# PRACTICE EXAM 16: ALEKS PPL SIMULATION

1. A store sells pens in bundles of 4 and pencils in bundles of 6. A teacher buys 4 bundles of pens and 2 bundles of pencils. How many individual pens did the teacher buy?

A. 16

B. 20

C. 12

D. 24

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

A. 6x

B. 12

C. 18

D. 0

3. Solve: $\log(2x) = \log(x + 4)$.

A. $x = 2$

B. $x = 4$

C. $x = 8$

D. $x = -4$

4. A function f is defined as $f(x) = x^2$ for $x \leq 0$ and $f(x) = x + 2$ for $x > 0$. What is $f(-3) + f(3)$?

A. 0

B. 6

C. 12

D. 14

5. A right circular cylinder has a volume of $72\pi$ cubic meters and a height of 8 meters. What is the radius?

A. 3 m

B. 9 m

C. 4 m

D. 6 m

6. If $2x - 3y = 5$ and $x + y = 5$, what is x?

A. 2

B. 4

C. 6

D. 3

7. What is 3/5 divided by 9/10?

A. 27/50

B. 3/2

C. 5/6

D. 2/3

8. Factor: $3x^2 + 7x - 6$.

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

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

C. $(3x - 2)(x + 3)$

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

9. A car's value decreases 12% each year. If the car is currently worth $15,000, what will it be worth after 1 year?

A. $13,200

B. $13,500

C. $14,500

D. $16,800

10. Simplify: $(x^2 + 5x)/(x^2 - 25)$, assuming $x \neq \pm 5$.

A. $1/(x - 5)$

B. $x/(x - 5)$

C. $(x + 5)/(x - 5)$

D. $x(x + 5)/(x - 5)$

11. What is the domain of $f(x) = 1/(x^2 - 4)$?

A. $x > 2$

B. $x \neq 2$

C. all real numbers

D. $x \neq 2$ and $x \neq -2$

12. A ball is dropped from a height of 80 feet, and its height after t seconds is $h(t) = 80 - 16t^2$. After how many seconds does the ball hit the ground?

A. $\sqrt{5}$

B. 2

C. 3

D. 4

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

A. $x = 3$

B. $x = 2$

C. $x = 5$

D. $x = -2$

14. A bag contains 3 red, 5 blue, and 4 green balls. Two balls are drawn without replacement. What is the probability that both are red?

