

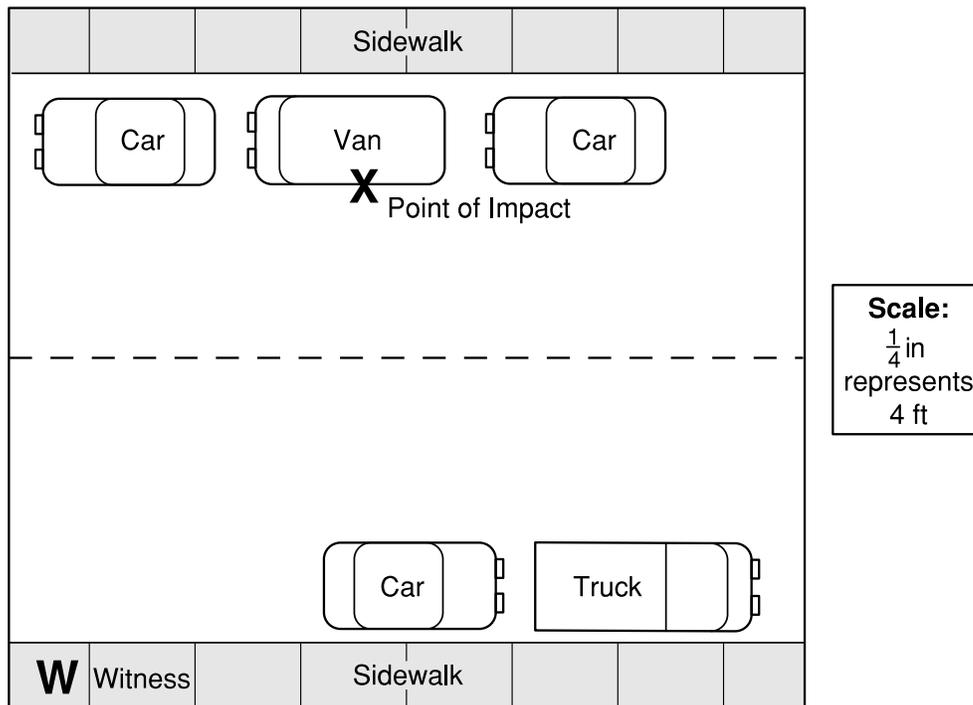
1998 Released Items

Hit and Run

Use the information below to answer questions 1-5.

Police Detective Pamela Watson was called to the scene of a hit-and-run accident. Although no one was injured, the accident smashed the door panel and broke the door window of a van parked along the curb. An eyewitness to the accident, standing at point W on the sidewalk across the street from the accident scene, reported that a blue convertible with its top down skidded and sideswiped the van.

Detective Watson sketched the scale drawing of the accident scene shown below.



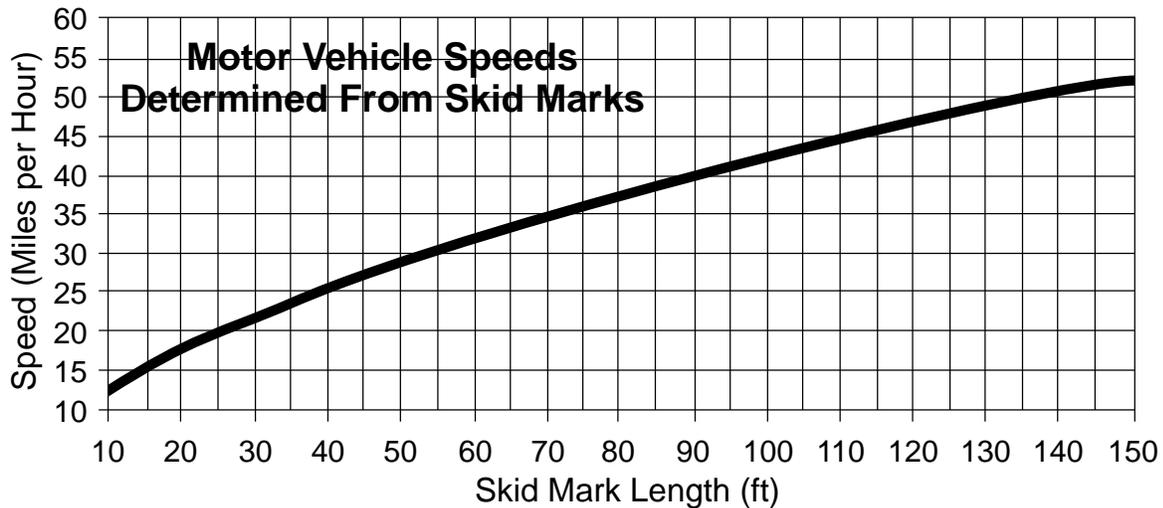
1. Point of Impact

Based on the scale drawing, about how many feet was the witness (W) from the point of impact (X)? Explain how you arrived at your answer.

