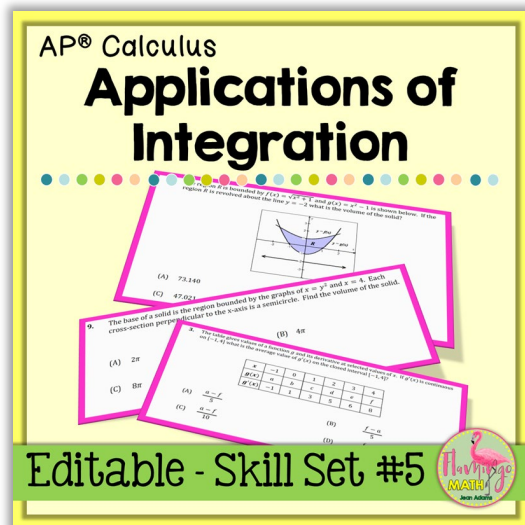




KEY CONCEPTS/TOPICS:



- Topic 8.1 Finding the Average Value of a Function on an Interval
- Topic 8.2 Connecting Position, Velocity, and Acceleration of Functions Using Integrals
- 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 8.5: Finding the Area Between Curves Expressed as Functions of y .
- 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 8.8: Volumes with Cross Sections: Triangles and Semicircles
- Topic 8.9: Volume with Disc Method: Revolving Around the x - or y -Axis
- Topic 8.10: Volume with Disc Method: Revolving Around Other Axes
- Topic 8.11: Volume with Washer Method: Revolving Around the x - or y -Axis
- Topic 8.12: Volume with Washer Method: Revolving Around Other Axes

Product Overview

Your Calculus students will practice AP-Style multiple choice questions related to the unit 8 in the CED Binder with this 25-question skill set. The fully-editable resource is designed as a series of “Multiple Choice Monday” Exam Prep and Practice. The questions in the set are in two sections, 15 non-calculator prompts and should be able to be completed in a 30-minute timed-setting and 10 calculator prompts which should be completed in a 30-minute timed setting to better prepare for the rigor of the AP Exam.

Multiple Choice Monday

Multiple Choice Monday Applications of Integration

Name _____

1. Hayley is measuring her protein intake throughout the day. The rate at which she eats protein is given by the differentiable function P , where $P(t)$ is measured in grams per day and t is measured in days. Which of the following expressions gives the average amount of protein in grams per day for Hayley's diet from $t = 0$ to $t = 7$ days.

(A) $\int_0^7 P'(t) dt$

(B) $\int_0^7 P(t) dt$

(C) $\frac{1}{7} \int_0^7 P(t) dt$

(D) $\frac{1}{7} \int_0^7 P'(t) dt$

2. The average value of a continuous function $f(x)$ on the interval $[a, b]$ is 15.

Find the value of $\int_a^b f(x) dx$.

(B)

3. The function $f(x)$ is continuous on the interval $[-1, 1]$. The average value of $f(x)$ on the interval $[-1, 1]$ is $\frac{1}{5}$. Find the value of $\int_{-1}^1 f(x) dx$.

	-1	0
$f(x)$	a	b
	-1	1

(A) $\frac{a-b}{5}$

(B) $\frac{f-a}{5}$

(C) $\frac{a-f}{10}$

(D) $\frac{f-a}{10}$

4. An object moves along a straight line so that at time $t \geq 0$ its acceleration function $a(t) = 4t$. At time $t = 0$, the velocity of the particle is 6 and the position of the particle is -5 . Which of the following is an expression for the position of the particle at time $t \geq 0$?

