

North Carolina School of Science and Mathematics

Admissions Math Assessment - Practice Test 6

Practice Test 6

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: $(x^3 + 2x - 1) - (3x^3 - x + 4)$

- A. $-2x^3 + x - 5$
- B. $-2x^3 + 3x - 5$
- C. $4x^3 + x + 3$
- D. $-2x^3 + 3x + 3$
- E. $4x^3 + 3x + 3$

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

- A. $-x - 3y$
- B. $-x - 7y$
- C. $11x - 7y$
- D. $-x - 6y$
- E. $11x - 3y$

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

- A. $2a^2 + ab + b^2$
- B. $2a^2 - 5ab - b^2$
- C. $2a^2 + a + b$
- D. $2a^2 + b^2$
- E. $2a^2 + 5ab + b^2$

4. Evaluate the expression: $\frac{5^3}{5^2} - (-4)^2$

- A. 21
- B. -11
- C. 1
- D. -1
- E. 9

5. Evaluate the expression: $49^{\frac{1}{2}} - 1^{\frac{1}{3}}$

- A. 6
- B. 5
- C. 23.5
- D. 4
- E. 8

6. Simplify the expression: $(2x^{-1}y^4)^3$

- A. $6x^{-3}y^{12}$
- B. $8x^2y^7$
- C. $8x^{-3}y^{12}$
- D. $6x^{-1}y^{12}$
- E. $8x^{-3}y^7$

7. Simplify the expression: $(a^5b^{-2})^{-1}(4a^3b)$

- A. $4a^7b^{-1}$
- B. $4a^{-2}b^3$
- C. $-4a^8b^{-1}$
- D. $4a^2b^{-1}$
- E. $-4a^{-2}b^3$

8. Simplify the expression, assuming no variables are zero: $\frac{(x^3y^{-1})^4}{x^5y^{-5}}$

- A. x^7y^{-9}
- B. $x^{12}y$
- C. x^7y
- D. x^7y^{-1}
- E. x^2y

9. Simplify the radical expression, assuming all variables represent positive numbers:
 $\sqrt{121a^4b^{16}}$

- A. $11a^2b^4$
- B. $11a^2b^8$
- C. $11a^4b^8$
- D. $1.1a^2b^8$
- E. $121a^2b^8$

10. Simplify the radical expression, assuming all variables represent positive numbers:
 $\sqrt{144m^{64}n^{16}}$

- A. $12m^{32}n^4$
- B. $72m^{32}n^8$
- C. $12m^8n^4$
- D. $12m^{32}n^8$
- E. $14m^{32}n^8$

11. Simplify the expression: $\frac{1}{x+3} + \frac{2}{x-3}$

- A. $\frac{3}{x^2-9}$
- B. $\frac{3x+3}{x^2-9}$
- C. $\frac{3x-3}{x^2-9}$
- D. $\frac{3x+9}{x^2-9}$
- E. $\frac{3}{2x}$

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

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

13. Determine the value of the expression $a(a+b)$ if $a = 5$ and $b = -3$.

- A. 10
- B. 40
- C. 22
- D. 4
- E. 28

14. Determine the value of the expression $\frac{x^2-y}{y}$ if $x = 4$ and $y = 2$.

- A. 6
- B. 8
- C. 3
- D. 7
- E. 14

15. Solve for x : $7x - 2 = 33$

- A. $x = 31$
- B. $x = 35$
- C. $x = 5$
- D. $x = \frac{31}{7}$
- E. $x = 6$

16. Solve for x : $\frac{1}{2}x + 4 = 10$

- A. $x = 28$
- B. $x = 7$
- C. $x = 3$
- D. $x = 12$
- E. $x = 20$

17. Solve for n : $10n + 2 = 3(n + 3)$

- A. $n = 1$
- B. $n = 7$
- C. $n = \frac{11}{7}$
- D. $n = \frac{7}{13}$
- E. $n = \frac{11}{13}$

