

North Carolina School of Science and Mathematics

Admissions Math Assessment - Practice Test 22

Practice Test 22

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: $(2x^2 + 3x - 7) - (x^2 - 5x + 1)$

- A. $x^2 - 2x - 6$
- B. $x^2 + 8x - 8$
- C. $x^2 - 2x - 8$
- D. $x^2 + 8x - 6$
- E. $3x^2 - 2x - 6$

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

- A. 0
- B. -12
- C. 12
- D. -15
- E. 3

3. Simplify the expression: $(a^{-3}b^4)^{-2}(2a^0b^2)$

- A. $2a^6b^{-6}$
- B. $2a^{-5}b^{-6}$
- C. $\frac{2a^6}{b^6}$
- D. $\frac{a^6}{2b^6}$
- E. a^6b^{-6}

4. Evaluate the expression: $64^{\frac{1}{2}} - 125^{\frac{1}{3}}$

- A. 1
- B. 2
- C. 3
- D. -13
- E. 13

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

- A. $-2x^2 - 6x$
- B. $-2x^2$
- C. $-2x^2 - 3x - 3$
- D. $4x^2$
- E. $4x^2 + 6x$

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

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

7. Find all solutions to the quadratic equation: $2x^2 + 5x = 3$

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

8. A bicyclist travels 30 miles in 2 hours. At this rate, how many miles can they travel in 5 hours?

- A. 60 miles
- B. 70 miles
- C. 75 miles
- D. 80 miles
- E. 150 miles

9. Factor the quadratic expression: $3x^2 + 8x + 4$

- A. $(3x + 2)(x + 2)$
- B. $(3x + 1)(x + 4)$
- C. $(3x + 4)(x + 1)$
- D. $(3x - 2)(x - 2)$
- E. $(x + 6)(x + 2)$

10. Simplify the radical expression, assuming all variables represent positive numbers:
 $\sqrt{48a^4b^7c^2}$

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

11. Solve the inequality: $2(x - 3) > 10$

- A. $x > 5$
- B. $x < 5$
- C. $x > 8$
- D. $x < 8$
- E. $x > 4$

12. Simplify the expression: $\frac{4}{x} - \frac{3}{x-1}$

- A. $\frac{1}{x(x-1)}$
- B. $\frac{x-4}{x(x-1)}$
- C. $\frac{x+4}{x(x-1)}$
- D. $\frac{7x-4}{x(x-1)}$
- E. $\frac{x-7}{x(x-1)}$

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: $(a - 2b)(a + 2b)$

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

15. Solve for x : $\frac{2}{3}x - 1 = 5$

- A. $x = 6$
- B. $x = 4$
- C. $x = 9$
- D. $x = 12$
- E. $x = 3$

16. Factor the expression completely: $5x^2 - 20$

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

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

- A. -1
- B. 1
- C. 216
- D. -729
- E. 3

18. Find all solutions to the quadratic equation: $x^2 - 10x = -25$

- A. $x = -5$
- B. $x = 5$
- C. $x = 5, x = -5$
- D. $x = 10, x = -5$
- E. $x = 0, x = 5$

19. Simplify the expression, assuming no variables are zero: $\frac{a^{-1}b^5}{a^2b^{-2}}$

- A. $a^{-3}b^7$
- B. $\frac{b^7}{a^3}$
- C. a^1b^3
- D. $\frac{b^3}{a}$
- E. Both A and B are correct

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

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

21. The area of a circle is 100π . What is its circumference?

- A. 10π
- B. 20π
- C. 25π
- D. 50π
- E. 100π

22. Simplify the expression: $(4^2)^{\frac{1}{2}}$

- A. 2
- B. 4
- C. 8
- D. 16
- E. 1

23. Solve the inequality: $5x + 3 \geq 2x - 9$

- A. $x \leq -4$
- B. $x \geq -4$
- C. $x \geq 4$
- D. $x \leq 4$
- E. $x \geq -2$

24. Find all solutions to the quadratic equation: $x^2 - 6x = 0$

- A. $x = 6$
- B. $x = 0$
- C. $x = 0, x = 6$
- D. $x = 0, x = -6$
- E. $x = 3, x = -3$

