### Lesson 3: The Area of Acute Triangles Using Height and Base

**Classwork**

**Exercises**

1. Work with a partner on the exercises below. Determine if the area formula \( A = \frac{1}{2}bh \) is always correct. You may use a calculator, but be sure to record your work on your paper as well.

<table>
<thead>
<tr>
<th>Area of Two Right Triangles</th>
<th>Area of Entire Triangle</th>
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<tbody>
<tr>
<td><img src="image1.png" alt="Diagram 1" /></td>
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<tr>
<td><img src="image2.png" alt="Diagram 2" /></td>
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<td><img src="image3.png" alt="Diagram 3" /></td>
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<td><img src="image4.png" alt="Diagram 4" /></td>
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</table>
2. Can we use the formula \( A = \frac{1}{2} \times \text{base} \times \text{height} \) to calculate the area of triangles that are not right triangles? Explain your thinking.

3. Examine the given triangle and expression.

\[
\frac{1}{2} (11 \text{ ft.})(4 \text{ ft.})
\]

Explain what each part of the expression represents according to the triangle.

4. Joe found the area of a triangle by writing \( A = \frac{1}{2} (11 \text{ in.})(4 \text{ in.}) \), while Kaitlyn found the area by writing \( A = \frac{1}{2} (3 \text{ in.})(4 \text{ in.}) + \frac{1}{2} (8 \text{ in.})(4 \text{ in.}) \). Explain how each student approached the problem.

5. The triangle below has an area of 4.76 sq. in. If the base is 3.4 in., let \( h \) be the height in inches.

a. Explain how the equation \( 4.76 \text{ in}^2 = \frac{1}{2} (3.4 \text{ in.})(h) \) represents the situation.

b. Solve the equation.
Problem Set

Calculate the area of each shape below. Figures are not drawn to scale.

1. 
   ![Triangle Diagram]
   - Base: 6.1 in.
   - Height: 5.5 in.
   - Height of base: 3.3 in.

2. 
   ![Triangle Diagram]
   - Base: 16 m
   - Height: 8 m
   - Base of triangle: 14 m

3. 
   ![Parallelogram Diagram]
   - Base: 12 ft.
   - Height: 13 ft.
   - Opposite sides: 5 ft.

4. 
   ![Hexagon Diagram]
   - Sides: 25 km, 24 km, 25 km, 7 km, 24 km, 25 km, 35 km
5. Immanuel is building a fence to make an enclosed play area for his dog. The enclosed area will be in the shape of a triangle with a base of 48 in. and an altitude of 32 in. How much space does the dog have to play?

6. Chauncey is building a storage bench for his son’s playroom. The storage bench will fit into the corner and then go along the wall to form a triangle. Chauncey wants to buy a cover for the bench.

   If the storage bench is 2 \( \frac{1}{2} \) ft. along one wall and 4 \( \frac{1}{4} \) ft. along the other wall, how big will the cover have to be in order to cover the entire bench?

7. Examine the triangle to the right.
   a. Write an expression to show how you would calculate the area.
   b. Identify each part of your expression as it relates to the triangle.

8. A triangular room has an area of 32 \( \frac{1}{2} \) sq. m. If the height is 7 \( \frac{1}{2} \) m, write an equation to determine the length of the base, \( b \), in meters. Then solve the equation.