18. Find the solution (x, y) to the system of equations: $x = 2y - 1$ and $x + 3y = 9$

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

19. Find the solution (x, y) to the system of equations: $3x - 2y = 10$ and $2x + y = 9$

- A. $(4, 1)$
- B. $(2, -2)$
- C. $(0, -5)$
- D. $(4, -1)$
- E. $(1, 4)$

20. Find the solution to the system of equations: $x + 2y = 6$ and $3x + 6y = 12$

- A. $(0, 3)$
- B. $(6, 0)$
- C. Infinite solutions
- D. No solution
- E. $(2, 2)$

21. Solve the inequality: $4x - 1 \leq 2x + 7$

- A. $x \geq 4$
- B. $x \leq 3$
- C. $x \geq 3$
- D. $x < 4$
- E. $x \leq \frac{8}{6}$

22. Solve the inequality: $20 - 4x < 8$

- A. $x < 3$
- B. $x > 3$
- C. $x < -3$
- D. $x > -3$
- E. $x > 7$

23. Find all solutions to the quadratic equation: $x^2 + 5x + 6 = 0$

- A. $x = 6, x = 1$

- B. $x = -6, x = -1$
- C. $x = 2, x = 3$
- D. $x = -2, x = -3$
- E. $x = -5, x = -6$

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

- A. $x = 3, x = \frac{1}{4}$
- B. $x = -3, x = -\frac{1}{4}$
- C. $x = 3, x = -\frac{1}{4}$
- D. $x = -3, x = \frac{1}{4}$
- E. $x = 4, x = -1$

25. Find all solutions to the quadratic equation: $100x^2 - 9 = 0$

- A. $x = \frac{3}{10}, x = -\frac{3}{10}$
- B. $x = \frac{10}{3}, x = -\frac{10}{3}$
- C. $x = \frac{9}{100}, x = -\frac{9}{100}$
- D. $x = 10, x = -10$
- E. $x = 3, x = -3$

26. Factor the expression completely: $14x^3y^2 - 21x^2y^3$

- A. $7x^2y^2(2x - 3y)$
- B. $7x^2y(2x - 3y^2)$
- C. $7x^3y^2(2 - 3y)$
- D. $7xy(2x^2y - 3xy^2)$
- E. $14x^2y^2(x - 2y)$

27. Factor the expression completely: $36 - y^2$

- A. $(6 - y)^2$
- B. $(y - 6)(y + 6)$
- C. $(6 - y)(6 + y)$
- D. $(18 - y)(2 + y)$
- E. $(y - 6)^2$

28. Factor the quadratic expression: $2x^2 + 9x - 5$

- A. $(2x - 1)(x + 5)$
- B. $(2x + 1)(x - 5)$
- C. $(2x - 5)(x + 1)$
- D. $(2x + 5)(x - 1)$
- E. $(x + 9)(2x - 5)$

29. If a printer can print 40 pages in $\frac{1}{3}$ of an hour, how many pages can it print in 2 hours?

- A. 120 pages

- B. 80 pages**
- C. 240 pages**
- D. 200 pages**
- E. 160 pages**

30. A recipe for 3 dozen cookies requires 2 cups of sugar. How many cups of sugar are needed to make 9 dozen cookies?

- A. 4 cups**
- B. 5 cups**
- C. 6 cups**
- D. 8 cups**
- E. 9 cups**

Answer Key

1. B

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

2. B

- *Explanation:* Distribute the coefficients: $5(x - y) \rightarrow 5x - 5y$. $-2(3x + y) \rightarrow -6x - 2y$.
- Combine the results: $(5x - 6x) + (-5y - 2y) = -x - 7y$.

3. A

- *Explanation:* Distribute $2a$: $2a(a - b) \rightarrow 2a^2 - 2ab$. Distribute b : $b(3a + b) \rightarrow 3ab + b^2$.
- Combine like terms: $2a^2 + (-2ab + 3ab) + b^2 = 2a^2 + ab + b^2$.

4. B

- *Explanation:* Use the quotient rule: $\frac{5^3}{5^2} = 5^{3-2} = 5^1 = 5$.
- Evaluate the second term: $(-4)^2 = 16$.
- Subtract: $5 - 16 = -11$.

5. A

- *Explanation:* $49^{\frac{1}{2}} = \sqrt{49} = 7$.
- $1^{\frac{1}{3}} = \sqrt[3]{1} = 1$.
- Subtract: $7 - 1 = 6$.

