

North Carolina School of Science and Mathematics

Admissions Math Assessment - Practice Test 24

Practice Test 24

Instructions: This 30-question practice test is designed to be representative of the NC-SSM Admissions Math Assessment. This assessment is taken without a calculator. Select the best answer for each question.

1. Simplify the expression: $3(x - 2y) - (x - 6y)$
 - A. $2x$
 - B. $2x - 12y$
 - C. $4x - 12y$
 - D. $2x - 6y$
 - E. $3x$
2. Evaluate the expression: $\frac{a^2 - b^2}{a - b}$ if $a = 5$ and $b = 3$.
 - A. 2
 - B. 16
 - C. 8
 - D. 4
 - E. 10
3. Simplify the expression: $(a^2b^{-3})(a^{-2}b^3)$
 - A. 0
 - B. 1
 - C. a^4b^6
 - D. $a^{-4}b^{-9}$
 - E. ab
4. Evaluate the expression: $2^{-3} + 2^{-1}$
 - A. -8
 - B. $1/10$
 - C. $1/16$
 - D. $5/8$
 - E. $3/8$
5. Simplify the expression: $(2x^2 + 5x - 1) + 2x(3x - 1)$

- A. $8x^2 + 3x - 1$
- B. $8x^2 + 7x - 1$
- C. $6x^3 + 3x^2 - x$
- D. $5x^2 + 4x - 1$
- E. $8x^2 + 5x - 1$

6. Solve for x : $1.5x + 3 = 0.5x + 7$

- A. $x = 2$
- B. $x = 4$
- C. $x = 5$
- D. $x = 10$
- E. $x = 1$

7. Find all solutions to the quadratic equation: $x^2 - 12 = x$

- A. $x = -4, x = 3$
- B. $x = 4, x = -3$
- C. $x = 12, x = 1$
- D. $x = -12, x = -1$
- E. $x = 4, x = 3$

8. A recipe for 4 people requires 3 cups of flour. How many cups of flour are needed for 6 people?

- A. 4
- B. 4.5
- C. 5
- D. 5.5
- E. 6

9. Factor the quadratic expression: $2x^2 + 9x + 4$

- A. $(2x + 2)(x + 2)$
- B. $(2x + 4)(x + 1)$
- C. $(2x + 1)(x + 4)$
- D. $(2x + 1)(x + 8)$
- E. $(x + 1)(2x + 8)$

10. Simplify the radical expression: $\sqrt{72}$

- A. $2\sqrt{18}$
- B. $3\sqrt{8}$
- C. $8\sqrt{3}$
- D. $6\sqrt{2}$
- E. $36\sqrt{2}$

11. Solve the inequality: $5 - x > 2x - 1$

- A. $x > 2$
- B. $x < 2$
- C. $x > 6$
- D. $x < 6$
- E. $x < 4/3$

12. Simplify the expression: $\frac{x}{x+1} - \frac{2}{x-1}$

- A. $\frac{x-2}{-2}$
- B. $\frac{x^2-3x-2}{x^2-1}$
- C. $\frac{x^2-x+2}{x^2-1}$
- D. $\frac{x^2-3x+2}{x^2-1}$
- E. $\frac{x^2+x-2}{x^2-1}$

13. Find the solution to the system of equations: $x + y = 10$ and $x - y = 4$

- A. (5, 5)
- B. (6, 4)
- C. (4, 6)
- D. (7, 3)
- E. (3, 7)

14. Simplify the expression: $(3a + 2b)^2$

- A. $9a^2 + 4b^2$
- B. $9a^2 + 6ab + 4b^2$
- C. $3a^2 + 2b^2$
- D. $9a^2 + 12ab + 4b^2$
- E. $6a^2 + 12ab + 4b^2$

15. Solve for x : $0.2x + 5 = 10$

- A. $x = 5$
- B. $x = 10$
- C. $x = 2.5$
- D. $x = 50$
- E. $x = 25$

16. Factor the expression completely: $x^4 - 16$

- A. $(x^2 - 4)(x^2 + 4)$
- B. $(x - 2)(x + 2)(x^2 + 4)$
- C. $(x - 2)^2(x + 2)^2$
- D. $(x - 4)(x + 4)$
- E. Both A and B are correct

