Ruth really wants a complex lego set. She only have $15 saved from the toothfairy, birthday presents and allowance. Her grandmother said she’d lend her the additional $75 to get the lego set, but Ruth will have to pay her back. To help Ruth figure out how to pay her back, her grandmother says she has to pay her back in 10 months, or $7.50 a month.

1. After 3 months how much will Ruth have paid?
2. Ruth wants to pay her grandmother back in 6 months, how much should she pay her each month?
3. If her grandmother charged her $0.25 extra a month as interest, how much would Ruth have paid in interest after 10 months?
4. Why might her grandmother charge interest?

**MATH STANDARDS ALIGNMENT:**
Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

**Personal Finance Big Ideas:**
Debt, Scarcity, Setting goals

**METHOD 1**
1. I know that Ruth borrowed $75 from her grandmother and her grandmother wanted her to pay her back $7.50 for 10 months. After 3 months, Ruth will have paid $7.50 three times. So she would have paid $7.50 + $7.50 + $7.50, I can see that’s $7(3) + $0.50(3) which equals $21 + $1.50, or, $22.50. So, after 3 months Ruth will have paid $22.50.
2. I know Ruth wants to pay her grandmother back in 6 months, which is shorter than 10 months, so I know she’ll have to pay more than $7.50 a month. I thought I could guess and check to figure out how much she’d have to pay.
   For each amount I guess, I can multiply it by 6 months and see how much she’d pay.
   For my first guess, I will try $9. $9(6) = $54, too low.
   For my next guess, I will try $10. $10(6) = $60, too low.
   For my next guess, I will try $11. $11(6) = $66, too low.
   For my next guess, I will try $14. $14(6) = $84, too high.
   For my next guess, I will try $12. $12(6) = $72, too low.
   For my next guess, I will try $13. $13(6) = $78, too high.
   I need to try something between $12 and $13, I'll try $12.50
   For my next guess, I will try $12.50. $12.50(6) = $75, perfect!
3. If her grandmother charged her an extra $0.25 a month as interest, Ruth would pay $7.75 a month for 10 months, so she’d end up paying $7.75(10) = $77.50, which is $2.50 more than without interest.
4. I guess Ruth’s grandmother might want to charge interest to help Ruth think about why she might want to save money before buying something, so she doesn’t have to pay extra money when she needs to borrow money just for the borrowing.
METHOD 2

1. I know Ruth borrowed $75 from her grandmother. And her grandmother asked her to pay her $7.50 a month to pay her back for 10 months. I want to know how much she has paid after 3 months. So I can add $7.50 three times.

\[
\begin{align*}
7.50 \\
7.50 \\
+ 7.50 \\
22.00
\end{align*}
\]

So she'll have paid back $22.50 back to her grandmother after 3 months.

2. To figure out how much she’s pay a month if she paid her grandmother back in 6 months, I decided to think about how much she had to pay back and breaking it into 6 equal groups. She has to pay back $75. So I know that $25 is 3 equal groups because $25 + $25 + $25 = $75. Since I want 6 groups I can split each $25 in two and get twice as many groups. I know that if I break $24 into 2 parts each part would be $12, since $25 is one more than $24, I can break that last $1 into $0.50 and $0.50, so half of $25 would be $12 + $0.50 or $12.50. So the 6 payments would be $12.50 each:

\[
\begin{align*}
$25 \\
$12.50 \\
$12.50
\end{align*}
\]

3. If her grandmother charged her an extra $0.25 a month as interest, Ruth would pay $7.75 a month for 10 months. To figure out how much she paid in 2 months:

\[
\begin{align*}
7.75 \\
+ 7.75 \\
15.50
\end{align*}
\]

to figure out how much she paid in 4 months, I’d add $15.50 twice:

\[
\begin{align*}
15.50 \\
+ 15.50 \\
31.00
\end{align*}
\]

To find 8 months, I’d add $33.00 twice:

\[
\begin{align*}
31.00 \\
+ 31.00 \\
62.00
\end{align*}
\]
To figure out 10 months, I'd add 2 months and 8 months:

\[
\begin{align*}
62.00 & \\
+ 15.50 & \\
\hline
77.50 & 
\end{align*}
\]

So, she’d pay her grandmother $77.50 in total if she paid the interest too.

4. Ruth’s grandmother might want to encourage Ruth to consider saving rather than borrowing because saving would not cost her any extra money.