6. C

- *Explanation:* Apply the power rule (cubing) to each factor: $2^3 = 8$. $(x^{-1})^3 = x^{-1 \cdot 3} = x^{-3}$. $(y^4)^3 = y^{4 \cdot 3} = y^{12}$.
- The result is $8x^{-3}y^{12}$.

7. B

- *Explanation:* Apply the power rule (-1) to the first term: $(a^5b^{-2})^{-1} = a^{-5}b^2$.
- Multiply by the second term: $(a^{-5}b^2)(4a^3b)$.
- Combine: $4 \cdot a^{-5+3} \cdot b^{2+1} = 4a^{-2}b^3$.

8. C

- *Explanation:* Apply the power rule (4) to the numerator: $(x^3y^{-1})^4 = x^{12}y^{-4}$.
- Divide by the denominator: $\frac{x^{12}y^{-4}}{x^5y^{-5}}$.
- Subtract exponents: $x^{12-5}y^{-4-(-5)} = x^7y^{-4+5} = x^7y^1 = x^7y$.

9. B

- *Explanation:* $\sqrt{121} = 11$. $\sqrt{a^4} = a^{4/2} = a^2$. $\sqrt{b^{16}} = b^{16/2} = b^8$.
- The result is $11a^2b^8$.

10. D

- *Explanation:* $\sqrt{144} = 12$. $\sqrt{m^{64}} = m^{64/2} = m^{32}$. $\sqrt{n^{16}} = n^{16/2} = n^8$.
- The result is $12m^{32}n^8$.

11. B

- *Explanation:* The common denominator is $(x + 3)(x - 3)$, or $x^2 - 9$.
- Multiply the first fraction by $\frac{x-3}{x-3}$: $\frac{1(x-3)}{x^2-9} = \frac{x-3}{x^2-9}$.
- Multiply the second fraction by $\frac{x+3}{x+3}$: $\frac{2(x+3)}{x^2-9} = \frac{2x+6}{x^2-9}$.
- Add numerators: $\frac{(x-3)+(2x+6)}{x^2-9} = \frac{3x+3}{x^2-9}$.

12. B

- *Explanation:* The common denominator is $a(a + 2)$.
- Multiply the first fraction by $\frac{a}{a}$: $\frac{a^2}{a(a+2)}$.
- Multiply the second fraction by $\frac{a+2}{a+2}$: $\frac{1(a+2)}{a(a+2)} = \frac{a+2}{a^2+2a}$.
- Subtract numerators: $\frac{a^2-(a+2)}{a^2+2a} = \frac{a^2-a-2}{a^2+2a}$.

13. A

- *Explanation:* Substitute values: $5(5 + (-3)) + 5^2$.
- Simplify inside parenthesis: $5(2) + 5^2$.
- Evaluate exponent: $5(2) + 25$.
- Multiply: $10 + 25 = 35$.
- *Correction:* Re-reading the problem, it's $a(a + b)$. $5(5 + (-3)) = 5(2) = 10$. (My previous calculation was for a different problem, apologies). The correct answer is 10.

14. D

- *Explanation:* Substitute values: $\frac{4^2-2}{2}$.
- Evaluate exponent: $\frac{16-2}{2}$.
- Simplify numerator: $\frac{14}{2}$.
- Divide: 7.

15. C

- *Explanation:* Add 2 to both sides: $7x = 33 + 2 \rightarrow 7x = 35$.
- Divide by 7: $x = 5$.

16. D

- *Explanation:* Subtract 4 from both sides: $\frac{1}{2}x = 10 - 4 \rightarrow \frac{1}{2}x = 6$.
- Multiply by 2: $x = 12$.

17. A

- *Explanation:* Distribute the 3: $10n + 2 = 3n + 9$.
- Subtract $3n$ from both sides: $7n + 2 = 9$.

- Subtract 2 from both sides: $7n = 7$.
- Divide by 7: $n = 1$.

18. B

- *Explanation:* Use substitution. Replace x in the second equation with $(2y - 1)$.
- $(2y - 1) + 3y = 9$. Combine y terms: $5y - 1 = 9$.
- Add 1: $5y = 10$. Divide by 5: $y = 2$.
- Find x : $x = 2(2) - 1 = 4 - 1 = 3$. Solution is $(3, 2)$.

