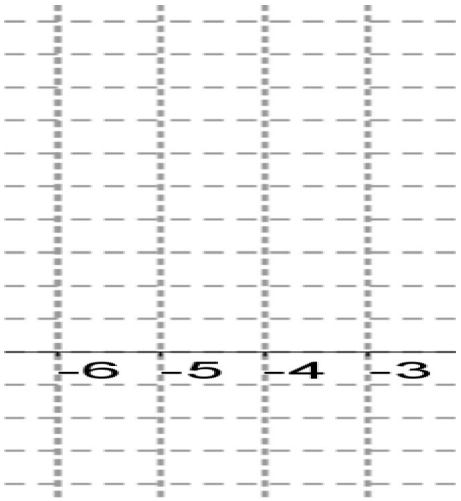
Part A: The Parent Function

1. Graph the function $y=2^x$ on the grid to the right.

x	y



2. List Key Properties of the graph:

Domain: _____

Range: _____

x-intercept: _____

y- intercept: _____

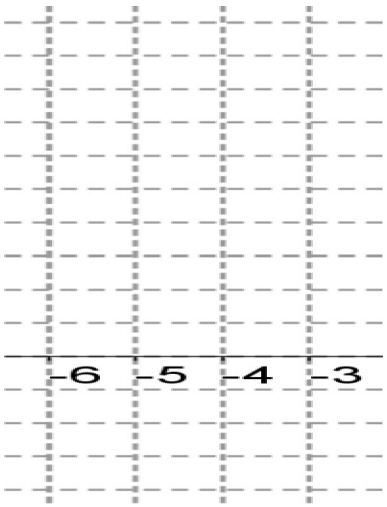
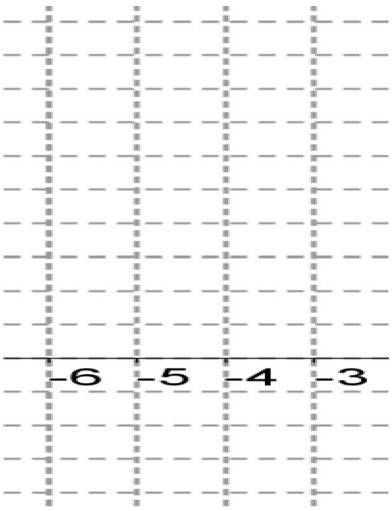
Vertical Asymptote: _____

Horizontal Asymptote: _____

Behaviour (increasing or decreasing): _____

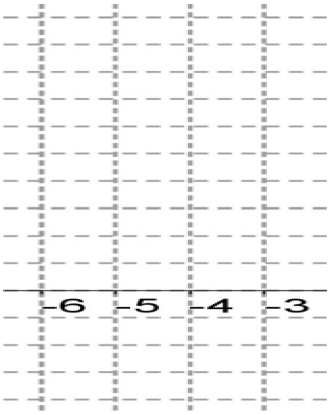
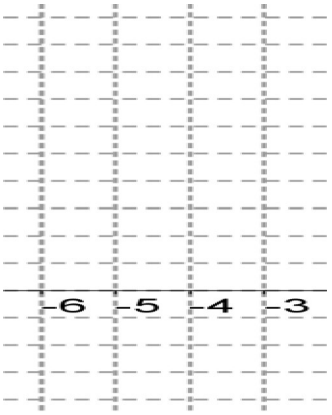
Part B: Investigating Transformations of Exponential Functions

1. Use your knowledge of transformations to describe the graph of each of the following and then sketch it.

Equation	$y=2^x+1$	$y=2^x-3$
What transformation do you need to apply to the parent function?		
Graph		
Key features (list the ones from Part A that are relevant to this graph)		
Function Notation	where $f(x)=2^x$	where $f(x)=2^x$

Given $y=2^x+q$, describe the effects of changing q in terms of a transformation and in terms of the key features.

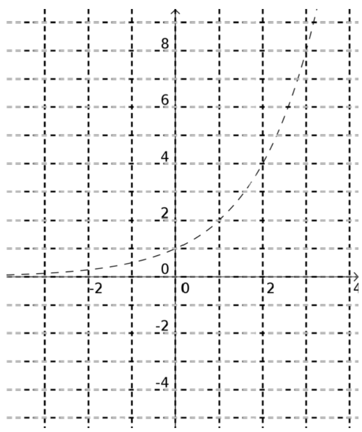
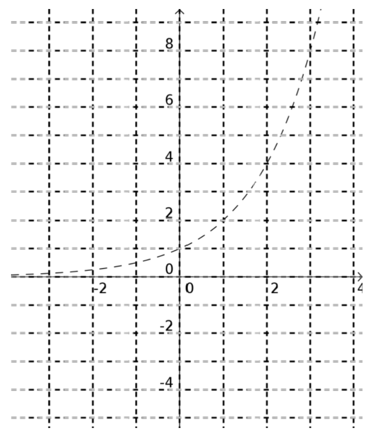
2. Use your knowledge of transformations to describe the graph of each of the following and then check your prediction using graphing technology.

Equation	$y=2(2^x)$	$y=\frac{1}{2}(2^x)$
What transformation do you need to apply to the parent function?		
Graph		
Key features (list the ones from Part A that are relevant to this graph)		
Function Notation	where $f(x)=2^x$	where $f(x)=2^x$

Given $y=a(2^x)$, ($a > 1$), describe the effects of changing a in terms of a transformation and in terms of the key features.

Given $y=a(2^x)$, ($0 < a < 1$), describe the effects of changing a in terms of a transformation and in terms of the key features.

