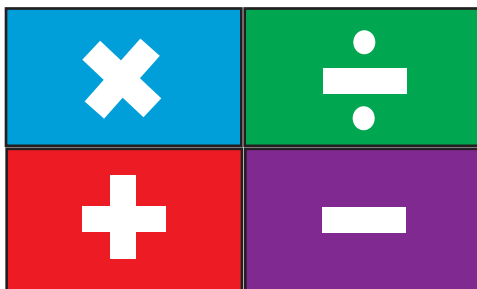


Math TODAY™

Student Edition

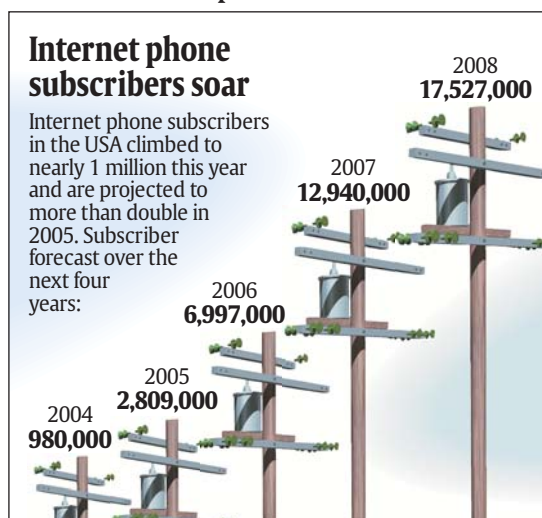
USA TODAY

NO. 1 IN THE USA



Internet phone subscribers soar

USA TODAY Snapshots™



Source: Yankee Group

By April Umminger and Karl Gelles, USA TODAY

Activity Overview:

The USA TODAY Snapshot "Internet phone subscribers soar" shows the growth of Internet subscribers in the USA. You will explore real-life data that will be modeled by a logistic function. You will explore and explain what the derivative means about the number of Internet subscribers. Derivatives will also be used to determine the year when the number of subscribers will be increasing most rapidly during the time period shown. Internet telephone is a new type of worldwide communications service. Internet telephone technology generally uses a phone adapter to convert your voice from an analog signal to a digital signal. The digital signal is sent over a Broadband Internet connection. This process is sometimes referred to as Voice Over IP (VoIP) or Internet Telephony. These calls are transmitted over the Internet backbone instead of a traditional telephone network. However, the person you are calling or the person calling you does not have to be connected to the Internet. Often these services provide normal calling features such as caller ID, call waiting, etc., and are less expensive than other communications methods. More and more people are choosing this service because of the features offered and because there are no additional long distance fees.

Focus Questions:

- Estimate and interpret the average rate of change for 2005 using the data from 2004 and 2006.
- Find and interpret the instantaneous rate of change for 2005.
- For the years listed, when does the model indicate that the number of Internet subscribers is increasing most rapidly?

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Internet phone subscribers soar

Procedure:

Activity 1

Estimate and interpret the rate of change for 2005 using the data from 2004 and 2006.

Step 1

Find the number of subscribers for 2004 and 2006 using the USA TODAY Snapshot "Internet phone subscribers soar". Enter the values below.

Year	2004	2006
Number of subscribers _____		
(in thousands)		

Step 2

Evaluate the average rate of change for the year-subscriber data from the previous step.

Step 3

In practical terms, what does the value in Step 2 mean in the context of this problem?

Activity 2

Find and interpret the instantaneous rate of change for 2005.

Step 1

Create a scatter plot of the data in the USA TODAY Snapshot "Internet phone subscribers soar" where 4 represents 2004 and the number of subscribers is measured in thousands.

Step 2

Determine the logistic regression model for the scatter plot in Step 1 and store this in Y1.

Step 3

Use the capabilities of the calculator to find the derivative of the logistic regression model and store this in Y2.

Step 4

Evaluate the derivative for the year 2005 and record your answer below.

Step 5

Interpret the meaning of the derivative in the year-subscriber context.

Data Source:

Yankee Group

Materials:

- TI-83 Plus family or TI-84 Plus family

World population milestones

Activity 3

For the years listed, when does the model indicate that the number of Internet subscribers is increasing most rapidly?

Step 1

Create a graph of the derivative and scatter plot in the same window.

Step 2

The greatest rate of change will happen when the value of the derivative is a maximum. Determine where the maximum value of the graph of the derivative exists. Record your answer below.

Step 3

What is the point called where the logistic graph is increasing most rapidly and the derivative graph has an extrema?

Student notes: