When an Expression Is Undefined

Name: _____	Date: _____	Score: _____ / 18

Quick Review and Helpful Hints

A fraction is *undefined* when its denominator equals 0, because dividing by zero is not allowed. To find where an expression is undefined, set the *denominator* equal to 0 and solve for x.

▷ **Example:** For what value of x is $\frac{1}{x-2}$ undefined? **Work:** Set the denominator to 0: $x-2=0$, so $x=2$. ★ **Answer:** $x=2$

Never divide by zero.

Practice Problems

Find where each expression is undefined.

1. $\frac{1}{x-2}$ _____
2. $\frac{1}{x+3}$ _____
3. $\frac{1}{x}$ _____
4. $\frac{5}{x-1}$ _____
5. $\frac{1}{x+5}$ _____
6. $\frac{2}{x-4}$ _____
7. $\frac{1}{2x}$ _____
8. $\frac{1}{x-7}$ _____
9. $\frac{3}{x+1}$ _____
10. $\frac{1}{x-10}$ _____
11. $\frac{1}{x+2}$ _____
12. $\frac{4}{x-6}$ _____
13. Can you divide by 0? _____
14. $\frac{1}{x}$ undefined at _____

Word Problems

15. A formula has $x-3$ in the denominator. Where is it undefined? _____
16. For what value is $\frac{1}{x+4}$ undefined? _____
17. Why is $\frac{5}{0}$ undefined? _____
18. At what value is $\frac{1}{x-9}$ undefined? _____

Answer Keys

1. $x = 2$	**7.** $x = 0$	**13.** No
2. $x = -3$	**8.** $x = 7$	**14.** $x = 0$
3. $x = 0$	**9.** $x = -1$	**15.** $x = 3$
4. $x = 1$	**10.** $x = 10$	**16.** $x = -4$
5. $x = -5$	**11.** $x = -2$	**17.** division by zero
6. $x = 4$	**12.** $x = 6$	**18.** $x = 9$

Step-by-Step Explanations

1. Start by naming the process: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x - 2 = 0 \Rightarrow x = 2$. So the final answer is $x = 2$.
2. A good way to think about this is: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x + 3 = 0 \Rightarrow x = -3$. So the final answer is $x = -3$.
3. Step by step: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x = 0$ makes the bottom 0. So the final answer is $x = 0$.
4. Take it one move at a time: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x - 1 = 0 \Rightarrow x = 1$. So the final answer is $x = 1$.
5. Start by naming the process: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x + 5 = 0 \Rightarrow x = -5$. So the final answer is $x = -5$.
6. A good way to think about this is: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x - 4 = 0 \Rightarrow x = 4$. So the final answer is $x = 4$.
7. Step by step: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $2x = 0 \Rightarrow x = 0$. So the final answer is $x = 0$.
8. Take it one move at a time: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x - 7 = 0 \Rightarrow x = 7$. So the final answer is $x = 7$.
9. Start by naming the process: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x + 1 = 0 \Rightarrow x = -1$. So the final answer is $x = -1$.
10. A good way to think about this is: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x - 10 = 0 \Rightarrow x = 10$. So the final answer is $x = 10$.
11. Step by step: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x + 2 = 0 \Rightarrow x = -2$. So the final answer is $x = -2$.
12. Take it one move at a time: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x - 6 = 0 \Rightarrow x = 6$. So the final answer is $x = 6$.
13. Start by naming the process: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is No – division by zero is undefined. So the final answer is No.
14. A good way to think about this is: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x = 0$ makes the bottom 0. So the final answer is $x = 0$.
15. Step by step: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x - 3 = 0 \Rightarrow x = 3$. So the final answer is $x = 3$.
16. Take it one move at a time: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x + 4 = 0 \Rightarrow x = -4$. So the final answer is $x = -4$.
17. Start by naming the process: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is The denominator is 0 (dividing by zero). So the final answer is division by zero.
18. A good way to think about this is: A fraction is undefined when its denominator is zero, so set the denominator equal to zero and solve. The setup/work is $x - 9 = 0 \Rightarrow x = 9$. So the final answer is $x = 9$.

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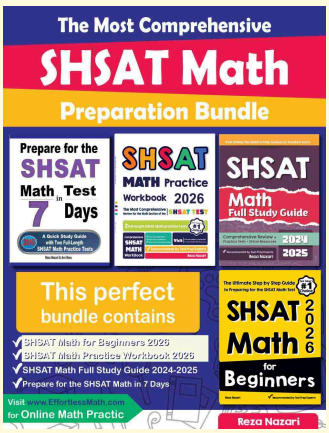

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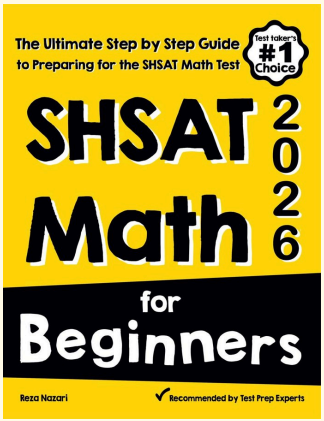

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