Name_______________________________

Class ______________________________

Problem 1 – Law of Sines

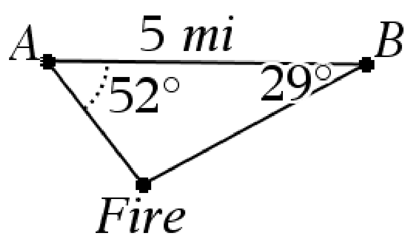
1. On page 1.3 you are given $\triangle ABC$ with the measure of all angles, sides and some calculated ratios. Drag the points *A*, *B* and *C* and observe any changes that occur.

2 Make a conjecture relating $\frac{\sin A}{a}$, $\frac{\sin B}{b}$, and $\frac{\sin C}{c}$.

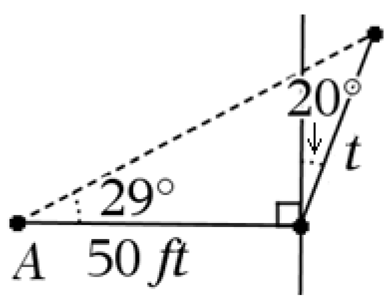
Problem 2 – Application of the Law of Sines

3. State the Law of Sines.

4. The distance between two fire towers is 5 miles. The observer in tower *A* spots a fire 52° SE and the observer in tower *B* spots the same fire 29° SW. Find the distance of the fire from each tower.



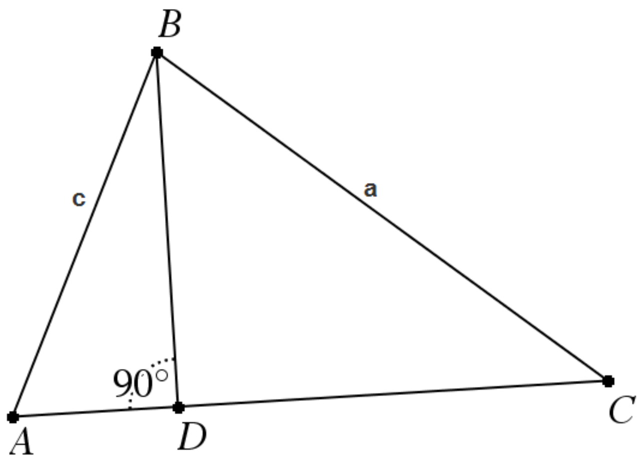
5. A tree leans 20° from vertical and at a point 50 feet from the tree, the angle of elevation to the top of the tree is 29°. Find the length, *t*, of the tree.



6. A boat is spotted by lighthouse *A* at 25° NE and spotted by lighthouse *B* at 50° NW. The lighthouses are 10 miles apart. What is the distance from the boat to each lighthouse?

Extension – Proof of the Law of Sines

We will now prove the Law of Sines. We will prove that $\frac{\sin(A)}{a} = \frac{\sin(C)}{c}$. You can use similar methods to show that $\frac{\sin(A)}{a} = \frac{\sin(B)}{b}$ and $\frac{\sin(B)}{b} = \frac{\sin(C)}{c}$. You are given △*ABC*, altitude *BD*, and sides *a* and *c*.



7. Using right triangular trigonometry, what is the sine ratio for ∠*A*?

8. Using right triangular trigonometry what is the sine ratio for ∠*C*?

9. What side is common to the sine of *A* and the sine of *C*? Solve for this common side in the ratio for sine of *A* and sine of *C*.

10. Since the side from Exercise 13 is common to both equations we can set them equal to each other. Set your two equations equal and try to show that $\frac{\sin(A)}{a} = \frac{\sin(C)}{c}$.