

Solving Logarithmic Equations



Overview of problems



Example Set: A

Solve the logarithmic equations

$$\log 5x = 2$$

$$2\log_3 x = 6$$

$$\ln \frac{1}{2}x = -3$$

$$14 + 3\log x = 18$$

$$\log_5 3x - 1 = 2$$

$$\frac{1}{2}\ln x + \ln e = 4$$



Example Set: B

Solve the logarithmic equations

$$\log(3x + 7) + \log(x - 2) = 1$$

$$\log x + \log(x + 4) = 3$$

$$\ln(2x - 1) - \ln x = 5$$

$$\ln(x + 2) + 2 \ln e = \frac{1}{3} \ln 27$$



Example Set: C

Earthquakes and the Richter Scale

How much more intense is a 6.0 magnitude earthquake compared to a 4.5 magnitude earthquake?
(use the formula below)

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

R = the magnitude of earthquake

I = the intensity of earthquake

I_0 = minimum intensity to compare;
for this problem use $I_0 = 1$.

Solving Logarithmic Equations



Overview of problems- KEY



Example Set: A

Solve the logarithmic equations

$$\log 5x = 2$$

$$x = 20$$

$$2 \log_3 x = 6$$

$$x = 27$$

$$\ln \frac{1}{2} x = -3$$

$$x = \frac{2}{e^3}$$

$$14 + 3 \log x = 18$$

$$x = 21.54$$

$$\log_5 3x - 1 = 2$$

$$x = 41.\bar{6}$$

$$\frac{1}{2} \ln x + \ln e = 4$$

$$x = e^6$$



Example Set: B

Solve the logarithmic equations

$$\log(3x + 7) + \log(x - 2) = 1$$

$$x = -3$$

$$x = 8/3$$

$$\log x + \log(x + 4) = 3$$

$$x = \frac{-4 \pm \sqrt{4016}}{2}$$

$$\ln(2x - 1) - \ln x = 5$$

$$x = -.00683$$

$$\ln(x + 2) + 2 \ln e = \frac{1}{3} \ln 27$$

$$x = -1.593$$



Example Set: C

Earthquakes and the Richter Scale

How much more intense is a 6.0 magnitude earthquake compared to a 4.5 magnitude earthquake?
(use the formula below)

31.62

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

R = the magnitude of earthquake

I = the intensity of earthquake

I_0 = minimum intensity to compare;
for this problem use $I_0 = 1$.