17. Evaluate the expression: $\frac{3^0 + 3^2}{2^2}$

- A. $9/4$
- B. $10/4$
- C. $5/2$
- D. 3
- E. Both B and C are correct

18. Find all solutions to the quadratic equation: $6x^2 - x = 1$

- A. $x = 1/2, x = -1/3$
- B. $x = -1/2, x = 1/3$
- C. $x = 1/6, x = -1$
- D. $x = -1/6, x = 1$
- E. $x = 2, x = -3$

19. Simplify the expression, assuming no variables are zero: $\frac{3a^5b^{-2}}{12a^2b^3}$

- A. $\frac{a^3}{4b^5}$
- B. $\frac{a^3b}{4}$
- C. $\frac{a^7}{4b}$
- D. $4a^3b^5$
- E. $\frac{a^3}{4b}$

20. Find the solution (x, y) to the system of equations: $3x - 2y = 8$ and $4x + y = 7$

- A. $(2, -1)$
- B. $(0, -4)$
- C. $(1, 3)$
- D. $(2, 1)$
- E. $(-2, -7)$

21. A rectangle's length is twice its width. If its perimeter is 30, what is its area?

- A. 150
- B. 30
- C. 200
- D. 50
- E. 100

22. Simplify the expression: $\sqrt{16a^4b^9}$

- A. $4a^2b^3$
- B. $4a^2b^4\sqrt{b}$
- C. $8a^2b^3\sqrt{b}$
- D. $4a^2b^4$
- E. $4a^4b^4\sqrt{b}$

23. Solve the inequality: $\frac{1}{2}x + 3 \geq 2x - 6$

- A. $x \leq 6$

- B. $x \geq 6$
- C. $x \leq 9$
- D. $x \geq 9$
- E. $x \leq 3$

24. Find all solutions to the quadratic equation: $5x^2 = 20x$

- A. $x = 4$
- B. $x = 0$
- C. $x = 0, x = 4$
- D. $x = 5, x = 4$
- E. $x = 0, x = -4$

25. A shirt that normally costs \$30 is on sale for 20% off. What is the sale price?

- A. \$6
- B. \$20
- C. \$24
- D. \$25
- E. \$10

26. Simplify the expression: $\frac{x^2+5x+6}{x+2}$

- A. $x + 2$
- B. $x + 3$
- C. $x + 5$
- D. $x - 3$
- E. $x^2 + 3$

27. Factor the expression completely: $4y^3 - 16y$

- A. $4y(y^2 - 4)$
- B. $4y(y - 2)(y + 2)$
- C. $4y(y - 2)^2$
- D. $y(4y^2 - 16)$
- E. Both A and B are correct

28. Find the solution to the system of equations: $y = x + 1$ and $y = -x + 3$

- A. (1, 2)
- B. (2, 1)
- C. (0, 1)
- D. (1, 0)
- E. (0, 3)

29. If $x = -2$, what is the value of $x^3 - x^2 + x$?

- A. 0
- B. -4

- C.** -8
- D.** -10
- E.** -14

30. A map scale is 1 inch = 50 miles. How many inches on the map represent 225 miles?

- A.** 4 inches
- B.** 4.5 inches
- C.** 5 inches
- D.** 5.5 inches
- E.** 2.25 inches

Answer Key

1. A

- *Explanation:* Distribute the 3: $3x - 6y$. Distribute the -1 : $-x + 6y$.
- Combine: $(3x - x) + (-6y + 6y) = 2x + 0y = 2x$.

2. C

- *Explanation:* The numerator is a difference of squares: $a^2 - b^2 = (a - b)(a + b)$.
- $\frac{(a-b)(a+b)}{a-b}$. The $(a - b)$ terms cancel, leaving $a + b$.
- Substitute: $5 + 3 = 8$.

3. B

- *Explanation:* Multiply by adding exponents.
- $a^{2+(-2)} \cdot b^{-3+3} = a^0 \cdot b^0 = 1 \cdot 1 = 1$.

