

North Carolina School of Science and Mathematics

Admissions Math Assessment - Practice Test 8

Practice Test 8

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: $(5x^2 + 2x - 7) - (3x^2 - 4x + 2)$

- A. $2x^2 + 6x - 9$
- B. $2x^2 - 2x - 5$
- C. $8x^2 - 2x - 5$
- D. $2x^2 + 6x - 5$
- E. $8x^2 + 6x - 9$

2. Simplify the expression: $3(a - 2b) - 4(a + b)$

- A. $-a - 2b$
- B. $-a - 10b$
- C. $7a - 10b$
- D. $7a - 2b$
- E. $-a + 2b$

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

- A. $x^2 - 10x - 1$
- B. $x^2 - 1$
- C. $x^2 - 10x + 1$
- D. $3x^2 - 10x - 1$
- E. $x^2 + 1$

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

- A. 19
- B. 21
- C. 15
- D. 35
- E. 9

5. Evaluate the expression: $1000^{\frac{1}{3}} + 4^{\frac{3}{2}}$

- A. 18
- B. 16
- C. 339
- D. 13
- E. 22

6. Simplify the expression: $(5x^2y^{-1})^{-2}$

- A. $-10x^{-4}y^2$
- B. $\frac{y^2}{25x^4}$
- C. $\frac{1}{25x^4y^2}$
- D. $25x^4y^{-2}$
- E. $\frac{-25y^2}{x^4}$

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

- A. $6ab^5$
- B. $12ab^5$
- C. $12b^5$
- D. $6b^5$
- E. $12a^4b^5$

8. Simplify the expression, assuming no variables are zero: $\frac{(2m^3n^{-1})^3}{4m^5n^2}$

- A. $\frac{2m^4}{n^5}$
- B. $\frac{2m}{n}$
- C. $\frac{m^4}{2n^5}$
- D. $2m^4n^{-1}$
- E. $2m^4n$

9. Simplify the radical expression, assuming all variables represent positive numbers:
 $\sqrt{64a^{12}b^6c^2}$

- A. $8a^6b^3c$
- B. $8a^{10}b^4c$
- C. $32a^6b^3c$
- D. $8a^{12}b^6c^2$
- E. $8a^6b^3$

10. Simplify the radical expression, assuming all variables represent positive numbers:
 $\sqrt{49x^2y^{100}z^{10}}$

- A. $7x^2y^{50}z^5$
- B. $7xy^{50}z^5$
- C. $7x^2y^{10}z^5$
- D. $49xy^{50}z^5$
- E. $7xy^{10}z^5$

11. Simplify the expression: $\frac{2}{x-5} + \frac{1}{x}$

- A. $\frac{3}{x^2-5x}$
- B. $\frac{3x-10}{x^2-5x}$
- C. $\frac{3x-5}{x^2-5x}$
- D. $\frac{2x+5}{x^2-5x}$
- E. $\frac{3}{x-5}$

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

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

13. Determine the value of the expression $ab^2 - a$ if $a = 3$ and $b = -1$.

- A. 6
- B. -12
- C. -6
- D. 9
- E. 0

14. Determine the value of the expression $\frac{x-y}{x+y}$ if $x = 5$ and $y = 3$.

- A. $\frac{1}{4}$
- B. 4
- C. $\frac{1}{8}$
- D. 2
- E. $\frac{8}{2}$

15. Solve for x : $4(x - 2) = 20$

- A. $x = 3$
- B. $x = 7$
- C. $x = 5$
- D. $x = 28$
- E. $x = 6$

16. Solve for y : $\frac{2}{3}y - 1 = 7$

- A. $y = 8$
- B. $y = 9$
- C. $y = 12$
- D. $y = \frac{16}{3}$
- E. $y = 4$

17. Solve for a : $5a - 3 = 2a + 9$

- A. $a = 2$
- B. $a = 3$
- C. $a = \frac{12}{7}$
- D. $a = 4$
- E. $a = 6$

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

- A. $(1, 3)$
- B. $(2, 3)$
- C. $(3, 9)$
- D. $(4, 12)$
- E. $(2, 6)$

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

- A. $(2, -\frac{1}{3})$
- B. $(1, 1)$
- C. $(2, -1)$
- D. $(2, 1)$
- E. $(10, 0)$

20. Find the solution to the system of equations: $y = 4x - 1$ and $8x - 2y = 2$

- A. No solution
- B. Infinite solutions
- C. $(0, -1)$
- D. $(1, 3)$
- E. $(\frac{1}{4}, 0)$

