PRACTICE EXAM 18: ALEKS PPL SIMULATION

1. A cyclist travels at 15 mph for 2.5 hours. How far does she travel?

A. 30 miles

B. 35 miles

C. 37.5 miles

D. 45 miles

2. Simplify: $(x^4y^2)/(xy)$.

A. x^3

B. x^3y

C. x^4y

D. x^5y^3

3. Find the roots of $x^2 + 4x = 0$.

A. $x = 4$

B. $x = 0$ only

C. $x = -4$

D. $x = 0$ or $x = -4$

4. What is the equation of a line passing through the origin with slope 3?

A. $y = 3x$

B. $y = x + 3$

C. $y = 3$

D. $y = -3x$

5. Simplify: $\sqrt{75} + \sqrt{48}$.

A. $\sqrt{123}$

B. $8\sqrt{3}$

C. $9\sqrt{3}$

D. $7\sqrt{3}$

6. A baker uses 2 cups of flour for every 3 cups of sugar. If she uses 8 cups of flour, how many cups of sugar does she use?

A. 6 cups

B. 10 cups

C. 16 cups

D. 12 cups

7. Solve: $3(x + 2) - x = 14$.

A. $x = 3$

B. $x = 4$

C. $x = 6$

D. $x = 8$

8. A cylinder has a radius of 3 cm and a height of 10 cm. What is its volume? (Use π.)

A. 90π cm³

B. 30π cm³

C. 60π cm³

D. 180π cm³

9. The graph of $y = x^2$ is shifted up 4 units. What is the new equation?

A. $y = x^2 - 4$

B. $y = (x + 4)^2$

C. $y = (x - 4)^2$

D. $y = x^2 + 4$

10. What is the reciprocal of 2/7?

A. $-7/2$

B. $2/7$

C. $7/2$

D. $-2/7$

11. Simplify: $(\sin^2\theta + \cos^2\theta)/\cos\theta$.

A. $\sec\theta$

B. $\sin\theta$

C. $\cos \theta$

D. 1

12. A triangle has vertices at (0, 0), (8, 0), and (8, 6). What is the perimeter?

A. 14

B. 20

C. 24

D. 28

13. Solve: $5x^2 = 45$.

A. $x = \pm 3$

B. $x = 9$ only

C. $x = 3$ only

D. $x = \pm \sqrt{9}$

14. What is the solution to $3 - 2x \geq 11$?

A. $x \geq 7$

B. $x \leq 7$

C. $x \geq -4$

D. $x \leq -4$

15. Factor: $4x^2 - 36$.

A. $4(x - 6)^2$

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

C. $(2x - 6)(2x + 6)$

D. $(4x - 6)(x + 6)$

16. If $f(x) = 3x + 2$, what is the value of $f^{-1}(8)$?

A. 2

B. 6

C. 3

D. 10

17. A regular hexagon has a perimeter of 24 cm. What is the length of one side?

A. 6 cm

B. 3 cm

C. 4 cm

D. 2 cm

18. What is the area of a circle with radius 7 inches? (Leave answer in terms of π.)

A. 14π in²

B. 21π in²

C. 28π in²

D. 49π in²

19. Convert $4\pi/3$ radians to degrees.

A. 240°

B. 150°

C. 120°

D. 300°

20. If $3x - y = 9$ and $y = 2x - 5$, what is x?

A. 2

B. 4

C. 8

D. 10

21. A rectangle has length 3x and width x + 2. What is the area?

A. $3x + 6$

B. $3x^2 + 6x$

C. $3x^2 + 2x$

D. $4x + 2$

22. Solve: $\log(x + 1) = 1$.

A. $x = 0$

B. $x = 1$

C. $x = 10$

D. $x = 9$

23. What is 3/8 expressed as a decimal?

A. 0.375

B. 0.38

C. 0.333

D. 0.325

24. Simplify: $x^2 + x^2 + x^2$.

A. x^6

B. $3x^6$

C. $3x^2$

D. x^8

25. A right triangle has legs of 6 and 8. What is the area of the triangle?

A. 48

B. 14

C. 28

D. 24

26. Solve: $2/x = 1/3$, where $x \neq 0$.

A. $x = 6$

B. $x = 5$

C. $x = 2/3$

D. $x = 3/2$

27. What is the y-coordinate of the vertex of $f(x) = x^2 - 6x + 8$?

A. 0

B. −1

C. 3

D. 8

28. A bicycle sells for $450 after a 25% discount. What was the original price?

A. $562.50

B. $540

C. $600

D. $375

29. Simplify: $(2i)(3 - 4i)$, where $i^2 = -1$.

A. $6i - 8$

B. $-8 - 6i$

C. $6 - 8i$

D. $8 + 6i$

30. A cone has a radius of 4 cm and a height of 9 cm. What is its volume? (Use π.)

A. 48π cm³

B. 36π cm³

C. 144π cm³

D. 12π cm³

PRACTICE EXAM 18: ANSWER KEY AND EXPLANATIONS

1. C — Distance = rate × time = 15 × 2.5 = 37.5 miles. The distance formula always multiplies speed by elapsed time when both are constant. Units must be consistent — here, miles per hour multiplied by hours yields miles.

2. B — Apply the quotient rule for exponents: x^(4−1) · y^(2−1) = x^3y. Always subtract exponents when dividing like bases; variables without exponents in the denominator are treated as having exponent 1.

