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Problems Involving Both Logarithms and Exponents - Guided Lesson Explanation

Explanation#1

The monthly payment cost of a long term mortgage can be calculated using the following formula:

$$P = \frac{r.M}{1-\left(1+\frac{r}{n}\right)^{-n.t}} \div n$$

Substitute $500,000 for M (the mortgage amount)

12 for n (the number of payments per year, 25 for t (the number of years), and 12.50% for r (the annual interest rate).

You are solving for P (the monthly payment)

Put the values in the equation.

$$P = \frac{0.125\,.\,\$500000}{1-\left(1+\frac{0.125}{12}\right)^{-12.30}} \div 12$$

The mortgage payment is $5,451.77 per month.

Explanation#2

Step 1) Convert the first sentence to an equivalent mathematical sentence or equation.

$$M_{SF} = log\frac{I_{SF}}{S} = 5$$

$$5 = log\frac{I_{SF}}{S}$$

Step 2) Convert the second sentence to an equivalent mathematical sentence or equation.

$$M_{SA} = log\frac{I_{SA}}{S}$$

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$$I_{SF} = 4I_{SA}$$

$$M_{SA} = log\frac{4I_{SF}}{S}$$

Step 3) Then solve for M_{SA}.

$$M_{SA} = log\frac{4I_{SF}}{S}$$

$$M_{SA} = log4I_{SF} - Log\ S$$

$$M_{SA} = log4 + logI_{SF} - logS$$

$$M_{SA} = log4 + (logI_{SF} - logS)$$

$$M_{SA} = log4 + log\frac{I_{SF}}{S}$$

$$M_{SA} = log4 + 5$$

$$M_{SA} = 0.60205999 + 5$$

$$M_{SA} = 5.60205999$$

The magnitude of earthquake in Japan was 5.60205999.

Explanation # 3

We can calculate the growth by using the growth formula.

$A= P(1+i)^n$

Assume P= x.

Since we want to know when the growth will be quadruple, A= 4x. For this example n represents a period of 2 years, therefore the n is halved for this propose.

Step 3) Substitute information given into formula.

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$4 = (1.15)^{n/2}$

Log 4= n/2* x log 1.15

n= 2 log 4 / log 1.15

n= 0.95424250 / 0.06069784

n= 15.72

Step 4) It will take approximately 15 years & 6 months for the growth of student population to reach 4 times the current size.