

1.05 - Dividing Radicals**Part 1 - Dividing Monomials**

Q1: Simplify the following expressions:

$$\frac{10}{5} = 2$$

$$\begin{aligned} \frac{10^{1/2}}{5^{1/2}} &= \left(\frac{10}{5}\right)^{1/2} \\ &= 2^{1/2} \end{aligned}$$

$$\frac{\sqrt{10}}{\sqrt{5}} = \sqrt{\frac{10}{5}} = \sqrt{2}$$

$$\frac{\sqrt{40}}{\sqrt{10}} = \sqrt{\frac{40}{10}} = \sqrt{4} = 2$$

$$\begin{aligned} \frac{2\sqrt{18}}{4\sqrt{2}} &= \frac{1}{2} \sqrt{\frac{18}{2}} = \frac{1}{2} \sqrt{9} \\ &= \frac{1}{2}(3) = \frac{3}{2} \end{aligned}$$

$$\frac{3\sqrt{26}}{\sqrt{13}} = 3\sqrt{\frac{26}{13}} = 3\sqrt{2}$$

## Part 2 – Rationalizing a Monomial Denominator

Q2: Rationalize the Denominator:

$$\frac{5}{\sqrt{x}} \cdot \frac{\sqrt{x}}{\sqrt{x}} = \frac{5\sqrt{x}}{x}$$

$$\frac{3}{\sqrt{7}} \cdot \frac{\sqrt{7}}{\sqrt{7}} = \frac{3\sqrt{7}}{7}$$

$$\frac{(x+\sqrt{3})}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{x\sqrt{3} + 3}{3}$$

$$\frac{\sqrt{6}}{\sqrt{2}} = \sqrt{\frac{6}{2}} = \sqrt{3}$$

$$\begin{aligned} \frac{(4+\sqrt{10})}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} &= \frac{4\sqrt{5} + \sqrt{50}}{5} \\ &= \frac{4\sqrt{5} + 5\sqrt{2}}{5} \end{aligned}$$

$$\begin{aligned} \frac{(\sqrt{6}+12\sqrt{2})}{\sqrt{6}} \cdot \frac{\sqrt{6}}{\sqrt{6}} &= \frac{6+12\sqrt{12}}{6} \\ &= \frac{6+12 \cdot 2\sqrt{3}}{6} = \frac{6+24\sqrt{3}}{6} \\ &= 1+4\sqrt{3} \end{aligned}$$

## Part 3 – Rationalizing a Binomial Denominator (Math 20-1 Content)

Q3: Simplify the following expressions:

$$(x+5)(x+5)$$

$$x^2 + 5x + 5x + 25$$

$$x^2 + 10x + 25$$

$$(\sqrt{3}+5)(\sqrt{3}+5)$$

$$3 + 5\sqrt{3} + 5\sqrt{3} + 25$$

$$28 + 10\sqrt{3}$$

$$(x+5)(x-5)$$

$$x^2 - 5x + 5x - 25$$

$$x^2 - 25$$

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

$$3 - 5\sqrt{3} + 5\sqrt{3} - 25$$

$$-22$$

Q4: Rationalize the Denominator:

$$\frac{(2+\sqrt{5})(\sqrt{5}-3)}{(\sqrt{5}+3)(\sqrt{5}-3)} = \frac{2\sqrt{5}-6+(5)-3\sqrt{5}}{(5)-3\sqrt{5}+3\sqrt{5}-9}$$

$$= \frac{-\sqrt{5}-1}{-4} = \frac{-1(\sqrt{5}+1)}{-1(4)}$$

$$= \frac{\sqrt{5}+1}{4}$$

$$\frac{(\sqrt{3}-2)(5+\sqrt{3})}{(5-\sqrt{3})(5+\sqrt{3})} = \frac{5\sqrt{3}+(3)-10-2\sqrt{3}}{25+5\sqrt{3}-5\sqrt{3}-(3)}$$

$$= \frac{3\sqrt{3}-7}{22}$$

$$\frac{(\sqrt{6}+\sqrt{2})}{(\sqrt{2}+2)} \cdot \frac{(\sqrt{2}-2)}{(\sqrt{2}-2)} = \frac{\sqrt{12}-2\sqrt{6}+(2)-2\sqrt{2}}{(2)-2\sqrt{2}+2\sqrt{2}-4}$$

$$= \frac{2\sqrt{3}-2\sqrt{6}+2-2\sqrt{2}}{-2}$$

$$\frac{6}{(1-2\sqrt{3})} \cdot \frac{(1+2\sqrt{3})}{(1+2\sqrt{3})} = \frac{6+12\sqrt{3}}{1+2\sqrt{3}-2\sqrt{3}-4(3)}$$

$$= \frac{6+12\sqrt{3}}{-11}$$

$$\frac{(\sqrt{5})}{(3\sqrt{2}-1)} \cdot \frac{(3\sqrt{2}+1)}{(3\sqrt{2}+1)} = \frac{3\sqrt{10}+\sqrt{5}}{9(2)+3\sqrt{2}-3\sqrt{2}-1}$$

$$= \frac{3\sqrt{10}+\sqrt{5}}{17}$$

$$\frac{6}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{6\sqrt{3}}{2(3)} = \frac{6\sqrt{3}}{6} = \sqrt{3}$$