3. D — Factor out the GCF x: x(x + 4) = 0. By the zero product property, x = 0 or x + 4 = 0. Both solutions are valid and must be reported. Quadratic equations always have two solutions, though they may coincide.

4. A — A line through the origin has y-intercept 0, so the slope-intercept form is y = mx. With m = 3: y = 3x. All lines through the origin have the form y = mx.

5. C — Simplify each radical: $\sqrt{75} = 5\sqrt{3}$, $\sqrt{48} = 4\sqrt{3}$. Sum: $9\sqrt{3}$. Like radicals must have the same radicand after simplification before combining coefficients.

6. D — Set up a proportion: 2 cups flour/3 cups sugar = 8 cups flour/x cups sugar. Cross-multiply: 2x = 24, so x = 12. Recipe scaling always uses direct proportionality between ingredients.

7. B — Distribute: 3x + 6 − x = 14, giving 2x + 6 = 14. Subtract 6: 2x = 8, so x = 4. Always combine like terms after distribution before isolating the variable.

8. A — Volume of cylinder = $\pi r^2 h = \pi(9)(10) = 90\pi$ cm^3. Always square the radius before multiplying by the height. Volume is measured in cubic units.

9. D — Shifting up by a constant adds that constant to the entire function: $y = x^2 + 4$. Vertical shifts affect the output directly. Horizontal shifts modify the input.

10. C — The reciprocal of a/b is b/a, formed by flipping numerator and denominator while preserving the sign. Reciprocal of 2/7 is 7/2. Multiplying a number by its reciprocal always produces 1.

11. A — Numerator equals 1 by the fundamental Pythagorean identity $\sin^2\theta + \cos^2\theta = 1$. So $1/\cos\theta = \sec\theta$. Always look for identity simplifications first in trig expressions.

12. C — Coordinates form a right triangle with legs 8 and 6. Hypotenuse: $\sqrt{(64 + 36)} = 10$. Perimeter: 8 + 6 + 10 = 24. Recognize the (6, 8, 10) multiple of the 3-4-5 triple.

13. A — Divide by 5: $x^2 = 9$. Take square root: $x = \pm 3$. Always include both ± when solving by the square root method. Options that list only the positive root lose half the solution.

14. D — Subtract 3: $-2x \geq 8$. Divide by −2 and flip the inequality: $x \leq -4$. Dividing by a negative always reverses the inequality direction — the single most tested rule in inequality problems.

15. B — Factor out GCF 4: $4(x^2 - 9)$. Factor the difference of squares: $4(x - 3)(x + 3)$. Always extract the GCF before applying special patterns for complete factoring.

16. A — To find $f^{-1}(8)$, set $f(x) = 8$: $3x + 2 = 8$, giving $3x = 6$ and $x = 2$. The inverse maps output 8 back to input 2. Finding a specific inverse value is often faster than constructing the full inverse function.

17. C — Perimeter of regular hexagon = 6s. Set 6s = 24: s = 4 cm. A regular polygon has all equal sides — divide the perimeter by the number of sides.

18. D — Area of a circle = $\pi r^2 = \pi(49) = 49\pi$ in². Always square the radius before multiplying by π. Area is measured in square units.

19. A — Multiply by $180/\pi$: $(4\pi/3)(180/\pi) = 720/3 = 240°$. The π cancels cleanly. Memorize common radian-to-degree conversions like $\pi/3 = 60°$ and $\pi/4 = 45°$.

20. B — Substitute $y = 2x - 5$ into $3x - y = 9$: $3x - (2x - 5) = 9$, giving $x + 5 = 9$ and $x = 4$. Substitution works best when one variable is already isolated.

21. B — Area = length × width = $3x(x + 2) = 3x^2 + 6x$. Always distribute completely when multiplying polynomial dimensions.

22. D — $\log(x + 1) = 1$ converts to exponential form: $x + 1 = 10^1 = 10$, so $x = 9$. The common log uses base 10 by convention when no base is specified.

23. A — Divide: $3 \div 8 = 0.375$. Converting fractions to decimals uses direct division of the numerator by the denominator.

24. C — Combining like terms: $x^2 + x^2 + x^2 = 3x^2$. Adding like terms combines coefficients but never changes the exponent. The expression x^2 does not change to x^6 when added to itself.

25. D — Area of right triangle = $(1/2)(\text{leg}_1)(\text{leg}_2) = (1/2)(6)(8) = 24$. Use the two legs as base and height, not the hypotenuse.

26. A — Cross-multiply: $2(3) = 1(x)$, giving $x = 6$. Cross-multiplication is the standard approach for equations equating two fractions.

27. B — Vertex x-coordinate: $-b/2a = 6/2 = 3$. Substitute: $f(3) = 9 - 18 + 8 = -1$. The y-coordinate is the function value at the vertex x.

28. C — Original × $(1 - 0.25)$ = Original × 0.75 = 450. Divide: 450/0.75 = 600. The retained percentage after a discount is (1 − discount rate); solve by dividing the sale price by this factor.

29. D — Multiply: $(2i)(3) - (2i)(4i) = 6i - 8i^2$. Since $i^2 = -1$: $6i - 8(-1) = 6i + 8 = 8 + 6i$. Always convert i^2 to -1 in the final step to produce standard a + bi form.

30. A — Volume of cone = $(1/3)\pi r^2 h = (1/3)\pi(16)(9) = 48\pi$ cm³. Always include the one-third factor for cones and pyramids — this distinguishes pointed solids from prisms and cylinders.