PRACTICE EXAM 29: ALEKS PPL SIMULATION

1. A worker earns $18 per hour. How much does she earn for a 40-hour work week?

A. $720

B. $680

C. $800

D. $640

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

A. $2x^2 - 7x - 15$

B. $2x^2 + 13x + 15$

C. $2x^2 - 13x - 15$

D. $2x^2 + 7x - 15$

3. Solve: $5x + 1 = 3x + 11$.

A. $x = 10$

B. $x = 5$

C. $x = 6$

D. $x = 4$

4. What is the area of a circle with radius 9? (Use π.)

A. 18π

B. 36π

C. 81π

D. 162π

5. Simplify: 2^(x) · 2^(3).

A. 2^(x + 3)

B. 2^(3x)

C. 4^(x + 3)

D. 6^(x)

6. What is the exact value of tan(30°)?

A. √3

B. 1

C. 1/2

D. √3/3

7. A right triangle has legs 6 and 10. What is the hypotenuse?

A. 14

B. 8

C. 2√34

D. 16

8. Solve: $\sqrt{(2x + 1)} = 5$.

A. $x = 10$

B. $x = 12$

C. $x = 14$

D. $x = 24$

9. A class has 20 boys and 15 girls. What is the ratio of boys to total students?

A. 4/7

B. 3/4

C. 4/3

D. 3/7

10. Simplify: $(x - 5)^2 - (x + 5)^2$.

A. $10x$

B. $20x$

C. 0

D. $-20x$

11. A rectangle has length $3x$ and width x. Its area is 48. What is x?

A. 2

B. 3

C. 4

D. 6

12. What is the slope of the line $7x - 3y = 21$?

A. $7/3$

B. $-7/3$

C. $3/7$

D. $-3/7$

13. Simplify: $\log(x^2y)$ using the product and power laws.

A. $2\log(xy)$

B. $\log(2x) + \log(y)$

C. $\log(x^2y^2)$

D. $2\log(x) + \log(y)$

14. The perimeter of a square is 36 cm. What is its area?

A. $72\ cm^2$

B. $81\ cm^2$

C. $144\ cm^2$

D. $36\ cm^2$

15. Solve: $x^2 + 4x - 12 = 0$.

A. $x = 6$ or $x = -2$

B. $x = -2$ or $x = 6$

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

D. $x = 2$ or $x = -6$

16. A cone has radius 4 and height 3. What is its volume? (Use π.)

A. 16π

B. 36π

C. 48π

D. 12π

17. If $\log_3(x) = 2$, what is x?

A. 6

B. 8

C. 5

D. 9

18. Simplify: $(x^2 - 36)/(x + 6)$, assuming $x \neq -6$.

A. $x + 6$

B. 6

C. $x - 6$

D. $x^2 - 6$

19. A line passes through (0, 3) and (4, 11). What is the slope?

A. 3

B. 2

C. 1/2

D. -2

20. What is the domain of $f(x) = 1/(x - 5)$?

A. $x \neq 5$

B. $x > 5$

C. $x \geq 5$

D. all real numbers

21. A spinner has 4 equal sectors: red, blue, green, yellow. What is the probability of spinning red or green?

A. 1/4

B. 3/4

C. 2/3

D. 1/2

22. Simplify: $(x^3 + x^2) / x$.

A. $x^2 + x^2$

B. $x^2 + x$

C. $x^2 + 1$

D. $x^3 + x$

23. What is 8% of 500?

A. 40

B. 50

C. 80

D. 400

24. A cube has surface area 96 cm^2. What is the volume?

A. 4 cm^3

B. 16 cm^3

C. 64 cm^3

D. 216 cm^3

25. Solve: $3x - 2(x - 1) = 5$.

A. $x = 7$

B. $x = 3$

C. $x = 5$

D. $x = 2$

26. Evaluate: $2^0 + 3^0 - 4^0$.

A. 1

B. 2

C. 6

D. 0

27. Factor: $4x^2 - 20x + 25$.

A. $(2x + 5)^2$

B. $(2x - 5)(2x + 5)$

C. $2(x - 5)^2$

D. $(2x - 5)^2$

28. Convert $120°$ to radians.

A. $\pi/3$

B. $2\pi/3$

C. $3\pi/4$

D. $4\pi/3$

29. What is the y-intercept of the parabola $y = x^2 - 4x + 3$?

A. -4

B. 4

C. 3

D. -3

30. Simplify: $\sin^2\theta + 2\sin^2\theta + \cos^2\theta$.

A. $1 + 2\sin^2\theta$

B. $3\sin^2\theta + \cos^2\theta$

C. 3

D. $1 + \sin^2\theta$

PRACTICE EXAM 29: ANSWER KEY AND EXPLANATIONS

1. A — $720, calculated by multiplying the hourly rate by total hours. Earnings = $18/hour × 40 hours = $720. Wage problems always follow the rate-times-quantity formula when the pay rate is constant. Always check that units match — dollars per hour times hours yields dollars.

