



Name: \_\_\_\_\_

Date: \_\_\_\_\_

Score: / 30

## Learning Objectives

- Simplify square roots of perfect squares
- Apply the product and quotient rules for exponents
- Convert between radical and rational exponent form
- Simplify expressions with negative exponents

*Simplify each expression completely. Show all steps and circle your final answer.*

## Exponent rules

1. Simplify:  $x^7 \cdot x^2$ .

$$x^7 \cdot x^2$$

Answer: \_\_\_\_\_

2. Simplify:  $x^4 / x^1$ .

$$x^4 \div x^1$$

Answer: \_\_\_\_\_

3. Simplify:  $x^2 \cdot x^5$ .

$$x^2 \cdot x^5$$

Answer: \_\_\_\_\_

4. Simplify:  $x^4 / x^3$ .

$$x^4 \div x^3$$

Answer: \_\_\_\_\_

5. Simplify:  $x^5 \cdot x^4$ .

$$x^5 \cdot x^4$$

Answer: \_\_\_\_\_

6. Simplify:  $x^7 / x^2$ .

$$x^7 \div x^2$$

Answer: \_\_\_\_\_

7. Simplify:  $x^3 \cdot x^5$ .

$$x^3 \cdot x^5$$

Answer: \_\_\_\_\_

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8. Simplify:  $x^3 / x^1$ .

$$x^3 \div x^1$$

Answer: \_\_\_\_\_

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9. Simplify:  $x^6 \cdot x^3$ .

$$x^6 \cdot x^3$$

Answer: \_\_\_\_\_

---

10. Simplify:  $x^3 / x^2$ .

$$x^3 \div x^2$$

Answer: \_\_\_\_\_

---

11. Simplify:  $x^6 \cdot x^3$ .

$$x^6 \cdot x^3$$

Answer: \_\_\_\_\_

---

12. Simplify:  $x^8 / x^4$ .

$$x^8 \div x^4$$

Answer: \_\_\_\_\_

---

13. Simplify:  $x^2 \cdot x^4$ .

$$x^2 \cdot x^4$$

Answer: \_\_\_\_\_

---

14. Simplify:  $x^2 / x^1$ .

$$x^2 \div x^1$$

Answer: \_\_\_\_\_

---

15. Simplify:  $x^2 \cdot x^4$ .

$$x^2 \cdot x^4$$

Answer: \_\_\_\_\_

---

16. Simplify:  $x^8 / x^3$ .

$$x^8 \div x^3$$

Answer: \_\_\_\_\_

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### Square roots

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17. Evaluate:  $\sqrt{64}$ .

$$\sqrt{64}$$

Answer: \_\_\_\_\_

---

18. The area of a square is 49 sq ft. What is the side length? Find  $\sqrt{49}$ .

$$\sqrt{49}$$

Answer: \_\_\_\_\_

---

19. Evaluate:  $\sqrt{100}$ .

$$\sqrt{100}$$

Answer: \_\_\_\_\_

---

20. The area of a square is 16 sq ft. What is the side length? Find  $\sqrt{16}$ .

$$\sqrt{16}$$

Answer: \_\_\_\_\_

---

21. Evaluate:  $\sqrt{36}$ .

$$\sqrt{36}$$

Answer: \_\_\_\_\_

---

22. The area of a square is 225 sq ft. What is the side length? Find  $\sqrt{225}$ .

$$\sqrt{225}$$

Answer: \_\_\_\_\_

---

23. Evaluate:  $\sqrt{225}$ .

$$\sqrt{225}$$

Answer: \_\_\_\_\_

---

24. The area of a square is 9 sq ft. What is the side length? Find  $\sqrt{9}$ .

$$\sqrt{9}$$

Answer: \_\_\_\_\_

---

25. Evaluate:  $\sqrt{36}$ .

$$\sqrt{36}$$

Answer: \_\_\_\_\_

---

26. The area of a square is 121 sq ft. What is the side length? Find  $\sqrt{121}$ .

$$\sqrt{121}$$

Answer: \_\_\_\_\_

---

27. Evaluate:  $\sqrt{81}$ .

$$\sqrt{81}$$

Answer: \_\_\_\_\_

---

28. The area of a square is 100 sq ft. What is the side length? Find  $\sqrt{100}$ .

$$\sqrt{100}$$

Answer: \_\_\_\_\_

---

29. Evaluate:  $\sqrt{169}$ .

$$\sqrt{169}$$

Answer: \_\_\_\_\_

---

30. The area of a square is 9 sq ft. What is the side length? Find  $\sqrt{9}$ .

$$\sqrt{9}$$

Answer: \_\_\_\_\_

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# INTALG: Radicals and Exponents