Hit and Run (continued)

2. Was the Driver Speeding?

Detective Watson measured the skid marks left by the convertible and reported them to be 94.5 feet long. She knows that such measurements have a margin of error of plus or minus 2 feet.



Using the graph above and the facts that the skid mark was 94.5 feet long, and the posted speed limit in the area of the accident is 35 mph, should the driver be charged with speeding? Explain how you arrived at this decision.

3. The License Plate

The witness remembered three things about the license plate on the convertible:

- it had three digits followed by three letters;
- the first digit was a 3; and
- the three letters were GEL.

Detective Watson wrote: 3 ____ ____ G E L.

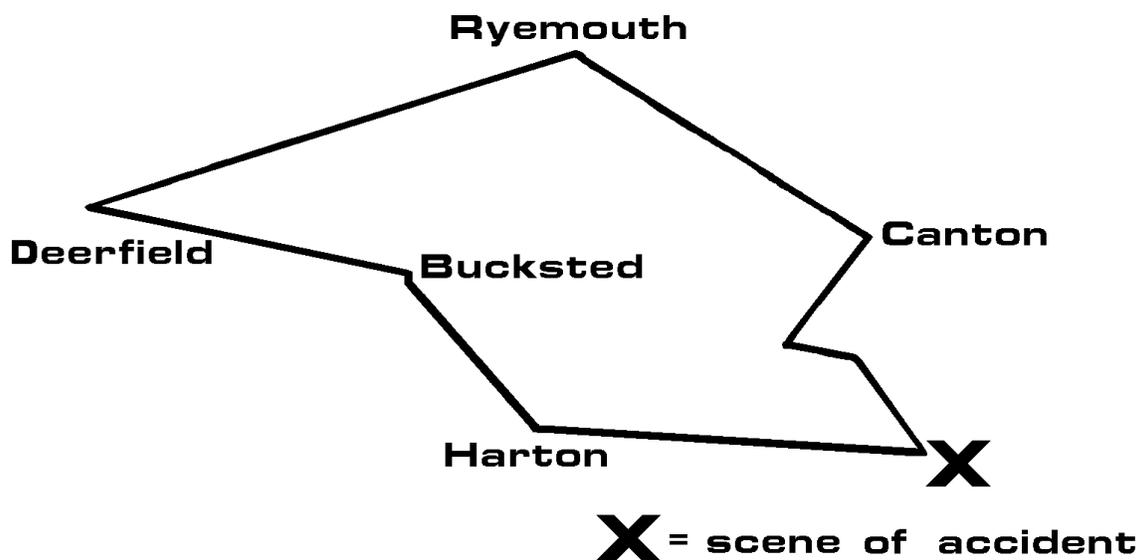
She knew that the missing digits could be any digit from 0 to 9 and that she would have to check all the possible license registrations in the hope of finding the blue convertible.

What is the greatest number of license registrations that Detective Watson will have to check? Explain how you arrived at your answer.

Hit and Run (continued)

4. Mrs. Kemper

Two blue convertibles with possibly matching license plates were found. One of them belonged to Sandra Kemper. Mrs. Kemper claimed that she did not hit the van and stated that she can prove she was in Deerfield at 12:55 P.M. She provided Detective Watson with a sketch of a map of her travels for the day of the accident. Detective Watson knows that the accident took place at 11:07 A.M.



Using the information and map above, should Mrs. Kemper be a suspect? Explain your reasoning.

Hit and Run (continued)

5. Mr. Dale

Detective Watson conducted a lawful search of the second blue convertible and found bits and pieces of broken glass in the back seat. The car's owner, Frank Dale, claims that the glass came from a broken bottle or drinking glass. Technicians at the police lab measured the mass and volume of the broken glass. The results of their tests are shown in Table 1 below:

Table 1

Evidence from Mr. Dale's Back Seat	
Mass (grams)	0.596
Volume (cm ³)	0.24

After receiving the lab report, Detective Watson searched the public library for a reference book on densities. She remembered that density is calculated by dividing the mass of the sample in grams by the volume of the sample in cubic centimeters. She found Table 2 in one of the books she checked:

Table 2

Densities of Types of Glass		
Soda Bottle	Auto Window Glass	Drinking Glass
2.33	2.48	2.33

Based on the information in Tables 1 and 2, do you believe that Mr. Dale should be considered a suspect? Explain how you arrived at your conclusion.

Fast Food Finances

1. Average Prices and Wages

The table below shows the average cost of a meal in a fast food restaurant and the average wage paid to workers in those restaurants over a period of 20 years.

Prices and Wages in Fast Food Restaurants		
Year	Average Meal Price	Average Wage
1970	\$0.90	\$2.10/hr
1980	\$2.00	\$4.49/hr
1990	\$3.20	\$5.50/hr

Use the data in the table to create a double line graph showing the average meal prices and the average wages from 1970 to 1990. Use the graph to predict both the average meal price and the average wage in fast food restaurants in the year 2000. Explain how you made your predictions.

