LESSON MAKER PRO

Integral Accumulation

Use antiderivatives to find exact accumulated change.

HIGH SCHOOL · MA.912.C.4

MA.912.C.4 "Develop an understanding for and determine integrals."

NAME _____ DATE _____

EVALUATE A DEFINITE INTEGRAL

A definite integral adds up a rate of change over an interval. Find an antiderivative F(x), then subtract the lower value from the upper value: F(b) - F(a).

WORKED EXAMPLE

Evaluate ∫_-1^0 13x^12 dx.

1. An antiderivative of 13x^12 is x^13.
2. Apply the bounds: [x^13]_-1^0 = 0^13 - (-1)^13.
3. 0 - (-1) = 1.

Answer: 1

PRACTICE 6 problems

1 Evaluate ∫_3^4 5x^3 dx.

ANSWER _____

2 Evaluate ∫_4^5 (6x^4 - 9) dx.

ANSWER _____

3 Evaluate ∫_3^6 5x dx.

ANSWER _____

4 Evaluate ∫_-4^-2 (x^3 + 10) dx.

ANSWER _____

5 Evaluate ∫_5^9 (14 - x) dx.

ANSWER _____

6 Evaluate ∫_4^9 3sqrt(x) dx.

ANSWER _____

APPLY IT Show your work

1 A robotics club tests a delivery robot. Its velocity is v(t) = 6t + 14 meters per minute from t = 3 to t = 5 minutes. How far does the robot travel during this interval?

WORK SPACE

ANSWER _____

2 At a school concert, the rate of ticket sales is r(t) = 4t^2 + 9 tickets per hour from t = 3 to t = 6 hours after sales open. How many tickets are sold during this interval?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Evaluate ∫_-6^4 |x + 3| dx. Show how you split the integral at the point where the expression inside the absolute value equals zero.

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_____

ANSWER KEY

Integral Accumulation

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Evaluate ∫_3^4 5x^3 dx.	**875/4**
2	Evaluate ∫_4^5 (6x^4 - 9) dx.	**12561/5**
3	Evaluate ∫_3^6 5x dx.	**135/2**
4	Evaluate ∫_-4^-2 (x^3 + 10) dx.	**-40**
5	Evaluate ∫_5^9 (14 - x) dx.	**28**
6	Evaluate ∫_4^9 3sqrt(x) dx.	**38**

PART 2 · APPLY IT

1. **76 meters** Integrate the positive velocity: ∫_3^5 (6t + 14) dt. Evaluate [3t^2 + 14t]_3^5 to get 76.
2. **279 tickets** Find accumulated tickets with ∫_3^6 (4t^2 + 9) dt. Evaluate [(4/3)t^3 + 9t]_3^6 to get 279.

CHALLENGE

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Accept equivalent exact fraction forms for the definite integrals. For the challenge, students should split at x = -3 and may use geometric areas or piecewise antiderivatives.