*Among all deaths from a particular disease, the percentage that are smoking related (21–39 cigarettes per day) is a function of the disease's* ***incidence ratio****. The incidence ratio describes the number of times more likely smokers are than nonsmokers to die from the disease. The following table shows the incidence ratios for heart disease and lung cancer for two age groups.*

**Incidence Ratios**

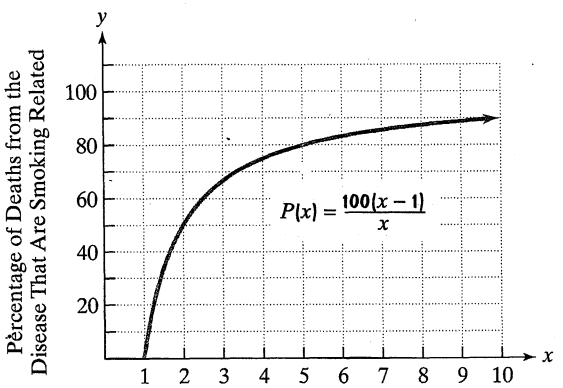
| | Heart Disease | Lung Cancer |
|---|---|---|
| **Ages 55–64** | 1.9 | 10 |
| **Ages 65–74** | 1.7 | 9 |

*Source:* Alexander M. Walker, *Observations and Inference*, Epidemiology Resources Inc., 1991.

*For example, the incidence ratio of 9 in the table means that smokers between the ages of 65 and 74 are 9 times more likely than nonsmokers in the same age group to die from lung cancer. The rational function*

$$P(x) = \frac{100(x-1)}{x}$$

*models the percentage of smoking-related deaths among all deaths from a disease, $P(x)$, in terms of the disease's incidence ratio, $x$. The graph of the rational function is shown. Use this function to solve Exercises 93–96.*



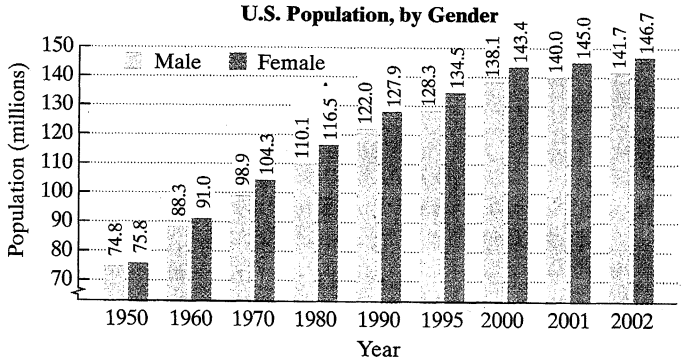

**93.** Find $P(10)$. Describe what this means in terms of the incidence ratio, 10, given in the table. Identify your solution as a point on the graph.

**94.** Find $P(9)$. Round to the nearest percent. Describe what this means in terms of the incidence ratio, 9, given in the table. Identify your solution as a point on the graph.

**95.** What is the horizontal asymptote of the graph? Describe what this means about the percentage of deaths caused by smoking with increasing incidence ratios.

**96.** According to the model and its graph, is there a disease for which all deaths are caused by smoking? Explain your answer.

**97.** The graph shows the U.S. population, by gender, for selected years from 1950 through 2002.




*Source:* U.S. Census Bureau

**a.** Write a fraction that shows the ratio of males to females in 1995. Then express the fraction as a decimal, rounded to the nearest thousandth. How many males per 1000 females were there in 1995?

**b.** How many males per 1000 females were there in 2002?

**c.** The function $p(x) = 1.256x + 74.2$ models the male U.S. population, $p(x)$, in millions, $x$ years after 1950. The function $q(x) = 1.324x + 76.71$ models the female U.S. population, $q(x)$, in millions, $x$ years after 1950. Write a function that models the ratio of males to females $x$ years after 1950.

**d.** Use the function that you wrote in part (c) to find the number of males per 1000 females in 1995. How well does the function model the actual number that you determined in part (a)?

**e.** Use the function that you wrote in part (c) to find the number of males per 1000 females in 2002. How well does the function model the actual number that you determined in part (b)?

**f.** What is the equation of the horizontal asymptote associated with the function in part (c)? Round to the nearest thousandth. What does this mean about the number of males per 1000 females over time?