4. D

- *Explanation:* $2^{-3} = \frac{1}{2^3} = \frac{1}{8}$. $2^{-1} = \frac{1}{2^1} = \frac{1}{2}$.
- Add fractions: $\frac{1}{8} + \frac{1}{2}$. Common denominator is 8.
- $\frac{1}{8} + \frac{4}{8} = \frac{5}{8}$.

5. A

- *Explanation:* Distribute $2x$: $2x(3x) + 2x(-1) = 6x^2 - 2x$.
- Combine: $(2x^2 + 5x - 1) + (6x^2 - 2x)$.
- $(2x^2 + 6x^2) + (5x - 2x) - 1 = 8x^2 + 3x - 1$.

6. B

- *Explanation:* Subtract $0.5x$ from both sides: $1.0x + 3 = 7$.
- Subtract 3 from both sides: $1.0x = 4$. So, $x = 4$.

7. B

- *Explanation:* Set to zero: $x^2 - x - 12 = 0$.
- Find two numbers that multiply to -12 and add to -1 . Numbers are -4 and 3 .
- Factored: $(x - 4)(x + 3) = 0$.
- Solutions: $x = 4$ and $x = -3$.

8. B

- *Explanation:* Set up proportion: $\frac{\text{cups}}{\text{people}} = \frac{3}{4} = \frac{x}{6}$.
- Cross-multiply: $4x = 3 \cdot 6 \rightarrow 4x = 18$.
- Divide by 4: $x = \frac{18}{4} = \frac{9}{2} = 4.5$ cups.

9. C

- *Explanation:* Factor $2x^2 + 9x + 4$. $a \cdot c = 8$. $b = 9$. Numbers are 8 and 1.
- Rewrite: $2x^2 + 8x + 1x + 4$. Group: $2x(x + 4) + 1(x + 4)$.
- Factored: $(2x + 1)(x + 4)$.

10. D

- *Explanation:* Find largest perfect square factor of 72. $72 = 36 \cdot 2$.
- $\sqrt{72} = \sqrt{36 \cdot 2} = \sqrt{36} \cdot \sqrt{2} = 6\sqrt{2}$.

11. B

- *Explanation:* Add x to both sides: $5 > 3x - 1$.
- Add 1 to both sides: $6 > 3x$.
- Divide by 3: $2 > x$, which is the same as $x < 2$.

12. B

- *Explanation:* Common denominator is $(x + 1)(x - 1) = x^2 - 1$.
- $\frac{x(x-1)}{x^2-1} - \frac{2(x+1)}{x^2-1} = \frac{x^2-x-(2x+2)}{x^2-1}$.
- $\frac{x^2-x-2x-2}{x^2-1} = \frac{x^2-3x-2}{x^2-1}$.

13. D

- *Explanation:* Use elimination. Add the two equations.
- $(x + y) + (x - y) = 10 + 4 \rightarrow 2x = 14$.
- Divide by 2: $x = 7$.
- Find y : $(7) + y = 10 \rightarrow y = 3$. Solution is $(7, 3)$.

14. D

- *Explanation:* $(3a + 2b)^2 = (3a + 2b)(3a + 2b)$.
- $3a(3a) + 3a(2b) + 2b(3a) + 2b(2b) = 9a^2 + 6ab + 6ab + 4b^2$.
- Combine: $9a^2 + 12ab + 4b^2$.

15. E

- *Explanation:* $0.2x$ is $\frac{1}{5}x$. $\frac{1}{5}x + 5 = 10$.
- Subtract 5: $\frac{1}{5}x = 5$.
- Multiply by 5: $x = 25$.

16. B

- *Explanation:* First, factor as difference of squares: $x^4 - 16 = (x^2)^2 - 4^2 = (x^2 - 4)(x^2 + 4)$.
- The term $(x^2 - 4)$ is also a difference of squares: $(x - 2)(x + 2)$.
- Fully factored: $(x - 2)(x + 2)(x^2 + 4)$. Option A is not fully factored.

17. E

- *Explanation:* $3^0 = 1$. $3^2 = 9$. $2^2 = 4$.
- $\frac{1+9}{4} = \frac{10}{4}$.
- Simplify $\frac{10}{4}$ by dividing by 2: $\frac{5}{2}$. Both B and C are equivalent.

