6.5 Applications of Common Logarithms

Obj: 1. Define & use common log. to solve log. & exp. eqs.
2. Use the change of base formula.

Solve: $5^x = 62$

$\log_5 62 = x = \frac{\log_{10}(62)}{\log_{10} 5} \approx 2.56$

Change of Base

$$\log_b x = \frac{\log_a x}{\log_a b}$$

Feb 19-10:56 AM

$8^x = 792$

$\log_8 792 = x$

$x = \frac{\log 792}{\log 8}$

≈ 3.21

OR

$\log 6^x = \log 82$

$x \log 6 = \log 82$

$\frac{x \log 6}{\log 6} = \frac{\log 82}{\log 6}$

$x = \frac{\log 82}{\log 6} \approx 2.46$

Feb 19-11:15 AM

Evaluate:

$\log_7 56$

$\frac{\log 56}{\log 7}$

2.07

$\log_8 36$

$\frac{\log 36}{\log 8}$

1.72

Feb 19-11:20 AM

$R = 10 \log \frac{I}{I_0}$

I: intensity of sound

I_0: threshold of hearing

R: relative intensity (decibels)

The intensity of a whisper is 300 times as loud as the threshold of hearing. Find the whisper's relative intensity.

$R = 10 \log \frac{I}{I_0}$ $\quad I = 300 I_0$

$R = 10 \log \frac{300 I_0}{I_0}$

$R = 10 \log 300 = 24.77$

Feb 19-11:21 AM

The relative intensity of a vacuum cleaner is about 70 decibels. Compare this to the threshold of hearing.

$R = 10 \log \frac{I}{I_0}$

$\frac{70}{10} = \frac{10 \log \frac{I}{I_0}}{10}$

$7 = \log \frac{I}{I_0}$

$10^7 = \frac{I}{I_0}$

Feb 19-11:25 AM