Section 2.5 An Introduction to Problem Solving

Before Class:

☐ Read the objectives on page 117.

☐ Read the Helpful Hint boxes on pages 118, 119, and 121.

☐ Complete the exercises:

1. Read the General Strategy for Problem Solving box on page 117. What are two ways to become comfortable with a problem?

2. When checking a proposed solution, where should you go back to?

3. Once you have checked all proposed solutions, what is the last thing to do in solving a problem?

During Class:

☐ Write your class notes. Neatly write down all examples shown as well as key terms or phrases with definitions. If not applicable or if you were absent, watch the Lecture Series (DVD) for this section and do the same (write down the examples shown as well as key terms or phrases). Insert more paper as needed.

Class Notes/Examples

Your Notes

Answers and References:  1) Answers may vary, see p. 117.  2) the original stated problem
3) State your conclusion.
<table>
<thead>
<tr>
<th>Class Notes (continued)</th>
<th>Your Notes</th>
</tr>
</thead>
</table>

(Insert additional paper as needed.)
Practice:

☐ Complete the Vocabulary and Readiness Check on page 122.

☐ Next, complete any incomplete exercises below. Check and correct your work using the answers and references at the end of this section.

Review this example:

1. Twice the sum of a number and 4 is the same as four times the number, decreased by 12. Find the number.

UNDERSTAND. Read and reread the problem. If we let $x$ = the unknown number, then “the sum of a number and 4” translates to “$x + 4$” and “four times the number” translates to “$4x$.”

TRANSLATE.

\[
\begin{align*}
\text{twice} & \quad \text{sum of a number and 4} & \text{is the} & \quad \text{same as} & \quad \text{four times} & \quad \text{the number} & \text{decreased by} & \quad \text{12} \\
\downarrow & \quad \downarrow & \downarrow & \quad \downarrow & \quad \downarrow & \quad \downarrow & \downarrow & \\
2 & \quad (x + 4) & = & \quad 4x & - & \quad 12
\end{align*}
\]

SOLVE.

\[
\begin{align*}
2(x + 4) &= 4x - 12 \\
2x + 8 &= 4x - 12 \\
2x + 8 - 4x &= 4x - 12 - 4x \\
-2x + 8 &= -12 - 8 \\
-2x &= -20 \\
\frac{-2x}{-2} &= \frac{-20}{-2} \\
x &= 10
\end{align*}
\]

INTERPRET.

Check: Check this solution in the problem as it was originally stated. To do so, replace “number” with 10. Twice the sum of “10” and 4 is 28, which is the same as 4 times “10” decreased by 12.

State: The number is \(10\).

Your turn:

2. Write the following as an equation, then solve.

Twice the difference of a number and 8 is equal to three times the sum of the number and 3. Find the number.
Review this example:
3. If the two walls of the Vietnam Veterans Memorial in Washington, D.C., were connected, an isosceles triangle would be formed. The measure of the third angle is 97.5° more than the measure of either of the other two equal angles. Find the measure of the third angle. (Source: National Park Service)

UNDERSTAND. Read and reread the problem. Draw a diagram and let
\[ x = \text{degree measure of one angle} \]
\[ x = \text{degree measure of the second angle} \]
\[ x + 97.5 = \text{degree measure of the third angle} \]

TRANSLATE. Recall that the sum of the measures of the angles of a triangle equals 180.
\[ x + x + (x + 97.5) = 180 \]

SOLVE.
\[ x + x + (x + 97.5) = 180 \]
\[ 3x + 97.5 = 180 \]
\[ 3x + 97.5 - 97.5 = 180 - 97.5 \]
\[ 3x = 82.5 \]
\[ \frac{3x}{3} = \frac{82.5}{3} \]
\[ x = 27.5 \]

INTERPRET.
Check: If \( x = 27.5 \), then the measure of the third angle is \( x + 97.5 \) = 125. The sum of the angles is then 27.5 + 27.5 + 125 = 180, the correct sum.

State: The third angle measures \( 125^\circ \).

*The two walls actually meet at an angle of 125 degrees 12 minutes. The measurement of 97.5° given in the problem is an approximation.

Your turn:
4. Two angles are supplementary if their sum is 180°. The larger angle measures eight degrees more than three times the measure of a smaller angle. If \( x \) represents the measure of the smaller angle and these two angles are supplementary, find the measure of each angle.
Review this example:

5. Some states have a single area code for the entire state. Two such states have area codes that are consecutive odd integers. If the sum of these integers is 1208, find the two area codes. (Source: North American Numbering Plan Administration)

UNDERSTAND. Read and reread the problem. Let \( x \) = the first odd integer, and \( x + 2 \) = the next odd integer

TRANSLATE.

\[
x + (x + 2) = 1208
\]

SOLVE.

\[
x + (x + 2) = 1208
\]
\[
2x + 2 = 1208
\]
\[
2x + 2 - 2 = 1208 - 2
\]
\[
2x = 1206
\]
\[
\frac{2x}{2} = \frac{1206}{2}
\]
\[
x = 603
\]

INTERPRET.

Check: If \( x = 603 \), then the next odd integer is \( x + 2 = 603 + 2 = 605 \). Notice their sum, \( 603 + 605 = 1208 \), as needed.

State: The area codes are 603 and 605.

Your turn:

6. The measures of the angles of a triangle are 3 consecutive even integers. Find the measure of each angle.
Section 2.5 An Introduction to Problem Solving

<table>
<thead>
<tr>
<th>Answer</th>
<th>Text Ref</th>
<th>Video Ref</th>
<th>Answer</th>
<th>Text Ref</th>
<th>Video Ref</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td>Ex 2, p. 118</td>
<td>4</td>
<td>43°, 137°</td>
<td>Sec 2.5, Ex 43</td>
</tr>
<tr>
<td>2</td>
<td>$2(x - 8) = 3(x + 3)$; $-25$</td>
<td>Sec 2.5, Ex 5</td>
<td>5</td>
<td>603, 605</td>
<td>Ex 6, p. 121</td>
</tr>
<tr>
<td>3</td>
<td>$125^\circ$</td>
<td>Ex 5, p. 120</td>
<td>6</td>
<td>$58^\circ$, $60^\circ$, $62^\circ$</td>
<td>Sec 2.5, Ex 35</td>
</tr>
</tbody>
</table>

☐ Next, insert your homework. Make sure you attempt all exercises asked of you and show all work, as in the exercises above. Check your answers if possible. Clearly mark any exercises you were unable to correctly complete so that you may ask questions later. DO NOT ERASE YOUR INCORRECT WORK. THIS IS HOW WE UNDERSTAND AND EXPLAIN TO YOU YOUR ERRORS.