Laws of Sines and Cosines
LawSineCosine.tns

Name _____

Class _____

Problem 1 – Review of Geometry

- What do SAS, ASA, SAA, SAS, SSS, and SSA mean?

- Which one does not always work?

Problem 2 – Proof of the Law of Sines

Read the proof of the Law of Sines on pages 2.1–2.3. The angle *C* refers to the angle *ACD*.

- Move point *C* so that it is an acute angle. Does the Law of Sines still hold? Explain.

Problem 3 – ASA and SAA cases

On pages 3.2 and 3.3 use the **Calculate** tool and the formula on the screen to find the length of *b*. Use the **Length** tool to check your answer.

- Then drag point *C*. How does it affect your answer?

- Case 1: *b* = _____
- Case 2: *b* = _____

Problem 4 – Law of Sines Problem

Use the Law of Sines to solve the following problem on page 4.2.

A surveyor took two angle measurements to the peak of the mountain 500m apart. What is the height of the mountain?

Problem 5 – Proof of the Law of Cosines

Read the proof of the Law of Cosines on pages 5.1–5.3. Use algebra to complete the proof from the 4 pieces of information.

A. Substitute 1 into 2 and simplify.

B. Solve 3 for h^2 and 4 for e.

C. Substitute the results from B into A.

1. $d = a + e$
2. $c^2 = d^2 + h^2$
3. $b^2 = e^2 + h^2$
4. $\cos(C) = -\dfrac{e}{b}$

The result is the Law of Cosines.

- On page 5.4, move point C so that it is an acute angle. Does the Law of Cosines still hold? Explain.

Problem 6 – SAS and SSS Cases

On pages 6.2 and 6.5, use the **Calculate** tool and the formula on the screen to find the length of c or the measure of angle C. Use the Length tool to check your answers.

- Then drag point C. How does dragging point C affect your answer?

- Case 3: $c =$ _____
- What trig function must be used in Case 4 to calculate the angle?
- Case 4: $m\angle C =$ _____

Problem 7 – Law of Cosines Problem

Use the Law of Cosines to solve the following problem. The diagram is on page 7.3.

A Major League baseball diamond is a square with each side measuring 90 feet. The pitching mound is located 60.5 feet from home plate on a line joining home plate and second base.

a) How far is it from the pitching mound to first base? Second base?

b) Facing home plate, what angle will the pitcher need to turn to face first base?

c) If a short stop is standing in the middle of 2nd and 3rd base and 12ft into the outfield, how far is the player standing from home plate where the ball is to be thrown?