

1. Mr Sanchez gets a small group of volunteers to rebuild part of the **Iglesia de Nuestra Señora de la Limpia Concepción**, one of the oldest churches in Costa Rica. Before it was finally finished in 1580, stonemasons constructed the church out of blocks of limestone using the traditional technique of *calicanto*. Mr. Sanchez found 115 blocks of limestone that can be preserved and use for this National Monument. Every week, Mr. Sanchez and his volunteers can build 50 blocks onto this foundation. It is estimated that they will need about 12,000 blocks of limestone to finish this project. *growth per week*

A) Fill in the table.

Weeks (x)	0	1	2	3	4	5	6	7	x
Blocks of Limestone (y)	115	165	215	265	315	365	415	465	$y = 50x + 115$

B) How many blocks did Mr. Sanchez have when he started building (week 0)? Explain how you found this amount.

*Mr. Sanchez found 115 blocks of limestone before his group of volunteers began the project. So, at week 0, they have 115 blocks.*

C) Write an equation for this scenario.

$y = mx + b$   
*growth "begin"/starting point at fig #0*  
 $y = 50x + 115$

D) How many blocks will Mr. Sanchez and his volunteers have constructed in the church on week 20? Show your work.

$y = \text{blocks of limestone}$   
 $x = \text{weeks} \rightarrow "20"$

$$y = 50x + 115$$

$$y = 50(20) + 115$$

$$y = 1000 + 115$$

$$y = 1115 \text{ blocks}$$

E) At the end of what week will he have enough blocks of limestone to rebuild the church? Justify your answer (You may estimate in years).

*More possible methods 😊*

$x = \text{weeks}$   
 $y = \text{blocks of limestone}$   
*to finish project is 12,000 blocks*

*blocks: 12,000*

$$y = 50x + 115$$

$$\begin{array}{r} 1199 \\ - 115 \\ \hline 11884 \end{array} \quad \begin{array}{r} 50x + 115 \\ - 115 \\ \hline 50x \end{array}$$

$$\begin{array}{r} 11884 \div 50 \\ \hline 237.68 \end{array} \quad \begin{array}{r} 50x \div 50 \\ \hline x \end{array}$$

$237.68 \text{ wks} \div 52 \text{ wks/year} \approx 4.57 \text{ years}$

F) What is the growth rate for this problem? What does the unit rate mean in the context of this problem?

- Each week, Mr. Sanchez's group builds 50 blocks of limestone. So the growth rate is 50 blocks.
- The unit rate is 50 blocks per 1 week.

#2 The late 18th century and early 19th century saw floods, earthquakes, and health crises, so the villagers were forced to move away from **Iglesia de Nuestra Señora de la Limpia Concepción**, one of the oldest churches in Costa Rica. As the people vanished, the church fell into ruin. Every year, the church's blocks of limestone are destroyed roughly by 50 blocks. If the church has only 450 blocks left, what will it look like after another ten years?

A) Make a table for this scenario. You may need to add **more columns** in order to solve the problem.

Years (x)	0	1	2	3	4
Remaining Blocks (y)	450	400	350	300	250

$-50$   $-50$   $-50$   $-50$

B) Graph the data on your table on the given graph.



C) Write an equation for this situation.

Equation:  $y = -50x + 450$

$y = \boxed{-50}x + \boxed{450}$

$-50$  growth      started/began at 450 (currently)

D) How long will this church remain with whole blocks of limestone? How do you know?

$$0 = -50(x) + 450$$

$$0 = -450 + 450$$

$\therefore 9$  weeks

E) How can you use your graph to answer the question?

At year 9, the blocks of limestone is 0.

(Hint:  $(9, 0)$  coordinate)

F) How can you use your equation to answer the question?

$x = \text{years}$      $y = \text{tiles/blocks}$

$$y = -50x + 450$$

$$\text{none left} \rightarrow 0 = -50x + 450$$

$$-450 = -50x$$

$$\div (-50) \quad \div (-50)$$

$$9 = x$$

$x = 9 \text{ yrs}$

F) What is the growth rate for this problem and what does that it mean? (Hint: Is this increasing or decreasing?)

The growth rate is  $-50$  blocks/year.  
This is decreasing, since the rate/slope is moving down.

(Note: increasing ("up") & decreasing ("down").)