

**Chapter 5: Exponents and Logarithms**  
**Section 1: Exponents**

**Things to remember...**

*Zero Power*      $m^0 = 1$

**Exponent Laws**

1)  $m^x \cdot m^y = m^{x+y}$

2)  $\frac{m^x}{m^y} = m^{x-y}$  ,  $m \neq 0$

3) If  $m \neq 0, 1, \text{ or } -1$  , then  $m^x = m^y$

if and only if  $x = y$

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**Same Exponent Laws**

4)  $(am)^x = a^x \cdot m^x$

5)  $\left(\frac{a}{m}\right)^x = \frac{a^x}{m^x}$  ,  $m \neq 0$

6) If  $x \neq 0$ ,  $a > 0$  and  $m > 0$ ,  
then  $a^x = m^x$  if  $a = m$

**Power of a Power**

7)

$$(m^x)^y = m^{xy}$$

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Negative Power

8)  $m^{-x} = \frac{1}{m^x}$

9)  $\frac{1}{m^{-x}} = m^x$

An expression is **simplified** when it doesn't contain negative exponents or power of powers.

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Examples

1)  $8^{-1} = \boxed{\frac{1}{8}}$

2)  $\left(\frac{2}{3}\right)^{-2} \frac{2^{-2}}{3^{-2}} = \frac{3^2}{2^2} = \boxed{\frac{9}{4}}$

3)  $4 \cdot 3^{-2}$   
 $4 \cdot \frac{1}{3^2} =$   
 $\frac{4}{1} \cdot \frac{1}{9} = \boxed{\frac{4}{9}}$

4)  $(2^{-1} \cdot 4^{-1})^{-1}$  OR  $(\frac{1}{2} \cdot \frac{1}{4})^{-1} = (\frac{1}{8})^{-1}$   
 $(2^{-1})^{-1} \cdot (4^{-1})^{-1} = 2^1 \cdot 4^1 = \boxed{8} \leftarrow = (\frac{8}{1})^1$

5)  $(2^{-1} + 4^{-1})^{-1}$   
 $(\frac{1}{2} + \frac{1}{4})^{-1} = (\frac{2}{4} + \frac{1}{4})^{-1} = (\frac{3}{4})^{-1} = (\frac{4}{3})^1 = \boxed{\frac{4}{3}}$

6)  $\left(\frac{12}{6}\right)^3 = (2)^3 = \boxed{8}$

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Examples

$$7) \frac{8^n \cdot 3^n}{4^n} = \left(\frac{8 \cdot 3}{4}\right)^n = \boxed{6^n}$$

8)

$$x^{-3}(x^5 + x^3) = x^2 + x^0$$

OR  $\frac{1}{x^3}(x^5 + x^3) = \frac{x^{5-3}}{x^3} + \frac{x^3}{x^3} = \boxed{x^2 + 1}$

$$9) \frac{3a^3 \cdot 6a^6}{a^{-1}} = \frac{18a^9}{a^{-1}}$$

$$a^1(3a^3 \cdot 6a^6) = \boxed{18a^9}$$

$$= a^1(18a^9)$$

10)

$$\frac{3a^3 - 6a^6}{a^{-1}} = a^1(3a^3 - 6a^6) = \boxed{3a^4 - 6a^7}$$

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☺ 173

# 5-11 ☺ odd

21-31 ☺ odd

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