

Rational Equation Rescue

Clear denominators, solve carefully, and check every result.

HIGH SCHOOL • MA.912.AR.8.1

MA.912.AR.8.1 "Write and solve one-variable rational equations. Interpret solutions as viable in terms of the context and identify any extraneous solutions."

NAME _____

DATE _____

CLEAR AND CHECK

First, list values that make a denominator equal to zero. Multiply every term by the least common denominator, solve the new equation, then test each result in the original equation. A result that makes an original denominator zero is extraneous.

WORKED EXAMPLE

Solve $(x + 17)/(x - 13) = 19$.

1. Restriction: $x \neq 13$.
2. Multiply by $x - 13$: $x + 17 = 19(x - 13)$.
3. Solve: $264 = 18x$, so $x = 44/3$.
4. Since $44/3$ is not 13, the solution is valid.

Answer: $x = 44/3$

PRACTICE 6 problems

1 Solve $x/(x - 2) = 3$. State the excluded value.

ANSWER _____

2 Solve $4/(x + 1) = 2$. State the excluded value.

ANSWER _____

3 Solve $(x + 3)/(x - 4) = 2$. State the excluded value.

ANSWER _____

4 Solve $6/(x - 5) = 3/(x + 1)$. State the excluded values.

ANSWER _____

5 Solve $(x^2 - 9)/(x - 3) = 8$. Identify any extraneous solution.

ANSWER _____

6 Solve $2/(x - 2) + 1/(x + 2) = 1$. State the excluded values.

ANSWER _____

APPLY IT Show your work

- 1** A music app charges a \$6 monthly fee plus \$2 for each album you download. After downloading x albums, the average cost per album is \$3. Write and solve a rational equation to find x . Is the solution viable?

WORK SPACE

ANSWER _____

- 2** Your student club orders x hoodies. A printer charges a \$48 setup fee plus \$12 per hoodie, and the club wants the average cost per hoodie to be \$16. Write and solve a rational equation to find x . Is the solution viable?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Solve $(x + 4)/(x - 2) = 9(x + 2)/(x^2 - 4)$. Explain why one result from cross-multiplying is extraneous.

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Solve $x/(x - 2) = 3$. State the excluded value.	$x = 3$; excluded value: 2
2	Solve $4/(x + 1) = 2$. State the excluded value.	$x = 1$; excluded value: -1
3	Solve $(x + 3)/(x - 4) = 2$. State the excluded value.	$x = 11$; excluded value: 4
4	Solve $6/(x - 5) = 3/(x + 1)$. State the excluded values.	$x = -7$; excluded values: 5, -1
5	Solve $(x^2 - 9)/(x - 3) = 8$. Identify any extraneous solution.	$x = 5$; $x = 3$ is extraneous
6	Solve $2/(x - 2) + 1/(x + 2) = 1$. State the excluded values.	$x = (3 + \sqrt{33})/2$ or $x = (3 - \sqrt{33})/2$; excluded values: 2, -2

PART 2 · APPLY IT

1. **$(6 + 2x)/x = 3$; $x = 6$ albums, viable** Set the average cost equal to 3: $(6 + 2x)/x = 3$. Solving gives $x = 6$, which is a positive whole number of albums.
2. **$(48 + 12x)/x = 16$; $x = 12$ hoodies, viable** Set the average cost equal to 16: $(48 + 12x)/x = 16$. Solving gives $x = 12$, which is a positive whole number of hoodies.

CHALLENGE

$x = 5$; $x = -2$ is extraneous because it makes $x^2 - 4$ equal to zero. Also, $x = 2$ is excluded.

Accept equivalent exact forms, including radicals written in a different order. Require students to exclude values that make an original denominator zero, even when those values appear after cross-multiplying.