# 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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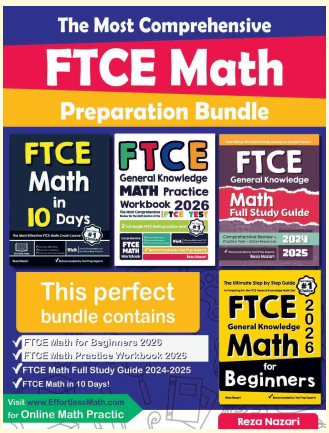


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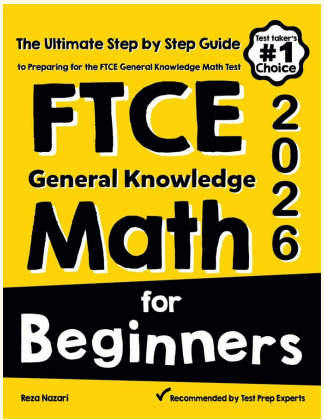


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