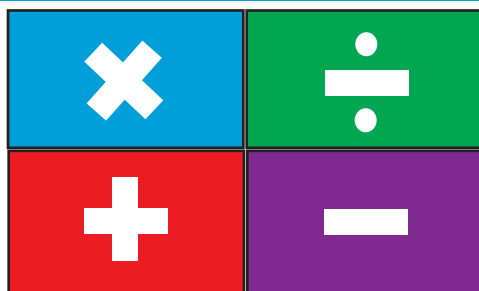


Math TODAY™

Student Edition

USA TODAY

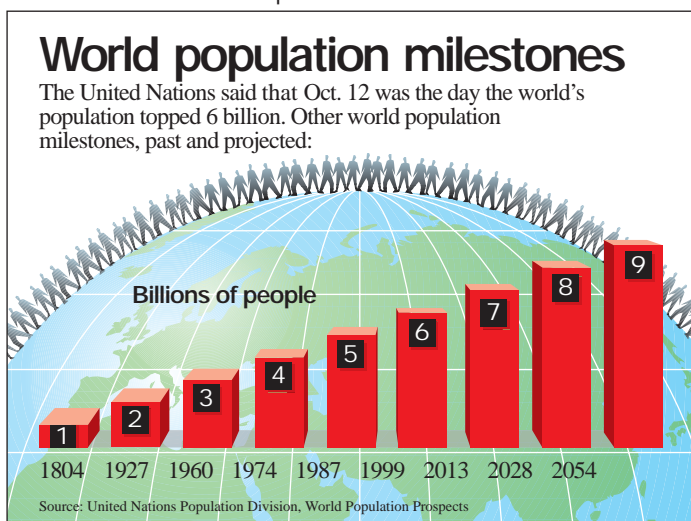
NO. 1 IN THE USA



World population milestones

USA SNAPSHOTS®

A look at statistics that shape the nation



By James Abundis and Bob Laird, USA TODAY

Focus Questions:

- Determine the logistic model for the world population data from 1950 through 2050. Use this model to determine the population in 1987 and compare this to the population shown in the Snapshot "World population milestones."
- What is the limiting behavior of the logistic model? Explain what this means.
- During which year was the world population increasing most rapidly?

Activity Overview:

The USA TODAY Snapshot "World population milestones" shows the growth of the world population. Additional data from the United Nations Population Division will allow you to explore real-life data that will be modeled by a logistic function. You will explore the end behavior of this model and explain what this means about world population estimates. Derivatives will be used to determine when world population was increasing most rapidly during this time period.

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This activity was created for use with
Texas Instruments handheld technology.

World population milestones

Procedure:

Activity 1

Determine the logistic model for the world population data from 1950 through 2050. Use this model to determine the population in 1987 and compare this to the population shown in the Snapshot "World population milestones."

Step 1

Enter the data from the table below into your calculator and draw a scatter plot.

Year	World population (billions)
1950	2.5
1955	2.8
1960	3.0
1965	3.3
1970	3.7
1975	4.1
1980	4.4
1985	4.8
1990	5.3
1995	5.7
2000	6.1
2005	6.5
2010	6.8
2015	7.2
2020	7.5
2025	7.9
2030	8.1
2035	8.4
2040	8.6
2045	8.8
2050	8.9

Source: United Nations Population Division

Step 2

Use your calculator to determine the logistic regression model for the world population data set.

Step 3

Determine the world population in 1987 (logistic model): _____

Step 4

Explain how this value compares to the population shown in the Snapshot.

Data Source:

United Nations Population Division,
World Population Prospects

Materials:

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

Additional Information:

- www.un.org/esa/population/unpop.htm

World population milestones

Activity 2

Explain the limiting behavior of the logistic model and what this means.

Step 1

Explore the graph of the logistic model to determine the behavior of the world population as the years increase without bound.

Step 2

Use trace or the table feature of the calculator to estimate the limiting value and explain the meaning of this value.

Limiting value: _____

Activity 3

Determine during which year the world population increased most rapidly.

Step 1

Turn off Plot 1 and Y1(the logistic model).

Step 2

Use the numerical derivative feature of the calculator to determine the graph of the derivative.

Step 3

Determine the maximum value of the derivative graph.

Step 4

Record the year during which the world population increased most rapidly

Student notes: