PRACTICE EXAM 13: ALEKS PPL SIMULATION

1. If 5 workers can complete a project in 12 days, how many days would it take 3 workers to complete the same project (assuming equal work rates)?

A. 15 days

B. 18 days

C. 24 days

D. 20 days

2. Simplify: $(x^2 - 5x + 6) - (2x^2 - 3x + 1)$.

A. $-x^2 - 2x + 5$

B. $-x^2 - 8x + 7$

C. $x^2 - 2x + 7$

D. $-x^2 + 2x + 5$

3. What is the slope of the line that passes through (1, 2) and is parallel to $4x + 2y = 6$?

A. 2

B. 1/2

C. −2

D. −1/2

4. Solve: $(x - 3)(x + 2) > 0$.

A. $-2 < x < 3$

B. $x < -2$ or $x > 3$

C. $x > 3$ only

D. $x < -2$ only

5. A bag contains 10 coins totaling $1.45. If the coins are only dimes and quarters, how many quarters are in the bag?

A. 6

B. 4

C. 5

D. 3

6. Simplify: $(\sqrt{3} + \sqrt{2})(\sqrt{3} - \sqrt{2})$.

A. 1

B. 5

C. $\sqrt{5}$

D. $\sqrt{6}$

7. What is the exact value of $\tan(30°)$?

A. $\sqrt{3}$

B. $\sqrt{3}/3$

C. 1

D. 1/2

8. A right triangle has legs of length 9 and 40. What is the hypotenuse?

A. 43

B. 45

C. 41

D. 39

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

A. $x = 7$

B. $x = 5$

C. $x = 6$

D. $x = 3$

10. A circle has diameter 10 cm. What is its area? (Use $\pi \approx 3.14$.)

A. 31.4 cm^2

B. 100 cm^2

C. 62.8 cm^2

D. 78.5 cm^2

11. If $f(x) = x^2 + 1$ and $g(x) = 2x - 3$, find $f(g(2))$.

A. 0

B. 1

C. 2

D. 5

12. A rectangle has a perimeter of 40 and length twice its width. What is the area?

A. 80

B. ≈ 88.9

C. 72

D. 96

13. Simplify: $2/(x - 1) + 3/(x - 1)$, assuming $x \neq 1$.

A. $5/(x - 1)$

B. $6/(x - 1)^2$

C. $5/(x + 1)$

D. $1/(x - 1)$

14. A cylinder's radius is 4 in and height is 7 in. What is the surface area? (Use π.)

A. 56π in^2

B. 112π in^2

C. 72π in^2

D. 88π in^2

15. If $\log_2(x) = 3$ and $\log_2(y) = 5$, what is $\log_2(xy)$?

A. 15

B. 8

C. 2

D. 32

16. A cone has a radius of 6 cm and a height of 8 cm. What is its slant height?

A. 12 cm

B. 14 cm

C. 10 cm

D. 48 cm

17. The graph of $y = 2(x + 1)^2 - 3$ has its vertex at which point?

A. $(-1, -3)$

B. $(1, -3)$

C. $(-1, 3)$

D. $(1, 3)$

18. A fair coin is flipped 4 times. What is the probability of getting at least one head?

A. 1/16

B. 1/2

C. 1/4

D. 15/16

19. Simplify: $(3 - i)(2 + i)$, where $i^2 = -1$.

A. $5 + i$

B. $7 + i$

C. $7 - i$

D. $5 - i$

20. Solve: $\ln(x - 2) = 0$.

A. $x = 0$

B. $x = 2$

C. $x = 3$

D. $x = e$

21. Which of the following equations represents exponential decay?

A. $y = 3(1.5)^x$

B. $y = 2^x$

C. $y = 4(0.75)^x$

D. $y = 5^x$

22. Simplify: $x^{(3/4)} \cdot x^{(5/4)}$.

A. x^2

B. $x^{(4/16)}$

C. $x^{(15/16)}$

D. $x^{(8/16)}$

23. Solve: $x^2 - 4x + 4 = 0$.

A. $x = 0$ or $x = 4$

B. $x = 2$

C. $x = \pm 2$

D. $x = -2$

24. A square has a diagonal of length 8. What is the area of the square?

A. 16

B. 24

C. 48

D. 32

25. Find the y-intercept of $f(x) = 3^x - 2$.

A. −1

B. 1

C. 3

D. −2

26. Simplify: $(x + 3)/(x^2 + 6x + 9)$, assuming $x \neq -3$.

A. $x + 3$

B. 1

C. $1/(x + 3)^2$

D. $1/(x + 3)$

27. A line passes through $(-3, 4)$ with slope -2. What is its equation in slope-intercept form?

A. $y = -2x + 10$

B. $y = -2x - 2$

C. $y = 2x + 10$

D. $y = -2x + 2$

