

LESSON 7.1 Skills Practice

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A Rational Existence
Introduction to Rational Functions**Vocabulary**

Write the term that best completes each sentence.

1. A _____ is any function that can be written as the ratio of two polynomials.
2. A _____ is a vertical line that a function gets closer and closer to, but never intersects.

Problem Set

Determine whether each function is a rational function or not a rational function. If the function is not rational, explain why.

1. $f(x) = x^2 - 6x + 2$

The function $f(x)$ is a rational function.

2. $g(x) = x^{\frac{2}{3}} - 1$

3. $q(x) = \frac{x^3 - 2x + 1}{\sqrt{x}}$

4. $r(x) = \left(\frac{1}{3}\right)^x$

5. $h(x) = \frac{x}{x - 3}$

6. $t(x) = \frac{5}{x} - x$

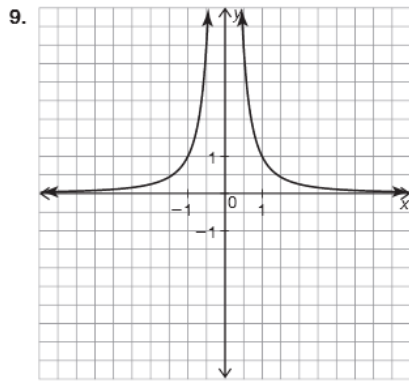
7. $s(x) = 1 - 4^x$

8. $p(x) = \frac{1}{(x - 1)(x + 1)}$

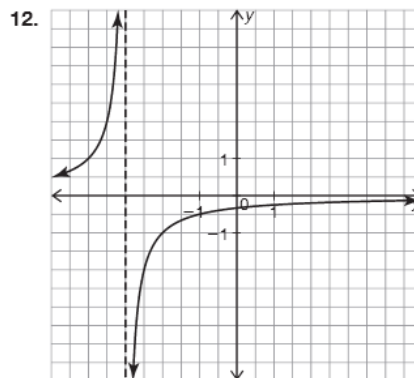
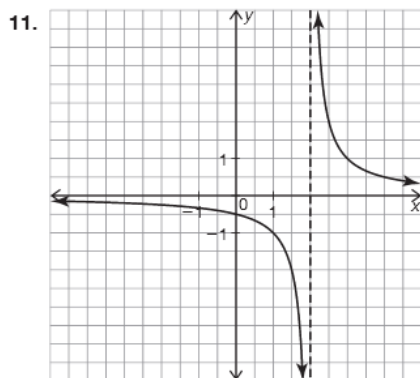
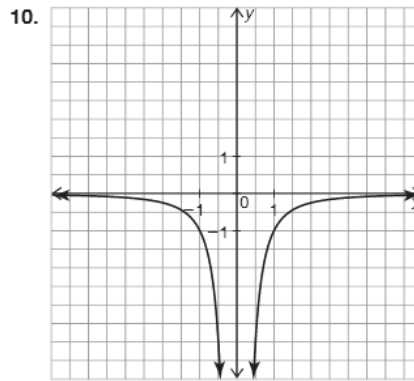
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Describe the vertical and horizontal asymptotes for each graph, provided they exist. Each figure represents the graph of a rational function.



The vertical asymptote is the y-axis or $x = 0$.
The horizontal asymptote is the x-axis or $y = 0$.

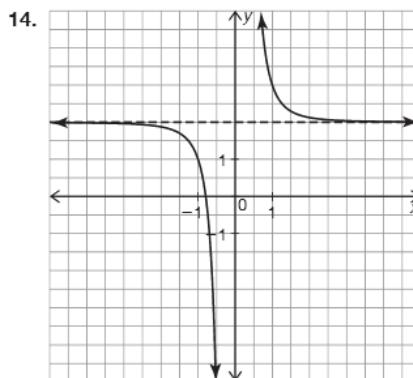
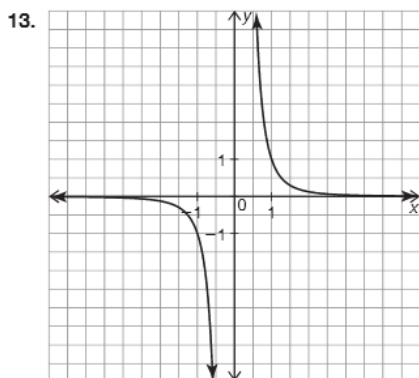


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Describe the domain and range of each rational function of the form $f(x) = \frac{a}{x^n}$. Note that a is a non-zero real number and n is an integer greater than or equal to 1.

15. $f(x) = \frac{2}{x^4}$

The domain of $f(x)$ is the set of real numbers excluding 0.

The range of $f(x)$ is the set of real numbers greater than 0.

