

# The Limit Definition of a Derivative Sum-It-Up

## TASK CARDS

1. Find the derivative at the indicated point by using the limit process.
2. Sum the results as you work, check your "Sum-It-Up" answer.

1. Find  $f'(-3)$  for  $f(x) = x^2 + 4$

$$f'(-3) = \lim_{x \rightarrow -3} \frac{x^2 + 4 - 13}{x - (-3)}$$

$$f'(-3) = \lim_{x \rightarrow -3} \frac{(x+3)(x-3)}{(x+3)}$$

$$f'(-3) = -3$$

-6

2. Find  $f'(4)$  for  $f(x) = x^2 - 3x$

$$f'(4) = \lim_{x \rightarrow 4} \frac{x^2 - 3x - 4}{x - 4}$$

$$f'(4) =$$

3. Find  $f'(2)$  for  $f(x) = 3x^2 + 1$

$$f'(2) = \lim_{x \rightarrow 2} \frac{3x^2 + 1 - 13}{x - 2}$$

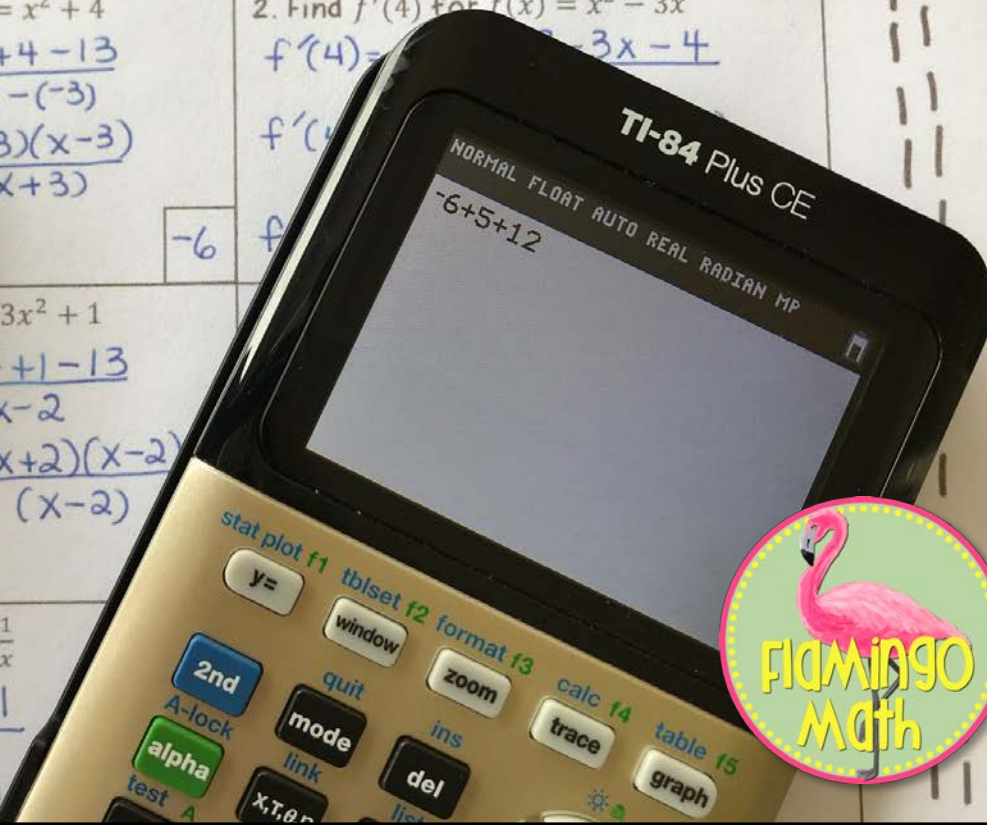
$$f'(2) = \lim_{x \rightarrow 2} \frac{3(x+2)(x-2)}{(x-2)}$$

$$f'(2) = 3(2+2)$$

Find  $f'(1)$  for  $f(x) = \frac{1}{x}$

$$f'(1) = \lim_{x \rightarrow 1} \frac{\frac{1}{x} - 1}{x - 1}$$

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



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## **The Limit Definition of a Derivative Sum-It-Up Activity**

In this Sum-It-Up Activity, your PreCalculus students will use the formal definition of a derivative to find the derivative of a function at a point. This activity is as a review for the unit on *Intro to Calculus*. There are 10 functions in the activity.

