

Shapes and Turns

Materials:

Toothpicks (or you can use paper clips, straws, or other thin objects that are the same length)

Directions:

1. Take three toothpicks and make a triangle. Then take four toothpicks and make a square.
2. Compare the two shapes. Pay attention to their angles. Which shape's angles are smaller?
3. Imagine you are small enough to walk along the toothpicks. Imagine yourself walking along each of your shapes. Picture yourself coming to a corner and making a turn. For which shape did you have to turn farther?
4. Now tilt the sides of your square a bit to the side, so they are not vertical. What do you notice about the angles now? Where are the smaller angles and where are the bigger angles?
5. Imagine yourself walking along your new shape. At which corners would you have to turn a lot? At which corners do you only have to turn a little?
6. Make a shape with 5 sides. To start out, try to make all the angles equal. Are the angles bigger or smaller than when you made a square? What about if you were to walk along this shape? Would you turn farther or less far at each corner?
7. You might have noticed a *pattern* by now. What happens to the angles of a shape when you add more sides (if you keep all the angles equal)? Computer scientists are always looking for patterns like this as they work.

When you answered the last question, you might have noticed your answer will be different depending on your perspective. If you are looking at a shape from above, the angles appear to get bigger as you add more sides. But if you are walking along the shape, you actually turn less at each corner as you add sides.

Your perspective changes what is important to pay attention to about the angles. Deciding what is important in a situation is called *abstraction*. Computer scientists do abstraction as they solve problems, and often have to adjust their perspective to decide what is important.

What other perspectives could you take that changes what is important to notice about your shape? For example, if you were a runner and the shapes were running routes, what would matter most to you about the shapes?