THINKING WRITING

9.B Skidding Distance

Police use a formula to estimate the speed a car was traveling before an accident by measuring its skid marks. This is the formula.

$$S = \sqrt{30df}$$

S is the speed the car was traveling (in mph).

d is the distance the car skidded (in feet).

f is a special number (called the *coefficient of friction*) that depends on the road surface and road conditions.

The number f is determined by the police when they investigate an accident. For a dry tar road, f is usually about 1.0, so the formula is

$$S = \sqrt{30d(1.0)} \quad \text{(dry tar road)}.$$

For a wet tar road, f is about 0.5, so the formula is

$$S = \sqrt{30d(0.5)} \quad \text{(wet tar road)}.$$

1. Make tables of values and a graph to show speed as a function of the length of the skid marks. Put both curves on the same axes and use a range for d that will give you values of S up to 125 mph.

2. Why is the coefficient of friction less for a wet road than for a dry road? How does that affect the graph?

Police Report

Weather	Skid marks (ft)
wet	112
dry	321
wet	459
wet	173
dry	100
dry	132

3. This table shows a summary of accidents from a police report. All the accidents took place on tar roads. Use formulas or graphs to estimate how fast the cars were going. Explain how you made your estimates.

4. A police report stated that a car had left 150-foot skid marks on a tar road, but the report did not state the weather. Estimate how fast the car was probably traveling if the road had been wet. Then estimate the speed if the road had been dry.

5. There are two sets of skid marks on the same road. The second set is twice as long as the first. Do you think the second car was going twice as fast as the first? If not, was it going less than twice as fast or more than twice as fast? Explain.

6. The coefficient of friction for a dry concrete road is about 0.8 and for a wet concrete road about 0.4. If a car had been traveling at 50 mph before it skidded, estimate the lengths of skid marks it would have left on each type of road (tar or concrete) and in each type of weather (wet or dry). Compare your answers and comment on the differences you find.

7. Report Imagine that you are responsible for giving a lecture on skidding distance to a class of police cadets who are being prepared to join the highway patrol. You are asked to provide an illustrated two-to-three-page report summarizing the information that you think is important for them to know. Use examples. You may also make a poster to help make your talk more interesting and understandable.