Name: ____________________________________ Date: _________________

INTRODUCTION TO EXPONENTIAL FUNCTIONS
ALGEBRA 2 WITH TRIGONOMETRY

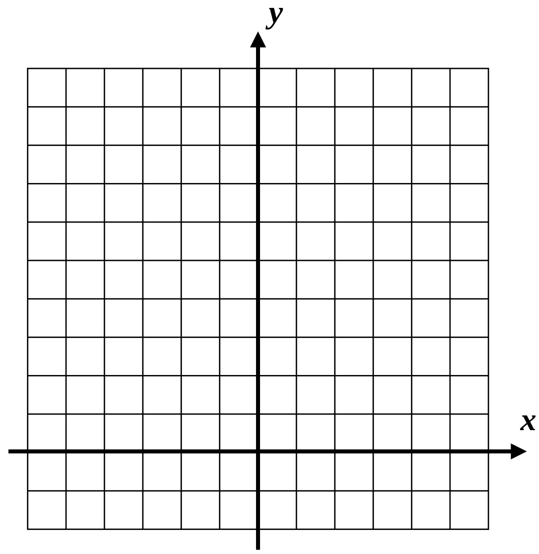
Exponential functions, those whose exponents are variable, are extremely important in mathematics, science, and engineering. Today we will be exploring the basic characteristics of the simplest exponential functions.

BASIC EXPONENTIAL FUNCTIONS

$y = b^x$ where $b > 0$ and $b \neq 1$

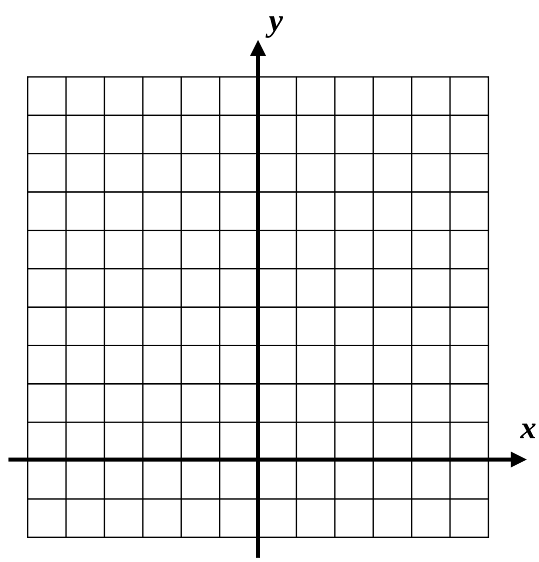
***Exercise* #1:** Consider the function $y = 2^x$. Fill in the table below without using your calculator and then sketch the graph on the grid provided.

x	$y = 2^x$
–3	
–2	
–1	
0	
1	
2	
3	



***Exercise* #2:** Now consider the function $y = \left(\frac{1}{2}\right)^x$. Using your calculator to help you, fill out the table below and sketch the graph on the axes provided.

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



***Exercise* #3:** Based on the graphs and behavior you saw in *Exercises* #1 and #2, state the domain and range for an exponential function of the form $y = b^x$.

***Exercise* #4:** Which of the following exponential functions would increase as x increases?

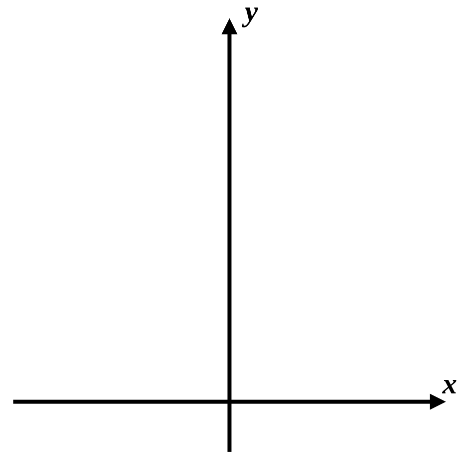
(1) $y = \left(\frac{2}{3}\right)^x$ (3) $y = \left(\frac{1}{2}\right)^x$

(2) $y = \left(\frac{5}{4}\right)^x$ (4) $y = \left(\frac{7}{8}\right)^x$

______

***Exercise* #5:** Now consider the function $y = 7(3)^x$.

(a) Determine the y-intercept of this function algebraically. Justify your answer.

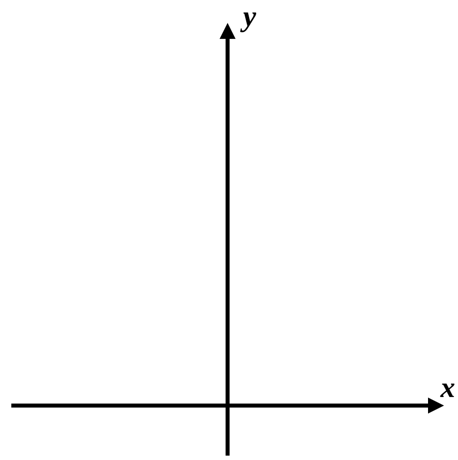


(b) Does the exponential function increase or decrease? Explain your choice.

(c) Create a rough sketch of this function, labeling its y-intercept.