25. The perimeter of a rectangle is 30. If the length is 7, what is the width?

- A. 7
- B. 8
- C. 15
- D. 16
- E. 23

26. Simplify the expression: $\frac{x^2+5x+6}{x+3}$

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

27. Factor the expression completely: $a^3 - 9a$

- A. $a(a^2 - 9)$
- B. $a(a - 3)^2$
- C. $a(a - 3)(a + 3)$
- D. $a(a + 3)^2$
- E. Both A and C are correct

28. Find the solution to the system of equations: $x + 2y = 4$ and $3x + 6y = 12$

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

29. If $a = 1$ and $b = -1$, what is the value of $(a - b)^{a+b}$?

- A. 0

- B.** 1
- C.** 2
- D.** -2
- E.** 4

30. A 25% discount is applied to a 120 dollar item. What is the final price?

- A.** 30
- B.** 80
- C.** 90
- D.** 95
- E.** 150

Answer Key

1. B

- *Explanation:* Distribute the negative: $2x^2 + 3x - 7 - x^2 + 5x - 1$.
- Combine like terms: $(2x^2 - x^2) + (3x + 5x) + (-7 - 1) = x^2 + 8x - 8$.

2. D

- *Explanation:* Substitute values: $3(-2) - (-3)^2$.
- Exponent first: $3(-2) - 9$.
- Multiply: $-6 - 9 = -15$.

3. C

- *Explanation:* Apply power (-2) : $(a^{-3}b^4)^{-2} = a^{(-3)(-2)}b^{(4)(-2)} = a^6b^{-8}$.
- $a^0 = 1$. Multiply: $(a^6b^{-8})(2 \cdot 1 \cdot b^2)$.
- Combine: $2 \cdot a^6 \cdot b^{-8+2} = 2a^6b^{-6}$.
- Write with positive exponent: $\frac{2a^6}{b^6}$.

4. C

- *Explanation:* $64^{\frac{1}{2}} = \sqrt{64} = 8$.
- $125^{\frac{1}{3}} = \sqrt[3]{125} = 5$.
- Subtract: $8 - 5 = 3$.

5. A

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

6. C

- *Explanation:* Distribute: $2x - 8 = 4x + 4$.
- Subtract $2x$: $-8 = 2x + 4$.
- Subtract 4: $-12 = 2x$.
- Divide by 2: $x = -6$.

7. D

- *Explanation:* Set to zero: $2x^2 + 5x - 3 = 0$.
- Factor by grouping. $a \cdot c = -6$. $b = 5$. Numbers are 6 and -1 .
- Rewrite: $2x^2 + 6x - 1x - 3 = 0$. Group: $2x(x + 3) - 1(x + 3) = 0$.
- Factored: $(2x - 1)(x + 3) = 0$.
- Set factors to zero: $x = 1/2$ and $x = -3$.

8. C

- *Explanation:* Find the rate: $\frac{30 \text{ miles}}{2 \text{ hours}} = 15 \text{ miles per hour}$.
- Multiply by 5: $15 \times 5 = 75 \text{ miles}$.

9. A

- *Explanation:* Factor by grouping. $a \cdot c = 12$. $b = 8$. Numbers are 6 and 2.
- Rewrite: $3x^2 + 6x + 2x + 4$. Group: $3x(x + 2) + 2(x + 2)$.
- Factored form: $(3x + 2)(x + 2)$.

10. A

- *Explanation:* $\sqrt{48a^4b^7c^2} = \sqrt{16 \cdot 3 \cdot a^4 \cdot b^6 \cdot b \cdot c^2}$.
- Take out roots: $\sqrt{16}\sqrt{a^4}\sqrt{b^6}\sqrt{c^2} \cdot \sqrt{3b} = 4a^2b^3c\sqrt{3b}$.

11. C

- *Explanation:* Distribute 2: $2x - 6 > 10$.
- Add 6: $2x > 16$.
- Divide by 2: $x > 8$.

12. B

- *Explanation:* Common denominator is $x(x - 1)$.
- Multiply first fraction by $\frac{x-1}{x-1} \cdot \frac{4(x-1)}{x(x-1)} = \frac{4x-4}{x(x-1)}$.
- Multiply second fraction by $\frac{x}{x} \cdot \frac{3x}{x(x-1)}$.
- Subtract: $\frac{(4x-4)-3x}{x(x-1)} = \frac{x-4}{x(x-1)}$.

