

North Carolina School of Science and Mathematics

Admissions Math Assessment - Practice Test 16

Practice Test 16

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: $(5a - 2b) - (2b - 3a)$
 - A. $2a - 4b$
 - B. $8a - 4b$
 - C. $2a$
 - D. $8a$
 - E. $8a + 4b$
2. Evaluate the expression: $x^2 - 4y$ if $x = -3$ and $y = 2$.
 - A. 1
 - B. 17
 - C. -17
 - D. 5
 - E. -14
3. Simplify the expression: $2x(3x^2 - 5) + x(x^2 + 2x)$
 - A. $6x^3 - 10x + x^3 + 2x^2$
 - B. $7x^3 + 2x^2 - 10x$
 - C. $7x^3 - 8x$
 - D. $6x^3 + 2x^2 - 10x$
 - E. $7x^3 - 3x$
4. Evaluate the expression: $27^{\frac{2}{3}}$
 - A. 18
 - B. 9
 - C. 6
 - D. 3
 - E. 81
5. Simplify the expression: $(2x^{-3}y^2)^3$

A. $8x^{-9}y^6$

B. $6x^{-9}y^6$

C. $8x^0y^5$

D. $6x^{-6}y^5$

E. $8x^{-6}y^6$

6. Solve for x : $3(x + 2) = 5x - 4$

A. $x = 1$

B. $x = -1$

C. $x = 4$

D. $x = 5$

E. $x = -5$

7. Find all solutions to the quadratic equation: $x^2 + 8x + 15 = 0$

A. $x = 3, x = 5$

B. $x = -3, x = 5$

C. $x = 3, x = -5$

D. $x = -3, x = -5$

E. $x = 15, x = -7$

8. If 1.5 cups of flour make 6 cookies, how many cups of flour are needed for 30 cookies?

A. 4.5 cups

B. 5 cups

C. 6.5 cups

D. 7.5 cups

E. 9 cups

9. Factor the quadratic expression: $2x^2 - x - 3$

A. $(2x - 1)(x + 3)$

B. $(2x + 1)(x - 3)$

C. $(2x - 3)(x + 1)$

D. $(2x + 3)(x - 1)$

E. $(2x - 3)(x - 1)$

10. Simplify the radical expression, assuming all variables represent positive numbers:
 $\sqrt{50a^2b^5}$

A. $25ab^2\sqrt{2b}$

B. $5a\sqrt{2b^5}$

C. $5ab^2\sqrt{2b}$

D. $2ab\sqrt{5b}$

E. $5a^2b^4\sqrt{2b}$

11. Solve the inequality: $3(x + 1) \leq 12$

- A. $x \leq 3$
- B. $x \geq 3$
- C. $x \leq 4$
- D. $x \leq 5$
- E. $x \geq 5$

12. Simplify the expression: $\frac{5}{x-1} - \frac{3}{x}$

- A. $\frac{2}{x^2-x}$
- B. $\frac{2x+3}{x^2-x}$
- C. $\frac{2x-3}{x^2-x}$
- D. $\frac{8x-3}{x^2-x}$
- E. $\frac{2}{x(x-1)}$

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

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

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

- A. 0
- B. $2a^2$
- C. $-2b^2$
- D. $2b^2$
- E. $2a^2 - 2b^2$

15. Solve for x : $\frac{x}{2} - 1 = 4$

- A. $x = 5$
- B. $x = 6$
- C. $x = 8$
- D. $x = 10$
- E. $x = 2.5$

16. Factor the expression completely: $3x^3 + 6x^2 + 3x$

- A. $3x(x + 1)^2$
- B. $3x(x^2 + 2x + 1)$
- C. $3x(x + 1)(x - 1)$
- D. $x(3x + 1)(x + 3)$
- E. Both A and B are correct

17. Evaluate the expression: $(-1)^5 + (-1)^6$

- A. 0

- B. 1
- C. -1
- D. 2
- E. -2

18. Find all solutions to the quadratic equation: $x^2 = 8x - 12$

- A. $x = -2, x = 6$
- B. $x = 2, x = -6$
- C. $x = 2, x = 6$
- D. $x = -2, x = -6$
- E. $x = 3, x = 4$

19. Simplify the expression, assuming no variables are zero: $\frac{(2x^3)^2}{4x^7}$

- A. x^{-1}
- B. 1
- C. x
- D. $4x^{-1}$
- E. $\frac{1}{x}$

20. Find the solution (x, y) to the system of equations: $y = 2x + 5$ and $y = -x - 1$

- A. $(-1, 3)$
- B. $(-2, 1)$
- C. $(1, 7)$
- D. $(-2, -3)$
- E. $(0, 5)$

21. A 20 foot ladder leans against a wall. The base of the ladder is 12 feet from the wall. How high up the wall does the ladder reach?

