

North Carolina School of Science and Mathematics

Admissions Math Assessment - Practice Test 10

Practice Test 10

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. A recipe for 12 cookies requires $\frac{3}{4}$ cup of sugar. How many cups of sugar are needed to make 36 cookies?
 - A. 2
 - B. 3
 - C. $2\frac{1}{4}$
 - D. $2\frac{1}{2}$
 - E. $3\frac{1}{4}$
2. 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. $(x + 9)(2x - 5)$
3. Evaluate the expression: $3^{-2} + 2^3$
 - A. -1
 - B. 2
 - C. $8\frac{1}{9}$
 - D. $8\frac{1}{6}$
 - E. 14
4. Simplify the radical expression, assuming all variables represent positive numbers:
 $\sqrt{49a^{10}b^{16}}$
 - A. $7a^5b^4$
 - B. $7a^5b^8$
 - C. $7a^8b^4$
 - D. $49a^5b^8$

E. $7a^{10}b^{16}$

5. Solve for x : $5(x - 3) = 2x + 3$

A. $x = 4$

B. $x = 6$

C. $x = 3$

D. $x = 2$

E. $x = 5$

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

A. $2x^2 - 1$

B. $2x^2 - 8x - 1$

C. $2x^2 + 1$

D. $4x^2 - 8x + 1$

E. $2x^2 - 8x + 1$

7. If $a = 4$ and $b = -1$, what is the value of the expression $a^2 - b^3$?

A. 15

B. 16

C. 17

D. 9

E. 7

8. Find the solution to the system of equations: $y = 2x + 1$ and $3x + 2y = 9$

A. (1, 3)

B. (3, 1)

C. (2, 5)

D. (-1, -1)

E. (0, 1)

9. Factor the expression completely: $16x^2 - 81y^2$

A. $(4x - 9y)^2$

B. $(4x - 9y)(4x + 9y)$

C. $(16x - 81y)(x + y)$

D. $(4x + 9y)^2$

E. $(8x - 9y)(2x + 9y)$

10. Simplify the expression, assuming no variables are zero: $\frac{10a^5b^2}{5a^2b^3}$

A. $2a^3b^{-1}$

B. $\frac{2a^3}{b}$

C. $5a^3b^{-1}$

D. $\frac{a^3}{2b}$

E. $2a^7b^5$

11. A map scale states that 1 inch = 15 miles. How many inches on the map represent 105 miles?
- A. 5 inches
 - B. 6 inches
 - C. 7 inches
 - D. 8 inches
 - E. 1575 inches
12. Solve the inequality: $20 - 5x \geq 5$
- A. $x \leq 3$
 - B. $x \geq 3$
 - C. $x \leq -3$
 - D. $x \geq -3$
 - E. $x \leq 5$
13. Simplify the expression: $\frac{3}{a+2} + \frac{1}{a}$
- A. $\frac{4}{a^2+2a}$
 - B. $\frac{4a+2}{a^2+2a}$
 - C. $\frac{3a+2}{a^2+2a}$
 - D. $\frac{4}{2a+2}$
 - E. $\frac{3a-2}{a^2+2a}$
14. Find all solutions to the quadratic equation: $x^2 + 5x - 14 = 0$
- A. $x = 7, x = -2$
 - B. $x = -7, x = 2$
 - C. $x = -7, x = -2$
 - D. $x = 7, x = 2$
 - E. $x = 14, x = -5$
15. Simplify the expression: $x(x - y) + y(x - y)$
- A. $x^2 - y^2$
 - B. $x^2 + y^2$
 - C. $x^2 - 2xy - y^2$
 - D. $x^2 - 2xy + y^2$
 - E. $x^2 + 2xy - y^2$
16. Find the solution (x, y) to the system of equations: $5x - 2y = 4$ and $x + 2y = 8$
- A. $(4, 2)$
 - B. $(2, 3)$
 - C. $(0, -2)$
 - D. $(3, 2.5)$
 - E. $(1, 3.5)$

17. Evaluate the expression: $16^{\frac{3}{4}}$

- A. 12
- B. 6
- C. 32
- D. 8
- E. 64

18. A rectangular garden has a length that is 3 feet greater than its width, w . What is the perimeter of the garden in terms of w ?

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

19. Factor the expression completely: $10x^3y - 15x^2y^2$

- A. $5x^2y(2x - 3y)$
- B. $5x^2y(2x - 3y^2)$
- C. $5x^3y(2 - 3y)$
- D. $5xy(2x^2 - 3xy)$
- E. $10x^2y(x - 1.5y)$

20. Solve for y : $\frac{y}{2} - 4 = 1$

- A. $y = 5$
- B. $y = 6$
- C. $y = -6$
- D. $y = 10$
- E. $y = -5$

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

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

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

- A. $4a^4b^7$
- B. $2a^3b^7$
- C. $4a^3b^6$
- D. $4a^3b^7$
- E. $2a^4b^6$

23. A painter can paint 3 rooms in 6 hours. At this rate, how many hours will it take to paint 5 rooms?

- A. 2 hours
- B. 18 hours
- C. 10 hours
- D. 11 hours
- E. 9 hours

24. Simplify the expression: $(x + 3)(x - 4)$

- A. $x^2 - x - 12$
- B. $x^2 + x - 12$
- C. $x^2 - 7x - 12$
- D. $x^2 + 7x - 12$
- E. $x^2 - 12$

