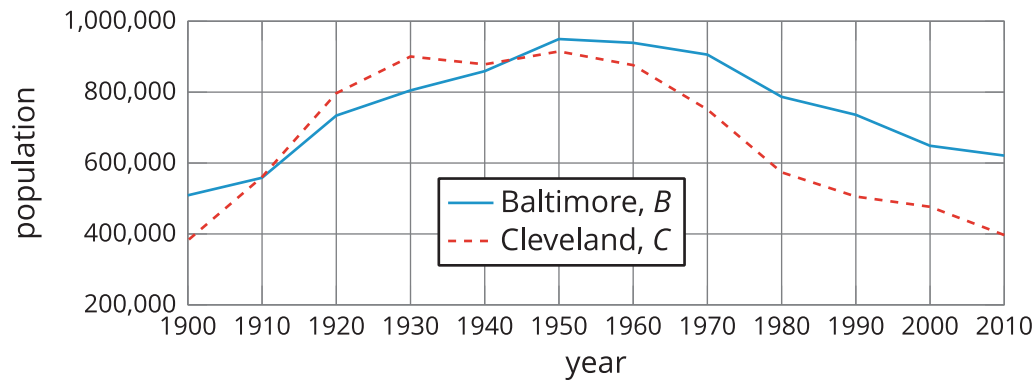# Unit 4 Lesson 9: Comparing Graphs

1 Population Growth (Warm up)

Student Task Statement

This graph shows the populations of Baltimore and Cleveland in the 20th century. $B(t)$ is the population of Baltimore in year t. $C(t)$ is the population of Cleveland in year t.
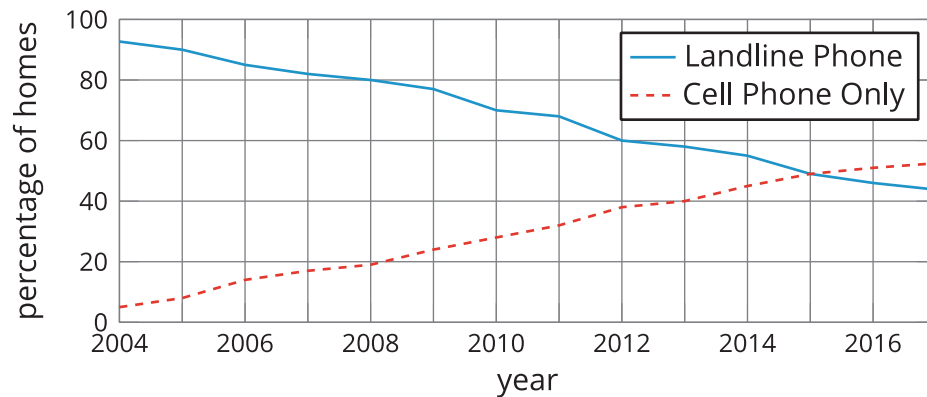

1. Estimate $B(1930)$ and explain what it means in this situation.

2. Here are pairs of statements about the two populations. In each pair, which statement is true? Be prepared to explain how you know.

    a. $B(2000) > C(2000)$ or $B(2000) < C(2000)$

    b. $B(1900) = C(1900)$ or $B(1900) > C(1900)$

3. Were the two cities' populations ever the same? If so, when?

2 Wired or Wireless?

Student Task Statement

$H(t)$ is the percentage of homes in the United States that have a landline phone in year t. $C(t)$ is the percentage of homes with *only* a cell phone. Here are the graphs of H and C.
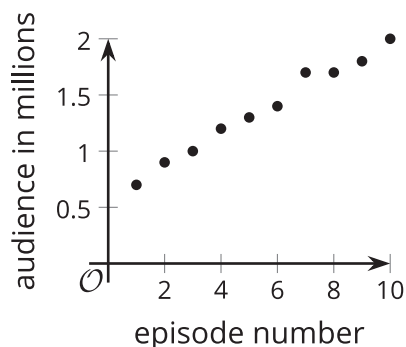