21. Solve the inequality: $3(x + 2) \leq 9$

- A. $x \leq 5$
- B. $x \geq 1$
- C. $x \leq 1$
- D. $x \leq 3$
- E. $x \geq 3$

22. Solve the inequality: $1 - 4x > 13$

- A. $x > -3$
- B. $x < -3.5$
- C. $x > -3.5$
- D. $x < -3$
- E. $x < 3$

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

- A. $x = 6, x = 4$
- B. $x = -6, x = -4$
- C. $x = 8, x = -3$
- D. $x = -8, x = 3$
- E. $x = -6, x = 4$

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

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

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

- A. $x = 4, x = -4$
- B. $x = 2, x = -2$
- C. $x = 2$
- D. $x = \sqrt{2}, x = -\sqrt{2}$
- E. $x = 6, x = -6$

26. Factor the expression completely: $12a^3b^2 - 8a^2b^3$

- A. $4a^2b^2(3a - 2b)$
- B. $4a^2b(3a - 2b^2)$
- C. $4a^2b^2(3a - 2b)$
- D. $2a^2b^2(6a - 4b)$
- E. $4a^3b^2(3 - 2b)$

27. Factor the expression completely: $25x^2 - 1$

- A. $(5x - 1)^2$
- B. $(25x - 1)(x + 1)$
- C. $(5x + 1)^2$
- D. $(5x - 1)(5x + 1)$
- E. $(5x)(5x) - 1$

28. Factor the quadratic expression: $3x^2 - 10x - 8$

- A. $(3x + 2)(x - 4)$
- B. $(3x - 2)(x + 4)$
- C. $(3x - 4)(x + 2)$
- D. $(3x - 8)(x + 1)$
- E. $(3x + 2)(x - 4)$

29. A $\frac{1}{2}$ gallon container of paint covers 30 square feet. How many gallons are needed to cover 150 square feet?

- A.** 2.5 gallons
- B.** 3 gallons
- C.** 5 gallons
- D.** 7.5 gallons
- E.** 10 gallons

30. On a map, 3 centimeters represents 5 kilometers. How many centimeters represent 30 kilometers?

- A.** 15 cm
- B.** 18 cm
- C.** 50 cm
- D.** 10 cm
- E.** 24 cm

Answer Key

1. A

- *Explanation:* Distribute the negative sign: $5x^2 + 2x - 7 - 3x^2 + 4x - 2$.
- Combine like terms: $(5x^2 - 3x^2) + (2x + 4x) + (-7 - 2) = 2x^2 + 6x - 9$.

2. B

- *Explanation:* Distribute the 3: $3a - 6b$. Distribute the -4 : $-4a - 4b$.
- Combine results: $(3a - 4a) + (-6b - 4b) = -a - 10b$.

3. B

- *Explanation:* Distribute x : $2x^2 - 5x$. Distribute the negative: $-x^2 + 5x - 1$.
- Combine results: $(2x^2 - x^2) + (-5x + 5x) - 1 = x^2 + 0x - 1 = x^2 - 1$.

4. D

- *Explanation:* $3^3 = 27$. $(-2)^3 = -8$.
- Subtract: $27 - (-8) = 27 + 8 = 35$.

5. A

- *Explanation:* $1000^{\frac{1}{3}} = \sqrt[3]{1000} = 10$.
- $4^{\frac{3}{2}} = (\sqrt{4})^3 = (2)^3 = 8$.
- Add: $10 + 8 = 18$.

6. B

- *Explanation:* Apply the power (-2) to each factor: $5^{-2} = \frac{1}{25}$. $(x^2)^{-2} = x^{-4}$. $(y^{-1})^{-2} = y^2$.
- Result is $\frac{1}{25}x^{-4}y^2 = \frac{y^2}{25x^4}$.

7. C

- *Explanation:* Apply the power (2) to the second term: $(2a^{-1}b^3)^2 = 4a^{-2}b^6$.
- Multiply by the first term: $(3a^2b^{-1})(4a^{-2}b^6)$.
- Combine: $(3 \cdot 4) \cdot a^{2+(-2)} \cdot b^{-1+6} = 12a^0b^5 = 12b^5$.

8. A

- *Explanation:* Apply the power (3) to the numerator: $(2m^3n^{-1})^3 = 8m^9n^{-3}$.
- Divide by the denominator: $\frac{8m^9n^{-3}}{4m^5n^2}$.
- Simplify coefficients: $\frac{8}{4} = 2$. Subtract m exponents: $m^{9-5} = m^4$. Subtract n exponents: $n^{-3-2} = n^{-5}$.
- Result is $2m^4n^{-5} = \frac{2m^4}{n^5}$.