25. Solve for x : $10x - 4 = 4x + 14$

- A. $x = \frac{10}{6}$
- B. $x = 2$
- C. $x = 3$
- D. $x = \frac{10}{4}$
- E. $x = \frac{18}{14}$

26. Find all solutions to the quadratic equation: $4x^2 = 100$

- A. $x = 25$
- B. $x = 5$
- C. $x = 10, x = -10$
- D. $x = 25, x = -25$
- E. $x = 5, x = -5$

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

- A. 0
- B. $\frac{2y^2}{y^2-4}$
- C. $\frac{4y}{y^2-4}$
- D. $\frac{-4y}{y^2-4}$
- E. $\frac{4}{y^2-4}$

28. Solve the inequality: $3 - x > 2$

- A. $x > 1$
- B. $x < 1$
- C. $x > 5$
- D. $x < 5$
- E. $x < -1$

29. Find the solution to the system of equations: $x + y = 5$ and $x + y = 3$

- A. $(0, 0)$
- B. $(4, 1)$
- C. $(3, 2)$
- D. Infinite solutions
- E. No solution

30. A new phone costs \$500. A student saved \$50 and earns \$25 per week mowing lawns. Which inequality represents the number of weeks, w , the student must work to have enough money to buy the phone?

- A. $25w > 500$
- B. $25w + 50 \geq 500$
- C. $25w \geq 550$
- D. $50w + 25 \geq 500$
- E. $25w - 50 \leq 500$

Answer Key

1. C

- *Explanation:* The student needs to make 36 cookies, which is $36 \div 12 = 3$ times the original recipe.
- Multiply the sugar by 3: $3 \cdot \frac{3}{4} = \frac{9}{4} = 2\frac{1}{4}$ cups.

2. A

- *Explanation:* Factor by grouping. $a \cdot c = -10$. $b = 9$. Numbers are 10 and -1 .
- Rewrite: $2x^2 + 10x - 1x - 5$. Group: $2x(x + 5) - 1(x + 5)$.
- Factored form: $(2x - 1)(x + 5)$.

3. C

- *Explanation:* $3^{-2} = \frac{1}{3^2} = \frac{1}{9}$. $2^3 = 8$.
- Add: $8 + \frac{1}{9} = 8\frac{1}{9}$.

4. B

- *Explanation:* $\sqrt{49} = 7$. $\sqrt{a^{10}} = a^{10/2} = a^5$. $\sqrt{b^{16}} = b^{16/2} = b^8$.
- Result: $7a^5b^8$.

5. B

- *Explanation:* Distribute 5: $5x - 15 = 2x + 3$.
- Subtract $2x$: $3x - 15 = 3$. Add 15: $3x = 18$.
- Divide by 3: $x = 6$.

6. A

- *Explanation:* Distribute the negative: $3x^2 - 4x - x^2 + 4x - 1$.
- Combine terms: $(3x^2 - x^2) + (-4x + 4x) - 1 = 2x^2 + 0x - 1 = 2x^2 - 1$.

7. C

- *Explanation:* Substitute values: $(4)^2 - (-1)^3$.
- Evaluate: $16 - (-1)$.
- Subtracting a negative is addition: $16 + 1 = 17$.

8. A

- *Explanation:* Substitute $y = 2x + 1$ into the second equation: $3x + 2(2x + 1) = 9$.
- Distribute: $3x + 4x + 2 = 9$. Combine terms: $7x + 2 = 9$.
- Subtract 2: $7x = 7$. Divide by 7: $x = 1$.
- Find y : $y = 2(1) + 1 = 3$. Solution is $(1, 3)$.

9. B

- *Explanation:* This is a difference of squares: $(4x)^2 - (9y)^2$.
- Factored form: $(4x - 9y)(4x + 9y)$.

10. B

- *Explanation:* Divide coefficients: $\frac{10}{5} = 2$. Subtract a exponents: $a^{5-2} = a^3$. Subtract b exponents: $b^{2-3} = b^{-1}$.
- Result: $2a^3b^{-1} = \frac{2a^3}{b}$.

11. C

- *Explanation:* Set up a proportion: $\frac{1 \text{ in}}{15 \text{ mi}} = \frac{x \text{ in}}{105 \text{ mi}}$.
- Solve for x : $x = 105 \div 15 = 7$ inches.

12. A

- *Explanation:* Subtract 20: $-5x \geq -15$.
- Divide by -5 . **Flip the inequality sign.**
- $x \leq \frac{-15}{-5} \rightarrow x \leq 3$.

13. B

- *Explanation:* Common denominator is $a(a+2)$.
- $\frac{3}{a+2} \cdot \frac{a}{a} = \frac{3a}{a(a+2)}$. $\frac{1}{a} \cdot \frac{a+2}{a+2} = \frac{a+2}{a(a+2)}$.
- Add numerators: $\frac{3a+(a+2)}{a^2+2a} = \frac{4a+2}{a^2+2a}$.

