions for even roots always exclude values that make the radicand negative, producing a bounded interval.

20. B — 75, calculated using the pyramid volume formula V = (1/3)(base area)(height). Base area = $5^2 = 25$. Volume = (1/3)(25)(9) = 75 cubic units. Always include the one-third factor for pyramids and cones, distinguishing pointed solids from prisms and cylinders.

21. D — $x = 4$ or $x = -3$, obtained by splitting the absolute value into two cases. Case 1: $2x - 1 = 7 \rightarrow x = 4$. Case 2: $2x - 1 = -7 \rightarrow x = -3$. Every absolute value equation $|\text{expression}| = k$ (with $k > 0$) produces exactly two solutions — both must be reported.

22. A — $1/(3x + 2)$, obtained by factoring the denominator as a difference of squares and canceling. Denominator: $9x^2 - 4 = (3x - 2)(3x + 2)$. Cancel $(3x - 2)$: result is $1/(3x + 2)$. Recognize that $9x^2$ and 4 are both perfect squares — the difference-of-squares factoring applies immediately.

23. C — -1, because $\cos(180°)$ corresponds to the x-coordinate of the unit-circle point at 180°, which is $(-1, 0)$. The terminal side of a 180° angle lies along the negative x-axis. Memorize all four quadrantal angle cosine values: (1, 0, −1, 0 at 0°, 90°, 180°, 270°).

24. B — 1/3, calculated as the product of two dependent probabilities. P(first blue) = 6/10. P(second blue | first blue) = 5/9. Joint probability: $(6/10)(5/9) = 30/90 = 1/3$. Without replacement, the second probability reflects the reduced count from the first draw.

25. D — $x + 3$, obtained by factoring the numerator as a perfect square and canceling. Numerator: $x^2 + 6x + 9 = (x + 3)^2$. Cancel one $(x + 3)$: result is $x + 3$. Perfect square trinomials always factor into $(a \pm b)^2$ when the middle coefficient matches $2ab$.

26. A — 2, found by setting $y = 0$ and solving for x. $0 = 2x - 4 \rightarrow x = 2$. The x-intercept is always found by setting the y-value to zero. This is the reverse of finding the y-intercept.

27. C — 16, because $\log_2(x) = 4$ converts to exponential form: $x = 2^4 = 16$. A logarithm is an exponent — always convert to exponential form when solving for the argument. Memorize small powers of 2 for rapid evaluation.

28. B — 6, obtained by setting up a quadratic equation from the area. $(x + 1)(x - 3) = x^2 - 2x - 3 = 21 \rightarrow x^2 - 2x - 24 = 0 \rightarrow (x - 6)(x + 4) = 0$. Positive solution: $x = 6$. Always reject the negative root for physical dimension problems.

29. A — 1, because sin and csc are reciprocal functions: $\csc\theta = 1/\sin\theta$. Product: $\sin\theta \times 1/\sin\theta = 1$ (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. D — 8, calculated by applying negative exponent rules and then cubing. $(1/2)^{-3} = (2/1)^3 = 8$. A negative exponent indicates the reciprocal; then cube the result. Memorize small cubes for rapid evaluation: $2^3 = 8$, $3^3 = 27$, $4^3 = 64$.