

## Day 7 - Multiplying Radicals with Variables - Notes

**Recall:** Do you remember what the rule is when you multiply two variables with exponents together? Work through the following examples to come up with the rule for multiplying exponents.

$$1. x^2 \cdot x^5 = x^7$$

$$2. a^3 \cdot a^4 = a^7$$

$$3. y^2 \cdot y^5 \cdot z^2 = y^7 z^2$$

Law of Exponents: When multiplying expressions with the same bases, add the exponents.

$$x^m \cdot x^n = x^{m+n}$$

Directions: Multiply the following radicals. Make sure they are in simplest form.

$$a. \sqrt{a^3 b} \cdot \sqrt{ab} = \sqrt{a^4 b^2} \\ = \boxed{a^2 b}$$

$$b. \sqrt{3x} \cdot \sqrt{15x} = \sqrt{45x^2} \\ = \sqrt{3 \cdot 3 \cdot 5 \cdot x \cdot x} \\ = \boxed{3x\sqrt{5}}$$

$$c. 5\sqrt{2y^3} \cdot \sqrt{32y} = 5\sqrt{64y^4} \\ = 5 \cdot 8 \cdot y^2 \\ = \boxed{40y^2}$$

$$d. -4\sqrt{2x^3} \cdot -\sqrt{8x} = 4\sqrt{16x^4} \\ = 4 \cdot 4 \cdot x^2 \\ = \boxed{16x^2}$$

$$e. 5\sqrt{3z^3} \cdot 3\sqrt{3z^7} = 15\sqrt{9z^{10}} \\ = 15 \cdot 3 \cdot z^5 \\ = \boxed{45z^5}$$

$$f. -4\sqrt{10x^3} \cdot -4\sqrt{6x} = 16\sqrt{60x^4} \\ = 16\sqrt{2 \cdot 2 \cdot 3 \cdot 5 \cdot x^4} \\ = 16 \cdot 2x^2\sqrt{15} \\ = \boxed{32x^2\sqrt{15}}$$

$$g. -3\sqrt{8x^4 z} \cdot -7\sqrt{y^3 z^5} = 21\sqrt{8x^4 y^3 z^6} \\ = 21 \cdot \sqrt{2 \cdot 2 \cdot 2} \cdot x^2 y^3 z^3 \\ = 21 \cdot 2 \cdot x^2 y^3 z^3 \sqrt{2} \\ = \boxed{42x^2 y^3 z^3 \sqrt{2}}$$

$$h. -4\sqrt{2a^4 b^3} \cdot -2\sqrt{6a^3 b^5} = 8\sqrt{12a^7 b^8} \\ = 8\sqrt{2 \cdot 2 \cdot 3 a^7 b^8} \\ = 8 \cdot 2 a^3 b^4 \sqrt{3a} \\ = \boxed{16a^3 b^4 \sqrt{3a}}$$

$$i. 3\sqrt{5c^3 d^2} \cdot 2\sqrt{10c^3 d} = 6\sqrt{50c^6 d^3} \\ = 6\sqrt{5 \cdot 5 \cdot 2 c^6 d^3} \\ = 6 \cdot 5 c^3 d \sqrt{2d} \\ = \boxed{30c^3 d \sqrt{2d}}$$