

Outdoor Activities for Circumference

Activity 1. A circle with people

Form a circle with $\frac{3}{4}$ of the participants (for example, if there are 16 people, 12 will form the circle). They hold hands and stretch out. Then have $\frac{1}{4}$ of the participants form a diameter inside the circle (with 12 people forming the circle, 4 would go inside).

- *What is the ratio of the number of people on the circumference to the number of people on the diameter?*

Activity 2. How far is it around a circle?

(Adapted from Lovitt & Clark, p. 209)

Materials needed: One eight-meter length of string for each group of three people.

1. Demonstrate to the whole class

Three people are needed with a string. The person who stays at the center stands still and holds the end of the string. The walker stands beside the center person, and then takes four paces, letting out the string. The observer marks the starting position, and then the walker paces and counts while the center person pivots so that he or she does not get entangled.

- *If the walker keeps walking forward keeping the string tight, what path will she make?*

Surprisingly, it is not always obvious to all people that the path will be a circle. It is an opportunity to include terminology such as radius and circumference.

- *How many paces do you think she will take around that circle?*

The guesses are an indication of students' perceptions. The correct answer is approximately 25. The range of guesses is amazing and worth pointing out to the group. Note how many guesses are fewer than 25, and how many are over. If participants make a guess, they will usually be interested in the accuracy of that guess.

2. Group work

It is more beneficial for all participants to experience the walk themselves, especially those whose guesses indicated a rather poor perception. Participants break into groups of three and work through the problems, including the first four-pace problem, and some they make for themselves. Point out that they should make a guess before each walk, and take turns at being center and walker.

3. Discussion

When most of the groups have completed the table, group the class together.

- *Were your guesses becoming more accurate?*
- *Can you see a relationship between the distance around the circle and the distance out from the center?*
- *Does this relationship work in all cases?*

It seemed to be about six, even with big steps. During the trials, participants were interested in the effect of using consistently small or large steps. They were intrigued to discover that the relationship did not change as step size changed.

There may be much discussion about the different answers the participants get, and about the errors of measurement that could produce these. Most results were $C = 6r$, or $C = 7r$. However, the accuracy of the value is not important to this lesson. What is important is the existence of the proportional relationship between C and r . The overall result is that each person would recognize that the circumference is approximately six times its radius. This is a good basis to appreciate the formula $C = 2r\pi$.