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ANSWER KEY & SOLUTIONS

*Topics: Square roots, Exponent rules. All answers verified by independent computation.*

## Solutions

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## Exponent rules

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1. Simplify:  $x^7 \cdot x^2$ .

$$x^7 \cdot x^2$$

→ Product rule:  $x^7 \cdot x^2 = x^{(7+2)} = x^9$ .

**Answer:**  $x^9$

---

2. Simplify:  $x^4 / x^1$ .

$$x^4 \div x^1$$

→ Quotient rule:  $x^4 / x^1 = x^{(4-1)} = x^3$ .

**Answer:**  $x^3$

---

3. Simplify:  $x^2 \cdot x^5$ .

$$x^2 \cdot x^5$$

→ Product rule:  $x^2 \cdot x^5 = x^{(2+5)} = x^7$ .

**Answer:**  $x^7$

---

4. Simplify:  $x^4 / x^3$ .

$$x^4 \div x^3$$

→ Quotient rule:  $x^4 / x^3 = x^{(4-3)} = x^1$ .

**Answer:**  $x^1$

---

5. Simplify:  $x^5 \cdot x^4$ .

$$x^5 \cdot x^4$$

→ Product rule:  $x^5 \cdot x^4 = x^{(5+4)} = x^9$ .

**Answer:**  $x^9$

---

6. Simplify:  $x^7 / x^2$ .

$$x^7 \div x^2$$

→ Quotient rule:  $x^7 / x^2 = x^{(7-2)} = x^5$ .

**Answer:**  $x^5$

---

7. Simplify:  $x^3 \cdot x^5$ .

$$x^3 \cdot x^5$$

→ Product rule:  $x^3 \cdot x^5 = x^{(3+5)} = x^8$ .

**Answer:**  $x^8$

---

8. Simplify:  $x^3 / x^1$ .

$$x^3 \div x^1$$

→ Quotient rule:  $x^3 / x^1 = x^{(3-1)} = x^2$ .

**Answer:**  $x^2$

---

9. Simplify:  $x^6 \cdot x^3$ .

$$x^6 \cdot x^3$$

→ Product rule:  $x^6 \cdot x^3 = x^{(6+3)} = x^9$ .

**Answer:**  $x^9$

---

10. Simplify:  $x^3 / x^2$ .

$$x^3 \div x^2$$

→ Quotient rule:  $x^3 / x^2 = x^{(3-2)} = x^1$ .

**Answer:**  $x^1$

---

11. Simplify:  $x^6 \cdot x^3$ .

$$x^6 \cdot x^3$$

→ Product rule:  $x^6 \cdot x^3 = x^{(6+3)} = x^9$ .

**Answer:**  $x^9$

---

12. Simplify:  $x^8 / x^4$ .

$$x^8 \div x^4$$

→ Quotient rule:  $x^8 / x^4 = x^{(8-4)} = x^4$ .

**Answer:**  $x^4$

---

13. Simplify:  $x^2 \cdot x^4$ .

$$x^2 \cdot x^4$$

→ Product rule:  $x^2 \cdot x^4 = x^{(2+4)} = x^6$ .

**Answer:**  $x^6$

---

14. Simplify:  $x^2 / x^1$ .

$$x^2 \div x^1$$

→ Quotient rule:  $x^2 / x^1 = x^{(2-1)} = x^1$ .

**Answer:**  $x^1$

---

15. Simplify:  $x^2 \cdot x^4$ .

$$x^2 \cdot x^4$$

→ Product rule:  $x^2 \cdot x^4 = x^{(2+4)} = x^6$ .