2. D — $2x^2 + 7x - 15$, obtained by applying FOIL. First: $2x \cdot x = 2x^2$. Outer: $2x \cdot 5 = 10x$. Inner: $-3 \cdot x = -3x$. Last: $-3 \cdot 5 = -15$. Combine: $2x^2 + 10x - 3x - 15 = 2x^2 + 7x - 15$. The outer and inner products combine to form the middle coefficient — always verify signs carefully.

3. B — $x = 5$, obtained by moving variables to one side and constants to the other. Subtract 3x: $2x + 1 = 11$. Subtract 1: $2x = 10$, so $x = 5$. Always move the variable with the smaller coefficient to avoid negative leading coefficients during solving.

4. C — 81π, calculated using the circle area formula πr^2. With radius 9: $A = \pi(9)^2 = 81\pi$ square units. Always square the radius before multiplying by π. Keeping π symbolic preserves precision and avoids rounding errors.

5. A — 2^(x + 3), obtained by applying the product rule for exponents with the same base. 2^x · 2^3 = 2^(x + 3). Always add exponents when multiplying like bases. The base stays the same; only the exponents combine.

6. D — $\sqrt{3}/3$, which is the rationalized form of $1/\sqrt{3}$. $\tan(30°) = \sin(30°)/\cos(30°) = (1/2)/(\sqrt{3}/2) = 1/\sqrt{3} = \sqrt{3}/3$ after rationalization. Memorize rationalized forms of exact trig values for standardized test use.

7. C — $2\sqrt{34}$, calculated using the Pythagorean theorem. Hypotenuse $= \sqrt{(6^2 + 10^2)} = \sqrt{(36 + 100)} = \sqrt{136} = \sqrt{(4 \cdot 34)} = 2\sqrt{34}$. Always extract perfect-square factors from the radicand to express radicals in simplest form.

8. B — $x = 12$, obtained by squaring both sides and isolating x. $\sqrt{(2x + 1)} = 5 \rightarrow 2x + 1 = 25 \rightarrow 2x = 24 \rightarrow x = 12$. Always square both sides first to eliminate the radical, then verify in the original equation: $\sqrt{25} = 5$. ✓

9. A — 4/7, calculated by dividing boys by the total student count. Total: 20 + 15 = 35. Ratio: 20/35 = 4/7. Always reduce ratios to simplest form. Ratios compare parts to wholes or parts to parts depending on what's asked.

10. D — $-20x$, applying the pattern $(a - b)^2 - (a + b)^2 = -4ab$ with $a = x$, $b = 5$: $-4(x)(5) = -20x$. Direct expansion also works: $(x^2 - 10x + 25) - (x^2 + 10x + 25) = -20x$. The identity is faster than

full expansion and the result is negative because the order has the subtracted square with the positive middle term.

11. C — $x = 4$, derived from the area equation. Length × width = $3x \times x = 3x^2 = 48$. Divide by 3: $x^2 = 16$. Take the positive square root: $x = 4$. Reject the negative root for physical dimensions.

12. A — 7/3, found by rewriting the equation in slope-intercept form. $7x - 3y = 21 \rightarrow -3y = -7x + 21 \rightarrow y = (7/3)x - 7$. The coefficient of x is the slope. Always isolate y to read the slope directly.

13. D — $2\log(x) + \log(y)$, obtained by applying the product and power laws. $\log(x^2y) = \log(x^2) + \log(y) = 2\log(x) + \log(y)$. The product law handles the multiplication of x^2 and y, and the power law converts the exponent 2 to a coefficient.

14. B — 81 cm^2, calculated by finding the side length and then squaring it. Perimeter = $4s = 36$, so $s = 9$ cm. Area = $s^2 = 81$ cm^2. Always derive the side length from the perimeter before computing area.

