### Chapter 3: Trigonometry

#### 3.9 Sine or Cosine?

Sine Law  \[ \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \]

Cosine Law  \[ a^2 = b^2 + c^2 - 2bc \cos A \]

<table>
<thead>
<tr>
<th>ASA or AAS</th>
<th>SAS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ASS</th>
<th>SSS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Example #1:

Example #2:
1) Determine whether the Law of Sines or the Law of Cosines would be used to begin the solution process for each triangle.

a) \( \triangle ABC \) with sides 12, 10, and 15.

b) \( \triangle ABC \) with sides 12, 10, and 40°.

c) \( \triangle ABC \) with sides 25°, 58°, and 105°.

d) \( \triangle ABC \) with sides 61°, 27°, and 10.

e) \( \triangle ABC \) with sides 70°, 12, and 8.

f) \( \triangle ABC \) with sides 120°, 25°, and 20.

2) Given the indicated parts of \( \triangle ABC \), what angle or side should be found first, and which formula should be used to find it?

a) \( \triangle ABC \) with sides \( b \) and \( c \).

b) \( \triangle ABC \) with sides \( a \) and \( c \).

c) \( \triangle ABC \) with sides \( b \) and \( a \).

d) \( \triangle ABC \) with sides \( a \) and \( b \).

e) \( \triangle ABC \) with sides \( a \) and \( b \).

f) \( \triangle ABC \) with sides \( a \) and \( c \).

g) \( \triangle ABC \) with sides \( b \) and \( a \).

h) \( \triangle ABC \) with sides \( b \) and \( a \).
3) Solve each triangle ABC. Round answers to one decimal place:

a) $\angle A = 50^\circ, b = 10, c = 15$

b) $\angle B = 36^\circ, a = 4, c = 10$

c) $\angle C = 60^\circ, b = 4, a = 8$

d) $a = 2, b = 3, c = 4$
e) \( a = 9, b = 14, c = 11 \)

f) \( b = 4, c = 1, \angle A = 120^\circ \)

g) \( \angle A = 28^\circ, \angle B = 42^\circ, c = 18.2 \)

h) \( \angle B = 63^\circ, b = 8, c = 10 \)
i) \( \angle B = 41^\circ, a = 11, c = 6 \)

**Answer Key**

1a) Cosine Law  
b) Sine Law  
c) Neither  
d) Sine Law  
e) Cosine Law  
f) Sine Law

2a) Cosine Law: side \( a \)  
b) Sine Law: side \( c \)  
c) Cosine Law: angle \( B \)  
d) Sine Law: angle \( B \)  
e) Angles add to 180: angle \( A \)  
f) Can’t be solved  
g) Sine Law: side \( b \)  
h) Cosine Law: side \( c \)

3a) \( \angle B = 41.8^\circ, \angle C = 88.2^\circ, a = 11.5 \)  
b) \( \angle B = 19.2^\circ, \angle C = 124.8^\circ, b = 7.2 \)  
c) \( \angle A = 90^\circ, \angle B = 30^\circ, a = 6.9 \)  
d) \( \angle A = 29.0^\circ, \angle B = 46.6^\circ, \angle C = 104.4^\circ \)  
e) \( \angle A = 40.0^\circ, \angle B = 88.2^\circ, \angle C = 51.8^\circ \)  
f) \( \angle B = 49.1^\circ, \angle B = 10.9^\circ, a = 4.6 \)  
g) \( \angle C = 110^\circ, a = 9.1, b = 13.0 \)  
h) *No Solution*  
i) \( \angle A = 107.7^\circ, \angle C = 31.3^\circ, b = 7.6 \)
Practice Quiz
Solve each triangle ABC. Round answers to one decimal place:

1) \( \angle A = 126^\circ, b = 9, a = 12.2 \)

2) \( a = 6, b = 7, c = 12 \)

Answers:
1) \( \angle B = 22.6^\circ, \angle C = 31.4^\circ, a = 18.9 \)
2) \( \angle A = 20.8^\circ, \angle B = 24.5^\circ, \angle C = 134.7^\circ \)