PRACTICE EXAM 14: ALEKS PPL SIMULATION

1. What is the greatest common factor of 48, 72, and 120?

A. 12

B. 24

C. 36

D. 48

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

A. $x = 1$

B. $x = 3$

C. $x = -4$

D. $x = 2$

3. Simplify: $3\sqrt{32} + 2\sqrt{8}$.

A. $16\sqrt{2}$

B. $12\sqrt{2}$

C. $20\sqrt{2}$

D. $5\sqrt{40}$

4. A store marks up items by 40%. If the cost of an item to the store is \$50, what is the selling price?

A. \$90

B. \$60

C. \$40

D. \$70

5. If $f(x) = 2x - 5$, find the value of x such that $f(x) = 7$.

A. 1

B. 5

C. 6

D. 12

6. What is the exact value of $\sin(45°)$?

A. 1/2

B. $\sqrt{2}/2$

C. $\sqrt{3}/2$

D. 1

7. Solve: $3^{(2x)} = 81$.

A. $x = 2$

B. $x = 4$

C. $x = 3$

D. $x = 1$

8. A rectangular garden has a length 3 meters more than its width. If the area is 70 m^2, what is the width?

A. 5 m

B. 9 m

C. 10 m

D. 7 m

9. Simplify: $(a^2 - b^2)/(a + b)$, assuming $a \neq -b$.

A. $a + b$

B. $a - b$

C. $1/(a - b)$

D. $(a - b)^2$

10. A circle has a circumference of 16π cm. What is its area?

A. 64π cm^2

B. 32π cm^2

C. 128π cm^2

D. 256π cm^2

11. Evaluate: $\log_4(64)$.

A. 3

B. 4

C. 16

D. 64

12. Solve the system: $x + 2y = 10$ and $3x - y = 9$.

A. (2, 4)

B. (4, 2)

C. (6, 2)

D. (4, 3)

13. What is the slope of the line $2x - 3y = 6$?

A. $-2/3$

B. $2/3$

C. $3/2$

D. $-3/2$

14. A triangle has sides 5, 12, and 13. What is its area?

A. 15

B. 24

C. 30

D. 60

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

A. $x + 1$

B. $x - 1$

C. $(x + 1)^2$

D. 1

16. If a coin is flipped twice, what is the probability of getting exactly one head?

A. 1/4

B. 1/2

C. 3/4

D. 1

17. What is the equation of a line with slope −3 and y-intercept 5?

A. $y = 5x - 3$

B. $y = 3x + 5$

C. $y = -3x - 5$

D. $y = -3x + 5$

18. Factor completely: $x^2 - 12x + 36$.

A. $(x - 6)^2$

B. $(x + 6)^2$

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

D. $(x - 12)(x - 3)$

19. Convert 150° to radians.

A. $\pi/6$

B. $2\pi/3$

C. $5\pi/6$

D. $7\pi/6$

20. A cube has a diagonal length of $\sqrt{27}$. What is the side length of the cube?

A. 2

B. 3

C. 4

D. 9

21. If $f(x) = x^2 - 4x$, find $f(x + 1)$.

A. $x^2 - 2x$

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

C. $x^2 - 2x - 3$

D. $x^2 + 4x - 3$

22. Solve: $|x - 4| = 6$.

A. $x = 10$ or $x = -2$

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

C. $x = 10$ only

D. $x = 2$ or $x = -10$

23. Simplify: $(2x^{(1/2)})^4$.

A. $16x^2$

B. $8x^2$

C. $16x^{(1/2)}$

D. $16x^2$

23. Simplify: $(2x^{(1/2)})^4$.

A. $8x^2$

B. $16x^{(1/2)}$

C. $8x^{(1/2)}$

D. $16x^2$

24. A trapezoid has parallel sides of length 8 and 12, and a height of 5. What is its area?

A. 40

B. 50

C. 60

D. 100

25. If $\sin \theta = 0.6$ and θ is in Quadrant I, what is $\cos \theta$?

A. 0.4

B. 0.6

C. 0.7

D. 0.8

26. Solve: $2x^2 - 3x - 5 = 0$.

A. $x = 5/2$ or $x = -1$

B. $x = 1$ or $x = 5/2$

C. $x = 5$ or $x = -1/2$

D. $x = -5/2$ or $x = 1$

27. What is the remainder when $2x^3 + 3x^2 - 5x + 1$ is divided by $x + 2$?

A. 3

B. 5

C. 7

D. −13

28. A fair die is rolled. What is the probability of rolling an even number?

