

North Carolina School of Science and Mathematics

Admissions Math Assessment - Practice Test 19

Practice Test 19

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: $(5a^2 - 3ab + 2b^2) - (2a^2 + ab - b^2)$

- A. $3a^2 - 2ab + b^2$
- B. $3a^2 - 4ab + 3b^2$
- C. $7a^2 - 2ab + b^2$
- D. $3a^2 - 4ab + b^2$
- E. $7a^2 - 4ab + 3b^2$

2. Evaluate the expression: $\frac{x^2 - y}{y - x}$ if $x = 3$ and $y = -1$.

- A. 2
- B. -2
- C. $\frac{5}{2}$
- D. $-\frac{5}{2}$
- E. 1

3. Simplify the expression: $(4m^3n^{-1})^2(m^{-2}n^4)$

- A. $16m^4n^2$
- B. $8m^4n^2$
- C. $16m^3n^3$
- D. $16m^4n^{-8}$
- E. $8m^3n^2$

4. Evaluate the expression: $27^{\frac{1}{3}} + (-2)^3$

- A. 1
- B. 17
- C. 3
- D. -5
- E. -11

5. Simplify the expression: $3(2x - 1) - 2(x + 4)$

- A. $4x - 11$
- B. $4x - 5$
- C. $4x + 7$
- D. $4x - 7$
- E. $8x - 11$

6. Solve for x : $\frac{x}{2} + 5 = \frac{x}{3} + 6$

- A. $x = 1$
- B. $x = 6$
- C. $x = \frac{6}{5}$
- D. $x = 2$
- E. $x = 3$

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

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

8. If 12 apples cost 9 dollars, how much will 20 apples cost?

- A. 15 dollars
- B. 17 dollars
- C. 18 dollars
- D. 20 dollars
- E. 21 dollars

9. Factor the quadratic expression: $5x^2 - 14x - 3$

- A. $(5x - 1)(x + 3)$
- B. $(5x + 1)(x - 3)$
- C. $(5x - 3)(x - 1)$
- D. $(5x + 3)(x - 1)$
- E. $(x - 15)(x + 1)$

10. Simplify the radical expression, assuming all variables represent positive numbers:
 $\sqrt{50x^5y^8z^3}$

- A. $5x^2y^4z\sqrt{2xz}$
- B. $25x^2y^4z\sqrt{2xz}$
- C. $5x^2y^4z\sqrt{2x}$
- D. $5x^4y^8z^2\sqrt{2xz}$
- E. $5xy\sqrt{2x^3y^6z}$

11. Solve the inequality: $10 - 3x \leq 1$

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

12. Simplify the expression: $\frac{a}{a+b} + \frac{b}{a-b}$

- A. $\frac{a+b}{a^2-b^2}$
- B. $\frac{a^2+b^2}{a^2-b^2}$
- C. $\frac{a^2-2ab+b^2}{a^2-b^2}$
- D. $\frac{a^2+2ab+b^2}{a^2-b^2}$
- E. $\frac{1}{a-b}$

13. Find the solution to the system of equations: $5x - y = 13$ and $2x + 3y = 12$

- A. $(1, -8)$
- B. $(2, -3)$
- C. $(3, 2)$
- D. $(0, -13)$
- E. $(6, 0)$

14. Simplify the expression: $x(x+1)^2$

- A. $x^3 + 1$
- B. $x^2 + 2x + 1$
- C. $x^3 + 2x^2 + x$
- D. $x^3 + x^2 + 2x + 1$
- E. $x^3 + 2x + 1$

15. Solve for x : $0.5x - 4 = -1$

- A. $x = 6$
- B. $x = -6$
- C. $x = 3$
- D. $x = -10$
- E. $x = 10$

16. Factor the expression completely: $a^4 - b^4$

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

17. Evaluate the expression: $(5^2 - 3^3)^2$

- A. 1
- B. 4
- C. -4
- D. 16
- E. 49

18. Find all solutions to the quadratic equation: $4x^2 + 11x = 3$

- A. $x = 1/4, x = -3$
- B. $x = -1/4, x = 3$
- C. $x = 3/4, x = -1$
- D. $x = -3/4, x = 1$
- E. $x = 1/2, x = -3/2$