13. C

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

14. A

- *Explanation:* This is a difference of squares: $(a - b)(a + b) = a^2 - b^2$.
- Here, $a = a$ and $b = 2b$.
- Result: $(a)^2 - (2b)^2 = a^2 - 4b^2$.

15. C

- *Explanation:* Add 1 to both sides: $\frac{2}{3}x = 6$.
- Multiply by the reciprocal, $\frac{3}{2}$: $x = 6 \cdot \frac{3}{2} = \frac{18}{2} = 9$.

16. E

- *Explanation:* Factor out GCF, 5: $5(x^2 - 4)$.
- $x^2 - 4$ is a difference of squares: $(x - 2)(x + 2)$.
- Fully factored form: $5(x - 2)(x + 2)$. Option A is not fully factored.

17. A

- *Explanation:* Parentheses first: $2^3 = 8$. $3^2 = 9$.
- $(8 - 9)^3 = (-1)^3$.
- Result: -1 .

18. B

- *Explanation:* Set to zero: $x^2 - 10x + 25 = 0$.
- This is a perfect square trinomial, $(x - 5)^2 = 0$.
- $x - 5 = 0 \rightarrow x = 5$. (This is one repeated root).

19. E

- *Explanation:* $\frac{a^{-1}b^5}{a^2b^{-2}}$. Subtract exponents.
- a : $-1 - 2 = -3$. b : $5 - (-2) = 7$.
- Result: $a^{-3}b^7$.
- This can be written as $\frac{b^7}{a^3}$. Both A and B are correct.

20. B

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

21. B

- *Explanation:* Area = πr^2 . $100\pi = \pi r^2$.
- $r^2 = 100 \rightarrow r = 10$.
- Circumference = $2\pi r = 2\pi(10) = 20\pi$.

22. B

- *Explanation:* $(4^2)^{\frac{1}{2}} = 16^{\frac{1}{2}} = \sqrt{16} = 4$.
- Alternatively, $(4^2)^{\frac{1}{2}} = 4^{2 \times \frac{1}{2}} = 4^1 = 4$.

23. B

- *Explanation:* Subtract $2x$: $3x + 3 \geq -9$.
- Subtract 3: $3x \geq -12$.
- Divide by 3: $x \geq -4$.

24. C

- *Explanation:* Set to zero: $x^2 - 6x = 0$.
- Factor out GCF, x : $x(x - 6) = 0$.
- Set factors to zero: $x = 0$ and $x - 6 = 0 \rightarrow x = 6$.

25. B

- *Explanation:* Perimeter = $2(L + W)$. $30 = 2(7 + W)$.
- Divide by 2: $15 = 7 + W$.
- Subtract 7: $W = 8$.

26. A

- *Explanation:* Factor numerator: find numbers that multiply to 6 and add to 5. The numbers are 3 and 2.
- Numerator: $(x + 3)(x + 2)$.

- $\frac{(x+3)(x+2)}{x+3}$. The $(x + 3)$ terms cancel.
- Result: $x + 2$.

27. E

- *Explanation:* Factor out GCF, a : $a(a^2 - 9)$.
- $a^2 - 9$ is a difference of squares: $(a - 3)(a + 3)$.
- Fully factored form: $a(a - 3)(a + 3)$. Option A is not fully factored.

28. D

- *Explanation:* Notice that the second equation is just the first equation multiplied by 3.
- $3(x + 2y = 4) \rightarrow 3x + 6y = 12$.
- Since the equations are identical, they are the same line. There are infinite solutions.

29. B

- *Explanation:* Substitute values: $((1) - (-1))^{(1)+(-1)}$.
- Base: $1 + 1 = 2$. Exponent: $1 - 1 = 0$.
- $(2)^0$. Any non-zero number to the power of 0 is 1.

30. C

- *Explanation:* A 25% discount is $\frac{1}{4}$ off.
- $\frac{1}{4}$ of 120 is 30.
- New price: $120 - 30 = 90$.