

For each of the following, apply the given rule. If more than one rule applies, apply all that are appropriate.

Multiplication of Like Bases: $b^x \cdot b^y = b^{x+y}$

1. $5^2 \cdot 5^4$ $5^6 = 15,625$	2. $2^3 \cdot 2^6$ $2^9 = 512$	3. $x^7 \cdot x$ x^8	4. $x^3(x^2)$ x^5
5. $5^{1/2} \cdot 5^{3/2}$ $5^{4/2} = 5^2 = 25$	6. $2^{3/4} \cdot 2^{1/4}$ $2^{4/4} = 2$	7. $x^{8/5} \cdot x^{2/5}$ $x^{10/5} = x^2$	8. $x^{3/2}(x^{5/2})$ $x^{8/2} = x^4$
9. $5^{1/3} \cdot 5^{3/2} \cdot 5^{5/6}$ $5^{2/6} \cdot 5^{5/6} \cdot 5^{5/6}$ $5^{11/6} = \sqrt[6]{5^{11}} = 5\sqrt[6]{5^5}$	10. $2^{3/4} \cdot 2^{1/2} \cdot 2^{1/4}$ $2^{3/4} \cdot 2^{2/4} \cdot 2^{1/4}$ $2^{6/4} = \sqrt[4]{2^6} = 2\sqrt[4]{2}$	11. $x^{8/5} \cdot x^{3/4} \cdot x^{5/20}$ $x^{16/20} \cdot x^{15/20} \cdot x^{10/20}$ $x^{41/20} = \sqrt[20]{x^{41}} = x^2 \sqrt[20]{x^1}$	12. $x^{3/2}(x^{5/3})^{2/3}$ $x^{3/2} \cdot (x^{10/9})$ $x^{19/6} = \sqrt[6]{x^{19}} = x^3 \sqrt[6]{x}$

OR $(b^x)^y = b^{xy}$

1. $(5^2)^6$ $5^{12} = 244,140,625$	2. $(2^3)^2$ $2^6 = 64$	3. $(x^7)^2$ x^{14}	4. $(y^5)^5$ y^{25}
5. $(5^2)^{1/6}$ $5^{2/6} = 5^{1/3} = \sqrt[3]{5}$	6. $(2^3)^{1/2}$ $2^{3/2} = 2\sqrt[2]{2}$	7. $(x^{7/2})^2$ $x^{14/2} = x^7$	8. $(y^{1/5})^{1/2}$ $y^{1/10} = \sqrt[10]{y}$
9. $(5^{3/2})^{1/6}$ $5^{1/4} = \sqrt[4]{5}$	10. $(2^{3/4})^{1/2}$ $2^{3/8} = \sqrt[8]{2^3}$ OR $\sqrt[8]{8}$	11. $(x^{7/2})^{2/7}$ $x^{14/14} = x^1$	12. $(y^{1/5})^{5/2}$ $y^{1/2} = \sqrt{y}$

Power of a Product: $(ab)^x = a^x b^x$

<p>1. $(5x)^2$ $5^2 x^2 = 25x^2$</p>	<p>2. $(xy)^3$ $x^3 y^3$</p>	<p>3. $(16y)^2$ $16^2 y^2 = 256y^2$</p>	<p>4. $(25 \cdot 64)^{\frac{1}{2}}$ $25^{\frac{1}{2}} \cdot 64^{\frac{1}{2}} = \sqrt{25} \cdot \sqrt{64}$ $5 \cdot 8 = 40$</p>
<p>5. $(5x)^{\frac{1}{2}}$ $5^{\frac{1}{2}} \cdot x^{\frac{1}{2}}$ $\sqrt{5x}$</p>	<p>6. $(xy)^{\frac{1}{3}}$ $x^{\frac{1}{3}} \cdot y^{\frac{1}{3}}$ $\sqrt[3]{xy}$</p>	<p>7. $(16y)^{\frac{1}{2}}$ $16^{\frac{1}{2}} \cdot y^{\frac{1}{2}} = \sqrt{16y}$ $4\sqrt{y}$</p>	<p>8. $(8 \cdot 27)^{\frac{1}{3}}$ $8^{\frac{1}{3}} \cdot 27^{\frac{1}{3}} = \sqrt[3]{8} \cdot \sqrt[3]{27}$ $2 \cdot 3 = 6$</p>
<p>9. $(125x)^{\frac{1}{3}}$ $125^{\frac{1}{3}} \cdot x^{\frac{1}{3}} = \sqrt[3]{125x}$ $5\sqrt[3]{x}$</p>	<p>10. $((a)(b))^5$ $a^5 b^5$</p>	<p>11. $(25 \cdot w)^{\frac{3}{2}}$ $25^{\frac{3}{2}} \cdot w^{\frac{3}{2}} = (\sqrt{25})^3 \cdot \sqrt{w^3}$ $= (5)^3 \cdot \sqrt{w^3}$ $125 w \sqrt{w}$</p>	<p>12. $(81 \cdot 16)^{\frac{1}{4}}$ $81^{\frac{1}{4}} \cdot 16^{\frac{1}{4}}$ $\sqrt[4]{81} \cdot \sqrt[4]{16}$ $3 \cdot 2 = 6$</p>