3. Use your knowledge of transformations to describe the graph of each of the following and then check your prediction using graphing technology.

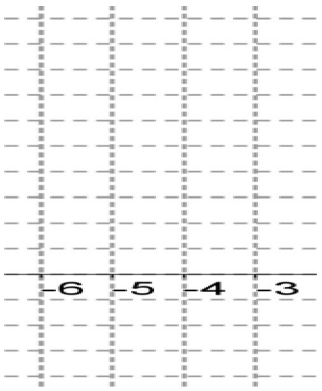
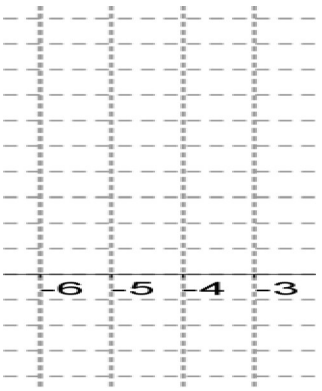
<table>
<tr><td>Equation</td><td>$y=-(2^x)$</td><td>$y=2^{-x}$</td></tr>
<tr><td>What transformation do you need to apply to the parent function?</td><td></td><td></td></tr>
<tr><td>Graph</td><td> 
</td><td> 
</td></tr>
<tr><td>Key features
(list the ones from Part A that are relevant to this graph)</td><td></td><td></td></tr>
<tr><td>Function Notation</td><td>where $f(x)=2^x$</td><td>where $f(x)=2^x$</td></tr>
</table>

Given $y=a(2^x)$, describe the effects of changing the sign of *a* in terms of a transformation and in terms of the key features.

Given $y=2^{kx}$, describe the effects of changing the sign of *k* in terms of a transformation and in terms of the key features.

Note: The equation $y=2^{-x}$ is equivalent to $y=\left(\frac{1}{2}\right)^x$.

4. Use your knowledge of transformations to describe the change to the graph for each of the following and then check your prediction by graphing.

Equation	$y=2^{x+1}$	$y=2(2^x)$
What transformation do you need to apply to the parent function?		
Graph		

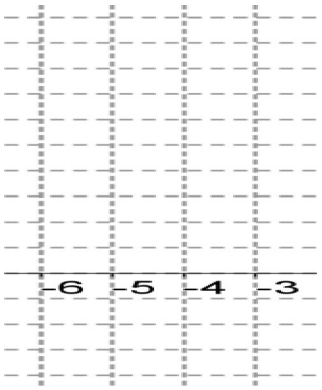
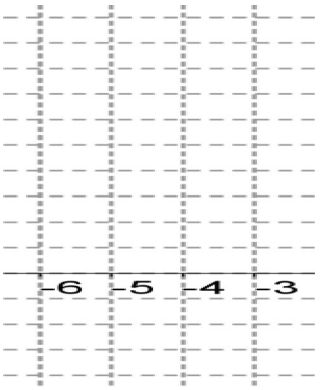
Given $y=2^{x-p}$, describe the effects of changing p in terms of a transformation.

What is an equivalent transformation?

Note: The graph of $y=2^{x+1}$ is the same as $y=2(2^x)$. Use this observation to help answer the question above.

Part C: Using Transformations to Sketch Exponential Functions

Complete each of the following, use your knowledge of transformations and, if you wish, a table of values.

Equation	$y=2(2^x)+1$	$y=2^{-x}-4$
What transformation do you need to apply to the parent function?		
Apply the transformation to the asymptote		
Sketch		
Function Notation	where $f(x)=2^x$	where $f(x)=2^x$
State the Domain & Range		

Changing the parent function:

Sketch the graph of $y=3^x$ (or graph using technology).

List Key Properties of the graph:

Domain:_ _

Range: _

x-intercept: _

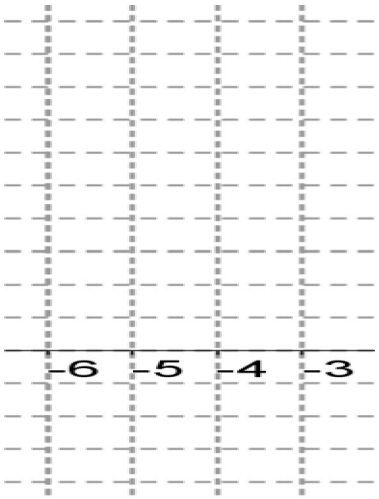
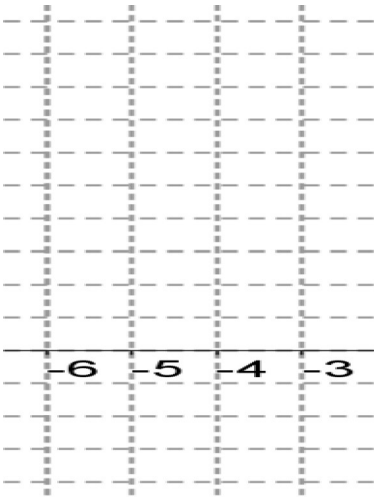
y- intercept: _

Vertical Asymptote: _

Horizontal Asymptote: _

Behaviour (increasing or decreasing): _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Complete each of the following <u>without</u> using graphing technology:

Equation	$y=\frac{1}{2}\left(3^{-x}\right)$	$y=\frac{3}{2}\left(3^{x}\right)-2$
What transformation do you need to apply to the parent function?		
Apply the transformation to the asymptote		
Sketch		
Function Notation	where $f(x)=3^{x}$	where $f(x)=3^{x}$
State the Domain & Range		

Start THINKING about the other transformations we have discussed in this course and why we are not discussing them with exponential functions.