



### Math Objectives

- Students will find one-sided and two-sided limits graphically.

### Vocabulary

- limit

### About the Lesson

- This lesson involves finding one-sided limits of piecewise functions.
- As a result, students will:
  - Examine a graph of a function.
  - Discuss continuity and limit of a function at a point.



### TI-Nspire™ Navigator™

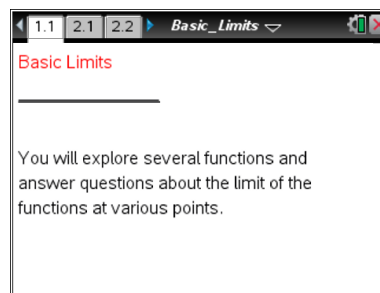
- Send a document.
- Use Class Capture to formerly assess students' understanding.
- Use Live Presenter to demonstrate and provide a means for students to share their thinking.
- Use Quick Poll to assess students' understanding.

### Activity Materials

Compatible TI Technologies:  TI-Nspire™ CX Handhelds,



TI-Nspire™ Apps for iPad®,  TI-Nspire™ Software



### Tech Tips:

- This activity is appropriate for use with the TI-Nspire family of products, including TI-Nspire handheld, software and TI-Nspire App. Slight variations to these directions may be required if using other technologies besides the handheld.
- Watch for additional Tech Tips throughout the activity for the specific technology you are using.
- Access free tutorials at <http://education.ti.com/calculators/pd/US/Online-Learning/Tutorials>

### Lesson Files:

*Student Activity*  
 Basic\_Limits\_Student.pdf  
 Basic\_Limits\_Student.doc  
*TI-Nspire document*  
 Basic\_Limits.tns

Visit [www.mathnspired.com](http://www.mathnspired.com) for lesson updates.



## Discussion Points and Possible Answers

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1. What is the limit of  $f(x)$  as  $x \rightarrow 1^+$ ?

Answer: 0

2. What is the limit of  $f(x)$  as  $x \rightarrow 1^-$ ?

Answer: 4

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3. What is the limit of  $f(x)$  as  $x \rightarrow -2^+$ ?

Answer: -1

4. What is the limit of  $f(x)$  as  $x \rightarrow -2^-$ ?

Answer: 0

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5. What is the limit of  $f(x)$  as  $x \rightarrow 3^+$ ?

Answer: 3

6. What is the limit of  $f(x)$  as  $x \rightarrow 3^-$ ?

Answer: 3

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7. What is the limit of  $f(x)$  as  $x \rightarrow 1^+$ ?

Answer: 3

8. What is the limit of  $f(x)$  as  $x \rightarrow 1^-$ ?

Answer: 3



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9. What is the limit of  $f(x)$  as  $x \rightarrow 0^-$ ?

Answer: 0

10. What is the limit of  $g(x)$  as  $x \rightarrow 0^+$ ?

Answer: -1

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Let  $h(x) = g(x) + 1$ .

11. What is the limit of  $h(x)$  as  $x \rightarrow 0^+$ ?

Answer: 1

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12. Define a function  $j(x)$  in terms of  $f(x)$  that makes the graph continuous.

Answer:  $j(x) = \begin{cases} -4x - 1, & x < 0 \\ x^2, & x \geq 0 \end{cases}$

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13. Define a function  $j(x)$  in terms of  $g(x)$  that makes the graph continuous.

Answer:  $j(x) = \begin{cases} 4, & x < 1 \\ \sqrt{x-1} + 4, & x \geq 1 \end{cases}$

14. Let  $h(x) = f(x) - c$ .

What value of  $c$  makes the limit of  $h(x)$  as  $x \rightarrow 1^- = 2$ ?

Answer: 2