### **Using the activity:**

Students find the answer to each of the 10 questions and add or subtract as they go along to “Sum-It-Up” for a grand total at the end. A Giant QR-Code is included if you like to use technology.

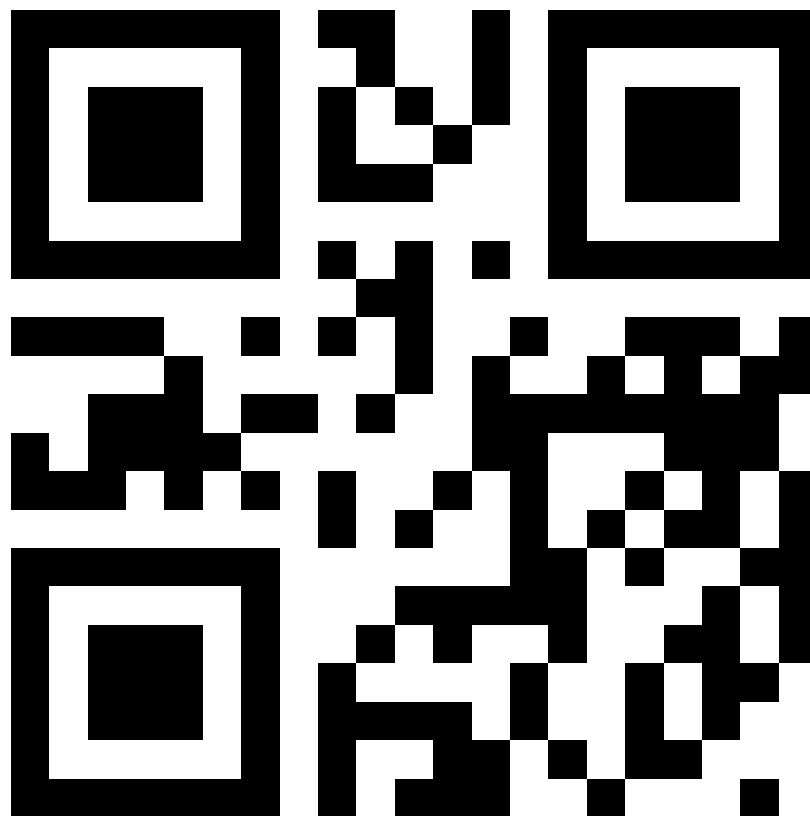
The activity can be done independently, as a pair and share, or many other strategies, including a race.

## The Limit Definition of a Derivative "Sum-It-Up"

1. Find the derivative at the indicated point by using the limit process.
2. Sum the results as you work, check your "Sum-It-Up" answer.

1. Find $f'(-3)$ for $f(x) = x^2 + 4$	2. Find $f'(4)$ for $f(x) = x^2 - 3x$
<input type="text"/>	<input type="text"/>
3. Find $f'(2)$ for $f(x) = 3x^2 + 1$	4. Find $f'(-2)$ for $f(x) = 4x - x^2$
<input type="text"/>	<input type="text"/>
5. Find $f'(1)$ for $f(x) = \frac{1}{x}$	6. Find $f'(-3)$ for $f(x) = x^2 + 2x - 3$
<input type="text"/>	<input type="text"/>
7. Find $f'(-1)$ for $f(x) = x^2 - 3x - 2$	8. Find $f'(5)$ for $f(x) = \sqrt{x-1}$
<input type="text"/>	<input type="text"/>
9. Find $f'(3)$ for $f(x) = x^3$	10. Find $f'(-1)$ for $f(x) = \frac{1}{x^2}$
<input type="text"/>	<input type="text"/>

# Sum-It-Up Total :





## THE LIMIT DEFINITION OF A DERIVATIVE "SUM-IT-UP"

1. Find the derivative at the indicated point by using the limit process.
2. Sum the results as you work, check your "Sum-It-Up" answer.