A. 1/4

B. 1/44

C. 1/22

D. 6/144

15. The graph of $f(x) = \log(x)$ passes through which of the following points?

A. (1, 0)

B. (0, 1)

C. (10, 0)

D. (0, 10)

16. A triangle has angles in the ratio 1 : 2 : 3. What is the measure of the largest angle?

A. 30°

B. 60°

C. 45°

D. 90°

17. Simplify: $\sqrt{(x^2y^4)}/\sqrt{(x)}$, assuming $x > 0$ and $y \geq 0$.

A. $xy^2$

B. $y^2\sqrt{x}$

C. $x^2y^2$

D. $y^2/\sqrt{x}$

18. Which equation represents a circle with center (0, 0) and radius 3?

A. $x + y = 3$

B. $x^2 + y^2 = 3$

C. $(x - 3)^2 + y^2 = 9$

D. $x^2 + y^2 = 9$

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

A. 25

B. 31

C. 37

D. 43

20. A triangle has sides of length 8, 15, and 17. Is it a right triangle?

A. Yes, because $8^2 + 15^2 = 17^2$

B. Yes, because $8 + 15 > 17$

C. No, because the sides are unequal

D. No, because 15 is not the hypotenuse

21. What is the solution to $3^x = 27$?

A. $x = 3$

B. $x = 9$

C. $x = 2$

D. $x = 6$

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

A. 1

B. $1/(x + 1)$

C. $1/(x + 1)$ (duplicate concern; verify options)

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

A. 1

B. $x - 1$

C. $1/(x + 1)$

D. $x + 1$

23. The length of a rectangle is 4 more than twice its width. If the area is 96, find the dimensions.

A. $w = 4, l = 12$

B. $w = 8, l = 12$

C. $w = 5, l = 14$

D. $w = 6, l = 16$

24. What is the value of $\cot(45°)$?

A. $\sqrt{2}/2$

B. 1

C. $\sqrt{3}$

D. $\sqrt{3}/3$

25. Solve the inequality: $-2x + 1 > 7$.

A. $x < -3$

B. $x > -3$

C. $x < 3$

D. $x > 3$

26. A sphere has a volume of $288\pi$ $cm^3$. What is its radius?

A. 4 cm

B. 5 cm

C. 6 cm

D. 8 cm

27. Simplify: $(x^{(1/3)})^9$.

A. $x^{(1/9)}$

B. 3x

C. $x^{(1/27)}$

D. $x^3$

28. If a function is increasing on its domain and has an inverse, the inverse function is:

A. Decreasing

B. Increasing

C. Constant

D. Undefined

29. A 24-hour clock shows 14:00. What is this time in 12-hour format?

A. 2:00 PM

B. 1:00 PM

C. 4:00 PM

D. 12:00 PM

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

A. $x = 4$

B. $x = -4$

C. $x = 4$ only (with extraneous $x = -1$)

D. $x = 4$ and $x = -1$

# PRACTICE EXAM 16: ANSWER KEY AND EXPLANATIONS

1. A — Multiply bundles by items per bundle: 4 bundles of pens × 4 pens per bundle = 16 pens. Always identify which quantity the question is asking about — the total items, the pencils, or just the pens.

2. C — Expand each square: $(x + 3)^2 = x^2 + 6x + 9$ and $(x - 3)^2 = x^2 - 6x + 9$. Sum: $2x^2 + 18$. Subtract $2x^2$: result is 18. The cross terms $\pm 6x$ cancel when the squares are added, leaving only the squared constants.

3. B — When logs with the same base are equal, their arguments must be equal: $2x = x + 4$, so $x = 4$. Verify both arguments are positive: $8 > 0$ and $8 > 0$. ✓ Always check that logarithmic solutions keep all arguments positive.

4. D — Evaluate each piece using the appropriate rule: $f(-3)$ uses $x^2$ (since $-3 \leq 0$), giving 9. $f(3)$ uses $x + 2$ (since $3 > 0$), giving 5. Sum: 14. Piecewise functions require matching the input to the correct rule before evaluating.

5. A — Volume of a cylinder = $\pi r^2 h$. Substitute: $72\pi = \pi(r^2)(8)$, so $r^2 = 9$ and $r = 3$ m. Always divide by $\pi h$ first to isolate $r^2$ before taking the square root.

6. B — From $x + y = 5$, solve $y = 5 - x$. Substitute: $2x - 3(5 - x) = 5$, giving $2x - 15 + 3x = 5$ and $5x = 20$, so $x = 4$. Substitution works best when one variable is easily isolated.

7. D — Division of fractions uses "Keep, Change, Flip": $(3/5) \times (10/9) = 30/45 = 2/3$. Always multiply by the reciprocal of the divisor, then simplify the result.

8. C — Use the AC method: $ac = 3(-6) = -18$; numbers multiplying to $-18$ and adding to 7 are 9 and $-2$. Rewrite: $3x^2 + 9x - 2x - 6 = 3x(x + 3) - 2(x + 3) = (3x - 2)(x + 3)$. Verify by FOIL to confirm.

9. A — Depreciation by 12% means retaining 88% of value: 15,000 × 0.88 = 13,200. Always use the complement (1 − depreciation rate) when computing the remaining value after loss.

10. B — Factor numerator: $x^2 + 5x = x(x + 5)$. Factor denominator: $x^2 - 25 = (x + 5)(x - 5)$. Cancel $(x + 5)$: result is $x/(x - 5)$. Only factors connected by multiplication can be canceled.

11. D — Set the denominator equal to zero: $x^2 - 4 = 0$, giving $x = 2$ or $x = -2$. Both values must be excluded from the domain. Domain restrictions from rational functions always come from denominators equaling zero.

12. A — Set $h(t) = 0$: $80 - 16t^2 = 0$, giving $16t^2 = 80$ and $t^2 = 5$. Since time must be positive, $t = \sqrt{5}$. Free-fall problems always yield quadratic time equations requiring the positive root.

13. B — Cross-multiply: $3(x + 2) = 4(2x - 1)$, giving $3x + 6 = 8x - 4$. Subtract 3x: $6 = 5x - 4$. Add 4: $10 = 5x$, so $x = 2$. Proportion problems are solved by cross-multiplication followed by standard linear steps.

