# Teacher Lesson 4: Using Distances and Angles to Follow a Path

In *Activity 3-A: Getting from Here to There*, students learned by trial and error how many steps it took to get from one person in the circle to another. They weren't thinking about what the distances were. In the last couple of challenges, they could use the turn commands. Did they learn on their own how the angles work? This is a good time to make sure they understand Tuff-Bot's distances and angles.

In *Activity 3-B: How Far Is It?*, student are asked to figure out how far Tuff-Bot moves with each forward command. They used a ruler or yardstick to find out.

When Tuff-Bot goes forward or back, it moves about 20 cm. That is almost 8 inches (7.87" to be exact). How close did the students get to that number?

The turn buttons on Tuff-Bot use 45° angles. By contrast, Bee-Bots use 90° angles.

Explore distance and angles with your students. Ask them these questions. The ones for Distance should be a review of what they learned in *Activity 3-B*.

**Distances:**

- How far does Tuff-Bot travel with each Forward command?
- Does it more Forward and Backward the same distance?
- Measure the distance from Tuff-Bot to another spot in the room with a ruler or yardstick. Figure out how many Forward steps to would take for Tuff-Bot to get to that spot. Code Tuff-Bot using that number. How close did it get to the target spot?

**Angles:**

- How much does Tuff-Bot turn each time it follows a turn command?
- For students learning geometry concepts, is this a right angle, an acute angle, or an obtuse angle?
- How many turns does it take to make a square corner?
- How could you get Tuff-Bot to draw a square?
- What kind of shape would Tuff-Bot make by going forward and turning one time, and then repeating that pattern?

Students can now try *Activity 3-A: Getting From Here to There* again and see if they come closer to their target.