Watch. Practice. Understand. | Lesson 293

the Secret of Solving Optimization Problems in Calculus Minimizing and Maximizing.

Watch the matching video: https://www.youtube.com/watch?v=ctpwvdOEEPo

Practice focus: Optimization

Original extra practice matched to the listed lesson topic.

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

01 A rectangle has perimeter 40 m. Find dimensions giving maximum area.

02 An open-top box with square base has volume 32 m^3. Minimize surface area.

03 Split 20 into two nonnegative numbers with maximum product.

04 Explain why solving f'(x)=0 alone does not finish an optimization problem.

Worked answers | Lesson 293

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Practice focus: Optimization

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01 A rectangle has perimeter 40 m. Find dimensions giving maximum area.

Let width x, length 20-x. $A=20x-x^2$; $A'=20-2x=0$ at $x=10$. Concave down, so 10 m by 10 m maximizes area.

02 An open-top box with square base has volume 32 m^3. Minimize surface area.

Let base side $x>0$, height $32/x^2$. $S=x^2+128/x$. $S'=2x-128/x^2=0$ gives $x=4$ and $h=2$; $S''>0$.

03 Split 20 into two nonnegative numbers with maximum product.

$P=x(20-x)$; vertex at $x=10$. Numbers 10 and 10 give maximum 100.

04 Explain why solving $f'(x)=0$ alone does not finish an optimization problem.

Critical points may be minima or inadmissible. Check the domain, classify candidates and compare endpoints when relevant.