PRACTICE EXAM 5: ALEKS PPL MATH SIMULATION

1. A recipe uses 3 cups of flour for every 2 cups of sugar. How much flour is needed for 10 cups of sugar?

A. 12 cups of flour

B. 13 cups of flour

C. 15 cups of flour

D. 20 cups of flour

2. Solve for x: $7(x - 2) = 3x + 6$.

A. 5

B. 4

C. 3

D. 6

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

A. $6x^5$

B. $12x^5$

C. $6x^7$

D. $18x^7$

4. What is the slope of a line perpendicular to $y = -4x + 3$?

A. -4 as slope

B. $1/4$ as slope

C. 4 as slope

D. $-1/4$ as slope

5. Solve: $x^2 - 7x + 10 = 0$.

A. $x = 1$ or $x = 10$

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

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

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

6. A jacket is marked down 30% to a sale price of $63. What was the original price?

A. $90.00 originally

B. $75.00 originally

C. $81.90 originally

D. $82.00 originally

7. Simplify: $(5x^2y)/(15xy^3)$.

A. $3x/y^2$

B. $x^2/(3y^2)$

C. $x/(3y^2)$

D. $xy/3$

8. What is $\log_2(32) + \log_2(4)$?

A. 6

B. 7

C. 8

D. 10

9. A right triangle has legs of 9 and 12. What is the length of the hypotenuse?

A. 13

B. 16

C. 18

D. 15

10. The function $f(x) = 2x - 3$ has an inverse of:

A. $(x + 3)/2$

B. $(x - 3)/2$

C. $2x + 3$

D. $3x + 2$

11. A class of 24 students has a ratio of girls to boys of 5:3. How many girls are in the class?

A. 15 girls

B. 12 girls

C. 9 girls

D. 18 girls

12. Evaluate: $3^2 + 2(5 - 1) - 4$.

A. 9

B. 11

C. 15

D. 13

13. A line passes through (0, 7) with slope −2. Its equation is:

A. $y = 7x - 2$

B. $y = -2x + 7$

C. $y = 2x + 7$

D. $y = 7x + 2$

14. Factor completely: $3x^2 + 10x - 8$.

A. $(x + 4)(3x - 2)$

B. $(3x + 4)(x - 2)$

C. $(3x - 2)(x + 4)$

D. $(3x + 2)(x - 4)$

15. What is 5% of 240?

A. 12

B. 14

C. 18

D. 24

16. The expression $\sqrt{(48x^4)}$ simplifies to:

A. $6x^2\sqrt{2}$

B. $4x^2\sqrt{2}$

C. $12x^2\sqrt{2}$

D. $4x^2\sqrt{3}$

17. A savings account earns 4% simple interest annually. How much interest does $1,500 earn in 3 years?

A. $60

B. $120

C. $180

D. $240

18. Which ordered pair satisfies the system $y = 2x + 1$ and $y = x + 4$?

A. (2, 6)

B. (3, 7)

C. (4, 9)

D. (1, 5)

19. The vertex form of $y = x^2 - 6x + 11$ is:

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

B. $(x - 3)^2 + 11$

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

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

20. Simplify: $(a + 2)/(a^2 - 4)$.

A. $1/(a - 2)$

B. $1/(a + 2)$

C. $(a - 2)/(a + 2)$

D. $(a + 2)/(a - 2)$

21. The area of a trapezoid with parallel sides of 8 and 14 cm and height 6 cm is:

A. 44 cm^2

B. 56 cm^2

C. 84 cm^2

D. 66 cm^2

22. Solve: $3^x = 27^{x-2}$

A. 1

B. 3

C. 4

D. 6

23. The probability of flipping three heads in a row on a fair coin is:

A. 1/8

B. 1/4

C. 1/16

D. 3/8

24. A circle has area 36π. What is its radius?

A. 3

B. 4

C. 6

D. 9

25. The standard deviation of a data set is small when:

A. the data is widely scattered

B. the data is tightly clustered around the mean

C. the mean is zero

D. the data contains many outliers

26. Which expression equals $\log(x^2y)$?

A. $2 \log(x) \cdot \log(y)$

B. $\log(x^2) \cdot \log(y)$

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

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

27. Solve for x: $2/(x + 1) = 4/(x + 5)$.

A. 3

B. 5

C. 7

D. 9

28. A cone has a radius of 3 and a height of 4. Its volume is:

A. 24π

B. 18π

C. 12π

D. 36π

29. Simplify: $(x^2 + 3x - 10)/(x + 5)$.

A. $x - 5$

B. $x + 5$

C. $x - 10$

D. $x - 2$

30. The sum of the first 6 terms of the arithmetic sequence 5, 8, 11, 14, … is:

A. 60

B. 75

C. 78

D. 90

PRACTICE EXAM 5: ANSWER KEY AND EXPLANATIONS

1. C — 15 cups of flour. The ratio of flour to sugar is 3:2, so for every 2 cups of sugar the recipe uses 3 cups of flour. Setting up the proportion $3/2 = x/10$ and cross-multiplying gives $2x = 30$, so $x = 15$ cups. Proportion problems scale known ratios to match a new quantity by cross-multiplying.
