PRACTICE EXAM 7: ALEKS PPL MATH SIMULATION

1. A train covers 420 miles in 6 hours. What is its average speed?

A. 65 mph

B. 70 mph

C. 72 mph

D. 75 mph

2. Solve for y: $4y - 9 = 2y + 7$.

A. 5

B. 6

C. 7

D. 8

3. Factor: $x^2 - 11x + 24$.

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

B. $(x + 8)(x - 3)$

C. $(x - 8)(x - 3)$

D. $(x - 12)(x + 2)$

4. The product of 3/4 and 8/9 is:

A. 2/3

B. 3/4

C. 4/9

D. 24/36

5. What is the equation of a line with slope −3 passing through (2, 4)?

A. $y = -3x + 4$

B. $y = -3x - 2$

C. $y = -3x + 10$

D. $y = -3x + 6$

6. Simplify: $3\sqrt{18} + 2\sqrt{50}$.

A. $12\sqrt{2}$

B. $19\sqrt{2}$

C. $25\sqrt{2}$

D. $5\sqrt{2}$

7. Evaluate: $\log_2(64) - \log_2(8)$.

A. 2

B. 4

C. 5

D. 3

8. The distance from $(-2, 5)$ to $(4, -3)$ is:

A. 10

B. 12

C. $\sqrt{50}$

D. $\sqrt{80}$

9. A rectangle's length is twice its width. If the perimeter is 42 cm, the width is:

A. 5 cm

B. 7 cm

C. 9 cm

D. 14 cm

10. Solve: $x^2 - 3x - 10 = 0$.

A. $x = 2$ or $x = 5$

B. $x = -2$ or $x = -5$

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

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

11. The expression $(x^4y^{-2})/(x^2y^3)$ simplifies to:

A. x^2y

B. x^6y^{-5}

C. x^2/y^5

D. x^6/y

12. A triangle has sides 6, 8, and 10. It is:

A. a right triangle

B. an equilateral triangle

C. an obtuse triangle

D. an isosceles triangle only

13. If $f(x) = 2x + 1$ and $g(x) = x^2$, what is $f(g(3))$?

A. 13

B. 15

C. 17

D. 19

14. Solve the system: $y = 2x$ and $x + y = 9$.

A. (2, 4)

B. (3, 6)

C. (4, 5)

D. (5, 4)

15. A population grows from 2,000 to 2,500. What is the percent increase?

A. 20%

B. 22%

C. 24%

D. 25%

16. Simplify: $(x^2 - 9x + 20)/(x - 5)$.

A. $x - 4$

B. $x + 4$

C. $x - 5$

D. $x + 5$

17. The vertex of the parabola $y = -(x + 2)^2 + 7$ is:

A. (2, 7)

B. (−2, −7)

C. (−2, 7)

D. (2, −7)

18. In a right triangle, $\cos \theta = 8/17$. What is $\sin \theta$?

A. 8/15

B. 15/17

C. 17/15

D. 15/8

19. The median of {9, 15, 21, 27, 33, 39, 45} is:

A. 21

B. 24

C. 33

D. 27

20. A bag has 8 red marbles and 12 blue marbles. The probability of drawing a blue marble is:

A. 3/5

B. 2/5

C. 1/2

D. 4/5

21. Solve: $2^{x+1} = 16$.

A. 3

B. 4

C. 2

D. 5

22. The circumference of a circle is 14π. Its diameter is:

A. 7

B. 28

C. 49

D. 14

23. A savings of $2,000 earns 5% simple interest annually. The interest after 4 years is:

A. $200

B. $400

C. $500

D. $1,000

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

A. $4x^2 + 9$

B. $4x^2 - 6x - 9$

C. $4x^2 - 9$

D. $4x^2 + 12x + 9$

25. The domain of $f(x) = \sqrt{(x - 2)}$ is:

A. $x \geq 2$

B. $x > 2$

C. $x \leq 2$

D. all real numbers

26. Solve: $3x - 4 < 2x + 1$.

A. $x > 5$

B. $x > -5$

C. $x < -5$

D. $x < 5$

27. The 4th term of the geometric sequence 3, 6, 12, 24, … is:

A. 36

B. 24

C. 48

D. 72

28. The sum of the interior angles of a hexagon is:

A. 360°

B. 540°

C. 900°

D. 720°

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

A. 1

B. 0

C. 2

D. $\sin(2\theta)$

30. A triangle has angles of 35° and 65°. The third angle is:

A. 70°

B. 75°

C. 80°

D. 85°

PRACTICE EXAM 7: ANSWER KEY AND EXPLANATIONS

