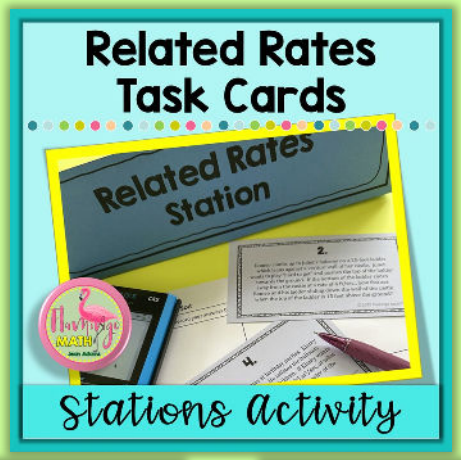
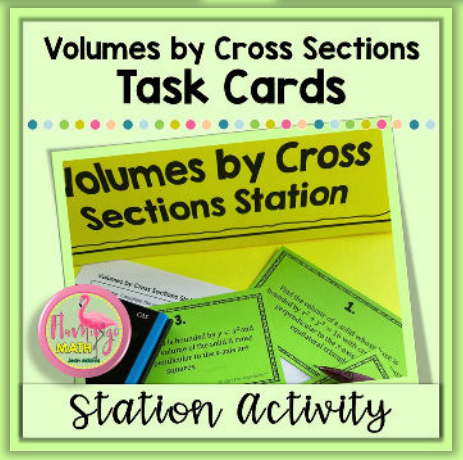
AP® Calculus

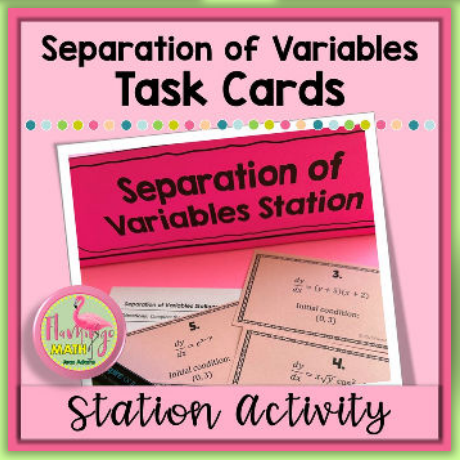
Exam Review Boot Camp











Flamingo MATH
Jean Adams

Station Activities

AP Calculus Exam Review Boot Camp



KEY CONCEPTS/TOPICS:

★ Differentiation
★ Related Rates
★ Indefinite Integration Techniques
★ Volumes by Cross Sections
★ Separation of Variables

Product Overview

Boot Camp Stations

PREPARATION:

You will be able to create a five station Boot Camp for reviewing key concepts that are tested on the AP Calculus AB Exam. Each station requires minor preparation, such as copying a set of task cards and cutting them apart.
Teachers should decide whether each student will need to show work on the student answer page, or as a small group assignment.

GENERAL DIRECTIONS:

1. Read through the product set up for each of the five stations.
2. Determine how you will use the task cards in each station to be able to create a boot camp for AP Exam Review.
3. There is a table "tent" to identify the learning concept for each station in the Camp. These can be created on colored card stock.
4. On the day or days of the Boot Camp, determine how long you want students to remain in a single group.
5. Be sure to set the time constraints and communicate your expectations.

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Differentiation Station

Differentiation Station

Preview

Differentiation Stations Card Sort Name:

Directions: Match the cards in the set and record your answers below.