19. A

- *Explanation:* Use elimination. Multiply the second equation by 2: $2(2x + y) = 2(9) \rightarrow 4x + 2y = 18$.
- Add this to the first equation: $(3x - 2y) + (4x + 2y) = 10 + 18 \rightarrow 7x = 28$.
- Divide by 7: $x = 4$.
- Substitute $x = 4$ into $2x + y = 9$: $2(4) + y = 9 \rightarrow 8 + y = 9 \rightarrow y = 1$. Solution is $(4, 1)$.

20. D

- *Explanation:* Multiply the first equation by 3: $3(x + 2y) = 3(6) \rightarrow 3x + 6y = 18$.
- The second equation is $3x + 6y = 12$.
- This gives $18 = 12$, which is a false statement. The lines are parallel, so there is no solution.

21. D

- *Explanation:* Subtract $2x$ from both sides: $2x - 1 \leq 7$.
- Add 1 to both sides: $2x \leq 8$.
- Divide by 2: $x \leq 4$.

22. B

- *Explanation:* Subtract 20 from both sides: $-4x < -12$.
- Divide by -4 . **Remember to flip the inequality sign.**
- $x > \frac{-12}{-4} \rightarrow x > 3$.

23. D

- *Explanation:* Factor the quadratic. Find two numbers that multiply to 6 and add to 5. The numbers are 2 and 3.
- Factored form: $(x + 2)(x + 3) = 0$.
- Set factors to zero: $x + 2 = 0 \rightarrow x = -2$. And $x + 3 = 0 \rightarrow x = -3$.

24. C

- *Explanation:* Set to zero: $4x^2 - 11x - 3 = 0$.
- Factor by grouping. Multiply $a \cdot c$: $4 \cdot -3 = -12$. Find numbers that multiply to -12 and add to -11 . The numbers are -12 and 1 .
- Rewrite: $4x^2 - 12x + 1x - 3 = 0$.
- Group: $4x(x - 3) + 1(x - 3) = 0$.

- Factored form: $(4x + 1)(x - 3) = 0$.
- Set factors to zero: $x - 3 = 0 \rightarrow x = 3$. And $4x + 1 = 0 \rightarrow x = -\frac{1}{4}$.

25. A

- *Explanation:* This is a difference of squares: $(10x)^2 - (3)^2 = 0$.
- Factor: $(10x - 3)(10x + 3) = 0$.
- Set factors to zero: $10x - 3 = 0 \rightarrow x = \frac{3}{10}$. And $10x + 3 = 0 \rightarrow x = -\frac{3}{10}$.

26. A

- *Explanation:* Find the GCF. GCF of 14, 21 is 7. GCF of x^3, x^2 is x^2 . GCF of y^2, y^3 is y^2 .
- Overall GCF is $7x^2y^2$.
- Factor it out: $7x^2y^2(2x) - 7x^2y^2(3y) = 7x^2y^2(2x - 3y)$.

27. C

- *Explanation:* This is a difference of squares: $a^2 - b^2 = (a - b)(a + b)$.
- $36 - y^2 = (6)^2 - (y)^2$.
- Factored form: $(6 - y)(6 + y)$.

28. A

- *Explanation:* Factor by grouping. Multiply $a \cdot c$: $2 \cdot -5 = -10$. Find numbers that multiply to -10 and add to 9. The numbers are 10 and -1 .
- Rewrite: $2x^2 + 10x - 1x - 5 = 0$.
- Group: $2x(x + 5) - 1(x + 5) = 0$.
- Factored form: $(2x - 1)(x + 5)$.

29. C

- *Explanation:* First, find the rate: 40 pages per $\frac{1}{3}$ hour. To find the pages per hour, multiply by 3: $40 \cdot 3 = 120$ pages per hour.
- Now find pages in 2 hours: $120 \text{ pages/hr} \cdot 2 \text{ hr} = 240$ pages.

30. C

- *Explanation:* Find the ratio of cookies: 9 dozen $\div$ 3 dozen = 3.
- The new batch is 3 times larger.
- Multiply the sugar required by 3: $2 \text{ cups} \cdot 3 = 6 \text{ cups}$.