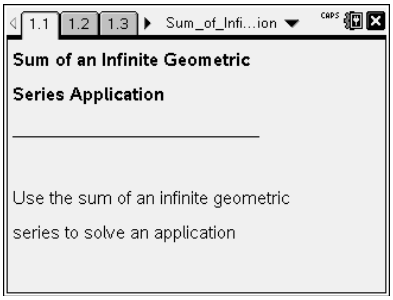
Open the TI-Nspire document *Sum_of_Infinite_Geo_Series_Application*.

In this activity, you will use an infinite geometric series to find the altitude of a hot air balloon.



Move to page 1.2.

Press ctrl ▶ and ctrl ◀ to navigate through the lesson.

Suppose you are an environmental scientist and have been asked to check the air quality in a certain city. To do this, you have attached a probe to collect data to a hot air balloon that will travel over different parts of the city. As a hot air balloon rises, the air inside the balloon cools and causes the balloon to rise more slowly with each minute. Assuming air resistance is negligible, suppose the balloon rose 114 feet the first minute. For each minute after the first minute, the hot air balloon rises 70% as far as it rose the previous minute. You will need to know the altitude when analyzing the data taken by the probe. What will be the balloon's maximum altitude?

Move to page 1.5.

1. Use the up/down arrows on page 1.5 to see the altitudes for the first five minutes of the balloon's flight. Calculate the distance the balloon travels for each of these minutes. Show your work in the table below.

Minute	Distance traveled per minute (nearest foot)	Total altitude given on page 1.5 (nearest foot)
0		
1		
2		
3		
4		
5		

2. If you could press the up arrow again, what would be the balloon's altitude after the next minute (minute 6)? Show your work below.

3. What makes this problem a geometric sequence? Explain.

4. What makes this problem an infinite geometric series? What would be the value of the multiplier *r*?

5. How can you tell if this infinite geometric series has a finite sum? Explain.

6. Use the sum of a geometric series formula given below, which will allow you to find partial sums. In this case, you can find the altitude of the balloon for any given minute. Find the altitude at 5, 6, and 10 minutes.

$S_n = \frac{a_1 - a_1 r^n}{1 - r}$, where $r \neq 1$

7. How would you find the same altitudes as in Question 6 using sigma notation? Show your work below.

8. Using the sum of an infinite geometric series formula, $S = \frac{a_1}{1 - r}$, find the maximum altitude of the balloon. Show your work below.

9. How would you find the maximum altitude of the balloon using sigma notation? Show your work below.