28. What is 15% of 80?

A. 8

B. 10

C. 12

D. 15

29. Solve: $7 - 2x > 3x + 2$.

A. $x < 1$

B. $x > 1$

C. $x < -1$

D. $x > 5$

30. What is the equation of the circle centered at the origin with radius $\sqrt{7}$?

A. $x^2 + y^2 = 49$

B. $x^2 + y^2 = 7$

C. $(x - 7)^2 + y^2 = 7$

D. $x^2 + y^2 = \sqrt{7}$

PRACTICE EXAM 13: ANSWER KEY AND EXPLANATIONS

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1. D — Total work units = workers × days = $5 \times 12 = 60$. For 3 workers: $60/3 = 20$ days. Work rate problems are inversely proportional — fewer workers require proportionally more days to complete the same total work.

2. A — Distribute the negative sign through the second polynomial: $x^2 - 5x + 6 - 2x^2 + 3x - 1$. Combine like terms: $(1 - 2)x^2 + (-5 + 3)x + (6 - 1) = -x^2 - 2x + 5$. Sign distribution must apply to every term in the subtracted polynomial.

3. C — Rewrite in slope-intercept form: $2y = -4x + 6$, giving $y = -2x + 3$. The slope is -2. Parallel lines share the same slope, so the parallel line also has slope -2. The y-intercept does not affect the slope of parallel lines.

4. B — The product $(x - 3)(x + 2)$ is positive when both factors have the same sign. Both positive: $x > 3$. Both negative: $x < -2$. Solution: $x < -2$ or $x > 3$. For quadratic inequalities in factored form, test intervals around the roots.

5. D — Let q = quarters, d = dimes; $q + d = 10$ and $0.25q + 0.10d = 1.45$. Substitute $d = 10 - q$: $0.25q + 0.10(10 - q) = 1.45$, giving $0.15q = 0.45$ and $q = 3$. Coin problems always use two equations: one for count, one for value.

6. A — Apply the difference of squares pattern $(a + b)(a - b) = a^2 - b^2$: $(\sqrt{3})^2 - (\sqrt{2})^2 = 3 - 2 = 1$. Conjugate radical pairs always produce a rational result because squaring eliminates the radicals.

7. B — $\tan(30°) = 1/\sqrt{3} = \sqrt{3}/3$ (rationalized). Memorize the exact trig values at the five standard angles: 0°, 30°, 45°, 60°, 90°. The rationalized form $\sqrt{3}/3$ is standard on tests.

8. C — By the Pythagorean theorem: $9^2 + 40^2 = 81 + 1600 = 1681$, and $\sqrt{1681} = 41$. The (9, 40, 41) combination is a Pythagorean triple worth memorizing for quick recognition.

9. A — Distribute: $3x + 6 = 4x - 1$. Subtract $3x$: $6 = x - 1$. Add 1: $x = 7$. Always distribute first, then move variables to one side to isolate them.

10. D — Radius = diameter/2 = 5. Area = $\pi r^2 = 3.14 \times 25 = 78.5$ cm². Always halve the diameter before substituting into the area formula. Area is always measured in square units.

11. C — Evaluate inner function: $g(2) = 2(2) - 3 = 1$. Then $f(1) = 1^2 + 1 = 2$. Function composition applies the inside function first; the output becomes the input for the outer function.

12. B — Let w = width, length = 2w. Perimeter: $2w + 4w = 6w = 40$, so $w = 20/3$. Length = 40/3. Area = w × length = $(20/3)(40/3) = 800/9 \approx 88.9$. Fractional dimensions produce fractional areas — approximate to the given precision.

13. A — Both fractions share the same denominator, so add numerators: $(2 + 3)/(x - 1) = 5/(x - 1)$. Like denominators allow direct numerator combination without finding an LCD.