15. D — $x = 2$ or $x = -6$, obtained by factoring the quadratic. Factor: $(x + 6)(x - 2) = 0$. Solutions: $x = -6$ or $x = 2$. Verify by expanding: $(x + 6)(x - 2) = x^2 + 4x - 12$. ✓

16. A — 16π, calculated using the cone volume formula $V = (1/3)\pi r^2 h$. Substitute: $V = (1/3)\pi(16)(3) = 16\pi$ cubic units. Always include the one-third factor for cones. The radius squared eliminates decimals when given as a whole number.

17. D — 9, obtained by converting logarithmic to exponential form. $\log_3(x) = 2$ means $x = 3^2 = 9$. Always convert logarithmic equations to exponential form to solve for the argument. The base is raised to the logarithm's value.

18. C — $x - 6$, obtained by factoring the numerator as a difference of squares and canceling. Numerator: $x^2 - 36 = (x + 6)(x - 6)$. Cancel $(x + 6)$: result is $x - 6$. Recognize difference-of-squares patterns immediately — both 36 and x^2 are perfect squares.

19. B — 2, calculated using the slope formula $(y_2 - y_1)/(x_2 - x_1)$. Substitute: $(11 - 3)/(4 - 0) = 8/4 = 2$. Always subtract y-values over x-values in the same order. A positive slope indicates a line rising from left to right.

20. A — $x \neq 5$, determined by setting the denominator equal to zero. $x - 5 = 0 \rightarrow x = 5$ must be excluded. Domain restrictions for rational functions always come from values that make the denominator zero. The numerator plays no role here.

21. D — 1/2, derived by dividing favorable outcomes by total outcomes. Favorable (red or green): 2 sectors. Total: 4 sectors. Probability = 2/4 = 1/2. "Or" probabilities for mutually exclusive events always add their individual probabilities.

22. B — $x^2 + x$, obtained by dividing each term in the numerator by x. $x^3/x = x^2$; $x^2/x = x$. Result: $x^2 + x$. Always divide term by term when the denominator is a monomial.

23. A — 40, obtained by converting 8% to decimal and multiplying. $0.08 \times 500 = 40$. Alternatively, recognize that 8% is 8/100, so $500 \times 8/100 = 4000/100 = 40$. Percent calculations always convert the percent to a decimal first before multiplying.

24. C — 64 cm^3, calculated by finding the side length and then cubing it. Surface area $6s^2 = 96 \rightarrow s^2 = 16 \rightarrow s = 4$. Volume = $s^3 = 64$ cm^3. Always derive the side length first when given surface area or perimeter.

25. B — $x = 3$, obtained by distributing and combining like terms. $3x - 2x + 2 = 5 \rightarrow x + 2 = 5 \rightarrow x = 3$. Always distribute through parentheses before combining like terms.

26. A — 1, because any nonzero base raised to the zero power equals 1. $2^0 = 1$, $3^0 = 1$, $4^0 = 1$. Sum: $1 + 1 - 1 = 1$. The zero-exponent rule follows directly from the quotient rule for exponents.

27. D — $(2x - 5)^2$, found by recognizing a perfect square trinomial. Check: $\sqrt{(4x^2)} = 2x$, $\sqrt{25} = 5$, and $2(2x)(5) = 20x$ (middle term is $-20x$, so the pattern is $(a - b)^2$). Factored: $(2x - 5)^2$. Perfect square trinomials always yield $(a \pm b)^2$ when the middle term matches $\pm 2ab$.

28. B — $2\pi/3$, calculated by multiplying degrees by $\pi/180$. $120 \times \pi/180 = 120\pi/180 = 2\pi/3$. Simplify by dividing both numerator and denominator by 60. Memorize common radian-degree conversions.

29. C — 3, found by substituting $x = 0$ into the function. $f(0) = 0^2 - 4(0) + 3 = 3$. The y-intercept is always the function value at $x = 0$, equivalent to the constant term when the function is in standard polynomial form.

30. A — $1 + 2\sin^2\theta$, obtained by recognizing $\sin^2\theta + \cos^2\theta = 1$ (the Pythagorean identity). Group: $(\sin^2\theta + \cos^2\theta) + 2\sin^2\theta = 1 + 2\sin^2\theta$. Always look for identity simplifications first in trig expressions — rearranging the terms reveals the pattern.