1.	**2.**
3.	**4.**
5.	
7.	**8.**
9.	**10.**

Preview

1. Find $f'(x)$:

$f(x) = \frac{e^{7x}}{7x}$

2. Find $f'(x)$:

$f(x) = -4e^x \tan(x)$

3. Find $\frac{dy}{dx}$:

$\ln(xy) + 3x = 4$

4. Find $\frac{dy}{dx}$:

$\ln(xy) + 2y = 4x$

5. Find $\frac{dy}{dx}$:

$x^2 \ln|y| = 5x$

6. Find $\frac{dy}{dx}$:

$x^2 \ln|x| = 2y$

7. Find $f'(x)$:

8. Find $f'(x)$:

$f(x) = \ln(\ln(3x + 4))$

9. Find $f'(x)$:

$f(x) = \left(\frac{3x^2}{x^3 + 1}\right)$

10. Find $f'(x)$:

$f(x) = \ln(\ln(x^2 + 6x))$

11. Find the first derivative of $f^{-1}(-8)$ given $f(x) = x^2 - 5x - 14$ on $-3 \le x \le 3$.

12. Find the first derivative of $f^{-1}(-8)$ given $f(x) = x^2 - 5x - 14$ on $5 \le x \le 10$.

13. Find the tangent line for $y = \ln(x^2) + 1$ at $(e, 3)$.

14. Find the tangent line for $y = 2x - 4x^{-1/2}$ at $(4, 6)$.

15. Find the tangent line at the point $(0, 1)$ for $y = \cos x + \tan(2x)$.

16. Find $f''(x)$ at $(1,3)$:

$x^2y + yx^2 = 6$

Preview

A. 1

B. $\frac{1}{2}$

C. $\frac{10}{(x-2)^3}$

D. $-4e^x(\sec^2 x + \tan x)$

E. $\frac{2}{\sqrt{15}}$

F. $\frac{3}{2\pi}$

G. $\frac{4xy - y}{x + 2xy}$

H. $\frac{3}{(3x+4)\ln(3x+4)}$

I. $(-\infty, 0)$ and $(2, \infty)$

J. $\frac{e^{7x}(7x-1)}{7x^2}$

K. $9x - 4y = 12$

L. $\frac{-2(9x^2+1)}{(3x^2-1)^3}$

M. $-2(\sin x - 6x^2)(\cos x + 2x^3)$

N. $\left(\frac{1}{2}, \frac{1}{2e}\right)$

O. $\frac{5y - 2xy\ln|y|}{x^2}$

P. $\frac{-(x^3+2)}{x(x^3+1)}$

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Indefinite Integration Station

Indefinite Integration Station

1. $\int e^{\ln x}\,dx$	**2.** $\int \frac{x}{\sqrt{1+2x^2}}\,dx$	**3.** $\int \frac{2^{3x}}{1+2^{3x}}\,dx$	**4.** $\int \tan(3x)\,dx$
5. $\int \frac{x^2}{3-x^3}\,dx$	**6.** $\int \frac{x^3}{x^2+1}\,dx$	**7.** $\int 5^{5x}\,dx$	**8.** $\int \cot(4x)\,dx$
9. $\int t^2\,dt^3+4\,dt$	**10.** $\int \sin^3(x)\cos(x)dx$	**11.** $\int \frac{x^{\frac{1}{2}}}{1+x^{\frac{3}{2}}}\,dx$	**12.** $\int 2^{-3x}\,dx$
13. $\int \frac{x}{\sqrt{9-x^2}}\,dx$	**14.** $\int \frac{1}{x\ln(x)}\,dx$	**15.** $\int e^{2x+1}\,dx$	**16.** $\int \frac{1}{\sqrt{x+1}}\,dx$

Indefinite Integration Stations Card Sort Name:

Directions: Match the cards in the set and record your answers below.

1.	**2.**
3.	**4.**
5.	
7.	**8.**
9.	**10.**

A. $\frac{1}{2}x^2$ [illegible]	**B.** [illegible]	$\frac{1}{2}\sin^{-1}(t^2)+C$	**D.** $\frac{2}{9}(t+4)^{\frac{3}{2}}+C$
E. $-\frac{1}{3}\ln(\lvert\cos 3x\rvert)+C$	**F.** $30x^2+C$	**G.** $\frac{1}{4}\tan^{-1}\left(\frac{x+2}{4}\right)+C$	**H.** $\frac{1}{2}x^2+C$
I. $\frac{2}{3}\ln\left(1+x^{\frac{3}{2}}\right)+C$	**J.** $\ln(\ln x)+C$	**K.** $\frac{2}{3}(\tan x)^{\frac{3}{2}}+C$	**L.** $\frac{1}{5}\ln\lvert\csc 5x-\cot 5x+C\rvert$
M. $-\frac{3}{2}e^{-x^2}+C$	**N.** $\frac{1}{8}\tan^{-1}\left(\frac{t^2}{4}\right)+C$	**O.** $\frac{\ln(1+2^{3x})}{3\cdot\ln(2)}+C$	**P.** $\frac{1}{2}e^{2x+1}+C$

Preview

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Related Rates Station

Related Rates Station

Related Rates Stations Card Sort

Name:

Directions: Complete the work for each card and record your answers below.

