

**Reteaching : Section 14-5**

## Probability Models

**Problem**

The table below shows the number of people who own road bikes or mountain bikes, and whether or not they ride their bikes to work.

	Rides to work	Does not ride to work	Totals
Mountain bike	12	58	70
Road bike	18	12	30
Totals	30	70	100

What is the probability a randomly chosen person owns a road bike and rides it to work?

This type of table is called a *two-way frequency table*, used to display the frequencies of data in two different categories.

To find the probability, calculate the relative frequency.

$$P(\text{owns road bike and rides to work}) = \frac{\text{owns road bike and rides to work}}{\text{total population in table}} = \frac{18}{100} = 0.18$$

The probability a randomly chosen person owns a road bike and rides it to work is 18%.

**Exercises**

The table below shows the amount of sleep for workers on the night shift and day shift.

	Sleeps less than 8 hours	Sleeps 8 or more hours	Totals
Night shift	12	58	70
Day shift	14	16	30
Totals	26	74	100

Use the table to determine the probabilities.

1.  $P(\text{sleeps less than 8 hours and works on the night shift})$
2.  $P(\text{sleeps 8 or more hours and works on the day shift})$
3.  $P(\text{sleeps 8 or more hours and works on the night shift})?$

**Reteaching** (continued)

## Probability Models

**Conditional Probability**

What is the likelihood that you will pass your next test? Will your chance be better if you study more? This type of situation is called *conditional probability*, where probability is affected by another event, which in this case is studying.

**Problem**

The table below shows the number of students who passed and failed the last math test and the amount of time they studied. What is the probability a randomly chosen person failed given he studied 4 or more hours?

	Pass	Fail	Totals
Studied less than 4 hours	8	6	14
Studied 4 or more hours	34	2	36
Totals	42	8	50

The term *given* tells you that the category you are concerned with is an event that has already happened. Of all the students, 36 studied 4 or more hours. Of those students, 2 failed.

It is written as:  $P(\text{failed} \mid \text{studied 4 or more hours})$  and is calculated as  $\frac{2}{36} \approx 0.056$ .

The probability a randomly chosen student failed given he or she studied 4 or more hours is 5.6%.

**Exercises**

The table below shows the number of cars and trucks that are red or blue at a local dealership.

Use the table to determine the probabilities.

- $P(\text{red} \mid \text{truck})$ ?
- $P(\text{blue} \mid \text{truck})$ ?
- What is the probability that a randomly chosen vehicle is a car given it is blue?

	Red	Blue	Totals
Cars	4	10	14
Trucks	4	6	10
Totals	8	16	24