

# Math 10

## Radicals and Powers REVIEW

Name: Key ★

Learning Goal	Beginning	Developing	Proficient	Sophisticated
I will be able to express a radicals in multiple forms (entire and mixed)				
I will be able to use the laws of exponents to simplify power expressions				

Learning Goal #1: I will be able to express radicals in multiple forms (entire and mixed)

Developing	
<p>Write the below radical as a mixed radical: <math>\sqrt{60}</math></p> <p><math>2\sqrt{15}</math></p>	<p>Write the below radical as a mixed radical: <math>\sqrt{45}</math></p> <p><math>3\sqrt{5}</math></p>
<p>Write the below radical as a mixed radical: <math>\sqrt[3]{81}</math></p> <p><math>3\sqrt{3}</math></p>	<p>Write the below mixed radical as an entire radical:</p> <p><math>4\sqrt{5}</math></p> <p><math>\sqrt{4 \cdot 4 \cdot 5} = \sqrt{80}</math></p>
<p>Write the below mixed radical as an entire radical:</p> <p><math>3\sqrt{7}</math></p> <p><math>\sqrt{3 \cdot 3 \cdot 7} = \sqrt{63}</math></p>	<p>Write the below mixed radical as an entire radical:</p> <p><math>5\sqrt{2}</math></p> <p><math>\sqrt{5 \cdot 5 \cdot 2} = \sqrt{50}</math></p>

Proficient	
<p>Arrange the mixed radicals from greatest to least:</p> <p><math>4\sqrt{5}, 2\sqrt{6}, \sqrt{5}, \sqrt{9}, 5\sqrt{2}, 3\sqrt{2}, 4\sqrt{3}</math></p>	<p>Write the below radical as a mixed radical: <math>\sqrt{50xy^2}</math></p> <p><math>5y\sqrt{2x}</math></p>

<p>Write the below radical as a mixed radical: <math>\sqrt[4]{48}</math></p> <p><math>2 \overline{) 48}</math>  <math>2 \overline{) 24}</math>  <math>2 \overline{) 12}</math>  <math>2 \overline{) 6}</math>  <math>2 \overline{) 3}</math></p> <p><math>\sqrt[4]{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3}</math>  <math>2 \cdot \sqrt[4]{3}</math></p>	<p>Write the below mixed radical as an entire radical:</p> <p><math>4x\sqrt{5y}</math></p> <p><math>\sqrt{4x \cdot 4x \cdot 5y} = \sqrt{80x^2y}</math></p>
<p>Write the below mixed radical as an entire radical:</p> <p><math>3xy\sqrt{7x}</math></p> <p><math>\sqrt{3xy \cdot 3xy \cdot 7x} = \sqrt{63x^3y^2}</math></p>	<p>Write the below mixed radical as an entire radical:</p> <p><math>5m^2\sqrt{2m}</math></p> <p><math>\sqrt{5m^2 \cdot 5m^2 \cdot 2m} = \sqrt{50m^5}</math></p>

## Sophisticated

<p>Arrange the mixed radicals from greatest to least:</p> <p><math>5\sqrt{10}, 4\sqrt{2}, 4\sqrt[3]{2}, 2\sqrt[3]{3}, 3\sqrt[3]{5}, 5\sqrt[3]{3}</math></p> <p><math>\sqrt{250}, \sqrt{32}, \sqrt[3]{128}, \sqrt[3]{24}, \sqrt[3]{35}, \sqrt[3]{375}</math></p> <hr/> <p>greatest <math>\longrightarrow</math> least</p> <p><math>\sqrt{250}, \sqrt[3]{375}, \sqrt{32}, \sqrt[3]{135}, \sqrt[3]{128}, \sqrt[3]{24}</math></p>	<p>Write the below radical as a mixed radical: <math>\sqrt[3]{375}</math></p> <p><math>375</math>  <math>5 \overline{) 375}</math>  <math>5 \overline{) 75}</math>  <math>5 \overline{) 15}</math>  <math>5 \overline{) 3}</math></p> <p><math>\sqrt[3]{375} = \sqrt[3]{5 \cdot 5 \cdot 5 \cdot 3} = 5\sqrt[3]{3}</math></p>
<p>Explain the error in the below solution.</p> <p><math>8\sqrt[3]{2} = 8 \cdot \sqrt[3]{2}</math>  <math>= \sqrt[3]{2} \cdot \sqrt[3]{2}</math>  <math>= \sqrt[3]{2 \cdot 2}</math>  <math>= \sqrt[3]{4}</math></p> <p><i>When moving 8 to the radical of <math>\sqrt[3]{}</math> you multiply <math>8 \times 8 \times 3</math> not turn it into its roots.</i></p> <p><math>\sqrt[3]{8 \cdot 8 \cdot 8 \cdot 2} = \sqrt[3]{1024}</math></p>	<p>Explain the error in the below solution.</p> <p><math>\sqrt{96} = \sqrt{4} \cdot \sqrt{48}</math>  <math>= 2 \cdot \sqrt{48}</math>  <math>= 2 \cdot \sqrt{8} \cdot \sqrt{6}</math>  <math>= 2 \cdot 4 \cdot \sqrt{6}</math>  <math>= 8\sqrt{6}</math></p> <p><i>96 doesn't come from <math>4 \times 48</math></i>  <math>\sqrt{96} = \sqrt{2 \cdot 48}</math>  <math>\sqrt{96} = \sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3}</math>  <math>= 4\sqrt{6}</math></p> <p><math>96</math>  <math>2 \overline{) 96}</math>  <math>2 \overline{) 48}</math>  <math>2 \overline{) 24}</math>  <math>2 \overline{) 12}</math></p>
<p>Write the below entire radical as a mixed radical:</p> <p><math>\sqrt{7mn^6s^5}</math></p> <p><math>n^3 \sqrt{7ms}</math></p>	<p>Write the below mixed radical as an entire radical:</p> <p><math>5v^2\sqrt{2vw^5}</math></p> <p><math>\sqrt{5v^2 \cdot 2vw^5} = \sqrt{10v^3w^5}</math></p>

