

North Carolina School of Science and Mathematics

Admissions Math Assessment - Practice Test 25

Practice Test 25

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: $(9x - 2y + 3) - (5x - 4y - 1)$

- A. $4x + 2y + 4$
- B. $4x - 6y + 2$
- C. $14x + 2y + 4$
- D. $4x - 2y + 2$
- E. $4x + 2y + 2$

2. Evaluate the expression: $(a - b)^a$ if $a = 3$ and $b = 1$.

- A. 2
- B. 4
- C. 6
- D. 8
- E. 9

3. Simplify the expression: $(2x^5y^2)^3$

- A. $6x^8y^5$
- B. $8x^8y^5$
- C. $8x^{15}y^6$
- D. $6x^{15}y^6$
- E. $8x^5y^2$

4. Evaluate the expression: $100^{\frac{1}{2}} - 64^{\frac{1}{3}}$

- A. 2
- B. 4
- C. 6
- D. 8
- E. 18

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

- A. $4x^2 - 2x - 2$
- B. $4x^2 + 2x - 8$
- C. $4x^2 - 2x - 8$
- D. $5x^2 - 2x - 2$
- E. $4x^2 - 2$

6. Solve for x : $7(x - 1) = 4(x + 2)$

- A. $x = 1$
- B. $x = 3$
- C. $x = 5$
- D. $x = 1/3$
- E. $x = 15/11$

7. Find all solutions to the quadratic equation: $x^2 + 6x = 7$

- A. $x = -1, x = -6$
- B. $x = 1, x = -7$
- C. $x = -1, x = 7$
- D. $x = 1, x = 6$
- E. $x = -3, x = -2$

8. If a printer can print 50 pages in 3 minutes, how many minutes will it take to print 200 pages?

- A. 8
- B. 10
- C. 12
- D. 15
- E. 6

9. Factor the quadratic expression: $3x^2 - 11x + 6$

- A. $(3x - 2)(x - 3)$
- B. $(3x - 3)(x - 2)$
- C. $(3x + 2)(x - 3)$
- D. $(3x - 1)(x - 6)$
- E. $(3x - 2)(x + 3)$

10. Simplify the radical expression: $\sqrt{48a^5}$

- A. $4a^2\sqrt{3a}$
- B. $16a^2\sqrt{3a}$
- C. $2a^2\sqrt{12a}$
- D. $4a\sqrt{3a}$
- E. $2a\sqrt{12a^3}$

11. Solve the inequality: $2(x + 3) \leq 5x - 3$

- A. $x \leq 3$
- B. $x \geq 3$
- C. $x \leq 1$
- D. $x \geq 1$
- E. $x \geq 9$

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

- A. $\frac{y-x}{xy}$
- B. $\frac{x-y}{xy}$
- C. 0
- D. $\frac{1}{y-x}$
- E. $\frac{x-y}{x+y}$

13. Find the solution to the system of equations: $y = 2x$ and $x + 3y = 14$

- A. (1, 2)
- B. (4, 8)
- C. (7, 0)
- D. (2, 4)
- E. (14, 0)

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

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

15. Solve for x : $\frac{x+1}{3} = 5$

- A. $x = 14$
- B. $x = 15$
- C. $x = 16$
- D. $x = 4$
- E. $x = 10$

16. Factor the expression completely: $5x^3 - 5x$

- A. $5x(x^2 - 1)$
- B. $5(x^3 - x)$
- C. $5x(x - 1)(x + 1)$
- D. $5x(x - 1)^2$
- E. Both A and C are correct

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

- A. 0

- B. 2
- C. 4
- D. 8
- E. 32

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

19. Simplify the expression, assuming no variables are zero: $\frac{a^3b^2c^0}{a^{-1}b^4}$

- A. $\frac{a^2}{b^2}$
- B. $\frac{a^4}{b^2}$
- C. a^2b^6
- D. a^4b^6
- E. a^4b^2

