

## Algebra: Police Officer

Boise Police Department

Job Description: Traffic investigation

### Problem:

#### Background:

A car travels 1.467 feet per second for every 1 mph.

The formula for speed at the start of skid (in miles per hour) is  $S = \sqrt{30 * f * d}$

$f$  = coefficient of friction;  $d$  = skid distance

Total feet per second (fps) = miles per hour (mph) x 1.467

Total Stopping Distance = (reaction time) x (fps) + skid length

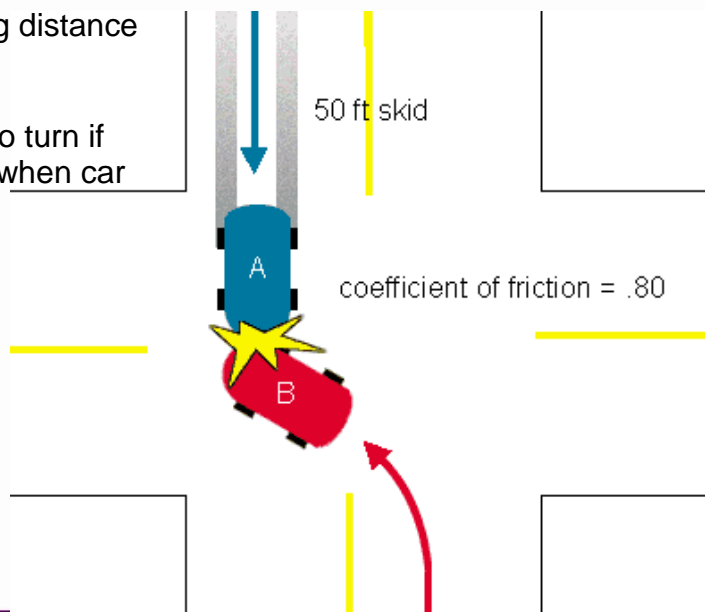
Time to impact =  $d \div v$

#### Questions:

1. Assuming a reaction time of .75 seconds, how fast was car A traveling at the beginning of its skid? The coefficient of friction ( $f$ ) on the road is .80. The coefficient of friction is given for different circumstances, such as dry pavement, snow floor, or black ice.

2. What was the total stopping distance of car A?

3. How long did it take car B to turn if driver A reacted immediately when car B began its turn?



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**See problem page for details.**

### Solution:

1. Speed at the start of skid =  $\sqrt{30 * f * d} = \sqrt{1200} = 34.63$

Speed = 35 mph at the start of the skid

2. Total stopping distance = reaction time x (speed at start of skid x 1.467) + skid length

speed at start of skid = fps =  $35 \times 1.467 = 51.345$

Total stopping distance =  $.75 \times 51.345 \text{ ft} + 50 \text{ foot skid} = 88.5 \text{ ft}$

Car A was 88–89 feet from point of impact when car B started the left turn.

3. Time =  $d \div v = \text{Total stopping distance} \div \text{fps}$

Time =  $88.5 \text{ ft} \div 51.345 = 1.7236$

Time = 1.72 seconds for car B to begin turning and get hit