2. A — 5. Distributing the 7 gives $7x - 14 = 3x + 6$, then subtracting $3x$ from both sides gives $4x - 14 = 6$. Adding 14 gives $4x = 20$, and dividing by 4 gives $x = 5$. Linear equations with parentheses are always solved by first distributing, then collecting like terms, and finally isolating the variable.
3. D — $18x^7$. The expression $(3x^2)^2$ expands to $9x^4$ by applying the power-to-a-power rule (multiply exponents) and squaring the coefficient. Multiplying $2x^3 \times 9x^4$ gives $18x^7$, since coefficients multiply and exponents add when multiplying like bases.
4. B — 1/4. Perpendicular lines have slopes that are negative reciprocals of each other, meaning the product of the two slopes equals −1. The slope of the given line is −4, and its negative reciprocal is 1/4. This relationship holds for any two perpendicular lines in the coordinate plane.
5. D — $x = 2$ or $x = 5$. Factoring $x^2 - 7x + 10$ requires two numbers that multiply to 10 and add to −7, which are −2 and −5. The factored form is $(x - 2)(x - 5) = 0$, and applying the zero product property gives $x = 2$ or $x = 5$. Both solutions satisfy the original quadratic equation.
6. A — \$90.00. A 30% markdown means the sale price is 70% of the original, so the equation is 0.70 × original = \$63. Dividing both sides by 0.70 gives the original price as \$63 ÷ 0.70 = \$90. Reverse percentage problems always divide the new value by the percentage it represents of the original.
7. C — $x/(3y^2)$. Dividing the coefficients gives $5/15 = 1/3$, and applying exponent rules to the variables gives $x^2/x = x$ and $y/y^3 = 1/y^2$. Combining these produces $(1/3) \cdot x \cdot (1/y^2) = x/(3y^2)$. Rational expressions with monomials are simplified by reducing coefficients and applying exponent rules separately to each variable.
8. B — 7. Using the logarithm product rule, $\log_2(32) + \log_2(4) = \log_2(32 \times 4) = \log_2(128)$. Since $2^7 = 128$, the value is 7. Alternatively, evaluating each term directly gives $\log_2(32) = 5$ and $\log_2(4) = 2$, which sum to 7. Both methods confirm the same result.
9. D — 15. Using the Pythagorean theorem $a^2 + b^2 = c^2$ with legs 9 and 12 gives $81 + 144 = 225$, so $c = \sqrt{225} = 15$. This is a scaled version of the 3-4-5 Pythagorean triple multiplied by 3. Recognizing common Pythagorean triples saves time on right-triangle problems during placement exams.

10. A — $(x + 3)/2$. To find the inverse, replace $f(x)$ with y to get $y = 2x - 3$, then swap x and y to get $x = 2y - 3$. Solving for y gives $y = (x + 3)/2$, which is the inverse function. Inverse functions reverse the input-output relationship of the original function through the swap-and-solve procedure.

11. A — 15 girls. The total ratio parts are $5 + 3 = 8$, and dividing 24 students by 8 gives 3 students per ratio part. Multiplying 5 parts (girls) by 3 gives 15 girls, and multiplying 3 parts (boys) by 3 gives 9 boys. Ratio problems are solved by dividing the total quantity by the sum of the ratio parts to find the value of one part.

12. D — 13. Following the order of operations, the parentheses come first: $(5 - 1) = 4$. Then the exponent: $3^2 = 9$. Then multiplication: $2(4) = 8$. Finally, adding and subtracting left to right: $9 + 8 - 4 = 13$. PEMDAS ensures that multi-operation expressions always produce a single correct result regardless of who evaluates them.

13. B — $y = -2x + 7$. The slope-intercept form $y = mx + b$ requires the slope m and the y-intercept b. Here $m = -2$ and the line passes through (0, 7), so the y-intercept is 7. Substituting gives $y = -2x + 7$ directly, without additional calculation needed.

14. C — $(3x - 2)(x + 4)$. Using the AC method, $ac = 3(-8) = -24$, and two numbers that multiply to -24 and add to 10 are 12 and -2. Splitting the middle term gives $3x^2 + 12x - 2x - 8$, and factoring by grouping produces $3x(x + 4) - 2(x + 4) = (3x - 2)(x + 4)$. The AC method handles trinomials with leading coefficients greater than 1.

