Gabe had a job as a busboy at a local restaurant and he had been saving money since he got the job a few months ago. Before he got the job, Gabe borrowed some money from his older brother to buy comic books. In the beginning of March, Gabe had some money in his savings.
At the beginning of every month Gabe was able to deposit enough money in his savings account to double it. Every month he also used the money he earned to pay his brother $15 for the comic book loan.

At the end of August, Gabe had $111 left in his account. How much did Gabe have at the beginning of March?

MATH STANDARDS ALIGNMENT
CCSS.MATH.CONTENT.8.EE.C.7: Solve linear equations in one variable.

> **Personal Finance Big Ideas:**
> *Setting Goals, Debt, Scarcity*

METHOD 1
I thought I'd start by noticing the information in the problem:
I noticed:

- Gabe has a savings account
- Gabe has a job
- Gabe earns money at his job
- Gabe borrowed money from his job
- Gabe had some unknown amount of money in his account at the beginning of March
- Gabe deposits money in his account every month and it doubles his balance when he does
- Gabe pays his brother $15 every month
- At t he end of August Gabe has $111 in his account

Then I wondered:

- How much did Gabe make each month?
- Did he like the comics he bought?
- How much did he have in his account at the beginning of March?
- How much did he spend each month?
- Did he like his job?

I started by assigning a variable to represent Gabe's beginning balance:

Let x = the amount of money (in dollars) in Gabe's savings account at the beginning of March.
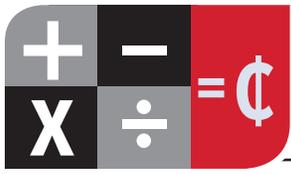
I want to model what's happening and I think it work to do it monthly.

At the beginning of March Gabe's balance was x.

His first deposit will double his balance, so it must be x. I also know that he will withdraw $15 to pay back his brother. So at the beginning of April, his balance will be (2x -15).

At the beginning of the month	Double his account balance	Withdraw $15 to pay his brother	Account balance at the end of the month
March Balance= x	2x	2x -15	2x - 15
April Balance= 2x - 15	2(2x – 15) = 4x - 30	4x - 30 - 15	4x - 45
May Balance= 4x - 45	2(4x – 45) = 8x - 90	8x - 90 - 15	8x - 105
June Balance= 8x - 105	2(8x – 105) = 16x - 210	16x – 210 - 15	16x - 225
July Balance= 16x - 225	2(16x – 225) = 32x - 450	32x – 450 - 15	32x - 465
August Balance= 32x - 465	2(32x – 465)= 64x - 930	64x – 930 - 15	64x - 945

Now I from my table I can see that his account balance was (64x – 945) at the end of August. I also know that at the end of August he had $111 in his account, so I can set (64x - 945) is equal to $111 and solve for x.

$$64x - 945 = 111$$
$$64x = 1056$$
$$x = 16.5$$

So, at the beginning of March, Gabe had $16.50 in his account.
To check this, I can use an excel table:

Balance at the beginning of the month		Double the Balance	Pay $15 to brother	Balance at the end of the month
March	$16.50	$33.00	$33.00 - $15.00	$18.00
April	$18.00	$36.00	$36.00 - $15.00	$21.00
May	$21.00	$42.00	$42.00 - $15.00	$27.00
June	$27.00	$54.00	$54.00 - $15.00	$39.00
July	$39.00	$78.00	$78.00 - $15.00	$63.00
August	$63.00	$126.00	$126.00 - $15.00	$111.00

Great! It checks out, so Gabe started with $16.50 in his account.