This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found here.

If you have a suggestion to make the keys better, please fill out the short survey here.

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

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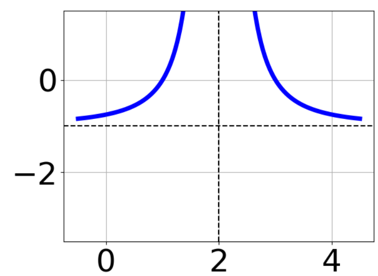
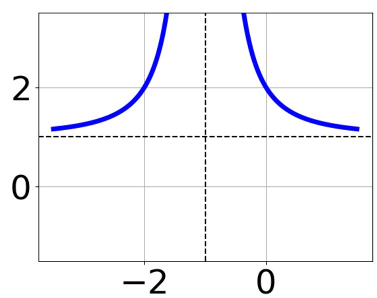
1. Choose the graph of the equation below.

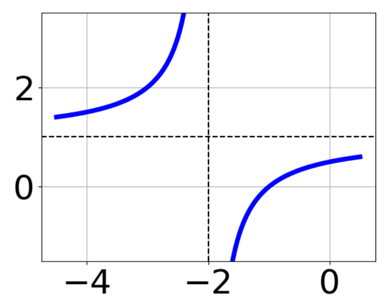
$$f(x) = \frac{1}{(x-2)^2} - 1$$

The solution is

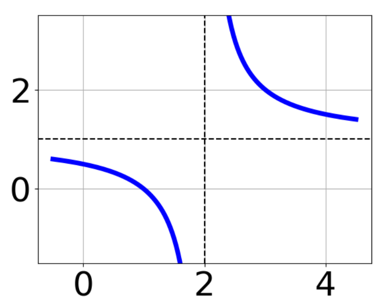




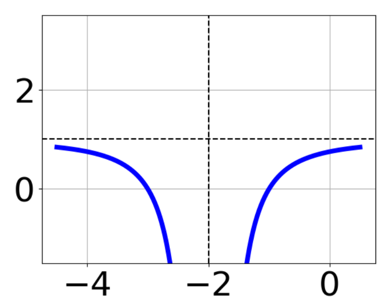
A.



B.



C.



D.

E. None of the figures above.

A. Incorrect due to y-value.

B. Corresponds to using the general form $f(x) = \frac{a}{(x+h)^2} + k$ and the opposite leading coefficient.

C. Corresponds to thinking the graph was a shifted version of $\frac{1}{x}$.

D. Corresponds to thinking the graph was a shifted version of $\frac{1}{x}$, using the general form $f(x) = \frac{a}{(x+h)^2} + k$, and the opposite leading coefficient.

General Comment: General Comments: Remember that the general form of a basic rational equation is $f(x) = \frac{a}{(x-h)^n} + k$, where a is the leading coefficient (and in this case, we assume is either 1 or -1), n is the degree (in this case, either 1 or 2), and (h, k) is the intersection of the asymptotes.

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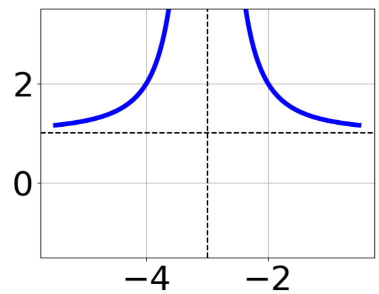
2. Choose the equation of the function graphed below.



The solution is $f(x) = \frac{1}{(x+3)^2} + 1$

A. $f(x) = \frac{1}{(x+3)^2} + 1$

This is the correct option.

B. $f(x) = \frac{1}{x+3} + 1$

Corresponds to thinking the graph was a shifted version of $\frac{1}{x}$.

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

Corresponds to using the general form $f(x) = \frac{a}{(x+h)^2} + k$ and the opposite leading coefficient.

D. $f(x) = \frac{-1}{x-3} + 1$

Corresponds to thinking the graph was a shifted version of $\frac{1}{x}$, using the general form $f(x) = \frac{a}{(x+h)^2} + k$, and the opposite leading coefficient.

E. None of the above

This corresponds to believing the vertex of the graph was not correct.

General Comment: General Comments: Remember that the general form of a basic rational equation is $f(x) = \frac{a}{(x-h)^n} + k$, where a is the leading coefficient (and in this case, we assume is either 1 or -1), n is the degree (in this case, either 1 or 2), and (h, k) is the intersection of the asymptotes.

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3. Determine the domain of the function below.

$$f(x) = \frac{3}{36x^2 - 36}$$

The solution is All Real numbers except $x = -1.000$ and $x = 1.000$.

A. All Real numbers except $x = a$ and $x = b$, where $a \in [-36.2, -35.1]$ and $b \in [35.1, 36.3]$

   All Real numbers except $x = -36.000$ and $x = 36.000$, which corresponds to not factoring the denominator correctly.

B. All Real numbers except $x = a$, where $a \in [-36.2, -35.1]$

   All Real numbers except $x = -36.000$, which corresponds to removing a distractor value from the denominator.

C. All Real numbers.

   This corresponds to thinking the denominator has complex roots or that rational functions have a domain of all Real numbers.

D. All Real numbers except $x = a$, where $a \in [-1.4, 0.6]$

   All Real numbers except $x = -1.000$, which corresponds to removing only 1 value from the denominator.

E. All Real numbers except $x = a$ and $x = b$, where $a \in [-1.4, 0.6]$ and $b \in [0.2, 3.6]$

   All Real numbers except $x = -1.000$ and $x = 1.000$, which is the correct option.

General Comment: General Comments: The new domain is the intersection of the previous domains.

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4. Solve the rational equation below. Then, choose the interval(s) that the solution(s) belongs to.

$$\frac{-3}{2x+8} + 5 = \frac{7}{-16x-64}$$

The solution is $x = -3.788$

A. All solutions lead to invalid or complex values in the equation.

   This corresponds to thinking $x = -3.788$ leads to dividing by zero in the original equation, which it does not.

B. $x_1 \in [-8, -3]$ and $x_2 \in [-5, 0]$

   $x = -3.788$ and $x = -3.000$, which corresponds to getting the correct solution and believing there should be a second solution to the equation.

C. $x_1 \in [-8, -3]$ and $x_2 \in [2, 7]$

   $x = -3.788$ and $x = 4.213$, which corresponds to getting the correct solution and believing there should be a second solution to the equation.

D. $x \in [2, 7]$

   $x = 4.213$, which corresponds to not distributing the factor $2x + 8$ correctly when trying to eliminate the fraction.

E. $x \in [-3.79, -1.79]$

   * $x = -3.788$, which is the correct option.

General Comment: General Comments: Distractors are different based on the number of solutions. Remember that after solving, we need to make sure our solution does not make the original equation divide by zero!

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0. Solve the rational equation below. Then, choose the interval(s) that the solution(s) belongs to.

$$\frac{5x}{3x-3} + \frac{-4x^2}{-12x^2-9x+21} = \frac{4}{-4x-7}$$

The solution is There are two solutions: $x = 0.229$ and $x = -2.187$

A. $x_1 \in [-0.87, 1.07]$ and $x_2 \in [-0.4, 2.4]$

B. $x_1 \in [-0.87, 1.07]$ and $x_2 \in [-6, -1.4]$

   * $x = 0.229$ and $x = -2.187$, which is the correct option.

C. $x \in [-2.56, -1.85]$

D. $x \in [-1.83, -0.66]$

E. All solutions lead to invalid or complex values in the equation.

General Comment: General Comments: Distractors are different based on the number of solutions. Remember that after solving, we need to make sure our solution does not make the original equation divide by zero!