3.7 Negative and Zero Exponents
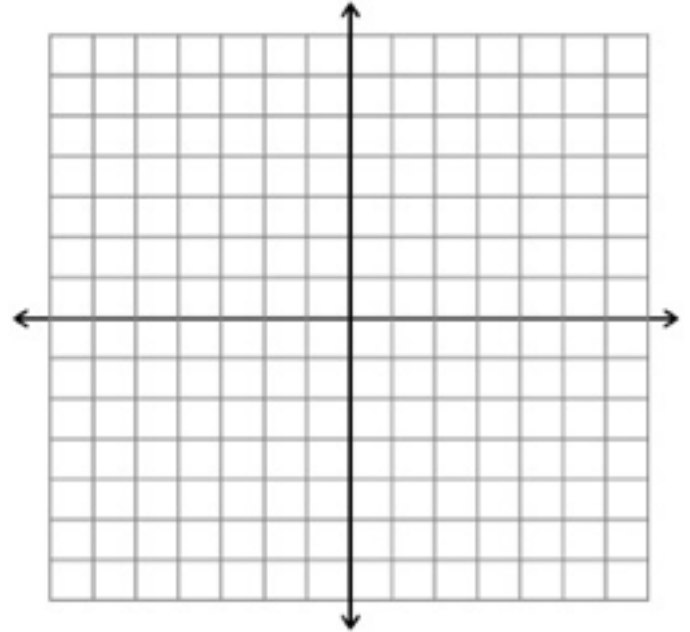
Ex 1 Complete the table of values for $y=2^x$. Graph $y=2^x$

(no decimals use factions)

x	y
5	
4	
3	
2	
1	
0	

x	y
-1	
-2	
-3	
-4	
-5	
-6	

Describe the graph. How does it compare to $y = x^2$

Will the graph ever cross the x-axis? Explain

Ex. 2 Complete the table for $y=3^x$

(no decimals use factions)

x	y
5	
4	
3	
2	
1	
0	

x	y
-1	
-2	
-3	
-4	
-5	
-6	

Think about what a negative exponent means

Ex. 3 Use the pattern in the previous examples to determine the value of:

a) 4^{-2} b) 5^{-2} c) 7^{-3} d) 4^{-2}

e) 5^0 f) 4^0 g) 9^0 h) 435^0

Rule: for any non zero base "a"

$$a^0 = 1 \quad \text{and} \quad a^{-k} = \frac{1}{a^k}$$

Ex. 4 Evaluate. No Decimals.

a) 2^{-3} b) 3^{-4} c) 5^{-3} d) 6^{-2}

e) $(2)^{-4}$ f) $(3)^{-1}$ g) $(-4)^{-3}$ h) -5^{-2}

Ex. 5 Evaluate. No Decimals.

a) $\dfrac{1}{4}^{-2}$ b) $\dfrac{-2}{3}^{-3}$ c) $\dfrac{-1}{5}^{-1}$ d) $\dfrac{4}{3}^{-2}$

Ex 6A bacteria colony decays by 1/2 of its original population every 5 hours

a) What fraction remains after 20h, 30h and 50h

b) Write each fraction from a) as a power with a negative number

c) If the colony started with 32768 bacteria. How many remain after 25 hours?