

6-3

Binomial Radical Expressions

Name: Key
 Date: _____ Hour: _____

Vocabulary Builder

binomial (adjective) by NOH mee ul

Definition: A binomial expression is an expression made up of two terms.

Related Words: monomial, binomial expression, trinomial

Examples: monomial: $a, x^2, -3, 17c^3, \sqrt{5}$

binomial: $a - 7, x^2 + 0.9, -3 - ab, 17c^3 + 1, b - \sqrt{5}$

trinomial: $a - 7 + x, x^2 + x + 0.9, -3 - ab + a, 17c^3 = c^2 + 1, b^3 + b - \sqrt{5}$

Use Your Vocabulary

Write M if the expression is a *monomial*, B if the expression is a *binomial*, or T if the expression is a *trinomial*.

T 4. $37 - 100x^3y + r$

M 5. $-57t^6$

B 6. $s + 0.91r$

T 7. $18a - 1.4b^7 + 3.85c^{14}$

Take note

Property Combining Radical Expressions: Sums and Differences

Use the Distributive Property to add or subtract like radicals.

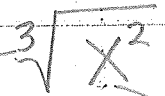
$$a\sqrt[n]{x} + b\sqrt[n]{x} = (a + b)\sqrt[n]{x}$$

$$a\sqrt[n]{x} - b\sqrt[n]{x} = (a - b)\sqrt[n]{x}$$

8. Underline the words that make each sentence true.

To be like radicals, their indexes must be the same / different, and their radicands must be the same / different.

To add or subtract two like radicals, you add or subtract their radicands / coefficients.



$$3x + 4x$$



Problem 1 Adding and Subtracting Radical Expressions

Got It? What is the simplified form of each expression?

$$7\sqrt[3]{5} - 4\sqrt{5}$$

$$\underline{7\sqrt[3]{5} - 4\sqrt{5}}$$

$$\textcircled{3x}\sqrt{xy} + \textcircled{4x}\sqrt{xy}$$

$$7x\sqrt{xy}$$

Simplify if possible.

See Problem 1.

10. $5\sqrt{6} + \sqrt{6}$

11. $6\sqrt[3]{3} - 2\sqrt[3]{3}$

12. $4\sqrt{3} + 4\sqrt[3]{3}$

13. $3\sqrt{x} - 5\sqrt{x}$

14. $14\sqrt{x} + 3\sqrt{y}$

15. $7\sqrt[3]{x^2} - 2\sqrt[3]{x^2}$



Problem 3 Simplifying Before Adding or Subtracting

Got It? What is the simplified form of the expression $\sqrt[3]{250} + \sqrt[3]{54} - \sqrt[3]{16}$?



$$\sqrt[3]{\frac{25 \cdot 10}{5 \cdot 5 \cdot 5 \cdot 2}} + \sqrt[3]{(3 \cdot 3 \cdot 3) \cdot 2} - \sqrt[3]{(2 \cdot 2 \cdot 2) \cdot 2}$$

$$5\sqrt[3]{2} + 3\sqrt[3]{2} - 2\sqrt[3]{2}$$

$$6\sqrt[3]{2}$$

Simplify.

See Problem 3.

17. $6\sqrt{18} + 3\sqrt{50}$

18. $14\sqrt{20} - 3\sqrt{125}$

19. $\sqrt{18} + \sqrt{32}$

20. $\sqrt[3]{54} + \sqrt[3]{16}$

21. $3\sqrt[3]{81} - 2\sqrt[3]{54}$

22. $\sqrt[4]{32} + \sqrt[4]{48}$

**Problem 4** Multiplying Binomial Radical Expressions**Got It?** What is the product $(3 + 2\sqrt{5})(2 + 4\sqrt{5})$?

$$\begin{array}{r}
 3 \cdot 2 + 3 \cdot 4\sqrt{5} + 2 \cdot 2\sqrt{5} + 2\sqrt{5} \cdot 4\sqrt{5} \\
 6 + 12\sqrt{5} + 4\sqrt{5} + 40 \\
 46 + 16\sqrt{5}
 \end{array}$$

Multiply.

23. $(3 + \sqrt{5})(1 + \sqrt{5})$

24. $(2 + \sqrt{7})(1 + 3\sqrt{7})$

25. $(3 - 4\sqrt{2})(5 - 6\sqrt{2})$

See Problem 4.

26. $(\sqrt{3} + \sqrt{5})^2$

27. $(\sqrt{13} + 6)^2$

28. $(2\sqrt{5} + 3\sqrt{2})^2$

**Problem 5** Multiplying Conjugates

Thursday 9-11-14

Got It? What is the product of the expression $(6 - \sqrt{12})(6 + \sqrt{12})$?

Multiply each pair of conjugates.

29. $(5 - \sqrt{11})(5 + \sqrt{11})$

30. $(4 - 2\sqrt{3})(4 + 2\sqrt{3})$

See Problem 5.

31. $(2\sqrt{6} + 8)(2\sqrt{6} - 8)$

32. $(\sqrt{3} + \sqrt{5})(\sqrt{3} - \sqrt{5})$

**Problem 6 Rationalizing the Denominator**

Got It? How can you write the expression $\frac{2\sqrt{7}}{\sqrt{3} - \sqrt{5}}$ with a rationalized denominator?

Rationalize each denominator. Simplify your answer.

33. $\frac{4}{1 + \sqrt{3}}$

34. $\frac{4}{3\sqrt{3} - 2}$

35. $\frac{5 + \sqrt{3}}{2 - \sqrt{3}}$

36. $\frac{3 + \sqrt{8}}{2 - 2\sqrt{8}}$

See Problem 6.

6.1 and 6.2 Review

Simplify each expression. Use only positive exponents.

1. $(-4x^2y^3)(5xy^4)$

2. $(2x^{-3}y^4)^3$

3. $\frac{(2a^2c^{-3}d^0)^{-4}}{3a^{-3}b^4}$

Multiply or divide and simplify. Assume that all variables are positive.

4. $\sqrt{3x^4} \cdot \sqrt{24x^3}$

5. $\frac{\sqrt{18x^5y}}{\sqrt{2x}}$

6. $\frac{\sqrt{7}}{\sqrt{12y}}$