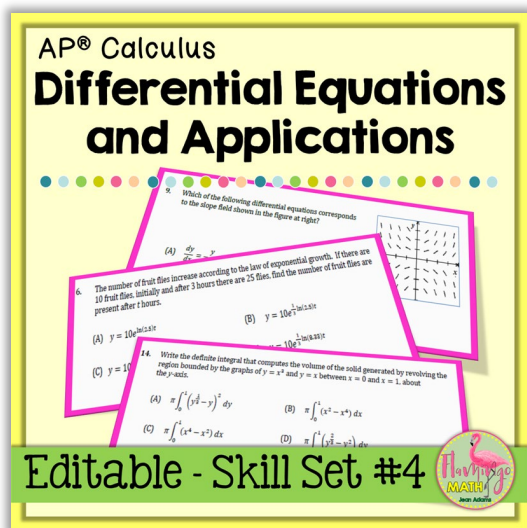


Differential Equations & Applications Skill Set #4



KEY CONCEPTS/TOPICS:

- Topic 8.1 Finding the Average Value of a Function on an Interval
- Topic 8.2 Connecting Position, Velocity, and Acceleration of Functions
- Topic 8.3 Using Accumulation Functions and Definite Integrals in Applied Contexts
- Topic 8.4 Finding the Area Between Curves Expressed as Functions of x
- Topic 8.6 Finding the Area Between Curves That Intersect at More Than Two Points
- Topic 8.7 Volumes with Cross Sections: Squares and Rectangles
- Topic 8.9 Volume with Disc Method: Revolving Around the x - or y -Axis
- Topic 8.11 Volume with Washer Method: Revolving Around the x - or y -Axis

Product Overview

Your Calculus students will practice AP-Style multiple choice questions related to Differential Equations and Applications of Integration with this 20-question skill set. The fully-editable resource is designed as a series of “Multiple Choice Monday” Exam Prep and Practice. All questions in the set are non-calculator prompts and should be able to be completed in a 40 to 50-minute class period.

Multiple Choice Monday

Multiple Choice Monday Differential Equations and Applications

Name _____

1. If $\frac{dy}{dx} = 4y$ and if $y = 4$ when $x = 0$, then $y =$

(A) $2x^2 + 4$ (B) $4 + e^{4x}$ (C) $3 + e^{4x}$ (D) $4e^{4x}$

2. Which of the following is the solution to the differential equation $\frac{dy}{dx} = \frac{x^2}{y}$ with initial condition $y(3) = -2$?

(A) $y = -2e^{-9+x^3/3}$ (B) $y = -\sqrt{\frac{2x^3}{3} - 14}$

3. If $y = \frac{1}{x}$, then $\frac{dy}{dx} =$

(A) $-\frac{1}{x^2}$ (B) $\frac{1}{x^2}$

4. Find the area of the region bounded by the curve $y = x^2$ and the line $y = 4$.

(A) $\frac{32}{3}$ (B) $\frac{64}{3}$ (C) $\frac{32}{5}$ (D) $\frac{64}{5}$

5. Let R be the region enclosed by the curve $y = x^2$ and $y = 4$. Find the volume of the solid generated by revolving R about the y -axis if every cross-section perpendicular to the y -axis is a square.

(A) $\frac{512}{15}$ (B) $\frac{128}{15}$ (C) $\frac{64}{15}$ (D) $\frac{16}{3}$

6. The number of fruit flies in a culture increases according to the differential equation $\frac{dy}{dt} = ky$, where k is a constant. If there are 10 fruit flies at $t = 0$ and 100 fruit flies at $t = 1$, how many fruit flies are there at $t = 2$?

(A) $10e^{\ln 10}$ (B) $10e^{\frac{1}{3}\ln 10}$ (C) $10e^{\frac{1}{2}\ln 10}$ (D) $10e^{\ln 10}$

7. Which of the following would represent the area of the region bounded by the curve $y = x^2$ and the line $y = x - 2$?

(A) $\int_{-3}^2 (x^2 + x - 6) dx$ (B) $\int_{-3}^2 (2 - x^2 - x) dx$ (C) $\int_{-3}^2 (6 - x - x^2) dx$ (D) None of these

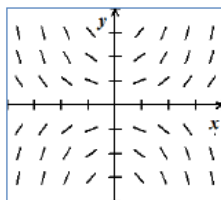
8. Find the volume of the solid generated by revolving the region bounded by $y = x^2$ and $y^2 = 8x$ about the y -axis.

(A) $\frac{16\pi}{3}$ (B) $\frac{24\pi}{5}$ (C) $\frac{192\pi}{5}$ (D) $\frac{128\pi}{15}$



Students gain valuable practice for AP Calculus Exam concepts

9. Which of the following differential equations corresponds to the slope field shown in the figure at right?



- (A) $\frac{dy}{dx} = -\frac{y}{x}$ (B) $\frac{dy}{dx} = -\frac{x}{y}$
 (C) $\frac{dy}{dx} = \frac{x}{y}$ (D) $\frac{dy}{dx} = \frac{xy}{2}$

10. What is the area of the largest rectangle that has its base on the x-axis and its other two vertices on the parabola $y = 6 - x^2$?