20. Find the solution (x, y) to the system of equations: $2x + 5y = 1$ and $3x - 5y = 19$

- A. $(1, -1/5)$
- B. $(5, -1)$
- C. $(4, -7/5)$
- D. $(4, -1)$
- E. $(-4, 9/5)$

21. A rectangular garden has an area of 100 square feet. If its length is 20 feet, what is its perimeter?

- A. 25 feet
- B. 30 feet
- C. 40 feet
- D. 50 feet
- E. 120 feet

22. Simplify the expression: $\sqrt{12} + \sqrt{27}$

- A. $\sqrt{39}$
- B. $5\sqrt{3}$
- C. $6\sqrt{3}$
- D. $7\sqrt{3}$
- E. $13\sqrt{3}$

23. Solve the inequality: $10 - 3x \leq -2$

- A. $x \leq 4$

- B. $x \geq 4$
- C. $x \leq -4$
- D. $x \geq -4$
- E. $x \geq 8/3$

24. Find all solutions to the quadratic equation: $x^2 = 81$

- A. $x = 9$
- B. $x = -9$
- C. $x = 9, x = -9$
- D. $x = 3, x = -3$
- E. $x = 81$

25. A bicycle is sold for \$210, which is 70% of its original price. What was the original price?

- A. \$280
- B. \$300
- C. \$147
- D. \$250
- E. \$350

26. Simplify the expression: $\frac{a^2-2a-3}{a-3}$

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

27. Factor the expression completely: $3x^2 - 12x - 15$

- A. $(3x - 5)(x + 3)$
- B. $3(x - 5)(x + 1)$
- C. $3(x^2 - 4x - 5)$
- D. $(3x + 3)(x - 5)$
- E. Both B and C are correct

28. Find the solution to the system of equations: $x + y = 3$ and $2x + 2y = 10$

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

29. If $a = -1$ and $b = 5$, what is the value of $\frac{a^2+b}{a+b}$?

- A. $6/4$

- B.** $\frac{3}{2}$
- C.** $\frac{4}{4}$
- D.** $\frac{26}{4}$
- E.** Both A and B are correct

30. A job takes 8 hours for 3 people to complete. At this same rate, how many people are needed to complete the job in 2 hours?

- A.** 6
- B.** 8
- C.** 12
- D.** 16
- E.** 24

Answer Key

1. A

- *Explanation:* Distribute the -1 : $9x - 2y + 3 - 5x + 4y + 1$.
- Combine like terms: $(9x - 5x) + (-2y + 4y) + (3 + 1) = 4x + 2y + 4$.

2. D

- *Explanation:* Substitute values: $(3 - 1)^3 = (2)^3 = 8$.

3. C

- *Explanation:* Apply the power (3) to all parts: $2^3 \cdot (x^5)^3 \cdot (y^2)^3$.
- This gives $8 \cdot x^{5 \times 3} \cdot y^{2 \times 3} = 8x^{15}y^6$.

4. C

- *Explanation:* $100^{\frac{1}{2}} = \sqrt{100} = 10$.
- $64^{\frac{1}{3}} = \sqrt[3]{64} = 4$ (since $4 \times 4 \times 4 = 64$).
- $10 - 4 = 6$.

5. A

- *Explanation:* Distribute the 5: $5x^2 - 5$. Distribute the -1 : $-x^2 - 2x + 3$.
- Combine: $(5x^2 - x^2) + (-2x) + (-5 + 3) = 4x^2 - 2x - 2$.

6. C

- *Explanation:* Distribute: $7x - 7 = 4x + 8$.
- Subtract $4x$ from both sides: $3x - 7 = 8$.
- Add 7 to both sides: $3x = 15$.
- Divide by 3: $x = 5$.

7. B

- *Explanation:* Set to zero: $x^2 + 6x - 7 = 0$.
- Find two numbers that multiply to -7 and add to 6. Numbers are 7 and -1 .
- Factored: $(x + 7)(x - 1) = 0$.
- Solutions: $x = -7$ and $x = 1$.

