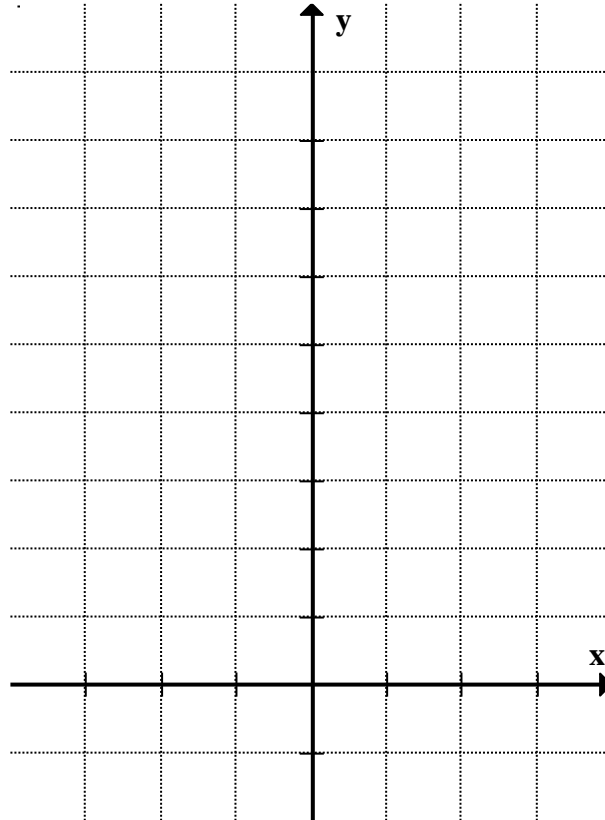In these exercises, you will be investigating the properties of exponential functions of the form $y = Cb^x$, with $b>0$, $b\neq 1$

1a) Complete the tables of ordered pairs and sketch on the same set of axes $y = 2^x$ and $y = 3^x$. Indicate the domain, range, intercept(s), and asymptote(s) of each function.

x	$y = 2^x$
-3	
-2	
-1	
0	
1	
2	
3	

x	$y = 3^x$
-3	
-2	
-1	
0	
1	
2	
3	

Domain: _____
Range: _____
Intercept(s):_____
Asymptote(s):_____

Domain: _____
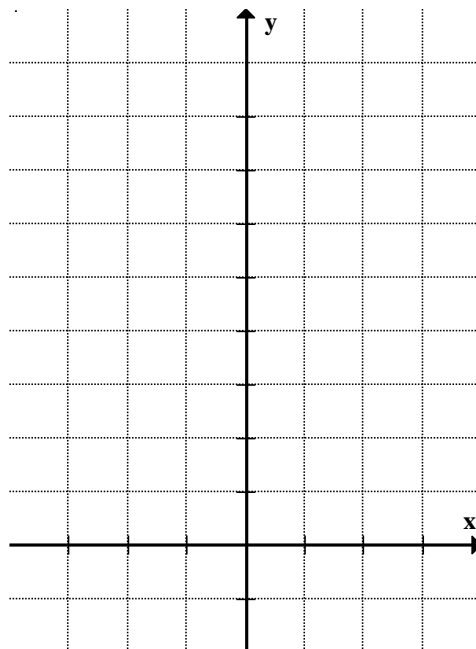Range: _____
Intercept(s):_____
Asymptote(s):_____

b) Write a few sentences summarizing the similarities and differences between the two graphs.

c) Write a few sentences describing what you think the graphs of $y = 5^x$ and $y = 2.5^x$ will look like. Indicate how these graphs differ from those above. Verify your hypotheses by graphing the functions on your calculator.