- A. 8 feet
- B. 10 feet
- C. 15 feet
- D. 16 feet
- E. 23 feet

22. Simplify the expression: $(\frac{x^2}{y^3})^{-2}(\frac{x}{y})$

- A. $x^{-3}y^5$
- B. $x^{-4}y^6$
- C. $\frac{y^7}{x^3}$
- D. $\frac{y^5}{x^3}$
- E. $\frac{x^5}{y^7}$

23. Solve the inequality: $1 - \frac{x}{2} > 4$

- A. $x > -6$

- B. $x < -6$
- C. $x > 6$
- D. $x < 6$
- E. $x > -3$

24. Find all solutions to the quadratic equation: $3x^2 - 12 = 0$

- A. $x = 2$
- B. $x = 4$
- C. $x = 2, x = -2$
- D. $x = 4, x = -4$
- E. $x = 0, x = 2$

25. The perimeter of a square is 20 cm. What is its area?

- A. 20 sq cm
- B. 25 sq cm
- C. 40 sq cm
- D. 100 sq cm
- E. 80 sq cm

26. Simplify the expression: $\frac{x^2+2x-8}{x-2}$

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

27. Factor the expression completely: $a^3b - ab^3$

- A. $ab(a^2 - b^2)$
- B. $ab(a - b)(a + b)$
- C. $ab(a - b)^2$
- D. $(a^2 - b)(a - b^2)$
- E. Both A and B are correct

28. Find the solution to the system of equations: $x + 2y = 5$ and $3x + 6y = 15$

- A. (1, 2)
- B. (5, 0)
- C. No solution
- D. Infinite solutions
- E. (3, 1)

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

- A. 1
- B. -1

- C. 25
- D. -2
- E. 6

30. A bus travels 60 miles in 1.5 hours. How many miles will it travel in 2 hours at the same speed?

- A. 40 miles
- B. 45 miles
- C. 75 miles
- D. 80 miles
- E. 90 miles

Answer Key

1. B

- *Explanation:* Distribute the negative: $5a - 2b - 2b + 3a$.
- Combine like terms: $(5a + 3a) + (-2b - 2b) = 8a - 4b$.

2. A

- *Explanation:* Substitute values: $(-3)^2 - 4(2)$.
- Evaluate exponent: $9 - 4(2)$. Multiply: $9 - 8 = 1$.

3. B

- *Explanation:* Distribute $2x$: $6x^3 - 10x$. Distribute x : $x^3 + 2x^2$.
- Combine: $(6x^3 + x^3) + 2x^2 - 10x = 7x^3 + 2x^2 - 10x$.

4. B

- *Explanation:* $27^{\frac{2}{3}} = (\sqrt[3]{27})^2$.
- $\sqrt[3]{27} = 3$.
- $3^2 = 9$.

5. A

- *Explanation:* Apply the power (3) to all terms: $2^3(x^{-3})^3(y^2)^3 = 8x^{-9}y^6$.

6. D

- *Explanation:* Distribute: $3x + 6 = 5x - 4$.
- Subtract $3x$: $6 = 2x - 4$. Add 4: $10 = 2x$.
- Divide by 2: $x = 5$.

7. D

- *Explanation:* Find two numbers that multiply to 15 and add to 8. The numbers are 3 and 5.
- Factored form: $(x + 3)(x + 5) = 0$.
- Set factors to zero: $x = -3$ and $x = -5$.

8. D

- *Explanation:* 30 cookies is 5 times 6 cookies.
- Multiply the flour by 5: $5 \cdot 1.5 \text{ cups} = 7.5 \text{ cups}$.

9. C

- *Explanation:* Factor by grouping. $a \cdot c = -6$. $b = -1$. Numbers are -3 and 2 .
- Rewrite: $2x^2 - 3x + 2x - 3$. Group: $x(2x - 3) + 1(2x - 3)$.
- Factored form: $(x + 1)(2x - 3)$.

10. C

- *Explanation:* $\sqrt{50a^2b^5} = \sqrt{25 \cdot 2 \cdot a^2 \cdot b^4 \cdot b}$.

- Take out the roots: $\sqrt{25}\sqrt{a^2}\sqrt{b^4} \cdot \sqrt{2b} = 5ab^2\sqrt{2b}$.

11. A

- *Explanation:* Distribute: $3x + 3 \leq 12$.
- Subtract 3: $3x \leq 9$.
- Divide by 3: $x \leq 3$.

