

Answer on Question#43295 – Math – Algebra

The atmospheric pressure P in pounds per square inch (psi) is given by $P = 14.7 e^{-0.21a}$, where a is the altitude above sea level (in miles). If a city has an atmospheric pressure of 12.11 psi, what is its altitude? (Recall that 1 mi = 5,280 ft. Round your answer to the nearest foot.)

Solution:

$$P = 14.7 e^{-0.21a}$$

$$\text{Given: } P = 12.11$$

$$12.11 = 14.7 e^{-0.21a}$$

Dividing both side on 14.7

$$e^{-0.21a} = \frac{12.11}{14.7}$$

$$\ln e^{-0.21a} = \ln \left(\frac{12.11}{14.7} \right)$$

$$-0.21a \ln e = \ln \left(\frac{12.11}{14.7} \right)$$

$$-0.21a = \ln \left(\frac{12.11}{14.7} \right)$$

$$a = \frac{\ln \left(\frac{12.11}{14.7} \right)}{-0.21} \text{ miles} = 5,280 \frac{\ln \left(\frac{12.11}{14.7} \right)}{-0.21} \text{ feet} = 4,873 \text{ feet}$$

Answer: The altitude is 4,873 feet.