Name: _____   Date: _____

Chapter 6 Test

1. The graph of $y = 2^{x+3}$ is shown.
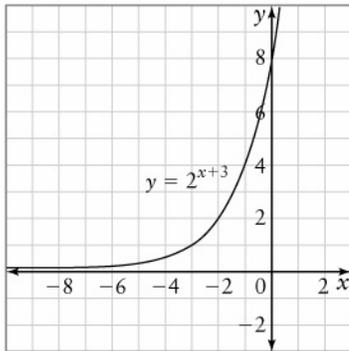
a) List the key features of the function (domain, range, intercepts, equation(s) of asymptote(s), intervals for which the function is positive and intervals for which it is negative, intervals for which the function is increasing and intervals for which it is decreasing)

b) Graph $y = x$ and the inverse of the $y = 2^{x+3}$ on the same set of axes.

c) State the equation of the inverse.

2. a) Sketch the graph of
$y = -2\log_3(x+4)$

b) State the domain, the range, and the equation for the asymptote of
$y = -2\log_3(x+4)$.

3. Determine an equation for the graph shown.
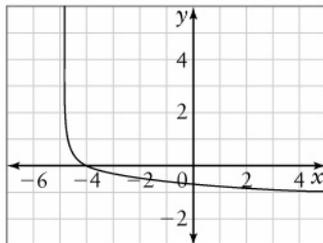
4. Evaluate without using a calculator.
   a) $\log 1000$ b) $\log_4 256$
   c) $\log_5 \sqrt[4]{125}$ d) $\log_9 27$

5. Solve for x, correct to three decimal places.
   a) $x = \log 356$ b) $x = \log_4 40$
   c) $17 = 5^x$ d) $9 = 40(2)^{2x+1}$

6. An investment earns interest compounded annually for 12 years. In that time, its value grows from $2500 to $7100. What was the interest rate, to the nearest tenth of a percent? Use the formula $A = P(1+i)^n$.

7. The decibel scale is defined by
$$\beta_2 - \beta_1 = 10\log\left(\frac{I_2}{I_1}\right).$$
   a) The intensity of a sound at the threshold of hearing (0 dB) is 10^{-12} W/m². What is the intensity of a 50 dB sound?
   b) How many times as intense is an 85 dB sound than a 50 dB sound?
   c) A noise is 400 times as intense as a 60 dB sound. What is the decibel rating of this noise?

8. The amount of radioactivity that gets through a barrier is modelled by the function $A(x) = 100(0.45)^{\frac{x}{3}}$, where A is the percent of radioactivity that gets through and x is the thickness of the barrier in centimetres. If 95% of the radioactivity must be stopped, how thick must the barrier be, to the nearest tenth of a centimetre?

9. The magnitude of a star's brightness is given by the formula

$$m_2 - m_1 = \log\left(\frac{b_1}{b_2}\right),$$ where m is the

apparent magnitude of the star (how bright it appears in the sky) and b is the brightness of the star (how much light the star actually gives off).

a) If the magnitudes of two stars are 0.5 and 3.1, how much brighter is one star than the other?

b) What is the magnitude of a star that is 2.5 times brighter than a star of magnitude 0?