<p>1. Find <math>f'(-3)</math> for <math>f(x) = x^2 + 4</math></p> $f'(-3) = \lim_{x \rightarrow -3} \frac{x^2 + 4 - 13}{x - (-3)}$ $f'(-3) = \lim_{x \rightarrow -3} \frac{(x+3)(x-3)}{(x+3)}$ $f'(-3) = -3 - 3 \quad \boxed{-6}$	<p>2. Find <math>f'(4)</math> for <math>f(x) = x^2 - 3x</math></p> $f'(4) = \lim_{x \rightarrow 4} \frac{x^2 - 3x - 4}{x - 4}$ $f'(4) = \lim_{x \rightarrow 4} \frac{(x+1)(x-4)}{(x-4)}$ $f'(4) = 4 + 1 \quad \boxed{5}$
<p>3. Find <math>f'(2)</math> for <math>f(x) = 3x^2 + 1</math></p> $f'(2) = \lim_{x \rightarrow 2} \frac{3x^2 + 1 - 13}{x - 2}$ $f'(2) = \lim_{x \rightarrow 2} \frac{3(x+2)(x-2)}{(x-2)}$ $f'(2) = 3(2+2) \quad \boxed{12}$	<p>4. Find <math>f'(-2)</math> for <math>f(x) = 4x - x^2</math></p> $f'(-2) = \lim_{x \rightarrow -2} \frac{4x - x^2 - (-12)}{x - (-2)}$ $f'(-2) = \lim_{x \rightarrow -2} \frac{(2+x)(6-x)}{(x+2)}$ $f'(-2) = 6 - (-2) \quad \boxed{8}$
<p>5. Find <math>f'(1)</math> for <math>f(x) = \frac{1}{x}</math></p> $f'(1) = \lim_{x \rightarrow 1} \frac{\frac{1}{x} - 1}{x - 1}$ $f'(1) = \lim_{x \rightarrow 1} \frac{-\frac{(x-1)}{x}}{(x-1)}$ $f'(1) = -\frac{1}{1} \quad \boxed{-1}$	<p>6. Find <math>f'(-3)</math> for <math>f(x) = x^2 + 2x - 3</math></p> $f'(-3) = \lim_{x \rightarrow -3} \frac{x^2 + 2x - 3 - 0}{x - (-3)}$ $f'(-3) = \lim_{x \rightarrow -3} \frac{(x+3)(x-1)}{(x+3)}$ $f'(-3) = -3 - 1 \quad \boxed{-4}$
<p>7. Find <math>f'(-1)</math> for <math>f(x) = x^2 - 3x - 2</math></p> $f'(-1) = \lim_{x \rightarrow -1} \frac{x^2 - 3x - 2 - 2}{x - (-1)}$ $f'(-1) = \lim_{x \rightarrow -1} \frac{(x-4)(x+1)}{x+1}$ $f'(-1) = -1 - 4 \quad \boxed{-5}$	<p>8. Find <math>f'(5)</math> for <math>f(x) = \sqrt{x-1}</math></p> $f'(5) = \lim_{x \rightarrow 5} \frac{\sqrt{x-1} - 2}{x - 5}$ $f'(5) = \lim_{x \rightarrow 5} \frac{(x-5)}{(x-5)(\sqrt{x-1} + 2)}$ $f'(5) = \frac{1}{\sqrt{5-1} + 2} \quad \boxed{\frac{1}{4}}$
<p>9. Find <math>f'(3)</math> for <math>f(x) = x^3</math></p> $f'(3) = \lim_{x \rightarrow 3} \frac{x^3 - 27}{x - 3}$ $f'(3) = \lim_{x \rightarrow 3} \frac{(x-3)(x^2 + 3x + 9)}{(x-3)}$ $f'(3) = 3^2 + 3(3) + 9 \quad \boxed{27}$	<p>10. Find <math>f'(-1)</math> for <math>f(x) = \frac{1}{x^2}</math></p> $f'(-1) = \lim_{x \rightarrow -1} \frac{\frac{1}{x^2} - 1}{x - (-1)}$ $f'(-1) = \lim_{x \rightarrow -1} \frac{(1+x)(1-x)}{x^2} \cdot \frac{1}{(x+1)}$ $f'(-1) = \frac{1 - (-1)}{1^2} \quad \boxed{2}$

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