14. D — Surface area of a closed cylinder = $2\pi r^2 + 2\pi rh = 2\pi(16) + 2\pi(4)(7) = 32\pi + 56\pi = 88\pi$ in². The formula includes two circular ends ($2\pi r^2$) plus the lateral curved surface ($2\pi rh$). Always check whether the problem specifies closed or open.

15. B — Apply the product law of logarithms: $\log_2(xy) = \log_2(x) + \log_2(y) = 3 + 5 = 8$. The product of bases becomes the sum of logs — this is the most frequently tested log property.

16. C — Slant height, radius, and height form a right triangle. By the Pythagorean theorem: $\ell^2 = 6^2 + 8^2 = 36 + 64 = 100$, so $\ell = 10$ cm. The (6, 8, 10) triple is a multiple of the 3-4-5 combination.

17. A — Vertex form $y = a(x - h)^2 + k$ has vertex at (h, k). For $2(x + 1)^2 - 3$, rewrite as $2(x - (-1))^2 - 3$, so $h = -1$ and $k = -3$. Vertex: $(-1, -3)$. The sign inside the parenthesis flips when identifying h.

18. D — P(no heads in 4 flips) = $(1/2)^4 = 1/16$. P(at least one head) = $1 - 1/16 = 15/16$. Complementary probability is often faster than summing individual cases of exactly one, exactly two, etc.

19. B — FOIL: $(3)(2) + (3)(i) + (-i)(2) + (-i)(i) = 6 + 3i - 2i - i^2 = 6 + i + 1 = 7 + i$ (since $i^2 = -1$). Always substitute -1 for i^2 at the end to convert to standard $a + bi$ form.

20. C — $\ln(x - 2) = 0$ converts to exponential form: $x - 2 = e^0 = 1$, so $x = 3$. Any logarithm of 1 equals 0 regardless of base, which defines $x - 2 = 1$.

21. C — Exponential decay has the form $y = a \cdot b^x$ where $0 < b < 1$. Only $y = 4(0.75)^x$ satisfies this condition. Values of b greater than 1 indicate exponential growth.

22. A — Apply the product rule for exponents: $x^{(3/4)} \cdot x^{(5/4)} = x^{(3/4 + 5/4)} = x^{(8/4)} = x^2$. Adding fractional exponents follows the same rules as integer exponents — find a common denominator, then add.

23. B — Factor as a perfect square trinomial: $x^2 - 4x + 4 = (x - 2)^2$. Setting $(x - 2)^2 = 0$ gives $x = 2$ (repeated root). Perfect square trinomials always produce a single repeated solution.

24. D — Diagonal of a square = $s\sqrt{2}$, where s is the side length. So $s\sqrt{2} = 8$, giving $s = 8/\sqrt{2} = 4\sqrt{2}$. Area = $s^2 = (4\sqrt{2})^2 = 32$. Alternatively, area = $(1/2)(\text{diagonal})^2 = (1/2)(64) = 32$.

25. A — $f(0) = 3^0 - 2 = 1 - 2 = -1$. The y-intercept is always the function value at $x = 0$. Any exponential function a^x equals 1 at $x = 0$.

26. D — Factor the denominator as a perfect square: $x^2 + 6x + 9 = (x + 3)^2$. Cancel one $(x + 3)$: $(x + 3)/(x + 3)^2 = 1/(x + 3)$. Always factor denominators before attempting simplification.

27. B — Use point-slope form: $y - 4 = -2(x + 3)$. Distribute: $y - 4 = -2x - 6$. Solve for y: $y = -2x - 2$. Always wrap the coordinates of a given point in parentheses to track signs correctly.

28. C — Convert 15% to decimal: 0.15. Multiply: $0.15 \times 80 = 12$. Percent calculations always convert the percent to a decimal first — move the decimal two places left before multiplying.

29. A — Subtract 3x: $7 - 5x > 2$. Subtract 7: $-5x > -5$. Divide by −5 and flip the inequality: $x < 1$. Dividing by a negative number always reverses the inequality direction.

30. B — Circle centered at origin (0, 0) with radius r: $x^2 + y^2 = r^2$. Substitute $r = \sqrt{7}$: $x^2 + y^2 = (\sqrt{7})^2 = 7$. Always square the radius when writing the circle equation.