8. C

- *Explanation:* Set up proportion: $\frac{\text{pages}}{\text{minutes}} = \frac{50}{3} = \frac{200}{x}$.
- Cross-multiply: $50x = 3 \cdot 200 \rightarrow 50x = 600$.
- Divide by 50: $x = \frac{600}{50} = \frac{60}{5} = 12$ minutes.

9. A

- *Explanation:* Factor $3x^2 - 11x + 6$. $a \cdot c = 18$. $b = -11$. Numbers are -9 and -2 .
- Rewrite: $3x^2 - 9x - 2x + 6$. Group: $3x(x - 3) - 2(x - 3)$.
- Factored: $(3x - 2)(x - 3)$.

10. A

- *Explanation:* $\sqrt{48a^5} = \sqrt{16 \cdot 3 \cdot a^4 \cdot a}$.
- Take out roots: $\sqrt{16}\sqrt{a^4}\sqrt{3a} = 4a^{4/2}\sqrt{3a} = 4a^2\sqrt{3a}$.

11. B

- *Explanation:* Distribute 2: $2x + 6 \leq 5x - 3$.
- Subtract $2x$: $6 \leq 3x - 3$.
- Add 3: $9 \leq 3x$.
- Divide by 3: $3 \leq x$, or $x \geq 3$.

12. B

- *Explanation:* Common denominator is xy .
- $\frac{1(x)}{xy} - \frac{1(y)}{xy} = \frac{x-y}{xy}$.

13. D

- *Explanation:* Substitute $y = 2x$ into the second equation: $x + 3(2x) = 14$.
- $x + 6x = 14 \rightarrow 7x = 14$.
- Divide by 7: $x = 2$.
- Find y : $y = 2(2) = 4$. Solution is $(2, 4)$.

14. B

- *Explanation:* This is the formula for a difference of cubes.
- Distribute: $a(a^2 + a + 1) - 1(a^2 + a + 1) = a^3 + a^2 + a - a^2 - a - 1$.
- Combine like terms: $a^3 + (a^2 - a^2) + (a - a) - 1 = a^3 - 1$.

15. A

- *Explanation:* Multiply both sides by 3: $x + 1 = 15$.
- Subtract 1: $x = 14$.

16. C

- *Explanation:* Factor out GCF, $5x$: $5x(x^2 - 1)$.
- $x^2 - 1$ is a difference of squares: $(x - 1)(x + 1)$.
- Fully factored form: $5x(x - 1)(x + 1)$. Option A is not fully factored.

17. A

- *Explanation:* $(2^3)^2 = 2^{3 \times 2} = 2^6 = 64$.
- $(2^2)^3 = 2^{2 \times 3} = 2^6 = 64$.
- $64 - 64 = 0$.

18. B

- *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: $(4x - 1)(x + 3) = 0$.

- Solutions: $x = 1/4$ and $x = -3$.

19. B

- *Explanation:* $c^0 = 1$. $\frac{a^3b^2}{a^{-1}b^4}$.
- Subtract exponents: $a^{3-(-1)} \cdot b^{2-4} = a^{3+1}b^{-2} = a^4b^{-2} = \frac{a^4}{b^2}$.

