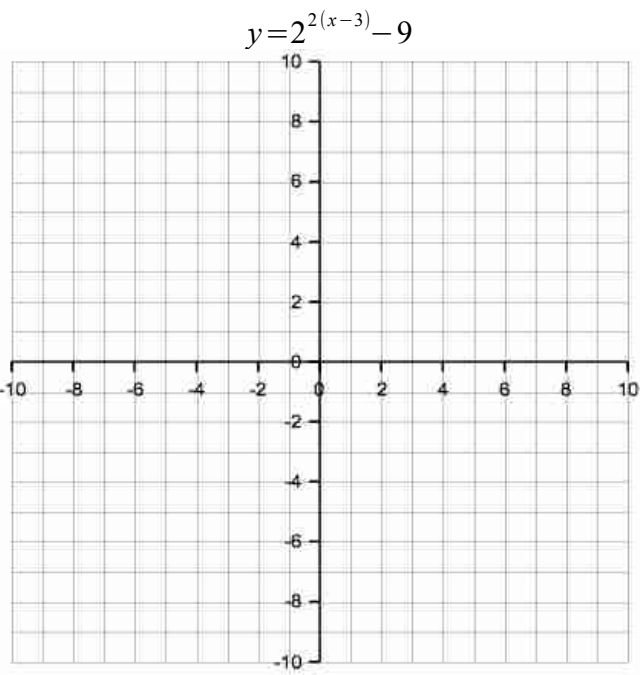
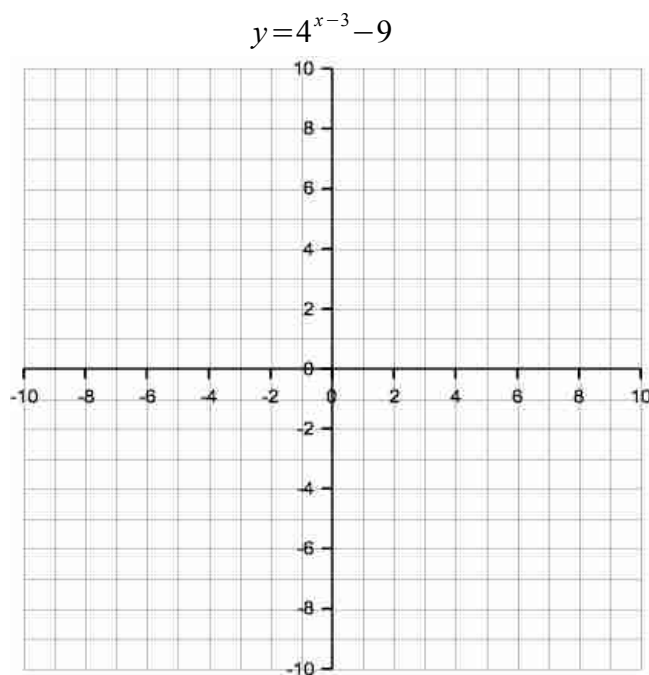


Exploring Exponential Functions

1.

a) Graph each of the following equations.



b) Are there any similarities between the graphs?

c) Use your knowledge of exponent laws to show why this is the case.

d) How would the graphs of $y = \left(\frac{1}{4}\right)^{x-7} - 13$ compare to the graph of $y = 2^{-2(x-7)} - 13$?

e) Write an **equivalent exponential equation** for $y = \left(\frac{1}{9}\right)^{x+19} - 8$.

Homework

1. Write equivalent exponential expressions for each of the following. In the process, eliminate the horizontal reflection.

- | | |
|--|--|
| a) $y = 2^{-x}$ | e) $y = 8\left(\frac{1}{2}\right)^{-7(x+3)} + 4$ |
| b) $y = \left(\frac{1}{3}\right)^{-x}$ | f) $y = 9(3)^{-\frac{1}{2}x}$ |
| c) $y = \left(\frac{1}{3}\right)^{-2x}$ | g) $y = 9(3)^{-\frac{1}{2}(x+6)} - 8$ |
| d) $y = 2\left(\frac{1}{2}\right)^{-7x}$ | h) $y = -\left(\frac{8}{9}\right)^{-\frac{1}{2}(x+6)} + 8$ |

2. Write equivalent exponential expressions for each of the following. In the process, make the vertical stretch 1.

- | | |
|---|--|
| a) $y = (4)2^x$ | e) $y = 8\left(\frac{1}{2}\right)^{x+3} + 4$ |
| b) $y = \left(\frac{1}{3}\right)\left(\frac{1}{3}\right)^{x+1}$ | f) $y = 16\left(\frac{1}{2}\right)^{27x} + 1$ |
| c) $y = \left(\frac{1}{3}\right)^{-2x}$ | g) $y = \left(\frac{9}{4}\right)\left(\frac{3}{2}\right)^x - 7$ |
| d) $y = 32(2)^{3x+2}$ | h) $y = \frac{64}{81}\left(\frac{8}{9}\right)^{-\frac{1}{2}(x+6)} + 8$ |

3. Write equivalent exponential expressions for each of the following. In the process, change the base of the exponential function.

- | | |
|--|--|
| a) $y = 4^x$ | e) $y = \left(\frac{1}{27}\right)^{x+3} + 4$ |
| b) $y = \left(\frac{1}{16}\right)^{x+1}$ | f) $y = 3(9)^{21x} + 1$ |
| c) $y = \left(\frac{1}{9}\right)^{-2x}$ | g) $y = (2)^{4x} - 7$ |
| d) $y = 64^{8x}$ | h) $y = (7)^{-14(x+6)} + 8$ |

4. Give two different equivalent exponential expressions for each of the following:

- | | |
|--------------------------|---|
| a) $y = 4(2)^{x-1} + 10$ | b) $y = 3\left(\frac{1}{27}\right)^{x+9} - 1$ |
|--------------------------|---|

5. On a separate sheet, graph $f(x) = 4\left(\frac{1}{2}\right)^{-2(x-4)} - 7$ and $g(x) = 4^{x-5} - 7$. Are they equivalent? Prove your conclusion using exponent laws.