A. 1/3

B. 1/2

C. 2/3

D. 3/4

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

A. $x - 3$

B. $x^2 - 3$

C. 9

D. $x + 3$

30. The inverse function of $f(x) = 2x + 6$ is $f^{-1}(x) = ?$

A. $(x - 6)/2$

B. $(x + 6)/2$

C. $2x - 6$

D. $2(x - 6)$

PRACTICE EXAM 14: ANSWER KEY AND EXPLANATIONS

1. B — List factors: $48 = 2^4 \cdot 3$, $72 = 2^3 \cdot 3^2$, $120 = 2^3 \cdot 3 \cdot 5$. Take each prime at its lowest power: $2^3 \cdot 3 = 24$. GCF is the product of shared prime factors at their minimum exponents. Always use prime factorization for GCFs of three or more numbers.

2. C — Cross-multiply: $2(3x + 2) = 4(x - 1)$, giving $6x + 4 = 4x - 4$. Subtract $4x$: $2x + 4 = -4$. Subtract 4: $2x = -8$, so $x = -4$. Proportion problems are always solved by cross-multiplication first.

3. A — Simplify each radical: $3\sqrt{32} = 3 \cdot 4\sqrt{2} = 12\sqrt{2}$; $2\sqrt{8} = 2 \cdot 2\sqrt{2} = 4\sqrt{2}$. Sum: $12\sqrt{2} + 4\sqrt{2} = 16\sqrt{2}$. Like radicals combine only after simplification when radicands match.

4. D — Markup formula: selling price = cost × (1 + markup%) = 50 × 1.40 = $70. Multiplication by (1 + rate) combines the base cost and the markup amount in a single step.

5. C — Set $f(x) = 7$: $2x - 5 = 7$, giving $2x = 12$ and $x = 6$. Solving $f(x)$ = a value is the inverse of evaluating $f(x)$; you work backward from the output to find the input.

6. B — $\sin(45°) = \sqrt{2}/2$ is a memorized unit-circle value. The 45-45-90 triangle has equal legs, so sine and cosine are equal at 45°, both equal to $\sqrt{2}/2$. Memorize the five standard angle values.

7. A — Rewrite 81 as 3^4: $3^{(2x)} = 3^4$, so $2x = 4$ and $x = 2$. Matching bases allows direct equating of exponents. Always attempt base matching before resorting to logarithms.

8. D — Let w = width; length = w + 3. Equation: $w(w + 3) = 70$, giving $w^2 + 3w - 70 = 0$. Factor: $(w - 7)(w + 10) = 0$. Positive solution: $w = 7$ m. Always reject the negative root for physical dimensions.

9. B — Factor the numerator as a difference of squares: $a^2 - b^2 = (a + b)(a - b)$. Cancel $(a + b)$: result is $a - b$. Only factors connected by multiplication can be canceled — never individual terms.

10. A — Circumference = $2\pi r = 16\pi$, so $r = 8$ cm. Area = $\pi r^2 = 64\pi$ cm². Always compute the radius from circumference first before finding area. Both formulas use the same radius.

11. A — $\log_4(64)$ asks what power of 4 equals 64. Since $4^3 = 64$, $\log_4(64) = 3$. A logarithm is always an exponent — the value that makes the base equal the argument.

12. D — From the first equation: $x = 10 - 2y$. Substitute into the second: $3(10 - 2y) - y = 9$, giving $30 - 7y = 9$ and $y = 3$. Then $x = 10 - 6 = 4$. Solution: (4, 3). Always verify in both equations.

13. B — Rewrite $2x - 3y = 6$ in slope-intercept form: $-3y = -2x + 6$, so $y = (2/3)x - 2$. Slope = 2/3. Isolate y to read the slope directly from the coefficient of x.

14. C — The (5, 12, 13) combination is a Pythagorean triple, so the triangle is right-angled. Area = (1/2)(5)(12) = 30. Recognizing Pythagorean triples eliminates verification steps — the two legs give the area directly.