20. D

- *Explanation:* Use elimination. Add the two equations.
- $(2x + 5y) + (3x - 5y) = 1 + 19 \rightarrow 5x = 20$.
- Divide by 5: $x = 4$.
- Find y : $2(4) + 5y = 1 \rightarrow 8 + 5y = 1 \rightarrow 5y = -7 \rightarrow y = -7/5$.
- Oh, wait, let me re-check. $3(4) - 5y = 19 \rightarrow 12 - 5y = 19 \rightarrow -5y = 7 \rightarrow y = -7/5$.
- Let me re-read the question. $3x - 5y = 19$. $2x + 5y = 1$.
- $5x = 20$, $x = 4$.
- $2(4) + 5y = 1 \rightarrow 8 + 5y = 1 \rightarrow 5y = -7 \rightarrow y = -7/5$.
- $3(4) - 5y = 19 \rightarrow 12 - 5y = 19 \rightarrow -5y = 7 \rightarrow y = -7/5$.
- The answer $(4, -7/5)$ is not an option. Let me check my addition.
- $2x + 5y = 1$. $3x - 5y = 19$. Adding gives $5x = 20$, so $x = 4$.
- $2(4) + 5y = 1 \rightarrow 8 + 5y = 1 \rightarrow 5y = -7 \rightarrow y = -1.4$.
- $3(4) - 5y = 19 \rightarrow 12 - 5y = 19 \rightarrow -5y = 7 \rightarrow y = -1.4$.
- There must be a typo in the question or options. Let me assume option D was intended.
- If $x = 4$ and $y = -1$: $2(4) + 5(-1) = 8 - 5 = 3 \neq 1$.
- Let me assume option C: $x = 4$, $y = -7/5$. $2(4) + 5(-7/5) = 8 - 7 = 1$. (Matches 1st eq). $3(4) - 5(-7/5) = 12 + 7 = 19$. (Matches 2nd eq).
- The correct answer is $(4, -7/5)$. This corresponds to option C.

21. D

- *Explanation:* Area = $L \times W$. $100 = 20 \times W$.
- Divide by 20: $W = 5$.
- Perimeter = $2(L + W) = 2(20 + 5) = 2(25) = 50$ feet.

22. B

- *Explanation:* $\sqrt{12} = \sqrt{4 \cdot 3} = 2\sqrt{3}$.
- $\sqrt{27} = \sqrt{9 \cdot 3} = 3\sqrt{3}$.
- $2\sqrt{3} + 3\sqrt{3} = (2 + 3)\sqrt{3} = 5\sqrt{3}$.

23. B

- *Explanation:* Subtract 10: $-3x \leq -12$.
- Divide by -3 . **Flip the inequality sign.**
- $x \geq \frac{-12}{-3} \rightarrow x \geq 4$.

24. C

- *Explanation:* This is a difference of squares, $x^2 - 81 = 0$.
- $(x - 9)(x + 9) = 0$.
- Solutions are $x = 9$ and $x = -9$.

25. B

- *Explanation:* Let P be the original price. 70% of P is 210.
- $0.70 \cdot P = 210$.
- $P = \frac{210}{0.7} = \frac{2100}{7} = 300$. Original price was \$300.

26. B

- *Explanation:* Factor numerator: $a^2 - 2a - 3$. Numbers multiply to -3 , add to -2 .
- Numbers are -3 and 1 . Factored: $(a - 3)(a + 1)$.
- $\frac{(a-3)(a+1)}{a-3}$. The $(a - 3)$ terms cancel.
- Result: $a + 1$.

27. B

- *Explanation:* Factor out GCF, 3: $3(x^2 - 4x - 5)$.
- Factor trinomial: numbers multiply to -5 , add to -4 . Numbers are -5 and 1 .
- Fully factored form: $3(x - 5)(x + 1)$. Option C is not fully factored.

28. C

- *Explanation:* Multiply first equation by 2: $2(x + y) = 2(3) \rightarrow 2x + 2y = 6$.
- The system is $2x + 2y = 6$ and $2x + 2y = 10$.
- This is a contradiction ($6 = 10$). The lines are parallel. No solution.

29. E

- *Explanation:* Substitute values: $\frac{(-1)^2 + (5)}{(-1) + (5)}$.
- $\frac{1+5}{4} = \frac{6}{4}$.
- Simplify $\frac{6}{4}$ by dividing by 2: $\frac{3}{2}$. Both A and B are equivalent.

30. C

- *Explanation:* This is an inverse relationship (work-rate).
- Total "person-hours" needed: 3 people $\times$ 8 hours = 24 person-hours.
- People needed for 2 hours: $\frac{24 \text{ person-hours}}{2 \text{ hours}} = 12$ people.