9. A

- *Explanation:* $\sqrt{64} = 8$. $\sqrt{a^{12}} = a^{12/2} = a^6$. $\sqrt{b^6} = b^{6/2} = b^3$. $\sqrt{c^2} = c^{2/2} = c$.
- Result: $8a^6b^3c$.

10. B

- *Explanation:* $\sqrt{49} = 7$. $\sqrt{x^2} = x^{2/2} = x$. $\sqrt{y^{100}} = y^{100/2} = y^{50}$. $\sqrt{z^{10}} = z^{10/2} = z^5$.
- Result: $7xy^{50}z^5$.

11. C

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

12. D

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

13. E

- *Explanation:* Substitute values: $3(-1)^2 - 3$.
- Evaluate exponent: $3(1) - 3$.
- Multiply/Subtract: $3 - 3 = 0$.

14. A

- *Explanation:* Substitute values: $\frac{5-3}{5+3}$.
- Simplify numerator and denominator: $\frac{2}{8}$.
- Reduce fraction: $\frac{1}{4}$.

15. B

- *Explanation:* Divide by 4: $x - 2 = 5$.
- Add 2: $x = 7$.

16. C

- *Explanation:* Add 1: $\frac{2}{3}y = 8$.
- Multiply by reciprocal $\frac{3}{2}$: $y = 8 \cdot \frac{3}{2} = \frac{24}{2} = 12$.

17. D

- *Explanation:* Subtract $2a$: $3a - 3 = 9$.
- Add 3: $3a = 12$.
- Divide by 3: $a = 4$.

18. E

- *Explanation:* Substitute $y = 3x$ into the second equation: $2x + (3x) = 10$.
- Combine terms: $5x = 10$. Divide by 5: $x = 2$.
- Find y : $y = 3(2) = 6$. Solution is $(2, 6)$.

19. A

- *Explanation:* Use elimination. Add the two equations: $(4x + 3y) + (x - 3y) = 7 + 3$.
- Combine terms: $5x = 10$. Divide by 5: $x = 2$.
- Substitute $x = 2$ into $x - 3y = 3$: $2 - 3y = 3 \rightarrow -3y = 1 \rightarrow y = -\frac{1}{3}$.
- Solution is $(2, -\frac{1}{3})$.

20. B

- *Explanation:* Substitute $y = 4x - 1$ into the second equation: $8x - 2(4x - 1) = 2$.
- Distribute: $8x - 8x + 2 = 2$.
- Combine x terms: $2 = 2$. This is a true statement, so there are infinite solutions.

21. C

- *Explanation:* Divide by 3: $x + 2 \leq 3$.
- Subtract 2: $x \leq 1$.

22. D

- *Explanation:* Subtract 1: $-4x > 12$.
- Divide by -4 . **Flip the inequality sign.**
- $x < \frac{12}{-4} \rightarrow x < -3$.

23. E

- *Explanation:* Find two numbers that multiply to -24 and add to 2. The numbers are 6 and -4 .
- Factored form: $(x + 6)(x - 4) = 0$.
- Set factors to zero: $x = -6$ and $x = 4$.

24. A

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

25. B

- *Explanation:* Divide by 3: $x^2 - 4 = 0$.
- Add 4: $x^2 = 4$.
- Take the square root: $x = \pm\sqrt{4} \rightarrow x = 2$ and $x = -2$.

26. C

- *Explanation:* GCF of 12, 8 is 4. GCF of a^3, a^2 is a^2 . GCF of b^2, b^3 is b^2 .
- Overall GCF is $4a^2b^2$.
- Factor it out: $4a^2b^2(3a) - 4a^2b^2(2b) = 4a^2b^2(3a - 2b)$.

27. D

- *Explanation:* This is a difference of squares: $(5x)^2 - (1)^2$.
- Factored form: $(5x - 1)(5x + 1)$.

28. E

- *Explanation:* Factor by grouping. Multiply $a \cdot c$: $3 \cdot -8 = -24$. Find numbers that multiply to -24 and add to -10 . The numbers are -12 and 2 .
- Rewrite: $3x^2 - 12x + 2x - 8 = 0$.
- Group: $3x(x - 4) + 2(x - 4) = 0$.
- Factored form: $(3x + 2)(x - 4)$.

29. A

- *Explanation:* Find how many "batches" of 30 sq ft are in 150 sq ft: $150 \div 30 = 5$.
- You need 5 times the amount of paint.
- $5 \cdot \frac{1}{2} = \frac{5}{2} = 2.5$ gallons.

30. B

- *Explanation:* Find the ratio of distance: $30 \text{ km} \div 5 \text{ km} = 6$.
- The new distance is 6 times larger.
- Multiply the map distance by 6: $3 \text{ cm} \cdot 6 = 18 \text{ cm}$.