8.G.7 Running on the Football Field

Alignments to Content Standards: 8.G.B.7

Task

During the 2005 Divisional Playoff game between The Denver Broncos and The New England Patriots, Bronco player Champ Bailey intercepted Tom Brady around the goal line (see the circled B). He ran the ball nearly all the way to other goal line. Ben Watson of the New England Patriots (see the circled W) chased after Champ and tracked him down just before the other goal line.

In the image below, each hash mark is equal to one yard: note too the the field is 53 \( \frac{1}{3} \) yards wide.
a. How can you use the diagram and the Pythagorean Theorem to find approximately how many yards Ben Watson ran to track down Champ Bailey?

b. Use the Pythagorean Theorem to find approximately how many yards Watson ran in this play.

c. Which player ran further during this play? By approximately how many more yards?

**IM Commentary**

Students need to reason as to how they can use the Pythagorean Theorem to find the distance ran by Ben Watson and Champ Bailey. The focus here should not be on who ran a greater distance, but on seeing how you can set up right triangles to apply the Pythagorean Theorem to this problem. Students must use their measurement skills and make reasonable estimates to set up the triangle and correctly apply the Theorem. According to our estimations and provided solutions both players ran about the same distance: we have used the tick marks on the football field to estimate these vertical and horizontal distances to the nearest yard.

Teachers should be prepared to help students with these estimations, particularly for Ben Watson. Careful counting of the small hashmarks running along the back of the end zone is one way to estimate how far he has run across the field. Another method would be to measure this distance with small ticks on a piece of paper and then line this paper up with the well marked yard lines on the football field. From the mathematical point of view, it is interesting to note that a few yards more or less in this direction have relatively little impact on the final result and this will hopefully come out as students will make different estimates. The students are likely to make slightly different estimations than those provided in the solution: this in turn will result in one player running a slightly greater distance than the other. If this happens, the teacher should engage the students in a discussion explaining their estimates and solution methods.

Students may engage in many of the CCSS standards for mathematical practices while working on this task. Consider giving students time either individually or in pairs to start the problem on their, initially with little guidance. By doing so you are allowing students the opportunity to engage in math practice one: “make sense of problems and persevere in solving them.” When students realize they can solve the problem by modeling with right triangles in order to apply the Pythagorean Theorem they are engaging in math practice number four: “model with mathematics.” There is a small range of lengths that could have been run by each player. This leaves the door open for