19. Simplify the expression, assuming no variables are zero: $\frac{(3x^{-1})^2}{x^2y^{-3}}$

- A. $9x^{-4}y^3$
- B. $\frac{9y^3}{x^4}$
- C. $\frac{6y^3}{x^4}$
- D. $\frac{9}{y^3}$
- E. Both A and B are correct

20. Find the solution (x, y) to the system of equations: $x = 3y + 1$ and $2x - 5y = 3$

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

21. The area of a square is 64. What is the length of its diagonal?

- A. 8
- B. $8\sqrt{2}$
- C. 16
- D. $4\sqrt{2}$
- E. 32

22. Simplify the expression: $(x^3y^{-1})^{-2}(x^0y^3)$

- A. x^6y^5
- B. $x^{-6}y^5$
- C. $x^{-6}y^{-1}$
- D. $\frac{y^5}{x^6}$
- E. Both B and D are correct

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

- A. $x \leq 12$
- B. $x \geq 12$
- C. $x \leq 6$
- D. $x \leq -4$
- E. $x \geq 6$

24. Find all solutions to the quadratic equation: $5x^2 = 25x$

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

25. The perimeter of a rectangle is 24. If the length is 2 units more than the width, what is the area?

- A. 24
- B. 30
- C. 32
- D. 35
- E. 40

26. Simplify the expression: $\frac{2x-4}{x^2-4}$

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

27. Factor the expression completely: $x^3 - 4x^2 - 5x$

- A. $x(x-1)(x+5)$
- B. $x(x-5)(x+1)$
- C. $x(x^2-4x-5)$
- D. $x(x-5)(x-1)$
- E. Both B and C are correct

28. Find the solution to the system of equations: $y = 3x - 4$ and $6x - 2y = 5$

- A. $(1, -1)$
- B. $(0, -4)$
- C. Infinite solutions
- D. No solution
- E. $(2, 2)$

29. If $a = 2$ and $b = -3$, what is the value of $(a + b)^{a-b}$?

- A.** 1
- B.** -1
- C.** 5
- D.** -5
- E.** 25

30. A 30% discount is applied to a 200 dollar item. What is the final price?

- A.** 60
- B.** 140
- C.** 170
- D.** 230
- E.** 260

Answer Key

1. B

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

2. D

- *Explanation:* Substitute values: $\frac{(3)^2 - (-1)}{(-1) - 3}$.
- Numerator: $9 - (-1) = 9 + 1 = 10$.
- Denominator: $-1 - 3 = -4$.
- Result: $\frac{10}{-4} = -\frac{5}{2}$.

3. A

- *Explanation:* Apply power (2): $(4m^3n^{-1})^2 = 4^2(m^3)^2(n^{-1})^2 = 16m^6n^{-2}$.
- Multiply: $(16m^6n^{-2})(m^{-2}n^4)$.
- Combine: $16 \cdot m^{6+(-2)} \cdot n^{-2+4} = 16m^4n^2$.

4. D

- *Explanation:* $27^{\frac{1}{3}} = \sqrt[3]{27} = 3$.
- $(-2)^3 = -8$.
- Add: $3 + (-8) = 3 - 8 = -5$.

5. A

- *Explanation:* Distribute 3: $6x - 3$. Distribute -2: $-2x - 8$.
- Combine: $(6x - 2x) + (-3 - 8) = 4x - 11$.

6. B

- *Explanation:* To clear fractions, multiply everything by 6: $6(\frac{x}{2}) + 6(5) = 6(\frac{x}{3}) + 6(6)$.
- $3x + 30 = 2x + 36$.
- Subtract $2x$: $x + 30 = 36$. Subtract 30: $x = 6$.

