EXAMPLE 4 Change intercepts of lines

TELEVISION A company produced two 30 second commercials, one for $300,000 and the second for $400,000. Each airing of either commercial on a particular station costs $150,000. The cost C (in thousands of dollars) to produce the first commercial and air it n times is given by $C = 150n + 300$. The cost to produce the second and air it n times is given by $C = 150n + 400$.

a. Graph both equations in the same coordinate plane.

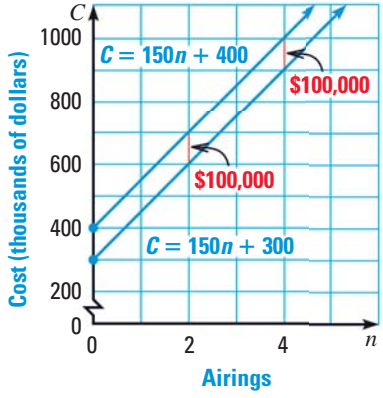
b. Based on the graphs, what is the difference of the costs to produce each commercial and air it 2 times? 4 times? What do you notice about the differences of the costs?

Solution

a. The graphs of the equations are shown.

b. You can see that the vertical distance between the lines is $100,000 when $n = 2$ and $n = 4$.

The difference of the costs is $100,000 no matter how many times the commercials are aired.



PARALLEL LINES Two lines in the same plane are **parallel** if they do not intersect. Because slope gives the rate at which a line rises or falls, two nonvertical lines with the same slope are parallel.

EXAMPLE 5 Identify parallel lines

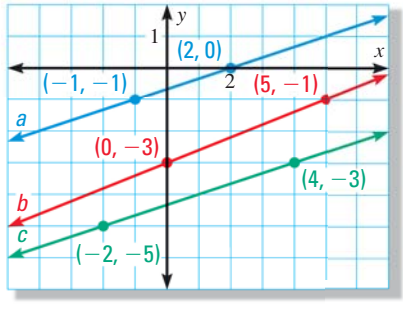
Determine which of the lines are parallel.

Find the slope of each line.

Line *a*: $m = \frac{-1 - 0}{-1 - 2} = \frac{-1}{-3} = \frac{1}{3}$

Line *b*: $m = \frac{-3 - (-1)}{0 - 5} = \frac{-2}{-5} = \frac{2}{5}$

Line *c*: $m = \frac{-5 - (-3)}{-2 - 4} = \frac{-2}{-6} = \frac{1}{3}$



▶ Line a and line c have the same slope, so they are parallel.

✓ GUIDED PRACTICE for Examples 4 and 5

6. WHAT IF? In Example 4, suppose that the cost of producing and airing a third commercial is given by $C = 150n + 200$. Graph the equation. Find the difference of the costs of the second commercial and the third.

7. Determine which lines are parallel: line a through $(-1, 2)$ and $(3, 4)$; line b through $(3, 4)$ and $(5, 8)$; line c through $(-9, -2)$ and $(-1, 2)$.