

## Unit 2 Lesson 18: Graphs of Rational Functions (Part 2)

### 1 Rewritten Equations (Warm up)

#### Student Task Statement

Decide if each of these equations is true or false for  $x$  values that do not result in a denominator of 0. Be prepared to explain your reasoning.

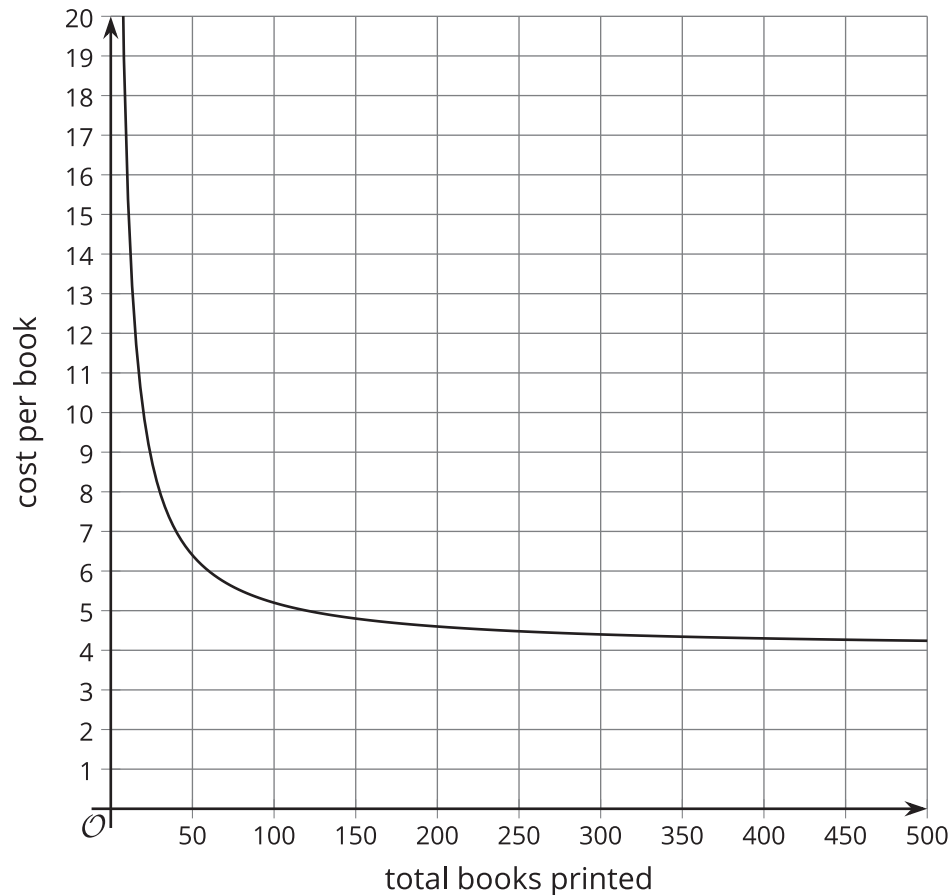
1.  $\frac{x+7}{x} = 1 + \frac{7}{x}$

2.  $\frac{x}{x+7} = 1 + \frac{x}{7}$

## 2 Publishing a Paperback

### Student Task Statement

Let  $c$  be the function that gives the average cost per book  $c(x)$ , in dollars, when using an online store to print  $x$  copies of a self-published paperback book. Here is a graph of  $c(x) = \frac{120+4x}{x}$ .



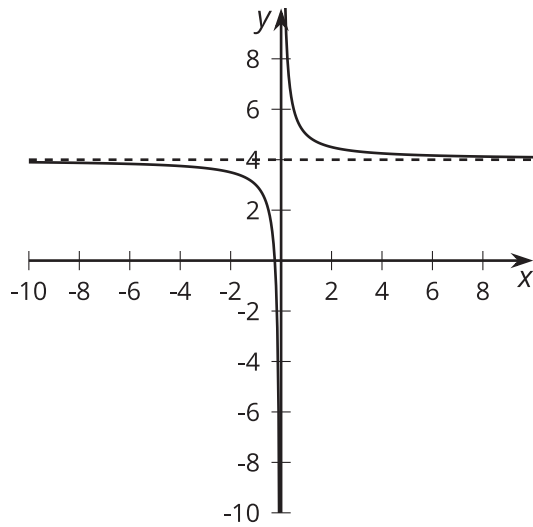
1. What is the approximate cost per book when 50 books are printed? 100 books?
2. The author plans to charge \$8 per book. About how many should be printed to make a profit?
3. What is the value of  $c(x)$  when  $x = \frac{1}{2}$ ? How does this relate to the context?
4. What does the end behavior of the function say about the context?