1. B — 70 mph. Dividing total distance by total time gives $420 \div 6 = 70$ miles per hour. Average speed is always calculated as distance divided by time elapsed, using the basic rate formula rearranged to solve for rate.
2. D — 8. Subtracting 2y from both sides gives $2y - 9 = 7$, then adding 9 gives $2y = 16$, so $y = 8$. Linear equations with variables on both sides are solved by collecting variable terms on one side before isolating.
3. C — $(x - 8)(x - 3)$. Two numbers that multiply to 24 and add to −11 are −8 and −3. The factored form $(x - 8)(x - 3)$ expands back to $x^2 - 11x + 24$, confirming the factoring. Both numbers are negative because the constant is positive and the middle coefficient is negative.
4. A — 2/3. Multiplying the fractions gives $(3 \times 8)/(4 \times 9) = 24/36$, which simplifies to 2/3 by dividing both numerator and denominator by 12. Fraction multiplication is always straightforward: multiply straight across and then simplify the result.
5. C — $y = -3x + 10$. Using point-slope form $y - 4 = -3(x - 2)$, distributing gives $y - 4 = -3x + 6$, and adding 4 yields $y = -3x + 10$. Point-slope form converts directly to slope-intercept form through distribution and addition.
6. B — $19\sqrt{2}$. Simplifying the radicals gives $\sqrt{18} = 3\sqrt{2}$ and $\sqrt{50} = 5\sqrt{2}$, so $3(3\sqrt{2}) + 2(5\sqrt{2}) = 9\sqrt{2} + 10\sqrt{2} = 19\sqrt{2}$. Like radicals combine by adding their coefficients once the radicand matches.
7. D — 3. Using the logarithm quotient rule, $\log_2(64) - \log_2(8) = \log_2(64/8) = \log_2(8) = 3$. Alternatively, evaluating directly gives $\log_2(64) = 6$ and $\log_2(8) = 3$, and $6 - 3 = 3$. Both methods produce the same result.
8. A — 10. Using the distance formula, $d = \sqrt{[(4 - (-2))^2 + (-3 - 5)^2]} = \sqrt{[36 + 64]} = \sqrt{100} = 10$. The distance formula is the Pythagorean theorem applied to coordinate differences between two points.
9. B — 7 cm. Let the width be w, so the length is 2w. The perimeter formula gives $2(2w) + 2w = 42$, which simplifies to $6w = 42$, so $w = 7$ cm. Rectangle problems with given relationships solve for the unknown dimension through substitution.
10. C — $x = -2$ or $x = 5$. Factoring $x^2 - 3x - 10$ gives $(x - 5)(x + 2) = 0$ because two numbers that multiply to −10 and add to −3 are −5 and 2. The zero product property yields $x = 5$ or $x = -2$ as the solutions.

11. C — x^2/y^5. Applying exponent rules to each variable, $x^4/x^2 = x^2$, and $y^{-2}/y^3 = y^{-5} = 1/y^5$. Combining gives $x^2 \cdot (1/y^5) = x^2/y^5$. Exponent division rules subtract the denominator exponent from the numerator exponent.

12. A — a right triangle. Testing with the Pythagorean theorem, $6^2 + 8^2 = 36 + 64 = 100 = 10^2$, which confirms the relationship $a^2 + b^2 = c^2$. This is the classic 3-4-5 Pythagorean triple scaled by 2, and any triple that satisfies the Pythagorean theorem forms a right triangle.

13. D — 19. First evaluate $g(3) = 3^2 = 9$. Then evaluate $f(9) = 2(9) + 1 = 18 + 1 = 19$. Function composition always evaluates the inner function first, then uses its output as the input for the outer function.

14. B — (3, 6). Substituting $y = 2x$ into the second equation gives $x + 2x = 9$, so $3x = 9$ and $x = 3$. Then $y = 2(3) = 6$, giving the solution (3, 6). Substitution is fastest when one equation is already solved for a variable.