**Learning Goal #2: I will be able to use the laws of exponents to simplify power expressions**

<b>Developing</b>	
Evaluate each power without using a calculator.  $27^{\frac{1}{3}}$ $\sqrt[3]{27} = 3$	Evaluate each power without using a calculator.  $100^{0.5}$ $100^{\frac{1}{2}} = \sqrt{100} = 10$
Evaluate each power without using a calculator.  $8^{\frac{5}{3}}$ $(\sqrt[3]{8})^5 = 2^5 = 32$	Evaluate each power without using a calculator.  $16^{\frac{3}{2}}$ $(\sqrt{16})^3 = (4)^3 = 64$
Evaluate each power without using a calculator.  $3^{-2}$ $\frac{1}{3^2} = \frac{1}{9}$	Evaluate each power without using a calculator.  $0.3^{-4}$ $\frac{1}{0.3^4} = 0.0081$

<b>Proficient</b>	
Arrange these numbers in order from least to greatest: $\sqrt[3]{4}$ , $4^{\frac{3}{2}}$ , $4^2$ , $(\frac{1}{4})^{\frac{3}{2}}$ , $(\frac{1}{2})^{\frac{3}{2}}$ , $\frac{1}{8}$ $\left(\frac{1}{4}\right)^{\frac{3}{2}}, \sqrt[3]{4}, 4^{\frac{3}{2}}, 4^2$ <p style="text-align: center;">least <math>\xrightarrow{\hspace{10em}}</math> greatest</p>	Evaluate $16^{1.5}$ $16^{\frac{3}{2}} = (\sqrt{16})^3 = 4^3 = 64$
Evaluate $(-32)^{0.8}$ $-32^{\frac{4}{5}}$ $= \left(\sqrt[5]{-32}\right)^4$ $= (-2)^4 = 16$	Determine the edge length of a cube with volume $25 \text{ cm}^3$ . Write your answer to the nearest tenth of a centimetre. Justify your answer. $\sqrt[3]{25} =$ <p style="text-align: right;"><b>~2.9cm</b></p>

<p>Simplify <math>(2x^{-3}y^4)^3</math></p> $2^3 \cdot x^{-9} \cdot y^{12} = \frac{8y^{12}}{x^9}$	<p>Simplify <math>\frac{(6a^3b)(3b^4)}{(9a^5b^3)}</math></p> $\frac{18a^3b^5}{9a^5b^3} = \frac{2b^2}{a^2}$
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<b>Sophisticated</b>	
<p>Evaluate <math>\left(\frac{25}{4}\right)^{\frac{3}{2}}</math></p> $\left(\sqrt{\frac{4}{25}}\right)^3 = \left(\frac{2}{5}\right)^3 = \frac{8}{125}$	<p>Simplify <math>\left(\frac{45x^8y^5}{5x^6y^{-3}}\right)^{\frac{1}{2}}</math></p> $\sqrt{\frac{45x^8y^5}{5x^6y^{-3}}} = \sqrt{9x^2y^8} = 3xy^4$
<p>Evaluate <math>\left(\frac{8}{27}\right)^{\frac{2}{3}}</math></p> $\left(\sqrt[3]{\frac{8}{27}}\right)^2 = \left(\frac{2}{3}\right)^2 = \frac{4}{9}$	<p>Evaluate <math>0.04^{-\frac{3}{2}}</math></p> $(0.04)^{-\frac{3}{2}} = \left(\frac{1}{0.04}\right)^{\frac{3}{2}} = \left(\sqrt{\frac{1}{0.04}}\right)^3 = \left(\frac{1}{0.2}\right)^3 = \frac{1}{0.008}$
<p>Michelle wants to invest enough money on January 1<sup>st</sup> to pay her nephew \$150 at the end of each year for the next 10 years. The savings account pays 3.2% compounded annually. The money, P dollars, that Michelle must invest today is given by the formula</p> $P = \frac{150(1 - 1.032^{-10})}{0.032}$ <p>How much must Michelle invest on January 1<sup>st</sup>?</p> <p><i>*use calculator</i></p> <p style="font-size: 2em; color: red;">\$ 1266.57</p>	<p>Which is greater, <math>2^{-5}</math> or <math>5^{-2}</math>? Justify your answer.</p> $\left(\frac{1}{2}\right)^5 = \frac{1}{32}$ $\left(\frac{1}{5}\right)^2 = \frac{1}{25}$ <p style="font-size: 2em; color: red; border: 2px solid red; border-radius: 50%; padding: 10px; display: inline-block;">1/25 is greater</p>