



Connecting F , F ' , and F '' Match-Up Activity

Your AP Calculus students will make connections between a function, its first derivative and its second derivative.

This task card matching activity is designed to challenge your **AP Calculus** students by engaging them in conversations related to a function and its first and second derivatives.

CONNECTING F, F' & F'' MATCH-UP ACTIVITY

College Board® Topics:

Topic 5.9: Connecting a Function, Its First Derivative, and Its Second Derivative

The **Connecting F, F' & F'' Match-Up Activity** is made for your AP Calculus students to gain proficiency in their ability to understand the behaviors of a function, its first derivative, and its second derivative.

You will find a **set of 10 Function Graph Cards, 10 First Derivative Graph Cards, 10 Second Derivative Graph Cards, 10 Equation Cards, and 10 Description Cards**, a student recording sheet. There is an answer key included for the activity.

Students will practice the following skills:

- ☒ Given the graph of a function, graph its first derivative function, and its second derivative function.
- ☒ Given the graph of a function write the equation for the function.
- ☒ Use the graph of the function to describe a key characteristic of the function.

Teaching Suggestions:

- Use the set as a group activity for 2-4 per group .
- Use the cards as an independent activity prior to assessing students.



Activity

Connecting f , f' and f'' Match Up

NAME: _____ Date: _____ Period: _____

Match each graph card with its corresponding first derivative and second derivative graph card. Find the equation and the description that matches the characteristics of the original function.

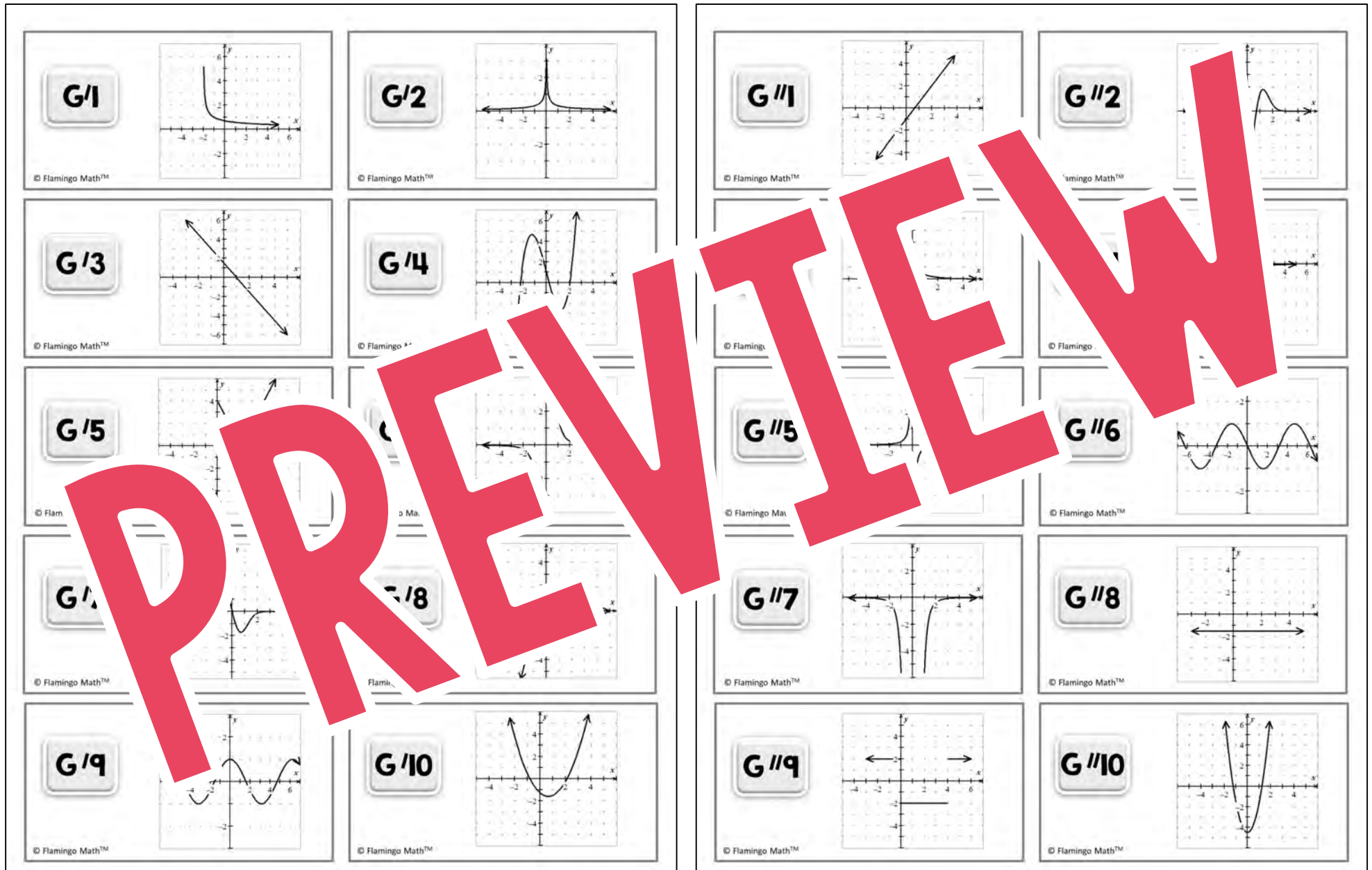
Card	G'	G''	Description	Equation
G1				
G2				
G3				
G4				
G5				
G6				
G7				
G8				
G9				
G10				