2a) Complete the tables of ordered pairs and sketch on the same set of axes $y = \left(\frac{1}{2}\right)^x$ and $y = \left(\frac{1}{3}\right)^x$. Indicate the domain, range, intercept(s), and asymptote(s) of each function.

x	$y = \left(\frac{1}{2}\right)^x$
-3	
-2	
-1	
0	
1	
2	
3	

x	$y = \left(\frac{1}{3}\right)^x$
-3	
-2	
-1	
0	
1	
2	
3	

Domain: _____
Range: _____
Intercept(s):_____
Asymptote(s):_____

Domain: _____
Range: _____
Intercept(s):_____
Asymptote(s):_____

b) Write a few sentences summarizing the similarities and differences between the two graphs.

c) Write a few sentences describing what you think the graphs of $y = \left(\frac{1}{10}\right)^x$ and y = (0.6)^x will look like. Indicate how these graphs differ from those above. Verify your hypotheses by graphing the functions on your calculator.

d) Write a few sentences describing the general behavior of y = b^x when b> 1.

e) Write a few sentences describing the general behavior of y = b^x when 0< b< 1.

Since we know the effect of the value a on the graph of y = b^x, let's fix a value of b, say b = 2, and investigate the effect of the constant C on the graph of y =C b^x.

3a) Complete the tables of ordered pairs and sketch on the same set of axes y = 2^x, $y = 3(2^x)$, $y = 0.5(2^x)$ and $y = -3(2^x)$. Indicate the domain, range, intercept(s), and asymptote(s) of each function.

x	$y = 2^x$
-3	
-2	
-1	
0	
1	
2	
3	

Domain: _____
Range: _____
Intercept(s):_____
Asymptote(s):_____

x	$y = 0.5(2^x)$
-3	
-2	
-1	
0	
1	
2	
3	

Domain: _____
Range: _____
Intercept(s):_____
Asymptote(s):_____

x	$y = 3(2^x)$
-3	
-2	
-1	
0	
1	
2	
3	

Domain: _____
Range: _____
Intercept(s):_____
Asymptote(s):_____

x	$y = -3(2^x)$
-3	
-2	
-1	
0	
1	
2	
3	

Domain: _____
Range: _____
Intercept(s):_____
Asymptote(s):_____

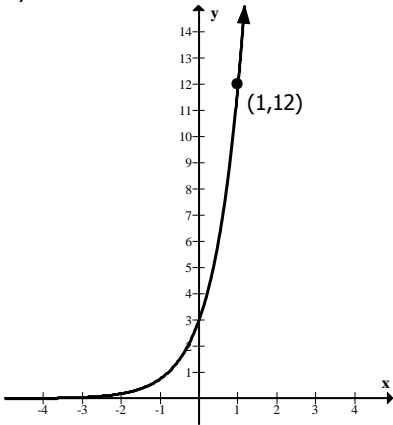b) Compare these graphs to the graph of y = 2^x, describing the effect of the constant C when C is:

- positive

- negative

- between 0 and 1.

(Describe these effects as transformations using the terms vertical stretch/shrink and refection and include appropriate axes).
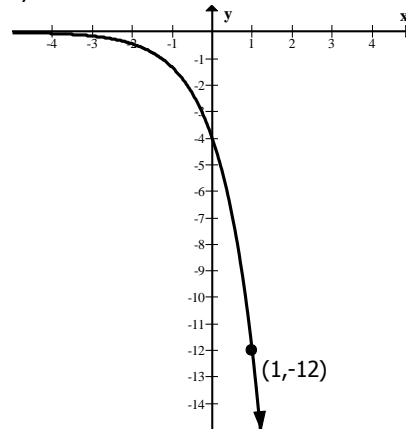
4. What is the y-intercept of the general function y = Cb^x? _____

5. Each of the graphs below represents a function of the form $y = Cb^x$, with $b>0$, $b\neq1$. In each case, write a formula for the function.
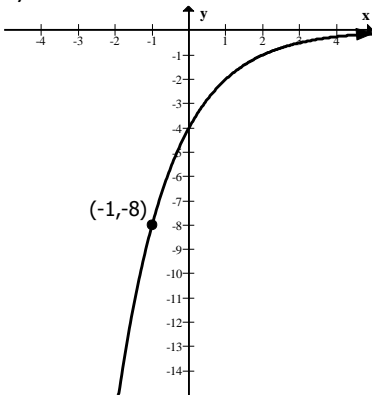
a)

(1,12)

b)

(1,-12)

c)

(-1,-8)

d)

(-1,12)