15. D — 25%. The percent change formula is (new − original)/original × 100, giving (2,500 − 2,000)/2,000 × 100 = 500/2,000 × 100 = 25%. Percent change is always calculated using the original value as the denominator, not the new value.

16. A — $x - 4$. Factoring the numerator as $(x - 5)(x - 4)$ and canceling the common factor $(x - 5)$ with the denominator leaves $x - 4$. This simplification is valid for all values of $x \neq 5$, where the original expression is undefined.

17. C — (−2, 7). The vertex form $y = a(x - h)^2 + k$ has vertex at (h, k), and matching with $(x + 2)^2$ gives $h = -2$ (since $x + 2 = x - (-2)$) and $k = 7$. The leading coefficient of −1 means the parabola opens downward with a maximum at (−2, 7).

18. B — 15/17. Using the Pythagorean identity $\sin^2\theta + \cos^2\theta = 1$ with $\cos\theta = 8/17$ gives $\sin^2\theta = 1 - 64/289 = 225/289$, so $\sin\theta = 15/17$. The positive value is taken because the angle is in a right triangle where all ratios are positive.

19. D — 27. For an odd number of values, the median is the single middle value. With seven values arranged in order, the fourth value is in the middle, and counting {9, 15, 21, 27, 33, 39, 45} gives 27 as the median.

20. A — 3/5. The total number of marbles is 8 + 12 = 20, and 12 of them are blue. Probability is calculated as favorable outcomes divided by total outcomes, so 12/20 simplifies to 3/5. Reducing fractions to simplest form is standard for probability answers.

21. A — 3. Rewriting 16 as 2^4 gives $2^{x+1} = 2^4$, so the exponents must be equal: $x + 1 = 4$, meaning $x = 3$. Exponential equations with matching bases reduce to setting exponents equal and solving as a linear equation.

22. D — 14. The circumference formula $C = \pi d$ gives $14\pi = \pi d$, and dividing both sides by π yields $d = 14$. The diameter is always twice the radius, and the circumference formula provides a direct path from C to d.

23. B — \$400. Simple interest uses $I = Prt$, so $I = 2{,}000 \times 0.05 \times 4 = 400$. Simple interest calculates interest only on the original principal, without compounding. Substituting the values directly into the formula produces the answer without further manipulation.

24. C — $4x^2 - 9$. The expression $(2x + 3)(2x - 3)$ matches the difference of squares pattern $(a + b)(a - b) = a^2 - b^2$, giving $(2x)^2 - 3^2 = 4x^2 - 9$. The middle terms cancel because they are opposites of each other.

25. A — $x \geq 2$. The expression under a square root must be nonnegative, so $x - 2 \geq 0$, giving $x \geq 2$. Even-root domain restrictions always require the radicand to be greater than or equal to zero for real-number outputs.

26. D — $x < 5$. Subtracting 2x from both sides gives $x - 4 < 1$, then adding 4 gives $x < 5$. The inequality sign does not flip because no multiplication or division by a negative number occurred during the solution.

27. B — 24. The geometric sequence 3, 6, 12, 24, … has common ratio 2. The 4th term is therefore the value already listed at position 4, which is 24. Alternatively, $a_n = a_1 \cdot r^{n-1}$ gives $a_4 = 3 \cdot 2^3 = 24$.

28. D — 720°. The sum of interior angles of a polygon with n sides is $(n - 2) \times 180°$. For a hexagon with 6 sides, the sum is $(6 - 2) \times 180° = 4 \times 180° = 720°$. This formula applies to any polygon regardless of whether it is regular.

29. A — 1. The Pythagorean identity $\sin^2\theta + \cos^2\theta = 1$ is one of the most fundamental facts in trigonometry and is true for any angle θ. This identity is derived from the Pythagorean theorem applied to the unit circle. Memorizing it is essential because it underlies most trigonometric simplifications.

30. C — 80°. The three angles of any triangle sum to 180°, so the third angle is $180 - 35 - 65 = 80°$. This follows directly from the Triangle Angle Sum Theorem, which holds for every triangle regardless of shape or size.