***Exercise* #6:** Consider the function $y = \left(\frac{1}{3}\right)^x + 4$.

(a) How does this function's graph compare to that of $y = \left(\frac{1}{3}\right)^x$?



(b) Determine this graph's y-intercept algebraically. Justify your answer.

(c) Create a rough sketch of this function, labeling its y-intercept.

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INTRODUCTION TO EXPONENTIAL FUNCTIONS
ALGEBRA 2 WITH TRIGONOMETRY - HOMEWORK

SKILLS

1. Which of the following represents an exponential function?

(1) $y=3x-7$ (3) $y=3(7)^x$

(2) $y=7x^3$ (4) $y=3x^2+7$ ________

2. If $f(x)=6\left(\frac{1}{2}\right)^x$ then $f(3)=$

(1) $\frac{3}{4}$ (3) 9

(2) $\frac{5}{8}$ (4) $\frac{9}{2}$ ________

3. If $h(x)=3^x$ and $g(x)=5x-7$ then $h(g(2))=$

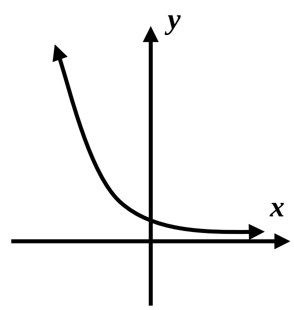
(1) 18 (3) 38

(2) 12 (4) 27 ________

4. Which of the following equations could describe the graph shown below?

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

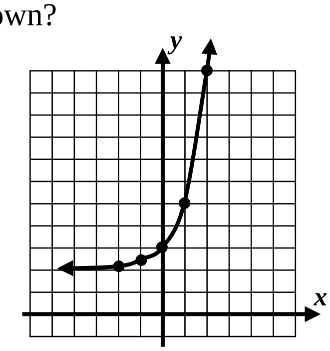
(2) $y=\left(\frac{2}{3}\right)^x$ (4) $y=4^x$ ________



5. Which of the following equations represents the graph shown?

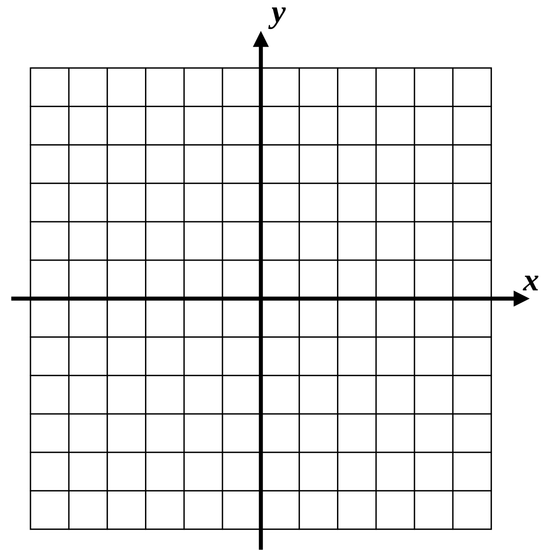
(1) $y=5^x$ (3) $y=\left(\frac{1}{2}\right)^x+2$

(2) $y=4^x+1$ (4) $y=3^x+2$ ________



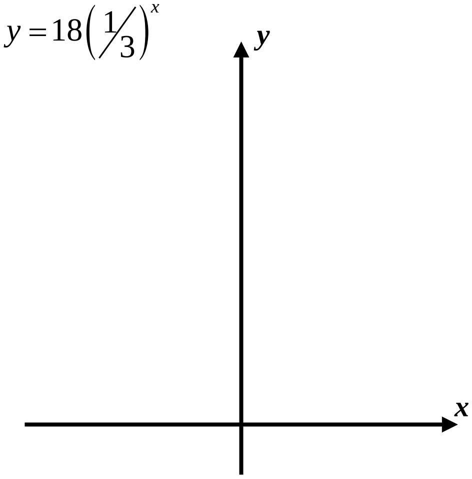
6. Graph the function $y = 2^x - 3$ for all values of x on the interval $-3 \le x \le 3$. Use your calculator to help generate a table of values. Show your table of values below.

x	y
–3	
–2	
–1	
0	
1	
2	
3	

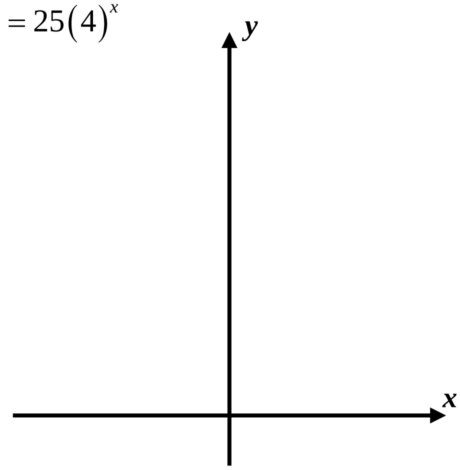


7. Sketch graphs of the equations shown below on the axes given. Label the y-intercepts of each graph.

(a) $y = 18\left(\frac{1}{3}\right)^x$



(b) $y = 25(4)^x$



REASONING

8. Explain why the equation below can have no real solutions. If you need to, graph both sides of the equation using your calculator to visualize the reason.

$$3^x + 5 = 2$$