

Bellwork 1-22-16

If  $f(x) = x^2 + 4$  and  $g(x) = 2x - 5$  find

1.  $(f \cdot g)(x)$   
 $(x^2 + 4)(2x - 5)$   
 $2x^3 - 5x^2 + 8x - 20$

2.  $f^{-1}(x)$   
 $y = x^2 + 4$   
 $x = y^2 + 4$   
 $-4 \quad -4$   
 $\pm\sqrt{x-4} = \sqrt{y^2}$   
 $\pm\sqrt{x-4} = f^{-1}(x)$

Answers: 1.  $3x\sqrt{x^2}$  2.  $2x\sqrt{2x^3}$  3.  $12x^3y^2\sqrt{x}$

- ①  $4x^2\sqrt{2}$  ②  $10m^2$
- ③  $2x^4\sqrt{7x}$  ④  $5\sqrt[3]{3x^2}$
- ⑤  $4a\sqrt{2}$  ⑥  $2r\sqrt[5]{4r}$
- ⑦  $12ab\sqrt{a}$  ⑧  $2x\sqrt[4]{5x^3y}$
- ⑨  $3x^2y^2\sqrt[3]{4x}$  ⑩  $3x^2y\sqrt[3]{3xy}$
- ⑪  $54a^2$  ⑫  $15x^2\sqrt[3]{5x^2}$
- ⑬  $-12x\sqrt[3]{x^2}$  ⑭  $30x\sqrt{6}$

Jan 23-7:05 PM

Jan 22-9:59 AM

⑬  $-3\sqrt[3]{64x^5}$

13,  
 $\begin{matrix} & & 8 & & 8 \\ & & / & & / \\ & 4 & & & 4 \\ & / & & & / \\ 2 & & & & 2 \\ / & & & & / \\ 2 & & & & 2 \end{matrix}$

$-3$   $222222$   $xxxxx$

$-12x\sqrt[3]{x^2}$

⑩  $\sqrt[3]{81x^7y^4}$

$\begin{matrix} & & 9 & & 9 \\ & & / & & / \\ & 3 & & & 3 \\ & / & & & / \\ 3 & & & & 3 \end{matrix}$

$33333xxxxxyyy$

$3x^2y\sqrt[3]{3xy}$

Converting from Radical Form to Rational Exponent Form 1-21-15

Rational Exponent Form (or Exponential Form)      Radical Form

$x^{\frac{m}{n}}$        $\xrightarrow[\text{index converts to}]{\text{Exponent}}$        $\sqrt[n]{x^m}$  or  $(\sqrt[n]{x})^m$

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1)  $x^{\frac{1}{2}}$   $\Rightarrow$   $\sqrt{x}$

2)  $7^{\frac{3}{4}}$   $\Leftarrow$   $\sqrt[4]{7^3}$       **\*\*Note\*\***  
 Pay attention to groupings by parentheses

3)  $(27x)^{\frac{2}{3}}$   $\Rightarrow$   $\sqrt[3]{(27x)^2}$

4)  $12^{\frac{1}{4}}x^{\frac{4}{4}}$   $\Leftarrow$   $\sqrt[4]{12x^4}$

5)  $6^{\frac{2}{5}}x^{\frac{4}{5}}$   $\Rightarrow$   $\sqrt[5]{6^2x^4}$

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Try these on your own.

6)  $n^{\frac{3}{8}}$   $\Rightarrow$   $\sqrt[8]{n^3}$

7)  $y^{\frac{5}{3}}$   $\Leftarrow$   $(\sqrt[3]{y})^5$

8)  $(16d)^{\frac{2}{5}}$   $\Rightarrow$   $\sqrt[5]{(16d)^2}$

9)  $8^{\frac{4}{4}}y^{\frac{3}{4}}$   $\Leftarrow$   $\sqrt[4]{8y^3}$

10)  $\frac{1}{3^4}b^{\frac{3}{4}}$   $\Rightarrow$   $\sqrt[4]{3b^3}$

Jan 22-10:03 AM

Jan 20-6:24 PM

**Negative Rational Exponents**  
 What does a negative exponent do?

Convert rational exponent to radical form.

11)  $x^{-\frac{5}{6}} \Rightarrow \frac{1}{x^{\frac{5}{6}}} \Rightarrow \frac{1}{\sqrt[6]{x^5}}$

12)  $f^{-\frac{1}{7}} \Rightarrow \frac{1}{f^{\frac{1}{7}}} \Rightarrow \frac{1}{\sqrt[7]{f}}$

13)  $(3x)^{-\frac{1}{3}} \Rightarrow \frac{1}{(3x)^{\frac{1}{3}}} \Rightarrow \frac{1}{\sqrt[3]{3x}}$

14)  $(4b)^{-\frac{5}{4}} \Rightarrow \frac{1}{(4b)^{\frac{5}{4}}} \Rightarrow \frac{1}{\sqrt[4]{(4b)^5}}$

15)  $4^{-\frac{5}{4}}x^{-\frac{1}{4}} \Rightarrow \frac{1}{4^{\frac{5}{4}}x^{\frac{1}{4}}} \Rightarrow \frac{1}{\sqrt[4]{4^5x}}$

16)  $7^{-\frac{1}{3}}k^{-\frac{2}{3}} \Rightarrow \frac{1}{7^{\frac{1}{3}}k^{\frac{2}{3}}} \Rightarrow \frac{1}{\sqrt[3]{7k^2}}$

Jan 19-3:02 PM

**Rational Exponents and Radicals**

Rational Exponent	Radical	Simplify
$9^{\frac{1}{2}}$	$\rightarrow \sqrt{9}$	1. 3
$16^{\frac{1}{4}}$	$\rightarrow \sqrt[4]{16}$	2. 2
$125^{\frac{1}{3}}$	$\rightarrow \sqrt[3]{125}$	3. 5
$8^{\frac{2}{3}}$	$\rightarrow$	4.
$16^{\frac{3}{4}}$	$\rightarrow$	5.

*Handwritten notes:*  
 For  $16^{\frac{1}{4}}$ , a red diagram shows  $\sqrt[4]{16}$  with '4' written above the radical symbol and '4' written below it, with two '2's below that, all enclosed in a red circle.

Jan 23-7:14 PM


**Conclusion**

- Where does the numerator of a rational exponent go in radical form, inside or outside the radical?  $x^{\frac{2}{3}}$  *inside*
- Where does the index number go in rational exponent form, numerator or denominator of the exponent?  $\sqrt[6]{x^7}$
- Questions???


Jan 23-10:01 AM

**Assignment**  
**Converting Rational to Radical Wkst**


Jan 16-9:23 AM

Rational Exponent	Radical	
$p^{\frac{1}{2}}$	→ 1.	
$a^{\frac{1}{3}}$	→ 2.	
$d^{\frac{1}{5}}$	→ 3.	
$w^{\frac{1}{4}}$	→ 4.	

Jan 23-7:28 PM

Rational Exponent	Radical	
$n^{\frac{3}{4}}$	→ 1.	
$r^{\frac{4}{5}}$	→ 2.	
$x^{\frac{2}{3}}$	→ 3.	
$b^{\frac{3}{5}}$	→ 4.	

Jan 23-7:28 PM

Rational Exponent	Radical	Simplify	
$8^{\frac{2}{3}}$	→ 1.	1.	
$125^{\frac{2}{3}}$	→ 2.	2.	
$16^{\frac{3}{4}}$	→ 3.	3.	

Jan 23-7:14 PM