Power of a Quotient: $\left(\frac{a}{b}\right)^x = \frac{a^x}{b^x}$

<p>1. $\left(\frac{x}{5}\right)^2$ $\frac{x^2}{5^2} = \frac{x^2}{25}$</p>	<p>2. $\left(\frac{x}{y}\right)^3$ $\frac{x^3}{y^3}$</p>	<p>3. $\left(\frac{y}{16}\right)^2$ $\frac{y^2}{16^2} = \frac{y^2}{256}$</p>	<p>4. $\left(\frac{25}{64}\right)^{\frac{1}{2}} = \frac{25^{\frac{1}{2}}}{64^{\frac{1}{2}}}$ $\frac{\sqrt{25}}{\sqrt{64}} = \frac{5}{8}$</p>
<p>5. $\left(\frac{5}{x}\right)^{\frac{1}{2}} = \frac{5^{\frac{1}{2}}}{x^{\frac{1}{2}}}$ $= \frac{\sqrt{5}}{\sqrt{x}} \cdot \frac{\sqrt{x}}{\sqrt{x}} = \frac{\sqrt{5x}}{x}$</p>	<p>6. $\left(\frac{x}{y}\right)^{\frac{1}{3}} = \frac{x^{\frac{1}{3}}}{y^{\frac{1}{3}}}$ $= \frac{\sqrt[3]{x}}{\sqrt[3]{y}} \cdot \frac{\sqrt[3]{y^2}}{\sqrt[3]{y^2}} = \frac{\sqrt[3]{xy^2}}{y}$</p>	<p>7. $\left(\frac{y}{16}\right)^{\frac{1}{2}} = \frac{y^{\frac{1}{2}}}{16^{\frac{1}{2}}}$ $= \frac{\sqrt{y}}{\sqrt{16}} = \frac{\sqrt{y}}{4}$</p>	<p>8. $\left(\frac{8}{27}\right)^{\frac{1}{3}} = \frac{8^{\frac{1}{3}}}{27^{\frac{1}{3}}}$ $= \frac{\sqrt[3]{8}}{\sqrt[3]{27}} = \frac{2}{3}$</p>
<p>9. $\left(\frac{x}{125}\right)^{\frac{1}{3}} = \frac{x^{\frac{1}{3}}}{125^{\frac{1}{3}}}$ $= \frac{\sqrt[3]{x}}{\sqrt[3]{125}} = \frac{\sqrt[3]{x}}{5}$</p>	<p>10. $\left(\frac{64}{x}\right)^{\frac{1}{2}} = \frac{64^{\frac{1}{2}}}{x^{\frac{1}{2}}}$ $= \frac{\sqrt{64}}{\sqrt{x}} \cdot \frac{\sqrt{x}}{\sqrt{x}} = \frac{8\sqrt{x}}{x}$</p>	<p>11. $\left(\frac{w}{25}\right)^{\frac{3}{2}} = \frac{w^{\frac{3}{2}}}{25^{\frac{3}{2}}}$ $= \frac{\sqrt{w^3}}{(\sqrt{25})^3} = \frac{w\sqrt{w}}{125}$</p>	<p>12. $\left(\frac{81}{16}\right)^{\frac{1}{4}} = \frac{81^{\frac{1}{4}}}{16^{\frac{1}{4}}}$ $= \frac{\sqrt[4]{81}}{\sqrt[4]{16}} = \frac{3}{2}$</p>