Angles

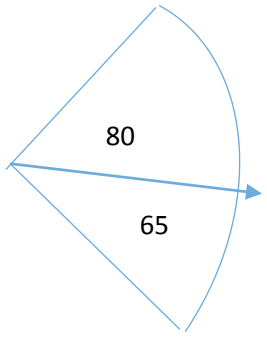
Background:

Katniss is at the training facility practicing skills needed for the game. She spots a bow and arrow and decides to practice her skills:

"I choose a bow, string it, and sling the matching quiver of arrows over my shoulder. There's a shooting range, but it's much too limited. Standard bull's eyes and human silhouettes. I walk to the center of the gymnasium and pick my first target. The dummy used for knife practice. Even as I pull back on the bow I know something is wrong. The string's tighter than the one I use at home. The arrow's more rigid. I miss the dummy by a couple of inches and lose what little attention I had been commanding." (P.101)

When Katniss pulls the arrow to shoot, the string and the quiver make an angle. The angle decides how far the angle will travel and if the arrow will go straight, up, or down. Knowing whether the arrow the arrow will go straight, up, or down can help Katniss at shooting items in the games. Not all items will be the same height as her.

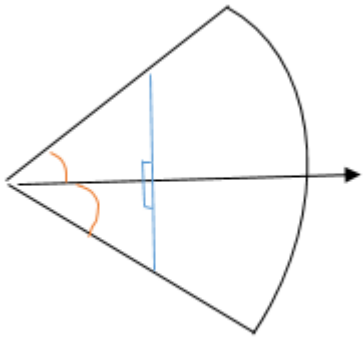
1.) Katniss pulled back the arrow and the string, it made an 80 degree angle on top and 65 degree angle on the bottom. Will the arrow go straight, up, or down?



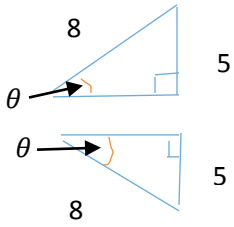
2.) Katniss pulled back the arrow and string, it made a 45 degree angle on top and a 55 degree angle on the bottom. Will the arrow go straight, up, or down?

3.) What might Katniss shoot at if the angle is bigger on top? What would she shoot at if the angle is bigger on the bottom?

4.) The further Katniss pulls back the arrow the farther it will go. Knowing what type of angle the string and arrow will form will help Katniss when shooting items at the games. To find the angle we will use trigonometry.



Two right triangles are made with the string and arrow. If the distance is 10 inches then base of each triangle is 5 inches. The hypotenuse is 8 inches and θ represents the angle we are trying to find. To find each missing angle we will need to use sine.



$\text{Sin}\theta = \frac{5}{8}$

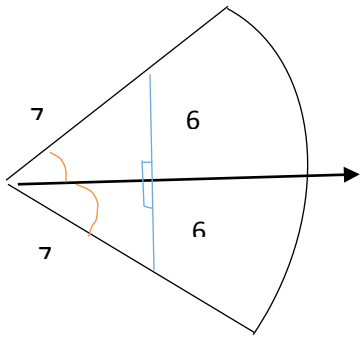
To solve you need to take the inverse of sine (sin^{-1}).

$$\theta = sin^{-1}\frac{5}{8}$$

After each angle is found we will add both together to find out how far Katniss pulled the arrow and string back. The smallest the angle the farther the arrow will go.

5.) Why would Katniss need to shoot something close up? Why would she need to shoot something far away? Provide an example of each.

6.) Given the distance is 12 inches and the hypotenuse is 7 inches. What is the angle of the string and the arrow? Could the arrow reach the other side of the classroom?



Angles Answer Key

1.) Down
2.) Up
3.) Bigger angle on top then the arrow goes down, bigger angle on the bottom then the arrow goes up
4.) 38.7
5.) The reason for shooting something close up is for her to protect herself from a person attacking her. The reason for shooting someone far away is to hunt.
6.) The angle is 40.6. Yes the arrow will reach the other side of the classroom