

6. Integration and Accumulation of Change

Starter Quiz · 课前小测

AP Calculus AB

Name: _____ Score: _____

- A tap runs at 3 L/min for 4 min. The area under the rate graph (accumulated volume) is...

- For $f(x) = x^2$ on $[0, 2]$ with 2 right rectangles (width 1): heights $f(1) = 1$, $f(2) = 4$. Find the right Riemann sum.

- For n equal strips on $[a, b]$, the width Δx is...
☐ $\frac{b-a}{n}$
☐ $b-a$
☐ $\frac{n}{b-a}$
☐ $n(b-a)$
- By FTC Part 1, $\frac{d}{dx} \int_a^x f(t) dt =$
☐ $F(x) - F(a)$
☐ $f(x)$
☐ $f'(x)$
☐ $f(a)$
- For $g(x) = \int_a^x f(t) dt$, g is increasing exactly where...
☐ $f(x) > 0$
☐ $f(x) < 0$
☐ $f'(x) > 0$
☐ $g(x) > 0$
- Given $\int_0^4 f dx = 10$ and $\int_0^4 g dx = 3$, find $\int_0^4 (2f - g) dx$.

- FTC Part 2 says $\int_a^b f dx =$
☐ $f'(b) - f'(a)$
☐ $F(b) - F(a)$ where $F' = f$
☐ $F(a) - F(b)$
☐ $f(b) - f(a)$

8. What is $\int x^3 dx$?

- ☐ $3x^2 + C$
☐ $\frac{x^4}{4} + C$
☐ $x^4 + C$
☐ $\frac{x^2}{2} + C$

9. Where a rate graph dips below the axis, that area subtracts from the net accumulated change.

- ☐ True ☐ False

10. Same setup, but a **left** Riemann sum: heights $f(0) = 0$, $f(1) = 1$. Find it.

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1. **12**

Rectangle area = $3 \times 4 = 12$ L.

2. **5**

$1 \cdot 1 + 4 \cdot 1 = 5$.

3. $\frac{b-a}{n}$

The interval width divided by the number of strips.

4. $f(x)$

The derivative of the accumulation function is the integrand $f(x)$.

5. $f(x) > 0$

$g' = f$, so g increases where $f > 0$.

6. **17**

$2(10) - 3 = 17$.

7. $F(b) - F(a)$ **where** $F' = f$

Evaluate an antiderivative at upper minus lower limit.

8. $\frac{x^4}{4} + C$

Add one to the exponent, divide by it: $\frac{x^4}{4} + C$.

9. **True**

Below-axis area is negative (signed area).

10. **1**

$0 \cdot 1 + 1 \cdot 1 = 1$.