15. A — Factor the numerator as a perfect square: $x^2 + 2x + 1 = (x + 1)^2$. Cancel one $(x + 1)$: result is $x + 1$. Perfect square trinomials factor into $(a + b)^2$ when the middle coefficient is 2 times the square root of the constant.

16. B — Total outcomes: $2^2 = 4$ (HH, HT, TH, TT). Exactly one head: HT, TH → 2 favorable. Probability = 2/4 = 1/2. Always list outcomes systematically for small sample spaces.

17. D — Slope-intercept form is $y = mx + b$ where m is slope and b is y-intercept. With $m = -3$ and $b = 5$: $y = -3x + 5$. The slope-intercept form provides the fastest route to the equation when both values are given.

18. A — Check for a perfect square trinomial: $\sqrt{(x^2)} = x$, $\sqrt{36} = 6$, and $2(x)(6) = 12x$. ✓ Factored: $(x - 6)^2$. Perfect square trinomials always yield $(a \pm b)^2$ when the middle term is ±2 times the product of the square roots.

19. C — Multiply degrees by π/180: $150 \times \pi/180 = 150\pi/180 = 5\pi/6$. Simplify by dividing both by 30. Memorize conversions for multiples of 30° and 45°.

20. B — Space diagonal of a cube = $s\sqrt{3}$. Set $s\sqrt{3} = \sqrt{27}$. Since $\sqrt{27} = 3\sqrt{3}$, divide: s = 3. The space diagonal formula extends the Pythagorean theorem to three dimensions.

21. C — $f(x + 1) = (x + 1)^2 - 4(x + 1) = x^2 + 2x + 1 - 4x - 4 = x^2 - 2x - 3$. Substitution into a function replaces every instance of x with the new expression. Expand carefully before combining.

22. A — Split into two cases: $x - 4 = 6$ or $x - 4 = -6$. Solve: $x = 10$ or $x = -2$. Every absolute value equation of form |expression| = k (with k > 0) has exactly two solutions.

23. D — Apply the power to each factor: $2^4 \cdot (x^{(1/2)})^4 = 16 \cdot x^{(1/2 \cdot 4)} = 16x^2$. Always distribute outer exponents to every factor and multiply inner exponents. Rational exponents follow integer exponent rules.

24. B — Trapezoid area = $(1/2)(b_1 + b_2)(h) = (1/2)(8 + 12)(5) = (1/2)(20)(5) = 50$. The formula averages the two parallel sides and multiplies by the height. The height must be perpendicular to the parallel sides.

25. D — Using $\sin^2\theta + \cos^2\theta = 1$: $\cos^2\theta = 1 - 0.36 = 0.64$, so $\cos \theta = \pm 0.8$. In Quadrant I, cosine is positive, giving $\cos \theta = 0.8$. The Pythagorean identity connects sine and cosine for any angle.

26. A — Factor using AC method: $ac = 2(-5) = -10$; numbers multiplying to -10 and adding to -3 are -5 and 2. Rewrite: $2x^2 - 5x + 2x - 5 = x(2x - 5) + 1(2x - 5) = (2x - 5)(x + 1)$. Solutions: $x = 5/2$ or $x = -1$.

27. C — By the remainder theorem, the remainder when $p(x)$ is divided by $(x + 2)$ equals $p(-2)$. Substitute: $2(-8) + 3(4) - 5(-2) + 1 = -16 + 12 + 10 + 1 = 7$. The remainder theorem bypasses long division when only the remainder is needed.

28. B — Even numbers on a die: 2, 4, 6. Favorable outcomes: 3. Total outcomes: 6. Probability = 3/6 = 1/2. Always reduce probability fractions to simplest form.

29. D — Factor the numerator as a difference of squares: $x^2 - 9 = (x + 3)(x - 3)$. Cancel $(x - 3)$: result is $x + 3$. Difference of squares is one of the most frequently tested factoring patterns on the assessment.

30. A — Swap x and y: $x = 2y + 6$. Solve for y: $2y = x - 6$, giving $y = (x - 6)/2$. The inverse undoes each operation in reverse order — here, subtracting 6 before dividing by 2.