(A) $\frac{2}{3}t^3 + 6t - 5$

(B) $2t^3 + 6t - 5$

(C) $\frac{4}{5}t^2 + 6t - 5$

(D) $2t^2 + 6t - 5$

5. The velocity of a particle moving along a straight line is given by the function $v(t) = 5t - t^2$ for $0 \leq t \leq 12$. The particle starts at the origin. The total distance traveled by the particle from $t = 0$ to $t = 12$ seconds is given by the table below. If the velocity of the particle is 5 feet per second, the approximated value of the velocity, in feet per second, at $t = 12$ seconds, computed using a Riemann sum with four subdivisions of equal length is

t (seconds)	0	3	6	9	12
$a(t)$ (ft/sec ²)	3	4	5	6	3

(A) 23

(B) 26

(C) 54

(D) 59



Students gain valuable practice for AP Calculus Exam concepts

7. Let R be the region bounded by the graphs of $y = x^2 + 1$ and the line $y = 5$. What is the area of R ?

(A) $\frac{14}{3}$ (B) $\frac{16}{3}$ (C) $\frac{28}{3}$ (D) $\frac{32}{3}$

8. Let R be the region bounded by the graphs of $y = 2 - x^2$ and $y = x - 4$. Write the expression to find the area of R .

(A) $\int_{-3}^2 (6 - x - x^2) dx$ (B) $\int_{-2}^3 (6 - x - x^2) dx$
 (C) $\int_{-2}^3 (x^2 + x - 6) dx$ (D) $\int_{-2}^1 (2 + x + x^2) dx$

9. The base of a solid is the region bounded by the graphs of $y = x^2 + 1$ and the line $y = 4$. Each cross-section perpendicular to the x -axis is a semicircle. What is the volume of the solid?

(A) 4
 (B) 6π

10. A solid is generated by revolving the region bounded by the graphs of $y = x^2 + 1$ and the line $y = 4$ about the y -axis. What is the volume of the solid?

(A) $\frac{1}{2}$ (B) $\frac{1}{4}$
 (C) $\frac{1}{2}$ (D) $\frac{32\pi}{5}$

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11. A region R , enclosed by $y = x^2 + 1$, the horizontal line $y = 1$, and the vertical line $x = 2$, is revolved about the y -axis. Write an integral expression that would give the volume of this solid.

(A) $\pi \int_0^2 [2^2 - (x^2 + 1)^2] dx$

(B) $\pi \int_1^5 [2^2 - (\sqrt{y-1})^2] dy$

(C) $\pi \int_1^5 [2^2 - (\sqrt{y-1})^2] dy$

12. A function f is defined on the interval $[0, 10]$ and is piecewise linear. The function passes through the points $(0, 0)$, $(2, 4)$, $(4, 0)$, $(6, 4)$, $(8, 0)$, and $(10, 4)$. What is the average value of f on the interval $[0, 10]$?

t (hour)	5	9	12	15	18	21	24
1000 ft	15	11	9	14	8	6	6

(A) 274 (B) 285 (C) 285 (D) 312

13. A solid has a circular base of radius 3. If every cross-section perpendicular to the x -axis is an equilateral triangle, then its volume is

(A) $36\sqrt{3}$ (B) $24\sqrt{3}$
 (C) $18\sqrt{3}$ (D) $12\sqrt{3}$

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

14. Let R be the region in the first quadrant enclosed by the lines $x = 0$ and $y = 3$ and the graph of $y = e^x$. The volume of the solid generated when R is revolved about the x -axis is given by

- (A) $\pi \int_0^3 (9 - e^{2x}) dx$ (B) $\pi \int_0^{\ln 3} (3 - e^x)^2 dx$
 (C) $\pi \int_0^{\ln 3} (9 - e^{2x}) dx$ (D) $\pi \int_0^3 (3 - e^x)^2 dx$

15. Let R be the region bounded by the graph $y = \sqrt{x}$ and the line $x = 3$. The vertical line $x = k$ divides the region R into two regions such that when these two regions are revolved about the x -axis they generate solids with equal volume.

- (A) $\frac{3}{\sqrt{2}}$
 (C) $\frac{\sqrt{3}}{2}$

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Multiple Choice Monday
Applications of Integration
CALCULATOR Allowed

Name _____

16. The region in the first quadrant enclosed by the graphs of $y = x$ and $y = e^x$ is revolved about the x -axis. The volume of the solid generated is

- (A) 7.397 (B) 9.339

17. The rate of change of a viral infection among a population is given by $f(t) = 520e^{-0.073t}$ per day, where t is the number of days since the virus was first detected. If there is no initial infection, how many people are infected by the virus after 10 days?

