

8. Applications of Integration

Starter Quiz · 课前小测

AP Calculus AB

Name: _____ Score: _____

1. The average value of f on $[a, b]$ is...

- ☐ $\int_a^b f \, dx$
- ☐ $\frac{1}{b-a} \int_a^b f \, dx$
- ☐ $(b-a) \int_a^b f \, dx$
- ☐ $f(b) - f(a)$

2. To recover position from velocity you...

- ☐ differentiate velocity
- ☐ integrate velocity
- ☐ square velocity
- ☐ take the reciprocal

3. The applied accumulation relationship is: final value =...

- ☐ $\int_a^b R \, dt$
- ☐ initial value $+$ $\int_a^b R \, dt$
- ☐ initial value $\times$ $\int_a^b R \, dt$
- ☐ $R(b) - R(a)$

4. The area between an upper curve f and lower curve g on $[a, b]$ is...

- ☐ $\int_a^b (g - f) \, dx$
- ☐ $\int_a^b (f - g) \, dx$
- ☐ $\int_a^b f \, dx$
- ☐ $\int_a^b (f \cdot g) \, dx$

5. With horizontal slices, the area is $\int_c^d (\quad) \, dy$ where...

- ☐ top minus bottom
- ☐ rightmost minus leftmost
- ☐ leftmost minus rightmost
- ☐ the product of the curves

6. Where do $y = x^3$ and $y = x$ cross?

☐ $x = -1$

☐ $x = 0$

☐ $x = 1$

☐ $x = 2$

Tick every correct option.

7. Find the average value of $f(x) = x^2$ on $[0, 3]$. ($\int_0^3 x^2 \, dx = 9$.)

8. For $v(t) = t - 2$ on $[0, 3]$, find the displacement $\int_0^3 (t - 2) \, dt$.

9. A tank has 50 L; water flows in at $R(t) = 4t$ for $0 \leq t \leq 3$ ($\int_0^3 4t \, dt = 18$). Find the total at $t = 3$.

10. Where do $y = x + 2$ and $y = x^2$ intersect?

☐ $x = -1$

☐ $x = 2$

☐ $x = 0$

☐ $x = 1$

Tick every correct option.

AP Calculus AB

1. $\frac{1}{b-a} \int_a^b f \, dx$

Total divided by width.

2. **integrate velocity**

Position = initial + $\int v \, dt$.

3. **initial value** + $\int_a^b R \, dt$

Final = initial + accumulated change.

4. $\int_a^b (f - g) \, dx$

Upper minus lower, integrated.

5. **rightmost minus leftmost**

Horizontal strips: right curve minus left curve.

6. $x = -1$; $x = 0$; $x = 1$

$$x^3 = x \Rightarrow x(x-1)(x+1) = 0.$$

7. **3**

$$\frac{1}{3} \cdot 9 = 3.$$

8. **-1.5**

$$\frac{9}{2} - 6 = -\frac{3}{2}.$$

9. **68**

$$50 + 18 = 68 \text{ L.}$$

10. $x = -1$; $x = 2$

$$x^2 - x - 2 = 0 \Rightarrow x = -1, 2.$$