15. A — 12. Calculating 5% of 240 means multiplying 0.05×240, which equals 12. Percent-of calculations convert the percent to a decimal by moving the decimal point two places to the left, then multiply by the whole quantity to find the part.

16. D — $4x^2\sqrt{3}$. Simplifying $\sqrt{48}$ requires factoring 48 as 16×3, where 16 is a perfect square: $\sqrt{48} = \sqrt{16} \cdot \sqrt{3} = 4\sqrt{3}$. For the variable, $\sqrt{x^4} = x^2$. Combining both parts gives $4x^2\sqrt{3}$. Radical simplification pulls out perfect square factors from under the radical sign.

17. C — \$180. The simple interest formula is $I = Prt$, where P is principal, r is rate, and t is time. Substituting gives $I = 1500 \times 0.04 \times 3 = 180$. Simple interest calculates interest only on the original principal, not on previously accumulated interest.

18. B — (3, 7). Setting the two expressions equal gives $2x + 1 = x + 4$, and solving produces $x = 3$. Substituting back into either equation gives $y = 2(3) + 1 = 7$, so the solution is (3, 7). Systems solved by substitution always check by plugging the solution back into both original equations.

19. D — $(x - 3)^2 + 2$. To complete the square on $x^2 - 6x + 11$, take half of -6 (which is -3) and square it (which is 9). Rewriting gives $(x^2 - 6x + 9) + 11 - 9 = (x - 3)^2 + 2$. The vertex form $a(x - h)^2 + k$ allows you to read the vertex (3, 2) directly from the equation.

20. A — $1/(a - 2)$. Factoring the denominator as a difference of squares gives $(a + 2)(a - 2)$, and canceling the common $(a + 2)$ factor with the numerator leaves $1/(a - 2)$. Rational expression simplification always requires factoring before canceling common factors.

21. D — 66 cm^2. The trapezoid area formula is $A = ½(b_1 + b_2)h$, where b_1 and b_2 are the parallel sides. Substituting gives $A = ½(8 + 14)(6) = ½(22)(6) = 66$ cm^2. The formula averages the two parallel sides and multiplies by the perpendicular height.

22. B — 3. Rewriting 27 as 3^3 gives $3^x = (3^3)^{x-2} = 3^{3x-6}$. Since the bases are equal, the exponents must be equal: $x = 3x - 6$. Solving gives $2x = 6$, so $x = 3$. Exponential equations with matching bases reduce to setting exponents equal and solving as a linear equation.

23. A — 1/8. Each coin flip has a probability of 1/2 for heads, and three independent flips multiply together: $(1/2)(1/2)(1/2) = 1/8$. Independent events combine through multiplication because the outcome of one flip does not affect the outcomes of the others.

24. C — 6. The area formula $A = \pi r^2$ gives $36\pi = \pi r^2$. Dividing both sides by π leaves $r^2 = 36$, so $r = 6$. Circle problems involving area always solve for radius by isolating r^2 and taking the square root.

25. B — the data is tightly clustered around the mean. Standard deviation measures how spread out data values are from the mean, so a small standard deviation indicates that most values lie close to the mean. A large standard deviation indicates wide scatter. Standard deviation is the most common measure of data variability in statistics.

26. D — $2 \log(x) + \log(y)$. Applying the logarithm product rule gives $\log(x^2y) = \log(x^2) + \log(y)$, and applying the power rule to $\log(x^2)$ gives $2 \log(x)$. Combining produces $2 \log(x) + \log(y)$. Logarithm rules split products into sums and pull exponents out as coefficients.

27. A — 3. Cross-multiplying gives $2(x + 5) = 4(x + 1)$, which expands to $2x + 10 = 4x + 4$. Subtracting 2x from both sides gives $10 = 2x + 4$, then subtracting 4 gives $6 = 2x$, so $x = 3$. Rational equations with single fractions on each side are solved by cross-multiplying and then treating the result as a linear equation.

28. C — 12π. The cone volume formula is $V = (1/3)\pi r^2 h$, so $V = (1/3)\pi(3^2)(4) = (1/3)\pi(9)(4) = (1/3)(36\pi) = 12\pi$. The 1/3 factor reflects that a cone fits exactly three times into a cylinder of the same base and height.

29. D — $x - 2$. Factoring the numerator requires two numbers that multiply to −10 and add to 3: those are 5 and −2. The factored form is $(x + 5)(x - 2)$, and dividing by $(x + 5)$ leaves $(x - 2)$. Polynomial division problems simplify cleanly when the divisor matches one of the factors of the numerator.

30. B — 75. The 6th term is $a_6 = 5 + 5(3) = 20$, and the sum formula $S_6 = (n/2)(a_1 + a_n)$ gives $S_6 = (6/2)(5 + 20) = 3(25) = 75$. Arithmetic series sums are calculated by averaging the first and last terms and multiplying by the number of terms.