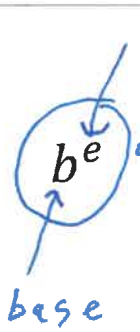
Mathematics9 Date _____

# *Unit 3: Powers & Exponents*

## *3.1 Using Exponents to Describe Numbers*




← Power - multiply the base by itself a number of times given by the exponent

**Ex.** Write in **exponential form** & evaluate:

a) $2 \times 2 \times 2 \times 2 \times 2$

$= 2^5$

$= 32$

b) $(-3) \times (-3) \times (-3) \times (-3)$

$= (-3)^4$

$= 81$

c) $-4 \times 4 \times 4$

$= -4^3$

$= -64$

Calculator : $y^x$ $x^y$ $\wedge$ $\alpha$

**Ex.** Write in **expanded form** & evaluate:

a) $5^4$

$= 5 \cdot 5 \cdot 5 \cdot 5$

$= 625$

b) $(-3)^2$

$= (-3)(-3)$

$= 9$

c) $-3^2$

$= -3 \times 3$

$= -9$

d) $-(-4)^3$

$= -(-4)(-4)(-4)$

$= 64$

e) $-2^3$

$= -2 \cdot 2 \cdot 2$

$= -8$

f) $(-2)^3$

$= (-2)(-2)(-2)$

$= -8$

Textbook pg. 79 #'s 1-3, 5, 9, 11-12, 13, 17-18

**Practice word problems together:**

#12: Acetaminophen is the active ingredient in the pain reliever Tylenol™. After taking Tylenol™, the liver breaks down approximately one half of the acetaminophen every 2.5 hours. What fraction of the initial amount is present in the body after 10 hours? $10 \div 2.5 = 4$

$= \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

$= \left(\frac{1}{2}\right)^4$

$= \boxed{\frac{1}{16}}$

#13: Under ideal conditions, a single bacterium doubles in number every 30 minutes.

a) Create a table to show this situation:

| time in half hours | # of bacteria |
|---|---|
| 1 | 2 |
| 2 | 4 |
| 3 | 8 |
| 4 | 16 |
| 5 | 32 |

b) Is this a linear relationship? How do you know?

no, not increasing by the same amount, so not a consistant slope

c) Use powers and exponents to create a formula that describes the relationship between time passed and the number of bacteria.

$t$ = time in half hours

$b$ = # of bacteria

$b = 2^t$

d) How many bacteria are there after 5 hours? Assume that none have died.

$b = 2^{10}$

$b = \boxed{1024}$