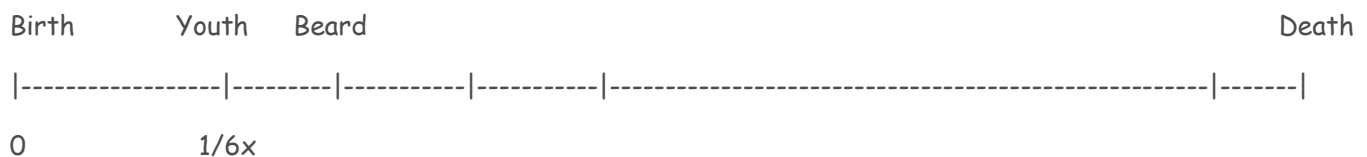


Diophantus' Riddle ,

"Diophantus' youth lasts $\frac{1}{6}$ of his life. He grew a beard after $\frac{1}{12}$ more of his life. After $\frac{1}{7}$ more of his life, Diophantus married. Five years later, he had a son. The son lived exactly half as long as his father, and Diophantus died just four years after his son's death. All of this totals the years Diophantus lived."

Suggested strategy to Solve: You can solve this several different ways, but here is one way. Draw a timeline of the riddle, and mark the events in the riddle with the information Diophantus gave us. It has been started for you:



Diophantus gave us the information in the form of fractions of what we don't know, his lifespan, and some exact numbers of years. Let's add these up in a column of units of "X" - the total number of years Diophantus lived - and a column of constant years:

Fractions of X:

Constants:

Combine all your like terms (x's), and multiply denominators to get a common denominator. You should at this point have an equation of what X - his lifespan equals:

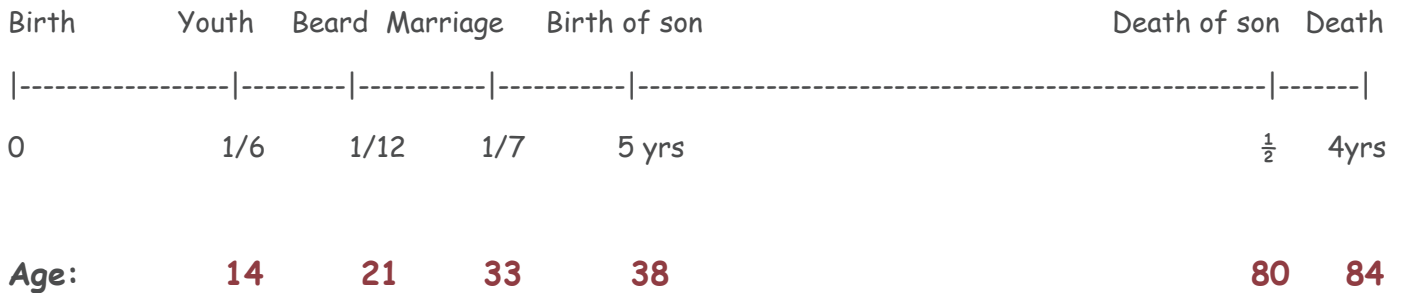
$$X = X + \underline{\hspace{2cm}}$$

Using the basic algebraic procedures of grouping all X's on one side of the equation, constants on the other, and multiplying or dividing to eliminate the co-efficient of X, what age do you come up with?

Living Math Through History
Lesson 9 Famous Alexandrians Activity Handouts

✓ Solution to Diophantus' Riddle

Diophantus lived to a ripe old age of **84** years.



How old was Diophantus when:

- He grew a beard? **21**
- He got married? **33**
- His son was born? **38**
- How long did his son live? **42 years**

Circular Reasoning: The Melon Problem 

Read the story on page 81, Chapter 12 of *The Man Who Counted* by Malba Tahan before working this problem. You may be able to read this online via [Google Books](#) or on this website: <http://www.arvindguptatoys.com/arvindgupta/count.pdf>

The story sets up the following scenario:

Harim has 30 melons to be sold three for a dinar (10 dinars)

Hamed has 30 melons to be sold at two for a dinar (15 dinars)

Harim and Hamed calculated that 30 melons sold @ three per dinar plus 30 melons sold @ two per dinar equals a **total of 60 melons** sold for $10 + 15 =$ **25 dinars**, their expected proceeds.

The merchant, however, was worried that if he sold the melons at different prices, he'd either lose buyers if he started with the high price, or he wouldn't be able to sell the more expensive melons if he started with the lower priced melons. So, he did the following:

- 60 melons were divided into lots of 5 melons each = 12 lots of 5 melons each.
- Each lot of five melons was sold for two dinars, since Harim's price was three for one dinar, and Hamed's was two for one dinar.
- He then sold twelve lots times two dinars = 24 dinars

Hmmm, what happened to the other dinar? See if you can figure it out before looking at the solution.

✓ The Melon Problem Solution

The first lot was to receive $\frac{1}{3}$ of a dinar per melon (3 melons per dinar), and the second lot was to receive $\frac{1}{2}$ of a dinar per melon (2 melons per dinar).

In order to find a "blended" or weighted cost for both lots (or groups), since the lots were equal, we could add the fractions and average them:

Price of the first lot: $\frac{1}{3}$ dinar per melon

plus

Price of the second lot: $\frac{1}{2}$ dinar per melon

$$\frac{1}{3} + \frac{1}{2}$$

Divided by the two lots to average =

$\frac{5}{12}$ dinars per melon was expected.

We can check this by multiplying $\frac{5}{12}$ times the 60 melons - do we get 25 dinars?

Another way to figure this out is to divide the 25 dinars the merchant expected to get, by the 60 melons, and again you get $\frac{25}{60}$ - divide the numerator and the denominator by 5, and this reduces to $\frac{5}{12}$ of a dinar per melon. Same answer.

The merchant in fact, however, priced the melons at 24 dinars for 60 melon - $\frac{24}{60}$ - simplified to $\frac{2}{5}$ a dinar per melon (the fraction means, two dinars for five melons).

How much did he give away with each sale? The difference between the $\frac{5}{12}$ he should have gotten, and the $\frac{2}{5}$ he took,

$\frac{25}{60} - \frac{24}{60} = \frac{1}{60}$ th of a dinar **on each melon** was given away.

Is there any possible way the merchant could have sold all the melons in even lots at one price a total profit of 25 dinars?