- (A) 5,073 (B) 5,704
 (C) 5,079 (D) 7,826

18. A stormwater management pond is overflowing and is being drained at the rate of $1000 - 20t$ gallons per hour for $t > 0$ hours. How many gallons of storm water have been drained after 10 hours?

- (A) 2,981 (B) 3,130 (C) 1,680 (D) 939

19. The base of a solid is the region enclosed by the graph $y = \frac{1}{2}(x - 4)^2$ and the coordinate axes. If every cross-section perpendicular to the x -axis is a square, then the volume of the solid is

- (A) 10.7 (B) 21.3 (C) 51.2 (D) 56.8

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Use as a timed-practice test prep prior to the AP Exam

20. The average value of the function $f(x) = (e^x) \sin(x)$ on the closed interval $[0, \pi]$ is

- (A) 12.070 (B) 8.231 (C) 6.035 (D) 3.842

21. What is the area of the region in the first quadrant enclosed by the graphs of $y = 2 \sin(x)$ and $y = 3 - x$ and the x-axis?

- (A) 1.208 (B) 1.686 (C) 2.894 (D) 3.986

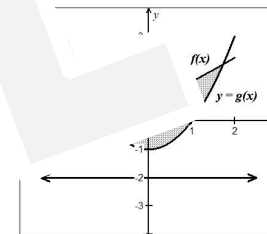
22. The temperature in a room changes at a rate of $r(t) = 1 - t^2$ degrees Fahrenheit per hour (where t is the time in hours). After $t = 0$, the room's temperature at time $t = 3$ hours?

- (A) 70.044°F (D) 74.124°F

24. An oil storage tank is being filled at a rate of $r(t)$ gallons per hour (where t is time in hours).

What does $\int_1^8 r'(t) dt$ represent?

- (A) The rate at which the tank is filled at $t = 8$.
 (B) The total amount of oil in the tank at $t = 1$ and $t = 8$.
 (C) The total amount of oil filled between $t = 1$ and $t = 8$.
 (D) The average rate of filling between $t = 1$ and $t = 8$.



- (A) 73.140 (B) 67.638
 (C) 47.021 (D) 24.491

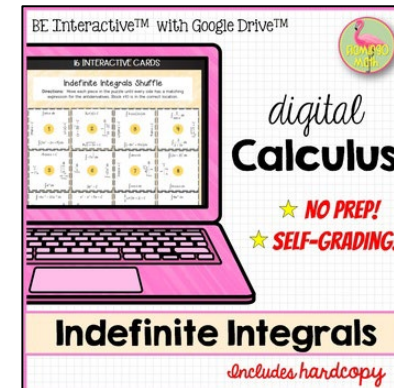
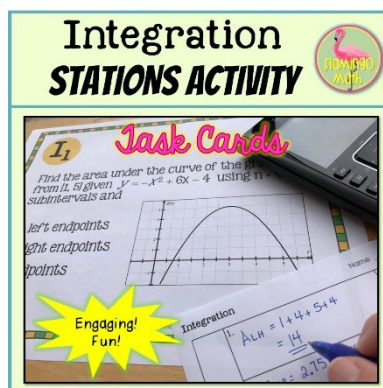
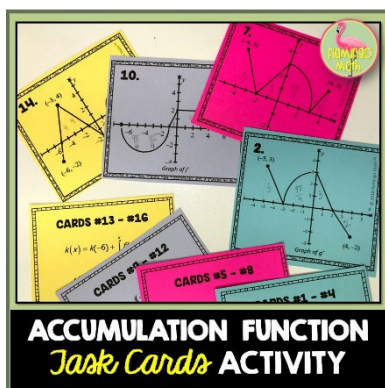




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