**Mortgage** A couple can afford $800 per month to purchase a home. As indicated in the table, if they can get an interest rate of 7.5% the number of years \( t \) that it will take to pay off the mortgage is a function of the dollar amount \( A \) of the mortgage for the home they purchase.\(^1\)

<table>
<thead>
<tr>
<th>Amount ( A ) ($)</th>
<th>( t ) (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40,000</td>
<td>5</td>
</tr>
<tr>
<td>69,000</td>
<td>10</td>
</tr>
<tr>
<td>89,000</td>
<td>15</td>
</tr>
<tr>
<td>103,000</td>
<td>20</td>
</tr>
<tr>
<td>120,000</td>
<td>30</td>
</tr>
</tbody>
</table>

(Source: Comprehensive Mortgage Tables [Publication No. 492], Financial Publishing Co.)

a. If the couple wishes to finance $103,000, for how long must they make payments?

Write this correspondence in function form if \( t = f(A) \).

For specific mortgage values of \( A \), \( f(A) \) represents the amount of time \( t \) it will take to pay off the mortgage. That is, \( f(A) = t \).

Here, \( A = $103,000 \) so look for the corresponding value of \( t \) in the chart and you will find \( t = 20 \). This tells us that the couple must make payments for 20 years.

In the form \( t = f(a) \), \( 20 = f(103,000) \)

b. What is \( f(120,000) \)? Write a sentence that explains its meaning.

\( f(120,000) = 30 \). We can also say, when \( A = 120,000 \), \( t = 30 \).

This means, if the couple borrows $120,000, it will take them 30 years to pay off their mortgage.

c. What is \( f(3 \cdot 40,000) \)?

Doing the multiplication within the parentheses gives us \( f(3 \cdot 40,000) = f(120,000) \). And we know from part b, above, that \( f(120,000) = 30 \).

d. What value of \( A \) makes \( f(A) = 5 \) true?

Here we are given that \( t = 5 \) and we’re looking for the corresponding value of \( A \). From the table, when \( t = 5 \), \( A = 40,000 \). Thus, the amount borrowed that can be paid off in 5 years is $40,000.

e. Does \( f(3 \cdot 40,000) = 3 \cdot f(40,000) \)? Explain your reasoning.

Let’s test the statement:

\[
\begin{align*}
  f(3 \cdot 40,000) & = 3 \cdot f(40,000) \\
  f(120,000) & = 3 \cdot 5 \\
  & = 15
\end{align*}
\]

No, these are not equal.

---

\(^1\)Harshbarger/Yocco, *College Algebra In Context*, 5e, p. 24, #50.