LESSON MAKER PRO

Rational Function Routes

Solve equations, read graphs, and explain constraints.

HIGH SCHOOL · MA.912.AR.8.3

MA.912.AR.8.3 "Solve and graph mathematical and real-world problems that are modeled with rational functions. Interpret key features and determine constraints in terms of the context."

NAME _____ DATE _____

KEY FEATURES

For a rational function, exclude any x-value that makes the denominator 0. An uncanceled denominator zero gives a vertical asymptote. A canceled factor gives a hole.

WORKED EXAMPLE

The number line marks an excluded input. For f(x) = (x + 13)/(x - 11), find f(12) and the vertical asymptote.



1. x = 11 makes the denominator 0.
2. f(12) = (12 + 13)/(12 - 11).
3. f(12) = 25, and the asymptote is x = 11.

Answer: f(12) = 25; vertical asymptote: x = 11

PRACTICE 4 problems

1 Solve 6/(x - 7) = 3. State the excluded x-value.

ANSWER _____

2 For g(x) = (x + 8)/(x - 6), state the vertical and horizontal asymptotes.

ANSWER _____

3 Solve (x + 5)/(x - 9) = 2. State the excluded x-value.

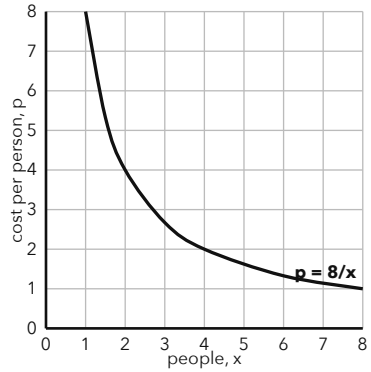
ANSWER _____

4 For k(x) = 12/(x + 7) + 3, state both asymptotes.

ANSWER _____

APPLY IT Show your work

1 A gaming club splits an $8 entry fee among x people. The graph shows p, the cost per person. Find p when x = 2. Explain why x = 0 is not allowed.



ANSWER _____

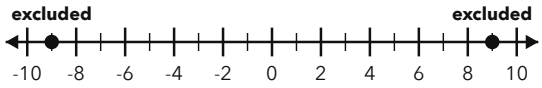
2 A team splits $42 equally. Each member pays p = 42/x dollars. If p = 6, find x. State a realistic domain and both asymptotes.

WORK SPACE

ANSWER _____

CHALLENGE One step up

The number line marks excluded inputs for $q(x) = (x^2 - 3x - 54)/(x^2 - 81)$. Identify the hole and the vertical asymptote.



WORK SPACE AND ANSWER

ANSWER KEY

Rational Function Routes

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve 6/(x - 7) = 3. State the excluded x-value.	**x = 9; x ≠ 7**
2	For g(x) = (x + 8)/(x - 6), state the vertical and horizontal asymptotes.	**Vertical: x = 6; horizontal: y = 1**
3	Solve (x + 5)/(x - 9) = 2. State the excluded x-value.	**x = 23; x ≠ 9**
4	For k(x) = 12/(x + 7) + 3, state both asymptotes.	**Vertical: x = -7; horizontal: y = 3**

PART 2 · APPLY IT

1. **p = $4; x = 0 is not allowed because division by 0 is undefined.** Read p = 4 when x = 2. Zero people would require dividing the fee by 0.
2. **x = 7; domain: positive whole numbers; vertical asymptote: x = 0; horizontal asymptote: y = 0** Set 42/x equal to 6, giving x = 7. Team size must be a positive whole number.

CHALLENGE

Hole: (9, 5/6); vertical asymptote: x = -9

Accept equivalent equation work and equivalent descriptions of the contextual domain. For the challenge, students should preserve both original exclusions after canceling (x - 9).