# Exponential Growth Patterns

In this investigation, we will explore a familiar *exponential growth* situation and compare it to linear growth patterns with tables, graphs, and equations.

Making Ballots: Linear or Nonlinear Relationship?

Chen is the secretary of the Student Government Association. He is making ballots for a meeting. Chen starts by cutting a sheet of paper in half. Then, he stacks the two pieces and cuts them in half again. With four pieces now, he stacks them and cuts them in half. By repeating this process, he makes smaller and smaller paper ballots.
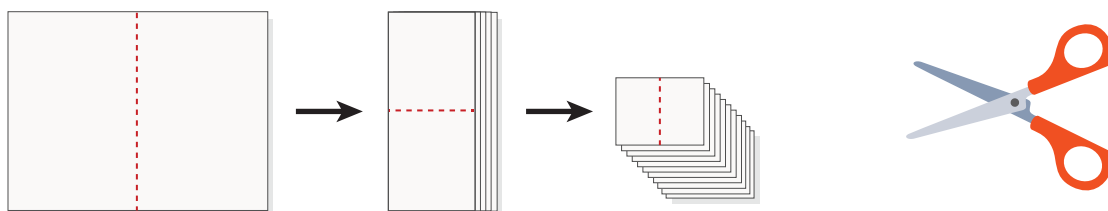
INITIAL CHALLENGE

After each cut, Chen counts and records the number of ballots in a table.

Number of Ballots for Each Cut

Number of Cuts	Number of Ballots
1	2
2	4
3	
4	
5	

He wants to predict the number of ballots after any number of cuts. So he looks for a growth pattern that describes how the number of ballots changes with each cut.

- Describe a growth pattern Chen might have noticed.
- How could he use this pattern to predict the number of ballots after 10 cuts?

WHAT IF . . . ?

Situation A. Predicting with a Graph or an Equation

Monroe's Strategy	Dawson's Strategy
I think a graph would be useful for making predictions.	I think an equation would be useful for making predictions.

1. What are the advantages and disadvantages of using a table, graph, or equation to make a prediction?

2. Explain how you would predict the number of ballots made with 20 cuts. Explain how you would predict the number of cuts needed to make 500 ballots.

3. How does Chen's growth pattern show up in the table? Monroe's graph? Dawson's equation?

4. How does this relationship compare to a linear function relationship?

NOW WHAT DO YOU KNOW?

What are the variables in this situation? How are they related? How is this relationship shown in a table, graph, and equation?