1.	2.
3.	
	6.

1.

Gary and Sandy, a newlywed couple, go out for a romantic dinner at Café Noir Bistro. They order a bottle of wine and Marcello, the waiter, brings them conical classes with an altitude of 4 inches and a diameter of 3 inches. If Marcello pours the wine into a glass at a rate of 15 in^3/min, find the rate at which the wine level is rising when the glass is half full.

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2.

Romeo [illegible] Juliet [illegible] which [illegible] tall [illegible]. Juliet wants to [illegible] pushes [illegible] of the ladder toward [illegible] bottom of the [illegible] away from the castle at a rate of 4 ft/sec., how fast are Romeo and the ladder sliding down the wall of the castle when the top of the ladder is 15 feet above the ground?

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3.

[illegible] rice from a field. When [illegible] placed [illegible] on the shelf. There was a [illegible] in the bottom of her sack, and rice leaked out forming a conical pile on the floor, with a constant altitude of [illegible] inches and a radius changing at a rate of 4 in/min. Find the rate of change of the volume of the pile of rice when the volume is 1400 in^3.

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4.

Klinky the Clown entertains at birthday parties. Klinky specializes in balloon tricks. He inflates the balloons quickly to keep the interest of the children. If Klinky wants the volume of the balloon to increase at 25 in^3/sec, at what rate would the radius change when the diameter of the balloon is 4 inches?

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5.

A balloon rises vertically above a level, straight road at a constant rate of 1 ft/sec. At the instant when the balloon is 65 feet above the ground, a bicycle passes under it, going 17 ft/sec. How fast is the distance between the bicycle and the balloon changing 3 seconds later?

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6.

The ends of a horizontal water trough 10 feet long are isosceles trapezoids, with lower base 3 feet, upper base 5 feet, and altitude 2 feet. If the water level is rising at a rate of 0.25 in/min., when the depth of the water is 1 foot, how fast is water entering the trough?

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Separation of Variables Station

Separation of Variables

Separation of Variables Stations Activity Name:

Directions: Complete the work for each card and record your answers below.

1.	**2.**
3.	
	6.

1.

$$\frac{dy}{dx} = 0.17(y - 25)$$

Initial condition:
$x = 0, y = 30$

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2.

$$\frac{dy}{dx} = x^2 y$$

Initial condition:
$(0, 5)$

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3.

$$\frac{dy}{dx} = \frac{1}{3}(x + 2)$$

Initial condition:
$(0, 3)$

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4.

$$\frac{dy}{dx} = x\sqrt{y}\cos^2\sqrt{y}$$

Initial condition:
$\left(6, \frac{\pi^2}{16}\right)$

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5.

$$\frac{dy}{dx} = e^{x-y}$$

Initial condition:
$(0, 3)$

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6.

$$\frac{dy}{dx} = e^{x^2}(2x + 2xy^2)$$

Initial condition:
$(0, 0)$

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Volumes by Cross Sections Station

Volumes by Cross Sections Station

Volumes by Cross Sections Stations Name:

Directions: Complete the work for each card and record your answers below.

1.	2.
3.	
5.	6.

1.

Find the volume of a solid whose base is bounded by $x^2 + y^2 = 16$ with cross sections perpendicular to the x-axis that are equilateral triangles.

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2.

Find [illegible] bounded by [illegible] $y = 2 -$ [illegible] $y =$ [illegible] with [illegible] perpendicular to the x-axis that are [illegible] triangles of height 3.

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3.

[illegible] base [illegible] bounded by $y = x^2$ and $= 4$. [illegible] the volume of the solid if cross sections perpendicular to the x-axis are squares.

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4.

The base of a solid is bounded by $y = x^2$ and $y = 4$. Find the volume of the solid if cross sections perpendicular to the x-axis are semi-circles.

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5.

The base of a solid is bounded by $x = y^2$ and $x = 16$. Find the volume if cross sections perpendicular to the x-axis are isosceles right triangles with one congruent side in the xy-plane.

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6.

The base of a solid is the region enclosed by the ellipse $9x^2 + y^2 = 9$. Find the volume of the solid if cross sections perpendicular to the y-axis are squares.

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