12. B

- *Explanation:* Common denominator is $x(x - 1)$.
- $\frac{5}{x-1} \cdot \frac{x}{x} = \frac{5x}{x(x-1)}$. $\frac{3}{x} \cdot \frac{x-1}{x-1} = \frac{3(x-1)}{x(x-1)} = \frac{3x-3}{x(x-1)}$.
- Subtract numerators: $\frac{5x-(3x-3)}{x^2-x} = \frac{5x-3x+3}{x^2-x} = \frac{2x+3}{x^2-x}$.

13. C

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

14. C

- *Explanation:* $(a + b)(a - b)$ is a difference of squares, $a^2 - b^2$.
- Distribute -1 to the second term: $-a^2 - b^2$.
- Combine: $(a^2 - b^2) - a^2 - b^2 = (a^2 - a^2) + (-b^2 - b^2) = -2b^2$.

15. D

- *Explanation:* Add 1: $\frac{x}{2} = 5$.
- Multiply by 2: $x = 10$.

16. E

- *Explanation:* Factor out the GCF, $3x$: $3x(x^2 + 2x + 1)$.
- The term in parenthesis is a perfect square trinomial: $(x + 1)^2$.
- The fully factored form is $3x(x + 1)^2$. Both A and B are correct.

17. A

- *Explanation:* $(-1)^5 = -1$ (odd power). $(-1)^6 = 1$ (even power).
- Add: $-1 + 1 = 0$.

18. C

- *Explanation:* Set to zero: $x^2 - 8x + 12 = 0$.
- Find two numbers that multiply to 12 and add to -8 . The numbers are -2 and -6 .
- Factored form: $(x - 2)(x - 6) = 0$.
- Set factors to zero: $x = 2$ and $x = 6$.

19. E

- *Explanation:* Apply the power (2) to the numerator: $(2x^3)^2 = 4x^6$.
- Divide: $\frac{4x^6}{4x^7}$. Divide coefficients: $\frac{4}{4} = 1$.
- Subtract exponents: $x^{6-7} = x^{-1} = \frac{1}{x}$.

20. B

- *Explanation:* Set the equations equal: $2x + 5 = -x - 1$.
- Add x : $3x + 5 = -1$. Subtract 5: $3x = -6$.
- Divide by 3: $x = -2$.
- Find y : $y = 2(-2) + 5 = -4 + 5 = 1$. Solution is $(-2, 1)$.

21. D

- *Explanation:* This is a right triangle. $a^2 + b^2 = c^2$.
- $h^2 + 12^2 = 20^2 \rightarrow h^2 + 144 = 400$.
- Subtract 144: $h^2 = 256$.
- Take the square root: $h = 16$ feet.

22. D

- *Explanation:* Apply power (-2) : $(x^2)^{-2}(y^3)^{-2} = x^{-4}y^6$.
- Multiply by $(\frac{x}{y})$: $(x^{-4}y^6)(\frac{x}{y}) = \frac{x^{-4} \cdot x^1}{1} \cdot \frac{y^6}{y^1}$.
- Combine: $x^{-4+1} \cdot y^{6-1} = x^{-3}y^5 = \frac{y^5}{x^3}$.

23. B

- *Explanation:* Subtract 1: $-\frac{x}{2} > 3$.
- Multiply by -2 . **Flip the inequality sign.**
- $x < -6$.

24. C

- *Explanation:* Set to zero: $3x^2 - 12 = 0$.
- Factor out GCF, 3: $3(x^2 - 4) = 0$.
- $x^2 - 4$ is a difference of squares: $3(x - 2)(x + 2) = 0$.
- Set factors to zero: $x = 2$ and $x = -2$.

25. B

- *Explanation:* Perimeter = $4s$. $20 = 4s \rightarrow s = 5$ cm.
- Area = $s^2 = 5^2 = 25$ sq cm.

26. C

- *Explanation:* Factor the numerator: find numbers that multiply to -8 and add to 2. The numbers are 4 and -2 .
- Factored form: $(x + 4)(x - 2)$.
- $\frac{(x+4)(x-2)}{x-2}$. The $(x - 2)$ terms cancel.
- Result: $x + 4$.

27. E

- *Explanation:* Factor out the GCF, ab : $ab(a^2 - b^2)$.
- The term in parenthesis is a difference of squares: $ab(a - b)(a + b)$.
- Both A and B are correct (B is just the more factored form of A).

28. D

- *Explanation:* If you multiply the first equation by 3, you get $3x + 6y = 15$.
- This is identical to the second equation. This means the lines are the same, and there are infinite solutions.

29. A

- *Explanation:* Substitute values: $(-2 + 3)^{-2}$.
- Add inside parenthesis: $(1)^{-2}$.
- 1 to any power is 1.

30. D

- *Explanation:* Find the speed: $60 \text{ miles} \div 1.5 \text{ hours} = 40 \text{ mph}$.
- Multiply by new time: $40 \text{ mph} \cdot 2 \text{ hours} = 80 \text{ miles}$.