1. Estimate $H(2006)$ and $C(2006)$. Explain what each value tells us about the phones.

2. What is the approximate solution to $C(t) = 20$? Explain what the solution means in this situation.

3. Determine if each equation is true. Be prepared to explain how you know.

   a. $C(2011) = H(2011)$

   b. $C(2015) = H(2015)$

4. Between 2004 and 2015, did the percentage of homes with landlines decrease at the same rate at which the percentage of cell-phones-only homes increased? Explain or show your reasoning.
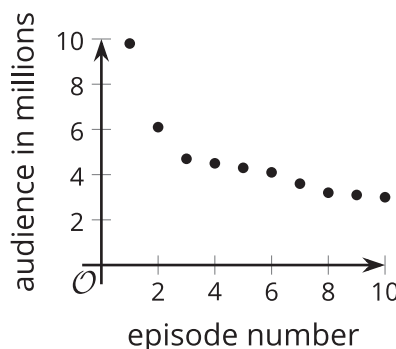
3 Audience of TV Shows (Optional)

Student Task Statement

The number of people who watched a TV episode is a function of that show's episode number. Here are three graphs of three functions—A, B, and C—representing three different TV shows.
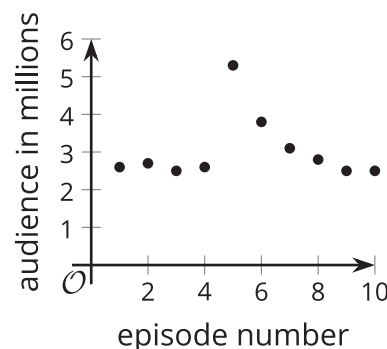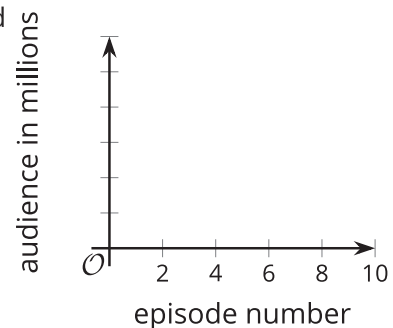
Show A

Show B

Show C

1. Match each description with a graph that could represent the situation described. One of the descriptions has no corresponding graph.

   a. This show has a good core audience. They had a guest star in the fifth episode that brought in some new viewers, but most of them stopped watching after that.

   b. This show is one of the most popular shows, and its audience keeps increasing.

   c. This show has a small audience, but it's improving, so more people are noticing.

   d. This show started out huge. Even though it feels like it crashed, it still has more viewers than another show.

2. Which is greatest, $A(7)$, $B(7)$, or $C(7)$? Explain what the answer tells us about the shows.

3. Sketch a graph of the viewership of the fourth TV show that did not have a matching graph.
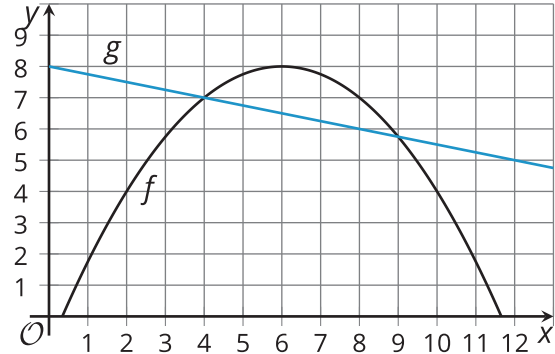
4 Functions f and g

Student Task Statement

1. Here are graphs that represent two functions, f and g.

   Decide which function value is greater for each given input. Be prepared to explain your reasoning.

   a. $f(2)$ or $g(2)$

   b. $f(4)$ or $g(4)$

   c. $f(6)$ or $g(6)$

   d. $f(8)$ or $g(8)$

2. Is there a value of x at which the equation $f(x) = g(x)$ is true? Explain your reasoning.

3. Identify at least two values of x at which the inequality $f(x) < g(x)$ is true.

Images for Activity Synthesis