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Preview of the graph cards used in the activity. Each card shows a graph on a coordinate plane with a grid. The cards are labeled G1 through G10.

- G1:** A graph of a function that is decreasing and concave up, passing through the origin.
- G2:** A graph of a function that is increasing and concave up, passing through the origin.
- G3:** A graph of a function that is increasing and concave down, passing through the origin.
- G4:** A graph of a function that is decreasing and concave down, passing through the origin.
- G5:** A graph of a function that is increasing and concave up, passing through the origin.
- G6:** A graph of a function that is increasing and concave down, passing through the origin.
- G7:** A graph of a function that is increasing and concave up, passing through the origin.
- G8:** A graph of a function that is increasing and concave down, passing through the origin.
- G9:** A graph of a function that is increasing and concave up, passing through the origin.
- G10:** A graph of a function that is increasing and concave down, passing through the origin.

Activity



Activity

E1

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

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E2

$$f(x) = -\frac{3}{4}(x+2)(x-4)$$

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E3

$$f(x) = 2e^{-x^2}$$

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E5

$$f(x) = \frac{(x+3)(x+1)}{4}$$

E7

E9

$$f(x) = \frac{1}{4}(x+2)(x-1)(x-3)$$

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E4

$$f(x) = \left(\frac{5}{2}\right)^{-x} - 2$$

E6

$$f(x) = \sqrt[3]{x}$$

E8

$$f(x) = \sin x$$

E10

$$f(x) = \sin x$$

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D1

This sinusoidal function has domain of all reals and range $[-1, 1]$.

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D2

The graph of the function is increasing and is defined on $(-2, \infty)$.

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D5

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D7

The graph of the function is always concave down and

$$\lim_{x \rightarrow -\infty} f(x) \rightarrow -\infty$$

$$\lim_{x \rightarrow \infty} f(x) \rightarrow -\infty$$

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D9

The graph of the function has a horizontal asymptote at $y = 2$ and a vertical asymptote at $x = 0$.

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D6

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D8

The graph of the function has three zeros, two relative minima and one relative maximum. The function is differentiable everywhere.

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D10

The graph of the function has a horizontal asymptote at $y = 0$ and one absolute maximum.

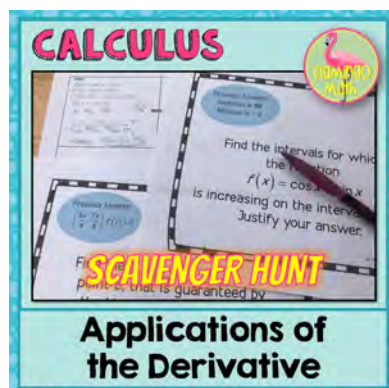
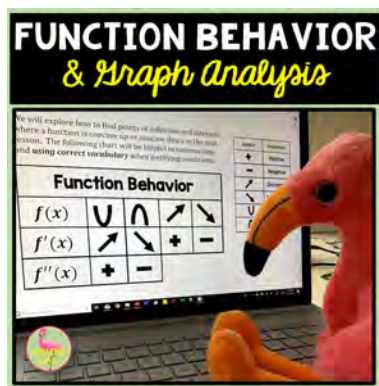
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