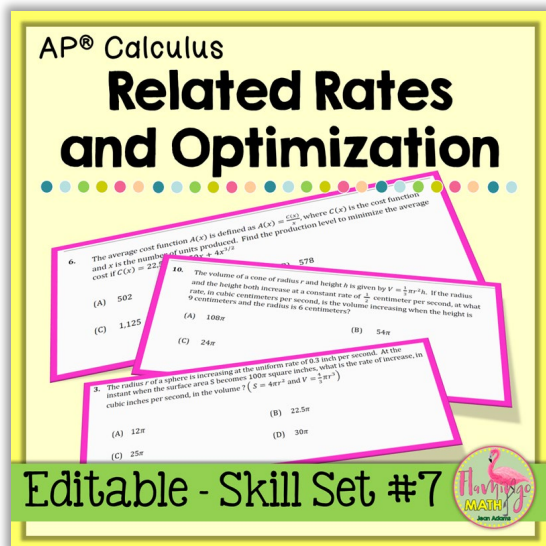


Related Rates & Optimization Skill Set #7



KEY CONCEPTS/TOPICS:

Topic 4.4 Introduction to Related Rates
Topic 4.5 Solving Related Rates
Topic 5.10 Introduction to Optimization Problems
Topic 5.11 Solving Optimization Problems

Product Overview

Your Calculus students will practice AP-Style multiple choice questions related to Related Rates and Optimization with this 16-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 should be able to be completed in a 40 to 50-minute class period.

Multiple Choice Monday

Multiple Choice Monday Related Rates & Optimization

Name: _____

1. The rate of change of the volume, V , in a tank of water, with respect to time, t , is directly proportional to the square root of the volume. Which of the following is a differential equation that describes this relationship?

- (A) $\frac{dV}{dt} = k\sqrt{V}$ (B) $\frac{dV}{dt} = \frac{k}{\sqrt{V}}$
(C) $\frac{dV}{dt} = k\sqrt{t}$ (D) $V(t) = k\sqrt{V}$

2. When the area in square units of an expanding circle is 4π linear units, the radius is

- (A) $\frac{1}{4\pi}$ (B) $\frac{1}{2}$

3. The area of a circle is increasing at a rate of 0.3 in. per second. At the instant when the radius is 2 in., the rate of change of the circumference is

- (A) $\frac{3}{20}$ in. per second (B) $\frac{3}{10}$ in. per second
(C) $\frac{3}{5}$ in. per second (D) $\frac{3}{2}$ in. per second

4. The top of a 25-foot ladder is sliding down a vertical wall at a constant rate of 7 ft/min. When the top of the ladder is 7 feet from the ground, what is the rate of change of the distance between the bottom of the ladder and the wall?

- (A) $-\frac{7}{8}$ ft/min (B) $-\frac{7}{24}$ ft/min
(C) $-\frac{7}{8}$ ft/min (D) $-\frac{7}{24}$ ft/min

The volume of a sphere is increasing at a constant rate of 364π cubic units per second. The radius of the sphere is 3 units. What is the rate of change of the surface area of the sphere at this instant?

- (A) 16π (B) 288π
(C) 32π (D) 32π

6. The average cost function for a product is $A(x) = \frac{C(x)}{x}$, where $C(x)$ is the cost function. Find the production level to minimize the average cost.

- (A) 502 (B) 578
(C) 1,125 (D) 1,736

7. The volume of a cylindrical tin can with a top and a bottom is to be 16π cubic inches. If a minimum amount of tin is to be used to construct the can, what must be the height, in inches, of the can?

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



Students gain valuable practice for AP Calculus Exam concepts

8. Galileo is planting a rectangular garden. He needs to enclose an area of 2,400 square meters into 4 sections whose sides are parallel to each other. Find the minimum amount of fencing (in meters) that he needs to enclose the garden.

- (A) $x = 8\sqrt{15}; y = 20\sqrt{15}$ (B) $x = 20\sqrt{10}; y = 9\sqrt{10}$
 (C) $x = 20\sqrt{15}; y = 8\sqrt{15}$ (D) $x = 18\sqrt{10}; y = 12\sqrt{10}$

9. The point on the curve $y = \sqrt{2x}$ that is nearest the point (1,4) occurs at the

- (A) $(1, \sqrt{2})$
 (C) $(4, 2\sqrt{2})$

11. The radius of a circle is decreasing at a constant rate of 0.1 centimeter in terms of the circumference C , what is the rate of change of the area in square centimeters per second?

- (A) $-(0.1)C$ (B) $(0.1)^2C$
 (C) $-(0.1)^2C$ (D) $(0.1)C$

13. A railroad track and a road cross at right angles. An observer stands on the road 70 meters south of the crossing and watches an eastbound train traveling at 60 meters per second. At how many meters per second is the train moving away from the observer 4 seconds after it passes through the intersection?

- (A) 57.60 (B) 57.88
 (C) 59.20 (D) 67.40



14. Find the radius of a cylindrical soda can with volume of 512 cubic inches that will use the minimum amount of aluminum material.

- (A) 8.672 in. (B) 4.335 in.
(C) 9 in. (D) 2.734 in.

15. 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 inch per minute when the depth of the water is 1 foot, how fast is water entering the trough?

- (A) $\frac{3 \text{ ft}^3}{10 \text{ min}}$
(C) $\frac{5 \text{ ft}^3}{6 \text{ min}}$

(B)

Name _____ Date _____ Period _____

AP CALCULUS

Multiple

Monday

I. Multiple Choice

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)



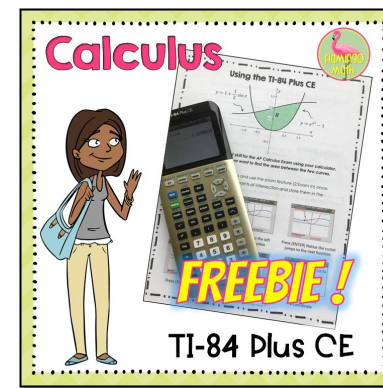
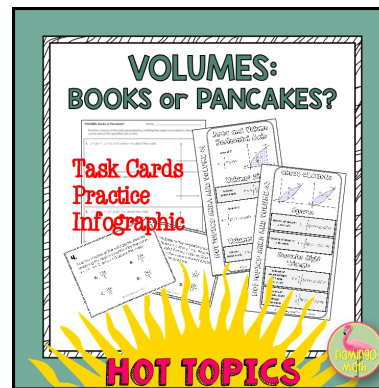
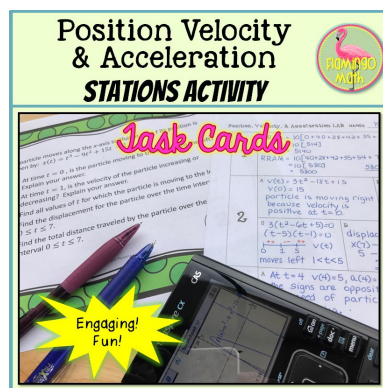
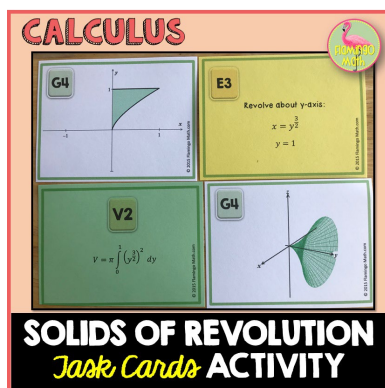
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