

1.04 – Multiplying Radicals**Key Ideas**

When multiplying radicals:

- Index's must be the same for it to be multiplied (square roots multiplying square roots, cube roots multiplying cube roots, etc).
- Multiply the coefficient values with each other.
- Multiply the radicands (numbers under the roots) together.
- Simplify as much as possible afterwards.

Part 1 – Multiplying Monomials

Q1: Simplify each of the following:

$$(3x)(4x)$$

$$12x^2$$

$$(3\sqrt{2})(4\sqrt{2})$$

$$12(\sqrt{2})^2$$

$$12 \cdot 2$$

$$24$$

$$(5\sqrt{6})(2\sqrt{6})$$

$$10(\sqrt{6})^2$$

$$10 \cdot 6$$

$$60$$

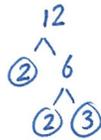
$$(3\sqrt{6})(5\sqrt{2})$$

$$15 \cdot \sqrt{12}$$

$$15\sqrt{2^2 \cdot 3}$$

$$15 \cdot 2\sqrt{3}$$

$$30\sqrt{3}$$



$$(4\sqrt{15})(3\sqrt{30})$$

$$12\sqrt{15 \cdot 30}$$

$$12\sqrt{3 \cdot 5 \cdot 2 \cdot 3 \cdot 5}$$

$$12\sqrt{2 \cdot 3^2 \cdot 5^2}$$

$$12 \cdot 3 \cdot 5\sqrt{2}$$

$$180\sqrt{2}$$

Part 2 – Multiplying Binomials

Q2: Simplify each of the following:

$$(x + 3)(2x - 7)$$

$$2x^2 - 7x + 6x - 21$$

$$2x^2 - x - 21$$

$$(\sqrt{5} + 3)(2\sqrt{5} - 7)$$

$$2(5) - 7\sqrt{5} + 6\sqrt{5} - 21$$

$$10 - 7\sqrt{5} + 6\sqrt{5} - 21$$

$$-11 - \sqrt{5}$$

$$(4\sqrt{2} + 1)(3\sqrt{2} + 5)$$

$$12(2) + 20\sqrt{2} + 3\sqrt{2} + 5$$

$$24 + 20\sqrt{2} + 3\sqrt{2} + 5$$

$$29 + 23\sqrt{2}$$

$$(3\sqrt{6} - 1)(2 - \sqrt{15})$$

$$6\sqrt{6} + 3\sqrt{90} - 2 + \sqrt{15}$$

$$6\sqrt{6} + 3 \cdot 3\sqrt{10} - 2 + \sqrt{15}$$

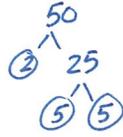
$$6\sqrt{6} + 9\sqrt{10} - 2 + \sqrt{15}$$

Part 3 – Multiplying Radical Expressions

Q3: Simplify each of the following:

$$(\sqrt{50x^2})(5\sqrt{3x} + \sqrt{2})$$

$$\begin{aligned} & (\sqrt{2 \cdot 5^2 \cdot x^2})(5\sqrt{3x} + \sqrt{2}) \\ & (5x\sqrt{2})(5\sqrt{3x} + \sqrt{2}) \end{aligned}$$



$$25x\sqrt{6x} + 5x(2)$$

$$25x\sqrt{6x} + 10x$$

$$(2\sqrt{3x} - 5)(2 + 6\sqrt{2x})$$

$$4\sqrt{3x} + 12\sqrt{6x^2} - 10 - 30\sqrt{2x}$$

$$4\sqrt{3x} + 12x\sqrt{6} - 10 - 30\sqrt{2x}$$