

# Speeding Costs Big Bucks

Statistics  
mean  
Problem Solving  
D = rt

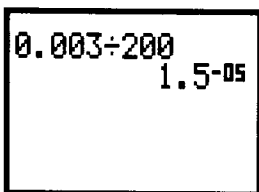
What measuring device would you use to accurately measure 0.1 of a mile?

You will be using the **distance formula** throughout this activity. It states:

$$\text{Distance} = \text{rate} \times \text{time}$$

## Understanding Exponential Notation on the fx-7400G

Divide 0.003 by 200.  
The result is shown below:

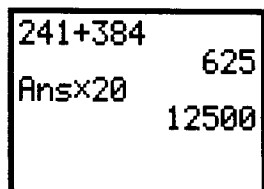


1.5<sup>-05</sup> represents  $1.5 \times 10^{-5}$  on the *fx-7400G*, which is equivalent to .000015.

## How to Use Your Previous Answer with Another Operation

Enter 241 + 384.  
Press EXE.  
X (mult. key)  
20.  
EXE.

See the resulting screen below.



**Standards:** Problem Solving, Reasoning, Connections, Estimation, Algebra, Statistics, Measurement

**Materials:** *fx-7400G*, Linear measuring device, stop watch (preferably to hundredths of a second).

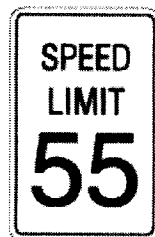
**Calculator Use:** STAT Menu, LISTS, OPTN key



As you ride down a road, the driver in front of you hits the brakes, slowing dramatically. You see nothing that should cause this action, but soon realize the driver in front of you became aware of a police **SPEED TRAP**. We know speeding is expensive in terms of fines, injury, and death. Many people speed, which is why different law enforcement units use various methods to catch them.

**To set up a speed trap**, select a straight section of road where people are assumed to speed often. Measure 0.1 of a mile. Other distances could be used but this is convenient and allows enough time to assure fairly accurate timing. Some methods for measuring 0.1 of a mile will be more accurate than others.

Which method did you use to measure your speed trap and why? **A.**



The road you pick will have a posted speed limit. Use that to compute how long it would take a vehicle to go through the selected distance. Suppose the speed limit is 35 miles an hour (mph). You need to know how long it takes a car to go through 0.1 of a mile at 35 mph. Use the distance formula,  $0.1 = 35t$  ( $t$  stands for time). Solve the equation for  $t$  with the *fx-7400G*:

$$t = \frac{0.1}{35} = 2.85714285^{-03} \text{ hours}$$

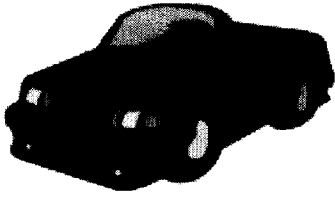
(remember that speed here is in miles per hour). The  $2.85714285^{-03}$  is how *fx-7400G* displays small decimals using scientific notation.

$$2.85714285^{-03} = 2.85714285 \times 10^{-03} = 0.00285714285$$

Convert the hours to seconds by multiplying by 3600. **B.** \_\_\_\_\_

Why do you multiply by 3600? **C.**

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## How to Enter a List in LIST Menu

Enter the LIST menu.  
Place cursor in List 1 row 1.  
Enter value.  
Press **EXE**.  
Enter next value.  
Press **EXE**.  
Repeat process for remaining values.

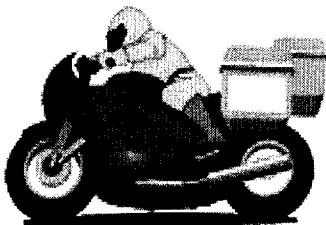
## How to Use an Expression to Fill a List.

Highlight the top of List 2 as shown below.

List 1	List 2
1	9
2	7.5
3	6

GRAPH CALC SRT-A SRT-D

With data in List 1,  
Press: 0.1  
÷  
(  
OPTN  
F1 (LIST)  
F1 (List)  
1  
÷  
3600  
)  
EXE



You now know that a vehicle traveling 35 mph should take 10.28571429 seconds to cover 0.1 of a mile.

- How long should it take a vehicle averaging 55 mph to go 0.1 of a mile? **D.** \_\_\_\_\_
- How long should it take a vehicle averaging 20 mph to go 0.1 of a mile? **E.** \_\_\_\_\_
- Suppose the speed limit is 35 mph, the distance is 0.1 of a mile, and a vehicle takes 12 seconds. Is the driver speeding? **F.** \_\_\_\_\_  
How fast would the vehicle be going? **G.** \_\_\_\_\_
- Suppose the speed limit is 35 mph, the distance is 0.1 of a mile, and a vehicle takes 7 seconds. Is the driver speeding? **H.** \_\_\_\_\_  
How fast would the vehicle be going? **I.** \_\_\_\_\_

Describe how you are able to tell if a driver is speeding in the above questions? **J.**

## EXPERIMENT

Record times for 20 vehicles going through your speed trap. Enter the time required for each car to go through the trap in **LIST 1** in the LIST MENU. The LIST MENU will allow you to use an expression to compute the rate (speed) for each time you entered. Be sure to move the cursor so List 2 is highlighted as shown in Figure 1.

List 1	List 2
1	9
2	7.5
3	6

GRAPH CALC SRT-A SRT-D

Figure 1

$$0.1 \div (\text{List1} \div 3600)$$

Figure 2

To convert the vehicle times to mph, press the **OPTN** key followed by

$$0.1 \div ( \text{F1} \text{ F1} \text{ 1} \div 3600 ) \text{ EXE}$$

The expression is shown in figure 2. List 2 now shows the speed in mph generated by the times recorded in List 1.

How many vehicles were speeding when you obtained your times? **K.** \_\_\_\_\_

Is this a good place for a speed trap? **L.** \_\_\_\_\_ Why or why not? **M.**

How much does a speeding ticket cost in your state? **N.**

