Algebra 2 Unit 6 Day 07 Operations with Radicals Notes & HW

Name Master C

Date _____ Block _____

ADDING & SUBTRACTING Radicals

1. **SIMPLIFY** all radicals.
2. Identify radicals with the **SAME INDEX** and **SAME RADICAND**. Only these can be combined!
3. For common radicals, **add/subtract the coefficients** and **KEEP THE COMMON RADICAL**.

1. $3\sqrt{27} - 2\sqrt{12}$

$3\sqrt{9\cdot3} - 2\sqrt{4\cdot3}$

$3\cdot3\sqrt{3} - 2\cdot2\cdot\sqrt{3}$

$9\sqrt{3} - 4\sqrt{3} = 5\sqrt{3}$

2. $3\sqrt[3]{54} - 2\sqrt[3]{2} + 7\sqrt[3]{-16}$

$3\sqrt[3]{27\cdot2} - 2\sqrt[3]{2} + 7\sqrt[3]{-8\cdot2}$

$3\cdot3\sqrt[3]{2} - 2\sqrt[3]{2} + 7\cdot-2\sqrt[3]{2}$

$9\sqrt[3]{2} - 2\sqrt[3]{2} - 14\sqrt[3]{2} = -7\sqrt[3]{2}$

3. $7\sqrt[4]{48} - 2\sqrt[4]{3} + 3\sqrt[3]{72}$

$7\sqrt[4]{16\cdot3} - 2\sqrt[4]{3} + 3\sqrt[3]{8\cdot9}$

$7\cdot2\sqrt[4]{3} - 2\sqrt[4]{3} + 3\cdot2\sqrt[3]{9}$

$14\sqrt[4]{3} - 2\sqrt[4]{3} + 6\sqrt[3]{9}$

$12\sqrt[4]{3} + 6\sqrt[3]{9}$

4. $10\sqrt{28} + \sqrt[3]{-56} - 4\sqrt{175}$

$10\sqrt{4\cdot7} + \sqrt[3]{-8\cdot7} - 4\sqrt{25\cdot7}$

$10\cdot2\sqrt{7} + -2\sqrt[3]{7} - 4\cdot5\sqrt{7}$

$20\sqrt{7} - 2\sqrt[3]{7} - 20\sqrt{7}$

$-2\sqrt[3]{7}$

5. $\sqrt{98x^4y^2} - 3x^2y\sqrt{2}$

$\sqrt{49\cdot2x^4y^2} - 3x^2y\sqrt{2}$

$7x^2y\sqrt{2} - 3x^2y\sqrt{2}$

$4x^2y\sqrt{2}$

6. $\sqrt[3]{-40a^7} + 2a^2\cdot\sqrt[3]{135a^4}$

$\sqrt[3]{-8\cdot5a^6a} + 2a^2\sqrt[3]{27\cdot5a^3a}$

$-2a^2\sqrt[3]{5a} + 2a^2\cdot3a\sqrt[3]{5a}$

$-2a^2\sqrt[3]{5a} + 6a^3\sqrt[3]{5a}$

MULTIPLYING Radicals

1. Multiply coeefficients, then use **PRODUCT RULE**: $\sqrt[n]{a}\cdot\sqrt[n]{b} = \sqrt[n]{ab}$
2. **SIMPLIFY** the resulting radical.

