

## 8.6 Exponential Models

TEKS A.1.B, A.1.D, A.3.B, A.11.C

**MATERIALS** • yarn • scissors

**QUESTION** How can you model a situation using an exponential function?

**EXPLORE** Collect data so that you can write exponential models

**STEP 1** *Fold and cut* Take about 1 yard of yarn and consider it to be 1 unit long. Fold it in half and cut, as shown. You are left with two pieces of yarn, each half the length of the original piece of yarn.



**STEP 2** *Copy and complete* Copy the table. Notice that the row for stage 1 has the data from Step 1. For each successive stage, fold *all* the pieces of yarn in half and cut. Then record the number of new pieces and the length of each new piece until the table is complete.

Stage	Number of pieces	Length of each new piece
1	2	$\frac{1}{2}$
2	?	?
3	?	?
4	?	?
5	?	?

**DRAW CONCLUSIONS** Use your observations to complete these exercises

- Use the data in the first and second columns of the table.
  - Do the data represent an exponential function? *Explain* how you know.
  - Write a function that models the number of pieces of yarn at stage  $x$ .
  - Use the function to find the number of pieces of yarn at stage 10.
- Use the data in the first and third columns of the table.
  - Do the data represent an exponential function? *Explain* how you know.
  - Write a function that models the length of each new piece of yarn at stage  $x$ .
  - Use the function to find the length of each new piece of yarn at stage 10.