### Steps for solving an applied problem

1. **Read the problem:** carefully noting the information given and the questions asked.
2. **Let a variable represent the unknown** (or one of the unknowns) you are asked to find.
3. **Think of a plan** (sentence or formula) that relates the information given and the unknown(s).
4. **From this plan,** write and equation and solve.
5. **Check your solution** to ensure it is reasonable.

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**Ex 1:** The sum of two consecutive even integers is 166. Find the two integers.

- \( n \) = smallest of two integers
- \( n + 2 \) = largest of two integers

**Plan:** smallest + largest = sum

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**Ex 2:** The bill for an auto repair was \$403\) (before any taxes). The cost of parts was \$225\). The mechanic charged \$50\) for the first hour of labor, then \$32\) per hour for each additional hour of labor to repair the car. How many hours total did it take to repair the automobile?

- \( h \) = total number of hours

**Plan:** cost of parts + cost of first hour’s labor + cost of additional labor = total bill before taxes
Ex 3: (When an object is projected upward to its maximum height, the velocity of the object at the time it reaches that maximum height is 0.)

The velocity of the water of a fountain projecting the water vertically upward with an initial velocity of 70 feet per second is given by the function \( v(t) = 70 - 32t \), where \( t \) is time in seconds. After how many seconds does the water reach its maximum height? (Round to the nearest tenth of a second.)

Ex 4: A sales representative drove 391 miles from his office to an appointment. He usually averaged 66 miles per hour. However, he had to slow to 54 miles per hour during a stretch of the road due to construction. The total time of the trip was 6 hours 10 minutes (excluding any stopped time). Find the amount of driving time at each speed.

<table>
<thead>
<tr>
<th></th>
<th>(in miles)</th>
<th>(in miles/hour)</th>
<th>(in hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel at faster rate</td>
<td></td>
<td></td>
<td>( x )</td>
</tr>
<tr>
<td>Travel in construction zone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTALS</td>
<td>391 miles</td>
<td></td>
<td>6 ( \frac{1}{6} ) hours</td>
</tr>
</tbody>
</table>
Ex 5: Jeff can bike to work in \( \frac{3}{4} \) hour. When he takes the bus, the trip takes \( \frac{1}{4} \) hour. If the bus averages 20 miles per hour faster than Jeff rides his bike, how far is it to his workplace?

<table>
<thead>
<tr>
<th></th>
<th>Distance</th>
<th>Rate</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>By Bike</td>
<td>( x )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>By Bus</td>
<td>( x )</td>
<td></td>
<td></td>
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Ex 6: A large rectangular church window has a perimeter of 40 feet. The height of the window is 4 feet more than the width of the window. Find the width and height of the window.
Ex 7: Steve needs 45 minutes to do the dishes, while Bob can do them in 30 minutes. How many minutes will it take them, if they work together?

Plan: Part of Job Steve completes + part of job Bob completes = 1 Job

Ex 8: James and Kelly work the same type of job. Working alone, James can complete a typical job in a time of 20 hours. If the two of them work together on a typical job, it takes them 12 hours. How long would it take Kelly alone to complete a typical job?
Ex 9: It takes a young girl 45 minutes to deliver the papers on her route; however, if her brother helps, it takes them only 20 minutes together. How long would it take her brother alone to deliver the newspapers?

\[ x = \text{time for brother alone} \]

Ex 10: Jon operates a small business out of his home. The retail price for the items Jon sells is the wholesale price marked up 175%. If Jon sells an item for $39.81 (before any taxes), \textit{approximately} (to nearest penny) how much was the wholesale cost to Jon?
Ex 11: MaryAnn received $2600 from her grandfather. She decides to invest part of the money in a savings account at a bank that earns 2 ¼% annual interest and the remainder of the money in a stock that earned 2.3% during the first year. If MaryAnn earned $59.03 interest from both investments during a year’s time, approximately how much did MaryAnn invest in the bank and how much did she invest in the stock.

\[ p = \text{principal invested in savings account at bank} \]
\[ 2600 - p = \text{principal invested in stock} \]

Ex 12: The sum of the angles inside any triangle is 180 degrees. Find the measures of the 3 angles represented in this triangle.

\[ x = \text{a number} \]
Ex 13: Julie needs to use a 40% antifreeze solution in her car radiator that holds 20 L. She only has pure antifreeze and a 10% antifreeze solution on hand. How much of each should she use to get the desired mix in her radiator?

\[
\begin{align*}
\text{Pure Antifreeze} + \text{Antifreeze Solution} &= \text{MIX}
\end{align*}
\]

Ex 14: Find three consecutive even integers such that three times the third is 24 more than the sum of the first and the second.