14. B

- *Explanation:* Find two numbers that multiply to -14 and add to 5 . The numbers are 7 and -2 .
- Factored form: $(x+7)(x-2) = 0$.
- Set factors to zero: $x = -7$ and $x = 2$.

15. A

- *Explanation:* Distribute x and y : $(x^2 - xy) + (yx - y^2)$.
- Combine terms: $x^2 - xy + xy - y^2 = x^2 - y^2$.
- Alternatively, factor out $(x - y)$: $(x - y)(x + y) = x^2 - y^2$.

16. B

- *Explanation:* Use elimination. Add the two equations: $(5x - 2y) + (x + 2y) = 4 + 8$.
- Combine terms: $6x = 12$. Divide by 6 : $x = 2$.
- Substitute $x = 2$ into $x + 2y = 8$: $2 + 2y = 8 \rightarrow 2y = 6 \rightarrow y = 3$.
- Solution is $(2, 3)$.

17. D

- *Explanation:* $16^{\frac{3}{4}} = (\sqrt[4]{16})^3$.
- $\sqrt[4]{16} = 2$.
- $2^3 = 8$.

18. C

- *Explanation:* Width = w . Length = $w + 3$.
- Perimeter = $2 \cdot (\text{length} + \text{width})$.
- $P = 2 \cdot ((w + 3) + w) = 2 \cdot (2w + 3)$.

- Distribute: $4w + 6$.

19. A

- *Explanation:* GCF of 10, 15 is 5. GCF of x^3, x^2 is x^2 . GCF of y, y^2 is y .
- Overall GCF is $5x^2y$.
- Factor it out: $5x^2y(2x) - 5x^2y(3y) = 5x^2y(2x - 3y)$.

20. D

- *Explanation:* Add 4: $\frac{y}{2} = 5$.
- Multiply by 2: $y = 10$.

21. C

- *Explanation:* Set to zero: $6x^2 - x - 2 = 0$.
- Factor by grouping. $a \cdot c = -12$. $b = -1$. Numbers are -4 and 3 .
- Rewrite: $6x^2 - 4x + 3x - 2 = 0$.
- Group: $2x(3x - 2) + 1(3x - 2) = 0$.
- Factored form: $(2x + 1)(3x - 2) = 0$.
- Set factors to zero: $x = -\frac{1}{2}$ and $x = \frac{2}{3}$.

22. D

- *Explanation:* Apply the power (2) to the first term: $(2a^2b^3)^2 = 4a^4b^6$.
- Multiply by the second term: $(4a^4b^6)(a^{-1}b)$.
- Combine: $4 \cdot a^{4+(-1)} \cdot b^{6+1} = 4a^3b^7$.

23. C

- *Explanation:* Find the rate: $6 \text{ hours} \div 3 \text{ rooms} = 2 \text{ hours per room}$.
- Multiply by the new amount: $5 \text{ rooms} \cdot 2 \text{ hours/room} = 10 \text{ hours}$.

24. A

- *Explanation:* Use FOIL (First, Outer, Inner, Last).
- (First: $x \cdot x = x^2$) (Outer: $x \cdot -4 = -4x$) (Inner: $3 \cdot x = 3x$) (Last: $3 \cdot -4 = -12$).
- Combine: $x^2 - 4x + 3x - 12 = x^2 - x - 12$.

25. C

- *Explanation:* Subtract $4x$: $6x - 4 = 14$.
- Add 4: $6x = 18$.
- Divide by 6: $x = 3$.

26. E

- *Explanation:* Divide by 4: $x^2 = 25$.
- Take the square root: $x = \pm\sqrt{25} \rightarrow x = 5$ and $x = -5$.

27. C

- *Explanation:* Common denominator is $(y - 2)(y + 2) = y^2 - 4$.

- $\frac{y}{y-2} \cdot \frac{y+2}{y+2} = \frac{y(y+2)}{y^2-4} = \frac{y^2+2y}{y^2-4}$.
- $\frac{y}{y+2} \cdot \frac{y-2}{y-2} = \frac{y(y-2)}{y^2-4} = \frac{y^2-2y}{y^2-4}$.
- Subtract numerators: $\frac{(y^2+2y)-(y^2-2y)}{y^2-4} = \frac{y^2+2y-y^2+2y}{y^2-4} = \frac{4y}{y^2-4}$.

28. B

- *Explanation:* Subtract 3: $-x > -1$.
- Divide by -1 . **Flip the inequality sign.**
- $x < 1$.

29. E

- *Explanation:* If you subtract the second equation from the first, you get $(x + y) - (x + y) = 5 - 3$, which simplifies to $0 = 2$.
- This is a false statement (a contradiction), so there is no solution. The lines are parallel.

30. B

- *Explanation:* The total amount needed is \$500. The student starts with \$50 and adds \$25 for w weeks.
- The total saved is $50 + 25w$. This amount must be greater than or equal to 500.
- $50 + 25w \geq 500$, which is the same as $25w + 50 \geq 500$.