### 3 Horizontal Asymptotes

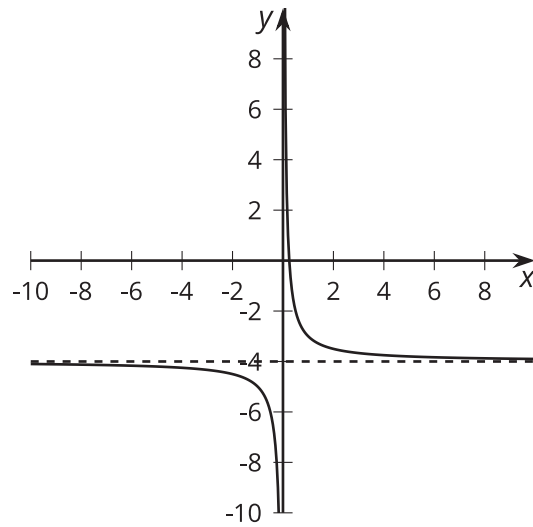
#### Student Task Statement

Here are four graphs of rational functions.

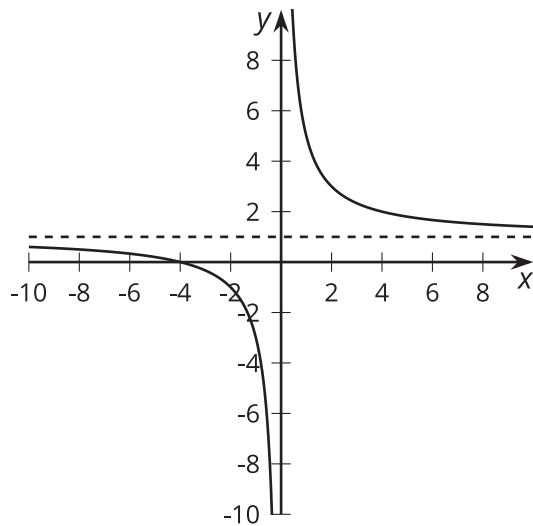
A



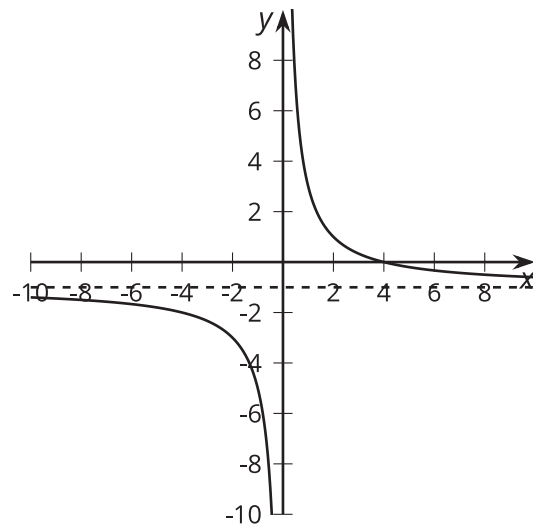
B



C



D



1. Match each function with its graphical representation.

a.  $a(x) = \frac{4}{x} - 1$

b.  $b(x) = \frac{1}{x} - 4$

c.  $c(x) = \frac{1+4x}{x}$

d.  $d(x) = \frac{x+4}{x}$

e.  $e(x) = \frac{1-4x}{x}$

f.  $f(x) = \frac{4-x}{x}$

g.  $g(x) = 1 + \frac{4}{x}$

h.  $h(x) = \frac{1}{x} + 4$

2. Where do you see the **horizontal asymptote** of the graph in the expressions for the functions?