# MCR3U Exponential Functions Assignment

1. Evaluate. Show how you can determine the answer without relying on a calculator.

a) $2^{-5}$ b) $27^{-\frac{2}{3}}$ c) 81 ¼

2. Evaluate. Show how you can determine the answer without relying on a calculator.

a) $\frac{2^{1000}}{2^{1002}}$ b) $\frac{3}{\sqrt{3}}x + 3^{\frac{1}{2}}x$ c) $\sqrt[3]{\frac{-1}{8}x^{6}}$

3. Simplify each expression.

a) $2^{x-2}$ b) $\frac{\left(x^{\frac{3}{5}}\right)^{5}\left(\sqrt[4]{x}\right)^{8}}{x^{-1}}$ c) $\frac{48a^{\frac{4}{3}}b^{\frac{2}{5}}}{16a^{\frac{-1}{3}}b^{\frac{7}{5}}}$

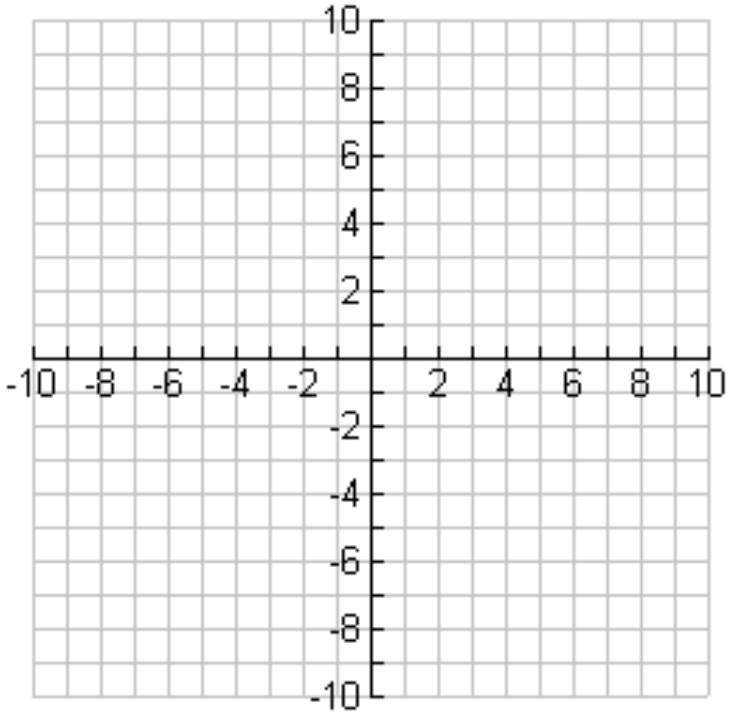
4. Simplify: $\left(\sqrt[4]{\frac{64x^{-5}y^{7}}{36xy^{3}}}\right)^{2}$

5. Describe the graph of the following equation: $f(x) = 5\left(\frac{1}{2}\right)^{x+2} - 7$

a) Is the function increasing or decreasing?

b) Identify the parent function

c) Describe and (on the grid below) sketch the graph of this parent function.




d) Identify the asymptote of the parent function.

e) Determine the location of the y-intercept of the parent function.

f) Describe how the graph of $f(x) = 5\left(\frac{1}{2}\right)^{x+2} - 7$ differs from its parent function $f(x) = \left(\frac{1}{2}\right)^{x}$. What transformations have occurred? How have they effected its graph?

6. The population of Ontario in 2005 was about 11 514 000. At that time the annual growth rate was 1.1%.

a) Write an expression to model the population growth.

b) Use this expression to predict the population of Ontario in 2013.

7. The Escherichia coli culture (better known as e coli) doubles every 40 minutes. If 30 e coli are present initially, what will the number of e coli be after 3 hours?

8. The population of an Ontario town grew from 1250 to 10 000 in 5 years due to the establishment of a large industry in the area. If the growth is exponential, what is the annual rate of growth as a percentage?

9. Gavin purchased a new truck that was worth $59 000. It depreciates in value by 15% each year. At this rate, when will the truck be worth $2000?