Watch. Practice. Understand. | Lesson 278

Calculus 3.8 and 3.9 Sample Quiz Questions and Review

Watch the matching video: https://www.youtube.com/watch?v=tnv2sHAdGkc

Practice focus: Related rates

Related course review; confirm topics with your teacher.

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

01 A circle's radius increases at 2 cm/s. How fast is area increasing when r=5 cm?

02 A 10-ft ladder has foot moving away at 1 ft/s. Find the top's vertical rate when its foot is 6 ft away.

03 A sphere's radius grows at 0.5 cm/s. Find volume rate when r=4.

04 A square's area grows at 24 cm^2/s when side length is 6 cm. Find the side's rate.

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Calculus 3.8 and 3.9 Sample Quiz Questions and Review

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Practice focus: Exponential change and cooling

Related course review; confirm topics with your teacher.

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

05 A quantity satisfies y'=0.2y and y(0)=50. Find y(t).

06 A population doubles in 4 h under continuous exponential growth. Find its growth constant.

07 An object cools in a 20°C room: T(t)=20+60e^(-0.1t), with t in minutes. Find initial temperature and limiting temperature.

08 For that cooling model, when does T reach 50°C?

Worked answers | Lesson 278

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01 A circle's radius increases at 2 cm/s. How fast is area increasing when r=5 cm?

$A=\pi r^2$ gives $dA/dt=2\pi r\, dr/dt=20\pi$ cm²/s.

02 A 10-ft ladder has foot moving away at 1 ft/s. Find the top's vertical rate when its foot is 6 ft away.

$x^2+y^2=100$; $y=8$. Differentiate: $x\,x'+y\,y'=0$. $y'=-(6/8)(1)=-3/4$ ft/s.

03 A sphere's radius grows at 0.5 cm/s. Find volume rate when r=4.

$V=4\pi r^3/3$ gives $V'=4\pi r^2 r'=32\pi$ cm³/s.

04 A square's area grows at 24 cm²/s when side length is 6 cm. Find the side's rate.

$A=s^2$ implies $A'=2ss'$; $s'=24/(12)=2$ cm/s.

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05 A quantity satisfies y'=0.2y and y(0)=50. Find y(t).

Exponential solution y(t)=50e^(0.2t).

06 A population doubles in 4 h under continuous exponential growth. Find its growth constant.

2=e^(4k), so k=(ln2)/4 per hour.

07 An object cools in a 20°C room: T(t)=20+60e^(-0.1t), with t in minutes. Find initial temperature and limiting temperature.

T(0)=80°C; as t->infinity, exponential term tends to 0, so T->20°C.

08 For that cooling model, when does T reach 50°C?

30=60e^(-0.1t), so e^(-0.1t)=1/2 and t=10ln2≈6.93 minutes.