C11 - 5.3 - Rationalizing the Denominator Notes

$$\frac{5}{\sqrt[2]{3}} = \frac{5 \times \boxed{\sqrt[2]{3}}}{\sqrt[2]{3} \times \sqrt[2]{3}}$$

Multiply the top and bottom by the root in the denominator.
Only the Root!

$$= \frac{5\sqrt[2]{3}}{\sqrt[2]{3 \times 3}}$$

$$= \frac{5\sqrt[2]{3}}{\sqrt[2]{9}}$$

$$\boxed{= \frac{5\sqrt[2]{3}}{3}}$$

$$\frac{5}{\sqrt[2]{3}} = 2.89 = \frac{5\sqrt[2]{3}}{3} \checkmark$$

$$\boxed{\sqrt[2]{3^1} = 3^{\frac{1}{2}} \qquad x^{\frac{m}{n}} = \sqrt[n]{x^m}}$$

$$\boxed{\sqrt{3} \times \sqrt{3} = 3 \qquad 3^{\frac{1}{2}} \times 3^{\frac{1}{2}} = 3^1 \qquad \frac{1}{2} + \frac{1}{2} = 1}$$

Add Exponents

$$\frac{5}{2 - \sqrt[2]{6}} = \frac{5 \times (2 + \sqrt[2]{6})}{(2 - \sqrt[2]{6}) \times (2 + \sqrt[2]{6})}$$

$$\boxed{= \frac{10 + 5\sqrt[2]{6}}{-2}}$$

Distribution
Foil

$$\frac{5}{2 - \sqrt[2]{6}} = -11.12 = \frac{10 + 5\sqrt[2]{6}}{-2} \checkmark$$

Multiply the top/bottom by **C**onjugate of denominator.

$$(2 - \sqrt[2]{6}) \times (2 + \sqrt[2]{6})$$

$$4 + 2\sqrt{6} - 2\sqrt{6} - \sqrt{36}$$
$$4 + \cancel{2\sqrt{6}} - \cancel{2\sqrt{6}} - \sqrt{36}$$
$$4 - \sqrt{36}$$
$$-2$$

$$\boxed{(a + b)(a - b) =}$$
$$a^2 - \cancel{ab} + \cancel{ab} - b^2 =$$
$$a^2 - b^2$$

$$\boxed{F\cancel{O}IL}$$

$$\frac{4}{\sqrt[2]{5} + \sqrt[2]{3}} = \frac{4 \times (\sqrt[2]{5} - \sqrt[2]{3})}{(\sqrt[2]{5} + \sqrt[2]{3}) \times (\sqrt[2]{5} - \sqrt[2]{3})}$$

Conjugate

$$= \frac{4\sqrt[2]{5} - 4\sqrt[2]{3}}{5 - 3}$$

$$= \frac{4\sqrt[2]{5} - 4\sqrt[2]{3}}{2} \boxed{\begin{array}{c}\div 2\\\div 2\end{array}}$$

$$\boxed{= 2\sqrt{5} - 2\sqrt{3}}$$

Simplify, by dividing the top and bottom by 2.

$$\frac{4}{\sqrt[2]{5} + \sqrt[2]{3}} = 1.01 = 2\sqrt{5} - 2\sqrt{3} \checkmark$$

$$\frac{5}{\sqrt[3]{3}} = \frac{5 \times \boxed{\sqrt[3]{3}} \times \boxed{\sqrt[3]{3}}}{\sqrt[3]{3} \times \boxed{\sqrt[3]{3}} \times \boxed{\sqrt[3]{3}}}$$

$$\boxed{= \frac{5\sqrt[3]{9}}{3}}$$

$$\frac{5}{\sqrt[3]{3}} = 3.47 = \frac{5\sqrt[3]{9}}{3} \checkmark$$

Multiply the top and bottom by the cube root of the denominator twice. (Or three times for a fourth root etc.)

$$\boxed{\sqrt[3]{3} = 3^{\frac{1}{3}} \qquad x^{\frac{m}{n}} = \sqrt[n]{x^m}}$$

$$\boxed{\sqrt[3]{3} \times \sqrt[3]{3} \times \sqrt[3]{3} = 3 \qquad 3^{\frac{1}{3}} \times 3^{\frac{1}{3}} \times 3^{\frac{1}{3}} \times = 3^1 \qquad \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1}$$