

## Lesson 2.1.3: Measuring Population Change

### Theme: Citizenship

#### Specific Objectives

Students will understand that

- a relative change is different from an absolute change.
- a relative measure is always a comparison of two numbers.

Students will be able to

- calculate a relative change.
- explain the difference between relative change and absolute change.

#### Problem Situation: How the Census Affects the House of Representatives

Every 10 years, the United States conducts a census. The census tells how many people live in each state. You can also find how much population has changed over time from the census data. The original purpose of the census was to decide on the number of representatives each state would have in the House of Representatives. Census data continue to be used for this purpose, but now have many other uses. For example, governments may use the data to plan for public services such as fire stations and schools. You will be given a list of states in a census region and their populations in 2000 and 2010. You will be asked to calculate the population growth in people as a percentage for each state in the region and for the region as a whole. You will examine how this affects the number of representatives each state has in the House of Representatives. You will start by looking at changes in representation based on the 2010 census.

The *absolute change* in a state's population tells by how many people the population has changed. The *relative change* is the change as it compares to the earlier population. Often relative change is given as a percentage.

Use the following data for Questions 1–6.

**South Atlantic States**

	2010 Population	2000 Population	Absolute Change	Percentage Change
Delaware	900,877	783,600		
Florida	18,801,310	15,982,378		
Georgia	9,687,653	8,186,453		
Maryland	5,773,552	5,296,486		
North Carolina	9,535,483	8,049,313		
South Carolina	4,625,364	4,012,012		
Virginia	8,001,024	7,078,515		
Washington, D.C.	601,723	572,059		
West Virginia	1,852,994	1,808,344		
South Atlantic Region				

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	2010 Population	2000 Population	Absolute Change	Percentage Change
Arizona	6,392,017	5,130,632		
Colorado	5,029,196	4,301,261		
Idaho	1,567,582	1,293,953		
Montana	989,415	902,195		
Nevada	2,700,551	1,998,257		
New Mexico	2,059,179	1,819,046		
Utah	2,763,885	2,233,169		
Wyoming	563,626	493,782		
Mountain Region				

- (1) For your group of states, calculate the absolute change in the population of each state.
- (2) For your group of states, calculate the relative change in the population of each state. Express your answer as a percentage.
- (3) List in order the three states that changed most in absolute population.
- (4) List in order the three states that had the largest relative increase in population.
- (5) Explain why the lists in Question 3 and Questions 4 are not the same.
- (6) For the region you are given, calculate the absolute change in total population from 2000 to 2010. Calculate the relative change in total population between 2000 and 2010.

While most states that lost representatives did so because their population became smaller relative to other states, Michigan's population actually fell between 2000 and 2010.

- (7) Michigan's population changed to 9,833,640 from 9,938,444. What was the absolute decrease in Michigan's population? What was the relative change in Michigan's population? Round your answer to the nearest hundredth of a percent.

**Making Connections**

Record the important mathematical ideas from the discussion.

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**Further Applications**

- (1) In 2011, the U.S. Congress had a major debate over cutting the federal budget mid-year. The goal was to reduce the national debt, which was \$14 trillion.
- (a) One group wanted to reduce the budget by \$100 billion. How large is this change relative to the national debt?
  - (b) Another group wanted to reduce the budget by \$40 billion. How large is this change relative to the national debt?
  - (c) If a politician wanted to argue for the larger cut, would he or she use the absolute or the relative change to justify his or her position? Why?
  - (d) If a politician wanted to argue for the smaller cut, would he or she use the absolute or the relative change to justify his or her positions? Why?