18. A

- *Explanation:* Set to zero: $6x^2 - x - 1 = 0$.
- Factor by grouping. $a \cdot c = -6$. $b = -1$. Numbers are -3 and 2 .

- Rewrite: $6x^2 - 3x + 2x - 1 = 0$. Group: $3x(2x - 1) + 1(2x - 1) = 0$.
- Factored: $(3x + 1)(2x - 1) = 0$.
- Solutions: $x = -1/3$ and $x = 1/2$.

19. A

- *Explanation:* $\frac{3a^5b^{-2}}{12a^2b^3}$. Coefficients: $\frac{3}{12} = \frac{1}{4}$.
- *a terms:* $a^{5-2} = a^3$. *b terms:* $b^{-2-3} = b^{-5}$.
- Result: $\frac{1}{4}a^3b^{-5} = \frac{a^3}{4b^5}$.

20. A

- *Explanation:* Use elimination. Multiply second equation by 2: $8x + 2y = 14$.
- Add this to the first equation: $(3x - 2y) + (8x + 2y) = 8 + 14 \rightarrow 11x = 22$.
- Divide by 11: $x = 2$.
- Find *y*: $4(2) + y = 7 \rightarrow 8 + y = 7 \rightarrow y = -1$. Solution is $(2, -1)$.

21. D

- *Explanation:* $L = 2W$. Perimeter $P = 2(L + W)$.
- $30 = 2((2W) + W) = 2(3W) = 6W$.
- $30 = 6W \rightarrow W = 5$.
- $L = 2W = 2(5) = 10$.
- Area = $L \times W = 10 \times 5 = 50$.

22. B

- *Explanation:* $\sqrt{16a^4b^9} = \sqrt{16 \cdot a^4 \cdot b^8 \cdot b}$.
- $\sqrt{16}\sqrt{a^4}\sqrt{b^8}\sqrt{b} = 4a^{4/2}b^{8/2}\sqrt{b} = 4a^2b^4\sqrt{b}$.

23. A

- *Explanation:* Subtract 3: $\frac{1}{2}x \geq 2x - 9$.
- Subtract $2x$: $\frac{1}{2}x - 2x \geq -9 \rightarrow -1.5x \geq -9$.
- Divide by -1.5 . **Flip the inequality sign.**
- $x \leq \frac{-9}{-1.5} \rightarrow x \leq 6$.

24. C

- *Explanation:* Set to zero: $5x^2 - 20x = 0$.
- Factor out GCF ($5x$): $5x(x - 4) = 0$.
- Set factors to zero: $5x = 0 \rightarrow x = 0$. And $x - 4 = 0 \rightarrow x = 4$.

25. C

- *Explanation:* 20% of \$30 is $0.20 \times 30 = \$6$. This is the discount.
- Sale price = Original Price - Discount = $30 - 6 = \$24$.

26. B

- *Explanation:* Factor the numerator: $x^2 + 5x + 6$.
- Find two numbers that multiply to 6 and add to 5. Numbers are 2 and 3.

- $\frac{(x+2)(x+3)}{x+2}$. The $(x + 2)$ terms cancel.
- Result: $x + 3$.

27. B

- *Explanation:* Factor out GCF, $4y$: $4y(y^2 - 4)$.
- $y^2 - 4$ is a difference of squares: $(y - 2)(y + 2)$.
- Fully factored form: $4y(y - 2)(y + 2)$. Option A is not fully factored.

28. A

- *Explanation:* Use substitution. Set equations equal: $x + 1 = -x + 3$.
- Add x : $2x + 1 = 3$. Subtract 1: $2x = 2$.
- Divide by 2: $x = 1$.
- Find y : $y = (1) + 1 = 2$. Solution is $(1, 2)$.

29. E

- *Explanation:* Substitute $x = -2$ into $x^3 - x^2 + x$.
- $(-2)^3 - (-2)^2 + (-2)$.
- $(-8) - (4) + (-2) = -8 - 4 - 2 = -14$.

30. B

- *Explanation:* Set up proportion: $\frac{\text{inches}}{\text{miles}} = \frac{1}{50} = \frac{x}{225}$.
- Cross-multiply: $50x = 225$.
- $x = \frac{225}{50} = \frac{450}{100} = 4.5$ inches.