Notes 8.1

The Pythagorean Theorem

Bellwork:

Find the missing angle measures:

1. Given segment AB, find the midpoints M if A(4, 8) and B(-8, 7).
   \[ M \left( \frac{4 - 8}{2}, \frac{8 + 7}{2} \right) \]
   \[ M(-2, \frac{15}{2}) \]

2. Write the converse of the statement: "If an angle is right, then it equals 90°."

3. Find the supplement to a 128° angle.
   \[ 180° - 128° = 52° \]

4. Sketch a linear pair and state two characteristics.

   \[ \text{Adjacent, supplementary} \]
Objective: Student will be able to simplify radicals without a calculator.

Student will use the Pythagorean Theorem to find the missing side lengths of a right triangle.

Simplifying Radicals:

The Perfect Square Method:

\[
\sqrt{20} = \sqrt{4 \cdot 5} = \sqrt{4} \cdot \sqrt{5} = 2\sqrt{5}
\]

\[
\sqrt{300} = \sqrt{9 \cdot 33} = \sqrt{9} \cdot \sqrt{33} = 3\sqrt{33}
\]

\[
\sqrt{45} = \sqrt{9 \cdot 5} = \sqrt{9} \cdot \sqrt{5} = 3\sqrt{5}
\]

\[
\sqrt{48} = \sqrt{16 \cdot 3} = \sqrt{16} \cdot \sqrt{3} = 4\sqrt{3}
\]
The Pythagorean Theorem:

\[ \text{Leg}^2 + \text{Leg}^2 = \text{hyp}^2 \]

6

\[ 6^2 + 12^2 = t^2 \]
\[ 180 = t^2 \]
\[ t = 6\sqrt{5} \]

5

\[ 5^2 + p^2 = 21^2 \]
\[ 5^2 + p^2 = 441 \]
\[ 25 = \sqrt{441} \]
\[ p = 4\sqrt{5} \]

3, 4, 5

5, 12, 13

8, 15, 17

7, 24, 25
Using Pythagorean Triples:

\[
\begin{align*}
9 & \quad 12 \\
& \quad \text{X} \\
\end{align*}
\]

\[
\begin{align*}
14 & \quad 48 \\
& \quad \text{Y} \\
\end{align*}
\]

Find the Area of the Triangle:

\[
A = \frac{b \cdot h}{2}
\]

\[
A = \frac{30(3\sqrt{11})}{2} = \frac{45\sqrt{11}}{2} + 2
\]

\[
15^2 + h^2 = 18^2 \\
225 + h^2 = 324 \\
-225 = -324 \\
\]

\[
h^2 = 99 \\
h = 3\sqrt{11}
\]