**Answer:**  $x^6$

---

16. Simplify:  $x^8 / x^3$ .

$$x^8 \div x^3$$

→ Quotient rule:  $x^8 / x^3 = x^{(8-3)} = x^5$ .

**Answer:**  $x^5$

---

## Square roots

---

17. Evaluate:  $\sqrt{64}$ .

$$\sqrt{64}$$

→ Find the number that multiplied by itself equals 64.

→  $\sqrt{64} = 8$ .

**Answer:**  $\sqrt{64} = 8$

---

18. The area of a square is 49 sq ft. What is the side length? Find  $\sqrt{49}$ .

$$\sqrt{49}$$

→  $Side = \sqrt{Area} = \sqrt{49} = 7 \text{ ft.}$

**Answer:**  $\sqrt{49} = 7$

---

19. Evaluate:  $\sqrt{100}$ .

$$\sqrt{100}$$

→ Find the number that multiplied by itself equals 100.

→  $\sqrt{100} = 10$ .

**Answer:**  $\sqrt{100} = 10$

---

20. The area of a square is 16 sq ft. What is the side length? Find  $\sqrt{16}$ .

$$\sqrt{16}$$

→  $Side = \sqrt{Area} = \sqrt{16} = 4 \text{ ft.}$

**Answer:**  $\sqrt{16} = 4$

---

21. Evaluate:  $\sqrt{36}$ .

$$\sqrt{36}$$

→ Find the number that multiplied by itself equals 36.

→  $\sqrt{36} = 6$ .

**Answer:**  $\sqrt{36} = 6$

---

22. The area of a square is 225 sq ft. What is the side length? Find  $\sqrt{225}$ .

$$\sqrt{225}$$

→  $Side = \sqrt{Area} = \sqrt{225} = 15 \text{ ft.}$

**Answer:**  $\sqrt{225} = 15$

---

23. Evaluate:  $\sqrt{225}$ .

$$\sqrt{225}$$

→ Find the number that multiplied by itself equals 225.

$$\rightarrow \sqrt{225} = 15.$$

**Answer:**  $\sqrt{225} = 15$

---

24. The area of a square is 9 sq ft. What is the side length? Find  $\sqrt{9}$ .

$$\sqrt{9}$$

→ Side =  $\sqrt{\text{Area}} = \sqrt{9} = 3$  ft.

**Answer:**  $\sqrt{9} = 3$

---

25. Evaluate:  $\sqrt{36}$ .

$$\sqrt{36}$$

→ Find the number that multiplied by itself equals 36.

$$\rightarrow \sqrt{36} = 6.$$

**Answer:**  $\sqrt{36} = 6$

---

26. The area of a square is 121 sq ft. What is the side length? Find  $\sqrt{121}$ .

$$\sqrt{121}$$

→ Side =  $\sqrt{\text{Area}} = \sqrt{121} = 11$  ft.

**Answer:**  $\sqrt{121} = 11$

---

27. Evaluate:  $\sqrt{81}$ .

$$\sqrt{81}$$

→ Find the number that multiplied by itself equals 81.

$$\rightarrow \sqrt{81} = 9.$$

**Answer:**  $\sqrt{81} = 9$

---

28. The area of a square is 100 sq ft. What is the side length? Find  $\sqrt{100}$ .

$$\sqrt{100}$$

→ Side =  $\sqrt{\text{Area}} = \sqrt{100} = 10$  ft.

**Answer:**  $\sqrt{100} = 10$

---

29. Evaluate:  $\sqrt{169}$ .

$$\sqrt{169}$$

→ Find the number that multiplied by itself equals 169.

$$\rightarrow \sqrt{169} = 13.$$

**Answer:**  $\sqrt{169} = 13$

---

30. The area of a square is 9 sq ft. What is the side length? Find  $\sqrt{9}$ .

$$\sqrt{9}$$

$$\rightarrow \text{Side} = \text{sqrt}(\text{Area}) = \text{sqrt}(9) = 3 \text{ ft.}$$

**Answer:**  $\sqrt{9} = 3$

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