2. Meals per Hour

Approximately 12% of the price of a meal goes to pay the wages of the average worker at a fast food restaurant. Compare the number of meals the restaurant had to sell each hour in 1970 to the number of meals it had to sell each hour in 1990 in order to cover a worker's wages. How could you explain this change in the number of meals needed to cover wages?

3. Cost of a Car

The cost of an inexpensive new car in 1970 was about \$4400, and had increased to about \$10,000 in 1990. Compare how long it would take a worker, working 40 hours per week, to earn enough to equal the cost of the new car in 1970 and in 1990. What conclusions can you make from this comparison?

The diagrams below show two different kinds of birdfeeders that are used to attract birds. Use the dimensions shown on the diagrams and the formulas provided to answer questions 1–4.

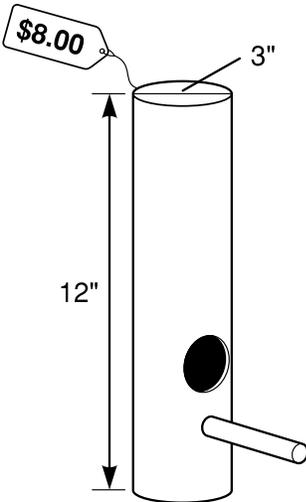
Formulas

Volume of a cylinder = $\pi r^2 h$ (use 3.14 for π)

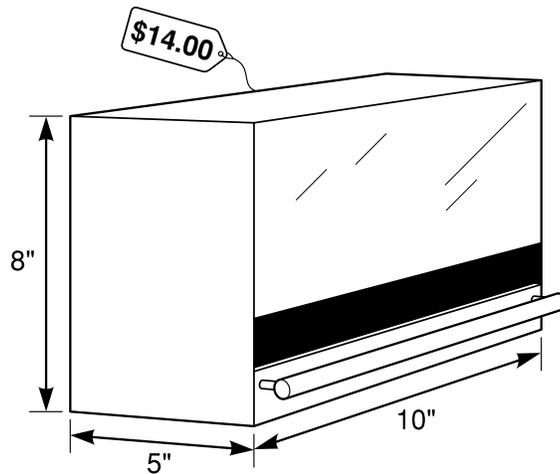
Volume of a rectangular prism = $l \cdot w \cdot h$

Circumference = $2\pi r$

Area of a rectangle = $l \cdot w$



Cylindrical Birdfeeder



Rectangular Birdfeeder

1. What is the volume, in cubic inches, of the rectangular birdfeeder?
2. What is the volume, in cubic inches, of the cylindrical birdfeeder (to the nearest hundredth of a cubic inch)?
3. The Boy Scouts are selling birdfeeders to raise money. They buy 300 of the cylindrical birdfeeders for \$8 each. How much profit will the Boy Scouts earn if they mark up the price of the birdfeeders by 15%?
4. A small can of paint covers 100 square inches. How many cans would you need to buy to have enough paint to cover the outside surface of the rectangular birdfeeder?

Connecticut Project

Carlos was working on a school project about Connecticut. Below is some of the information he found.

Land Use Designations

Total area	5,018 sq. mi.
<hr/>	
Developed	693,000
Cropland	239,000
Pasture land	110,000
Forest land.....	1,797,000
Other Usage	372,520
1 square mile = 640 acres	

1. Carlos read that more of Connecticut is now covered by forest than during colonial times. According to the table, what percent of Connecticut is designated as forest land?
2. One almanac indicated that in 1990 there were 19,991 miles of roads in Connecticut. On the average, how many miles of road is that for each 100 square miles of area in Connecticut? Round your answer to the nearest mile.
3. Carlos wondered about the difference in temperature from winter to summer. According to the table below, how many degrees higher is the average low temperature in Hartford in July than in January?

HARTFORD CLIMATE

	Temperatures (°C)	
	Average High	Average Low
Jan.	2	-8
Feb.	3	-8
Mar.	8	-3
Apr.	16	2
May	22	8
June	27	14
July	30	17
Aug.	28	16
Sept.	24	11
Oct.	18	5
Nov.	11	-1
Dec.	4	-7

Connecticut Project (continued)

4. Carlos decided to convert the Celsius temperatures in the table to Fahrenheit. He used the formula:

$$F = (9/5)C + 32$$

to convert from Celsius temperatures (C) to Fahrenheit temperatures (F). What was the average high temperature in July in degrees Fahrenheit?

5. Carlos also learned that tourism in Connecticut brought in \$77 million in 1956 and \$3.2 billion in 1989. How many times greater was the amount brought into Connecticut by tourism in 1989 than in 1956? Round your answer to the nearest whole number.