7. B

- *Explanation:* Set to zero: $x^2 - 7x + 12 = 0$.
- Find two numbers that multiply to 12 and add to -7. The numbers are -3 and -4.
- Factored form: $(x - 3)(x - 4) = 0$.
- Set factors to zero: $x = 3$ and $x = 4$.

8. A

- *Explanation:* Find the cost per apple: $\frac{9 \text{ dollars}}{12 \text{ apples}} = 0.75 \text{ dollars per apple}$.
- Multiply by 20: $20 \times 0.75 = 15 \text{ dollars}$.

9. B

- *Explanation:* Factor by grouping. $a \cdot c = -15$. $b = -14$. Numbers are -15 and 1 .
- Rewrite: $5x^2 - 15x + 1x - 3$. Group: $5x(x - 3) + 1(x - 3)$.
- Factored form: $(5x + 1)(x - 3)$.

10. A

- *Explanation:* $\sqrt{50x^5y^8z^3} = \sqrt{25 \cdot 2 \cdot x^4 \cdot x \cdot y^8 \cdot z^2 \cdot z}$.
- Take out roots: $\sqrt{25}\sqrt{x^4}\sqrt{y^8}\sqrt{z^2} \cdot \sqrt{2xz} = 5x^2y^4z\sqrt{2xz}$.

11. B

- *Explanation:* Subtract 10: $-3x \leq -9$.
- Divide by -3 . **Flip the inequality sign.**
- $x \geq 3$.

12. B

- *Explanation:* Common denominator is $(a + b)(a - b) = a^2 - b^2$.
- $\frac{a(a-b)}{a^2-b^2} + \frac{b(a+b)}{a^2-b^2} = \frac{a^2-ab+ab+b^2}{a^2-b^2}$.
- Combine numerator: $\frac{a^2+b^2}{a^2-b^2}$.

13. C

- *Explanation:* From $5x - y = 13$, $y = 5x - 13$. Substitute into the second equation.
- $2x + 3(5x - 13) = 12 \rightarrow 2x + 15x - 39 = 12 \rightarrow 17x - 39 = 12$.
- Add 39: $17x = 51$. Divide by 17: $x = 3$.
- Find y : $y = 5(3) - 13 = 15 - 13 = 2$. Solution is $(3, 2)$.

14. C

- *Explanation:* First expand $(x + 1)^2 = (x + 1)(x + 1) = x^2 + x + x + 1 = x^2 + 2x + 1$.
- Now distribute the x : $x(x^2 + 2x + 1) = x^3 + 2x^2 + x$.

15. A

- *Explanation:* $0.5x$ is $\frac{1}{2}x$. So, $\frac{1}{2}x - 4 = -1$.
- Add 4: $\frac{1}{2}x = 3$.
- Multiply by 2: $x = 6$.

16. B

- *Explanation:* $a^4 - b^4$ is a difference of squares: $(a^2)^2 - (b^2)^2 = (a^2 - b^2)(a^2 + b^2)$.
- $a^2 - b^2$ is also a difference of squares: $(a - b)(a + b)$.
- Fully factored form: $(a - b)(a + b)(a^2 + b^2)$. Option A is not fully factored.

17. B

- *Explanation:* Parentheses first: $5^2 = 25$. $3^3 = 27$.
- $(25 - 27)^2 = (-2)^2$.
- Result: 4.

18. A

- *Explanation:* Set to zero: $4x^2 + 11x - 3 = 0$.
- Factor by grouping. $a \cdot c = -12$. $b = 11$. Numbers are 12 and -1 .
- Rewrite: $4x^2 + 12x - 1x - 3 = 0$. Group: $4x(x + 3) - 1(x + 3) = 0$.
- Factored: $(4x - 1)(x + 3) = 0$.
- Set factors to zero: $x = 1/4$ and $x = -3$.