- (A) $8\sqrt{2}$ (B) 6
 (C) $4\sqrt{3}$ (D) $3\sqrt{2}$



12. If $\frac{dy}{dx} = 3$, then

- (A) $x^2 - y^2 = 7$ (B) $x^2 - y^2 = 5$ (C) $x^2 - y^2 = 3$ (D) $x^2 + y^2 = 7$

13. Find the volume generated by rotating the area bounded by $y = \frac{1}{x}$, $x = 3$, and $y = 0$ about the x-axis.

- (A) $\frac{2\pi}{3}$ (B) π (C) $\frac{4\pi}{3}$

- (A) $\pi \int_0^1 (x^2 - x^3) dx$ (B) $\pi \int_0^1 (x^2 - x^3) dx$
 (C) $\pi \int_0^1 (x^2 - x^3) dx$ (D) $\pi \int_0^1 (x^2 - x^3) dx$

15. Which of the following is a particular solution for $y(x)$?

- (A) $y = \ln(x^2 + e - 4)$ (B) $y = \ln(x^2 + e - 4)$
 (C) $y = \ln(x^2 + e^2 - 1)$ (D) $y = 2e^{x^2-1}$

16. If $\frac{dy}{dx} = \frac{k}{x}$, k a constant, and if $y = 2$ when $x = 1$ and $y = 4$ when $x = e$, then when $x = 2$, y equals

- (A) $\ln 2 + 2$ (B) $\ln 4 + 2$
 (C) $\ln 8$ (D) 4



A variety of AP-Style questions for Limits, Continuity and Derivatives

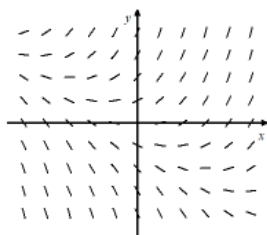
17. Shown at right is the slope field for which of the following differential equations?

(A) $1 + x$

(B) $\frac{x}{y}$

(C) $x + y$

(D) $\ln(y)$



18. Gasoline is leaking from an underground storage container at a rate of $-20(t - 10)$ liters per hour (where t is the number of hours). How many liters of gasoline have leaked out of the container between $t = 0$ and $t = 2$ hours?

(A) 360

(B) 240

(C) 180

19. An object is moving with position of the object given by $s(t) = t^2 + t$. When $t = 3$, what is the velocity of the object?

20. The value of y is $[-1, 5]$.

(A) $-\sin(1)$

(C) $\frac{\ln(1)}{4}$

$\frac{\sin(5) - \sin(1)}{4}$

Name _____ Date _____ Period _____

AP CALCULUS

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ce Monday

I. Multiple Choice (No Calculator)

1.	(A)	(B)	(C)	(D)
2.	(A)	(B)	(C)	(D)
3.	(A)	(B)	(C)	(D)
4.	(A)	(B)	(C)	(D)
5.	(A)	(B)	(C)	(D)
6.	(A)	(B)	(C)	(D)
7.	(A)	(B)	(C)	(D)
8.	(A)	(B)	(C)	(D)
9.	(A)	(B)	(C)	(D)
10.	(A)	(B)	(C)	(D)
11.	(A)	(B)	(C)	(D)
12.	(A)	(B)	(C)	(D)
13.	(A)	(B)	(C)	(D)
14.	(A)	(B)	(C)	(D)
15.	(A)	(B)	(C)	(D)
16.	(A)	(B)	(C)	(D)
17.	(A)	(B)	(C)	(D)
18.	(A)	(B)	(C)	(D)
19.	(A)	(B)	(C)	(D)
20.	(A)	(B)	(C)	(D)



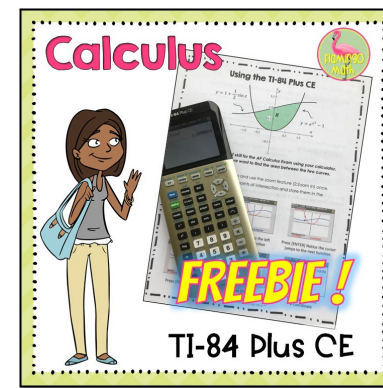
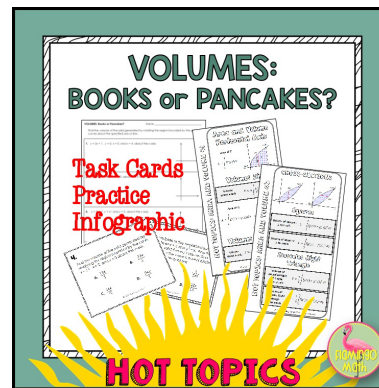
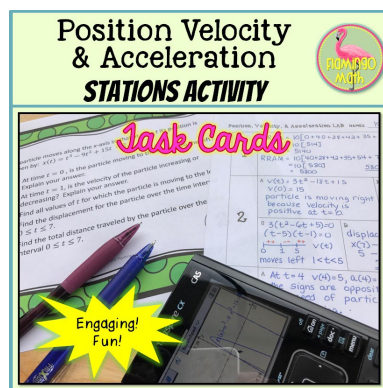
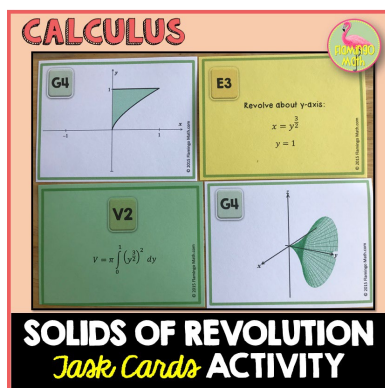
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