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Question 1 **(1 pts)**

What is the main idea in a related rates problem?

A. To find the average rate of change of a function y.

B. To compute the rate of change of one quantity in terms of the rate of change of another quantity.

C. To use the chain rule.

D. To find the velocity of a particle at time t.

Question 2 **(1 pts)**

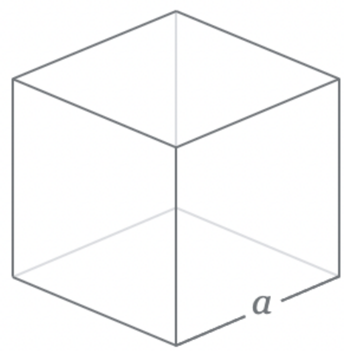
If V is the volume of a cube with edge length a, and the cube expands over time, what is $\frac{dV}{dt}$?

A. $\frac{dV}{dt} = 3a^2$

B. $\frac{dV}{dt} = a^3$

C. $\frac{dV}{dt} = 3a^2 \frac{da}{dt}$

D. $\frac{dV}{dt} = 3a$



Question 3 **(1 pts)**

Suppose you have the related rates problem:

Each side of a square, labeled x, is increasing at a rate of $6m/s$. At what rate is the area of the square increasing when the area of the square is $16m^2$?

Identify what is given and what is unknown/the goal in the problem statement.

A. Given: $\frac{dx}{dt}$.

Goal: $\frac{dx}{dt}$ at $x = 16m^2$.

B. Given: $\frac{dx}{dt}$.

Goal: $\frac{dA}{dt}$ at $x = 16m^2$.

C. Given: $\frac{dA}{dt}$.

Goal: $\frac{dx}{dt}$ at $x = 16m^2$.

D. Given: $\frac{dx}{dt}$.

Goal: $\frac{dA}{dt}$ at $x = 4m^2$.

Question 4 (1 pts)

Find the rate that the area of the square is increasing when the area is $16m^2$, from the Question 3.

A. $192m^2/s$

B. $48m^2/s$

C. $6m^2/s$

D. $32m^2/s$

Question 5 (1 pts)

Suppose $y = \sqrt{x^2 + 2x + 1}$, where x and y are **functions of** t. If $\frac{dx}{dt} = 3$, find $\frac{dy}{dt}$ when $x = 2$.

A. $\frac{dy}{dt} = 3$

B. $\frac{dy}{dt} = \frac{1}{6}$

C. $\frac{dy}{dt} = 2$

D. $\frac{dy}{dt} = 9$

Question 6 (1 pts)

When doing the process of linearization, we *approximate* the values of the curve $y = f(x)$ by the tangent line at $(a, f(a))$, when x is near a, if $f(x)$ is difficult to compute. Why can we do this?

A. Since $f(a)$ is linearizable.

B. The point of tangency exists.

C. $f(x)$ is differentiable.

D. The curve $y = f(x)$ lies very close to it's tangent line near the point of tangency.

Question 7 (1 pts)

If $f(x) \approx f(a) + f'(a)(x - a)$, what is the linearization?

A. $L(x) \approx f(a) + f'(a)(x - a)$

B. $L(x) = f'(a)$

C. $L(x) = f(a) + f'(a)(x - a)$

D. $L(x) = (x - a)'$

Question 8 (1 pts)

Find the linearization $L(x)$ of $f(x) = x^3 - x^2 + 3$ at $a = -1$

A. $L(x) = 5x + 6$

B. $L(x) = 16x + 23$

C. $L(x) = 3x^2 - 2x$

D. $L(x) = 5$

Question 9 (1 pts)

The differentiable dy is the approximate increment in the variable y given by $dy = f'(x)dx$. What is dx?

A. An independent variable.

B. The increment in the variable x.

C. The differential of x.

D. All of the above.

Question 10 (1 pts)

dy represents the amount that the tangent line rises or falls when x changes by an amount dx. What is this also known as?

A. Δy

B. The change in linearization.

C. The change in x, Δx.

D. $f'(x)$