7. $\sqrt{27}\cdot\sqrt{5}$

$\sqrt{27\cdot5} = \sqrt{9\cdot3\cdot5}$

$3\sqrt{15}$

8. $3\sqrt{10}\cdot-2\sqrt{18}$

$(3\cdot-2)(\sqrt{10\cdot18})$

$-6\sqrt{5(2\cdot2)(9)}$

$-6\cdot2\cdot3\sqrt{5} = -36\sqrt{5}$

9. $2\sqrt[3]{9}\cdot5\sqrt[3]{-24}$

$(2\cdot5)\sqrt[3]{9\cdot-24}$

$10\sqrt[3]{3\cdot3\cdot-3(8)}$

$10\cdot-3\cdot2 = -60$

10. $-3\sqrt[4]{64}\cdot-\sqrt[4]{8}$

$(-3\cdot-1)\sqrt[4]{64\cdot8}$

$3\sqrt[4]{4\cdot4\cdot4\cdot4}2$

$3\cdot4\cdot\sqrt[4]{2} = 12\sqrt[4]{2}$

	11. $\sqrt{5x^5} \cdot \sqrt{8x^5}$ $5\sqrt{16x^4 \cdot 8x^5}$ $5\sqrt{2 \cdot 3 \cdot 2 \cdot 4x^9}$ $5 \cdot 2 \cdot 2\sqrt{3x^8 x}$ $20x^4\sqrt{3x}$	12. $\sqrt[3]{5m^4} \sqrt[3]{2m^8}$ $\sqrt[3]{10 \cdot 5 \cdot m^{12}}$ $3m^4\sqrt[3]{10}$
	13. $\sqrt[3]{-27a^{13}b^6} \sqrt[3]{4a^{10}b^6}$ $\sqrt[3]{-3 \cdot 3 \cdot 3 \cdot 4a^{13}b^6}$ $-3\sqrt[3]{4a^{13}a^9b^6}$ $-3a^4b^2\sqrt[3]{4a}$	14. $2\sqrt[4]{p^4q^3} \cdot 7\sqrt[4]{p^5q^{10}}$ $2 \cdot 7\sqrt[4]{p^5q^{11}}$ $14\sqrt[4]{p^4 \cdot pq^8 \cdot q^3}$ $14pq^2\sqrt[4]{pq^3}$

15-26: Simplify each expression. Leave all answers in simplest radical form. NO DECIMAL ANSWERS.

15. $2\sqrt[3]{3} \cdot \sqrt[3]{3}$ $3\sqrt[3]{3}$	16. $5\sqrt{7} - 9\sqrt{7}$ $-4\sqrt{7}$	17. $4\sqrt{2} - \sqrt{8}$ $\sqrt{4 \cdot 2}$ $4\sqrt{2} - 2\sqrt{2}$ $2\sqrt{2}$
18. $\sqrt{18} \cdot 2\sqrt{50}$ $\sqrt{9 \cdot 2} + 2\sqrt{25 \cdot 2}$ $3\sqrt{2} + 2 \cdot 5\sqrt{2}$ $3\sqrt{2} + 10\sqrt{2} = 13\sqrt{2}$	19. $\sqrt[3]{40} \cdot \sqrt[3]{5}$ $\sqrt[3]{8 \cdot 5} + \sqrt[3]{5}$ $2\sqrt[3]{5} + \sqrt[3]{5}$ $3\sqrt[3]{5}$	20. $4\sqrt[3]{54} - 2\sqrt[3]{16}$ $4\sqrt[3]{27 \cdot 2} - 2\sqrt[3]{8 \cdot 2}$ $4 \cdot 3\sqrt[3]{2} - 2 \cdot 2\sqrt[3]{2}$ $12\sqrt[3]{2} - 4\sqrt[3]{2}$ $8\sqrt[3]{2}$
21. $\sqrt{7} \cdot \sqrt{3}$ $\sqrt{21}$	22. $\sqrt{6} \cdot \sqrt{3}$ $\sqrt{18} = \sqrt{9 \cdot 2}$ $3\sqrt{2}$	23. $\sqrt[3]{2} \cdot \sqrt[3]{4}$ $\sqrt[3]{2 \cdot 4} = \sqrt[3]{8}$ 2
24. $\sqrt[3]{9} \cdot \sqrt[3]{6}$ $\sqrt[3]{9 \cdot 6} = \sqrt[3]{3 \cdot 3 \cdot 3 \cdot 2}$ $3\sqrt[3]{2}$	25. $2\sqrt[3]{4} \cdot \sqrt[3]{16}$ $2\sqrt[3]{4 \cdot 16}$ $2\sqrt[3]{4 \cdot 4 \cdot 4}$ $2 \cdot 4 = 8$	26. $(2\sqrt{32})(-3\sqrt{24})$ $-6\sqrt{32 \cdot 24}$ $-6\sqrt{16 \cdot 2 \cdot 4 \cdot 3}$ $-6 \cdot 4 \cdot 2 \cdot 2\sqrt{3}$ $-96\sqrt{3}$