19. E

- *Explanation:* Apply power (2) to numerator: $3^2(x^{-1})^2 = 9x^{-2}$.
- Divide: $\frac{9x^{-2}}{x^2y^{-3}}$.
- Subtract x exponents: $9x^{-2-2}y^3 = 9x^{-4}y^3$.
- This is $9 \cdot \frac{1}{x^4} \cdot y^3 = \frac{9y^3}{x^4}$. Both A and B are correct.

20. B

- *Explanation:* Substitute $x = 3y + 1$ into the second equation: $2(3y + 1) - 5y = 3$.
- Distribute: $6y + 2 - 5y = 3$. Combine: $y + 2 = 3$.
- Subtract 2: $y = 1$.
- Find x : $x = 3(1) + 1 = 4$. Solution is $(4, 1)$.

21. B

- *Explanation:* Area = s^2 . $s^2 = 64$. Side length $s = 8$.
- The diagonal d forms a right triangle with two sides s .
- $s^2 + s^2 = d^2 \rightarrow 8^2 + 8^2 = d^2 \rightarrow 64 + 64 = d^2$.
- $d^2 = 128 \rightarrow d = \sqrt{128} = \sqrt{64 \cdot 2} = 8\sqrt{2}$.

22. E

- *Explanation:* Apply power (-2) : $(x^3)^{-2}(y^{-1})^{-2} = x^{-6}y^2$.
- $x^0 = 1$. Multiply: $(x^{-6}y^2)(1 \cdot y^3)$.
- Combine: $x^{-6}y^{2+3} = x^{-6}y^5$.
- This can be written as $\frac{y^5}{x^6}$. Both B and D are correct.

23. A

- *Explanation:* To clear fractions, multiply by 4: $4(\frac{1}{2}x) - 4(2) \leq 4(\frac{1}{4}x) + 4(1)$.
- $2x - 8 \leq x + 4$.
- Subtract x : $x - 8 \leq 4$. Add 8: $x \leq 12$.

24. D

- *Explanation:* Set to zero: $5x^2 - 25x = 0$.
- Factor out GCF, $5x$: $5x(x - 5) = 0$.
- Set factors to zero: $5x = 0 \rightarrow x = 0$. And $x - 5 = 0 \rightarrow x = 5$.

25. D

- *Explanation:* Perimeter = $2(L + W)$. Let $W = w$ and $L = w + 2$.
- $24 = 2((w + 2) + w) \rightarrow 24 = 2(2w + 2) \rightarrow 24 = 4w + 4$.

- Subtract 4: $20 = 4w$. Divide by 4: $w = 5$.
- Length $L = w + 2 = 7$.
- Area $= L \times W = 7 \times 5 = 35$.

26. B

- *Explanation:* Factor numerator: $2(x - 2)$.
- Factor denominator (diff. of squares): $(x - 2)(x + 2)$.
- $\frac{2(x-2)}{(x-2)(x+2)}$. The $(x - 2)$ terms cancel.
- Result: $\frac{2}{x+2}$.

27. E

- *Explanation:* Factor out GCF, x : $x(x^2 - 4x - 5)$.
- Factor trinomial: find numbers that multiply to -5 and add to -4 . The numbers are -5 and 1 .
- Fully factored form: $x(x - 5)(x + 1)$. Option C is not fully factored.

28. D

- *Explanation:* Substitute $y = 3x - 4$ into the second equation: $6x - 2(3x - 4) = 5$.
- Distribute: $6x - 6x + 8 = 5$.
- Combine: $8 = 5$. This is a false statement.
- There is no solution. (The lines are parallel).

29. B

- *Explanation:* Substitute values: $((2) + (-3))^{(2)-(-3)}$.
- Base: $2 - 3 = -1$. Exponent: $2 + 3 = 5$.
- $(-1)^5 = -1$.

30. B

- *Explanation:* A 30% discount means 30% off.
- 30% of 200 is $0.30 \times 200 = 60$.
- New price: $200 - 60 = 140$.