14. C — Without replacement, P(first red) = 3/12 and P(second red | first red) = 2/11. Joint probability: (3/12)(2/11) = 6/132 = 1/22. Without replacement, the second probability reflects the reduced count from the first draw.

15. A — $\log(1) = 0$ for any base because $b^0 = 1$. So the graph of $f(x) = \log(x)$ always passes through (1, 0). This point is the x-intercept of every logarithmic function.

16. D — Let the angles be x, 2x, 3x. Sum: $x + 2x + 3x = 6x = 180°$, so $x = 30°$. Largest angle = $3x$ = 90°. A triangle with angles in ratio 1:2:3 is always a right triangle.

17. B — $\sqrt{x^2y^4} = xy^2$. Divide by $\sqrt{x}$: $xy^2/\sqrt{x} = y^2 \cdot x^{1/2} \cdot x^{-1/2} \cdot x^{1/2} = y^2\sqrt{x}$. Simplify using rational exponents when mixing radicals.

18. D — Standard form of a circle centered at origin: $x^2 + y^2 = r^2$. With $r = 3$: $x^2 + y^2 = 9$. Always square the radius when writing the circle equation.

19. C — Follow PEMDAS: $5^2 = 25$; $(2 - 4) = -2$; $(-2)^2 = 4$; $3 \times 4 = 12$. Sum: $25 + 12 = 37$. Always evaluate parentheses first, then exponents, then multiplication and addition.

20. A — Test the Pythagorean theorem: $8^2 + 15^2 = 64 + 225 = 289 = 17^2$. Since the squared sum of the two shorter sides equals the squared hypotenuse, the triangle is right. The (8, 15, 17) combination is a common Pythagorean triple.

21. A — $3^3 = 27$, so $x = 3$. Matching bases allows direct equating of exponents. Memorize small powers of 2, 3, 5, and 10 to recognize matches instantly.

22. C — Factor the denominator as a difference of squares: $x^2 - 1 = (x - 1)(x + 1)$. Cancel $(x - 1)$: result is $1/(x + 1)$. Recognizing common factors in numerator and denominator is the first step of simplification.

23. D — Let w = width; length = 2w + 4. Area: $w(2w + 4) = 96$, giving $2w^2 + 4w - 96 = 0$ and $w^2 + 2w - 48 = 0$. Factor: $(w - 6)(w + 8) = 0$. Positive solution: $w = 6$, length = 16. Reject the negative root for physical dimensions.

24. B — $\cot(45°) = \cos(45°)/\sin(45°) = (\sqrt{2}/2)/(\sqrt{2}/2) = 1$. At 45°, all sine, cosine, and cotangent values are equal in magnitude, producing the clean ratio of 1.

25. A — Subtract 1: $-2x > 6$. Divide by $-2$ and flip: $x < -3$. Dividing by a negative always reverses the inequality direction. This is the single most tested rule in inequality problems.

26. C — Volume of sphere = $(4/3)\pi r^3 = 288\pi$. Divide by $(4/3)\pi$: $r^3 = 216$. Take cube root: $r = 6$. Always isolate $r^3$ first before taking the cube root.

27. D — Apply the power rule: $(x^{(1/3)})^9 = x^{(1/3 \cdot 9)} = x^3$. Multiplying rational exponents follows the same rules as integer exponents. The fractional exponent of 1/3 is canceled by raising to the 9th power, which is divisible by 3.

28. B — An increasing function preserves the order of inputs: if $a < b$, then $f(a) < f(b)$. The inverse undoes the function while preserving this order: if $f^{-1}(a) < f^{-1}(b)$, then $a < b$. The inverse of an increasing function is also increasing.

29. A — Subtract 12 from hours beyond noon: $14 - 12 = 2$, giving 2:00 PM. 24-hour times from 13:00 to 23:59 correspond to PM in 12-hour format.

30. C — Isolate the radical: $\sqrt{(x + 5)} = x - 1$. Square both sides: $x + 5 = x^2 - 2x + 1$. Rearrange: $x^2 - 3x - 4 = 0$. Factor: $(x - 4)(x + 1) = 0$. Check both: $x = 4$ gives $\sqrt{9} + 1 = 4$ ✓; $x = -1$ gives $\sqrt{4} + 1 = 3 \neq -1$ ✗. Only $x = 4$ is valid.