

Watch. Practice. Understand. | Lesson 258

Calculus 2 1 Average and Instantaneous Rate of Change

Watch the matching video: <https://www.youtube.com/watch?v=xWbCmkn48xo>

Practice focus: Average and instantaneous rates

Original extra practice matched to the listed lesson topic.

Name: _____ Date: _____ Show your reasoning and check units.

01 Find the average rate of $f(x) = x^2$ on $[1,3]$.

02 Find the instantaneous rate of $f(x) = x^2$ at $x = 3$ using a difference quotient.

03 For position $s(t) = t^2 + 2t$ meters, find average velocity on $[1,4]$ seconds.

04 Approximate $f'(2)$ for $f(x)=x^3$ with the centered quotient using $h=0.1$.

Worked answers | Lesson 258

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Practice focus: Average and instantaneous rates

Original extra practice matched to the listed lesson topic.

01 Find the average rate of $f(x) = x^2$ on $[1,3]$.

$$(f(3) - f(1))/(3 - 1) = (9 - 1)/2 = 4.$$

02 Find the instantaneous rate of $f(x) = x^2$ at $x = 3$ using a difference quotient.

$$[(3+h)^2 - 9]/h = 6+h. \text{ Let } h \rightarrow 0 \text{ to obtain } 6.$$

03 For position $s(t) = t^2 + 2t$ meters, find average velocity on $[1,4]$ seconds.

$$s(4)=24, s(1)=3, \text{ so } (24 - 3)/3 = 7 \text{ m/s.}$$

04 Approximate $f'(2)$ for $f(x)=x^3$ with the centered quotient using $h=0.1$.

$$[f(2.1)-f(1.9)]/0.2 = (9.261-6.859)/0.2 = 12.01, \text{ close to exact value } 12.$$