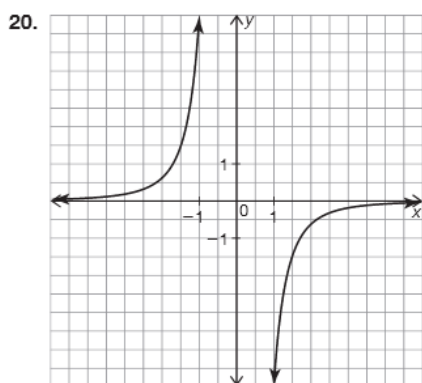
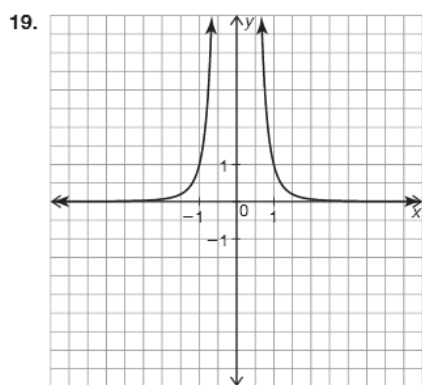
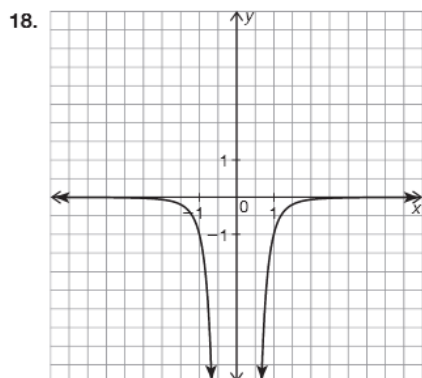
16. $f(x) = \frac{-1}{x^3}$

17. $f(x) = \frac{2}{x^3}$

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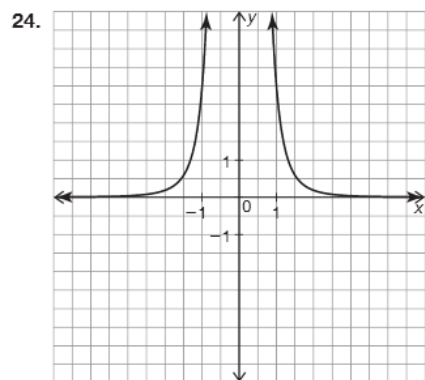
Describe the end behavior of each rational function of the form $f(x) = \frac{a}{x^n}$. Note that a is a non-zero real number and n is an integer greater than or equal to 1.

21. $f(x) = \frac{-1}{x^2}$ As x approaches negative infinity, y approaches 0.

As x approaches positive infinity, y approaches 0.

22. $f(x) = \frac{1}{x^3}$

23. $f(x) = \frac{-2}{x^3}$



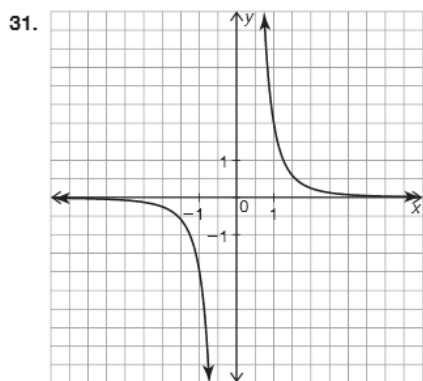
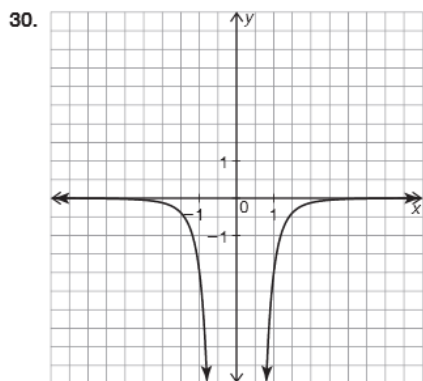
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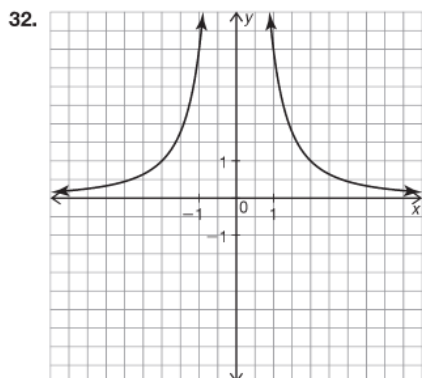
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Analyze each key characteristic of a rational function of the form $f(x) = \frac{1}{x^n}$ where n is an integer greater than or equal to 1. Identify whether the given characteristic is modeled by an odd power of n , an even power of n , or both.

- | | |
|--|---|
| <p>33. Range is all real numbers excluding 0.
 This characteristic is modeled by an odd power of n.</p> | <p>34. Domain is all real numbers excluding 0.</p> |
| <p>35. Horizontal asymptote at $x = 0$.</p> | <p>36. Graph only exists in the first and second quadrants.</p> |
| <p>37. Graph could be in any of the quadrants.</p> | <p>38. Range is all real numbers greater than 0.</p> |

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