# 4.2 Rational Exponents

Study 4.2 # 1 - 71

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#### 4.2 Rational Exponents

$$(3^2)^3 = (3 \cdot 3)(3 \cdot 3)(3 \cdot 3) = 3^6$$
3 factors of  $3^2$ 

$$(a^m)^n = a^{mn}$$

$$(3\Box)^3 = 3^6$$
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#### 4.2 Rational Exponents

$$(3^2)^3 = (3 \cdot 3)(3 \cdot 3)(3 \cdot 3) = 3^6$$
3 factors of  $3^2$ 

$$(a^m)^n = a^{mn}$$

$$(32)^3 = 36$$
  $(33)^2 = 36$ 

$$(3^{\square})^2 = 3^2$$
  $(3^{\square})^2 = 3^2$ 

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4.2 Rational Exponents

$$(a^m)^n = a^{mn}$$

$$(3\Box)^2 = 3^1$$

Need to define  $3^{1/2}$ 

Need to define  $3^{1/n}$ 

b<sup>1/n</sup>

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# 4.2 Rational Exponents

$$b^{1/n}$$
,  $n = 2, 3, 4, 5,...$ 

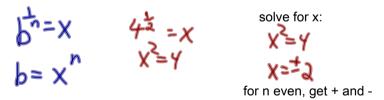
	n even	n odd
b ≥ 0	Principal n <sup>th</sup> root of b <sup>n</sup> √ <b>b</b>	n <sup>th</sup> root of b
b < 0	not a real #	n <sup>th</sup> root of b

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# 4.2 Rational Exponents

	n even	n odd
b ≥ 0	Principal nth root of b	n <sup>th</sup> root of b
b < 0	not a real #	n <sup>th</sup> root of b $ \sqrt[n]{b} $ $ (-8)^{\frac{1}{2}} = -2 $



But, for b<sup>1/n</sup> get only the positive root, the principal root.

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#### m, n rational numbers

$$p_m p_u = p_{m+u}$$

$$\frac{a^m}{a^n} = a^{m-n}$$

$$(ab)^m = a^m b^m$$

$$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$$

$$(a^m)^n = a^{mn}$$

$$b^{1/n}$$
, n = 2, 3, 4, 5,...

	n even	n odd
b ≥ 0	Principal n <sup>th</sup> root of b <b>∛ b</b>	n <sup>th</sup> root of b
b < 0	not a real #	n <sup>th</sup> root of b

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### 4.2 Rational Exponents

problems 2, 12, 22,...

$$27^{\frac{1}{3}} = (3^{\frac{3}{3}})^{\frac{1}{3}} = 3^{\frac{1}{3}}$$

$$(a^m)^n = a^{mn}$$

$$9^{-\frac{3}{2}} = \frac{1}{9^{\frac{3}{2}}} = \frac{1}{(3^{\frac{3}{2}})^{\frac{3}{2}}}$$

$$= \frac{1}{3^{\frac{3}{2}}} = \frac{1}{27}$$

$$(3^2)^{3/2} = 3^{\frac{2^2}{3^2}} = 3^{\frac{3}{2}}$$

$$25^{-\frac{3}{2}} = \frac{1}{(5^2)^{\frac{3}{2}}} = \frac{1}{5^3} = 125$$

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32. 
$$G: f(x) = 81^{x}$$
 $f: f(\frac{1}{4})$  exponential function.

Variable in exponent

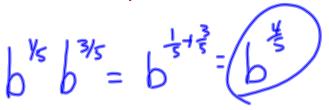
 $f(\frac{1}{4}) = 81^{\frac{1}{4}}$ 
 $= 81^{\frac{1}{4}}$ 
 $= 81^{\frac{1}{4}}$ 
 $= 3 \cdot 3 \cdot 3 \cdot 3$ 
 $= 3^{\frac{1}{4}} \cdot 3$ 

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### 4.2 Rational Exponents



 $p_m p_u = p_{m+u}$ 

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#### 4.2 Rational Exponents

$$\frac{1}{\sqrt{3}} = \sqrt{3}$$

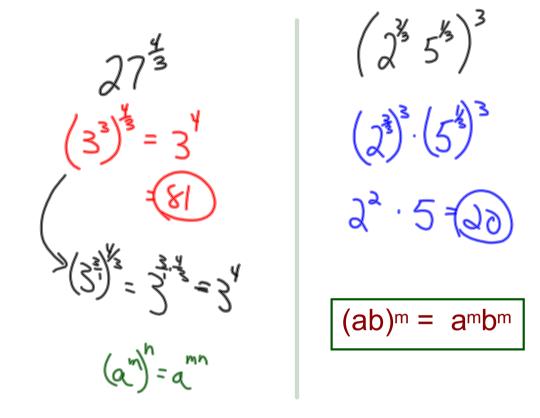
$$= \sqrt{3}$$

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# 4.2 Rational Exponents

$$\frac{b^{34}c^{32}}{b^{-34}c^{-32}}$$

$$= b^{34}c^{35}b^{34}c^{35}$$

$$= b^{34}c^{35}b^{34}c^{35}$$

$$= b^{34}c^{35}c^{35}$$

$$= b^{34}c^{35}c^{35}c^{35}$$

$$= b^{34}c^{35}c^{35}c^{35}c^{35}$$

$$= b^{34}c^{35}c^$$

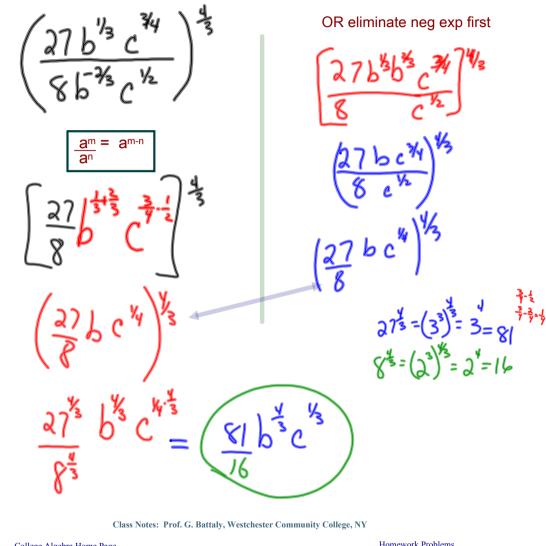
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### 4.2 Rational Exponents





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