

Stopping Distance

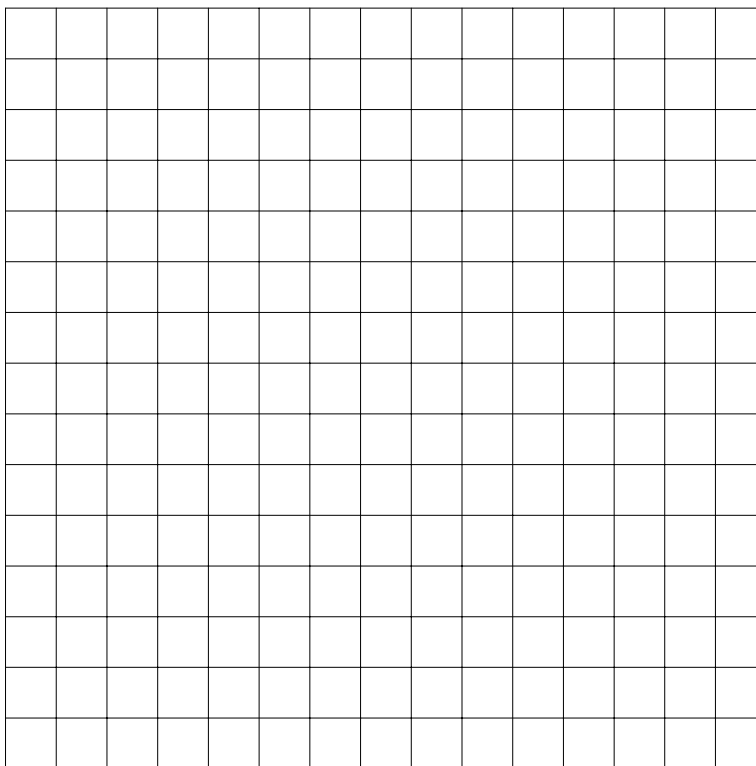
When driving, the distance required for a car to come to a complete stop is dependent upon the speed of the car at the time the driver makes the decision to stop. The distance to come to a complete stop has two components, the *reaction distance* and the *breaking distance*. The *reaction distance* is the distance the car travels from the time the decision to stop is made until the moment the brake is applied. The *breaking distance* is the distance the car travels from the moment the brake is applied to the time the car comes to a complete stop. Together the reaction distance and the breaking distance make up the *stopping distance* of the vehicle.

Speed (mph)	Reaction Distance (ft)	Breaking Distance (ft)	Total Stopping Distance (ft)
20	22	25	47
30	40	43	83
40	48	97	145
50	55	188	243
60	66	300	366
70	74	455	529

Average stopping distance of cars on dry, level pavement.

Part A

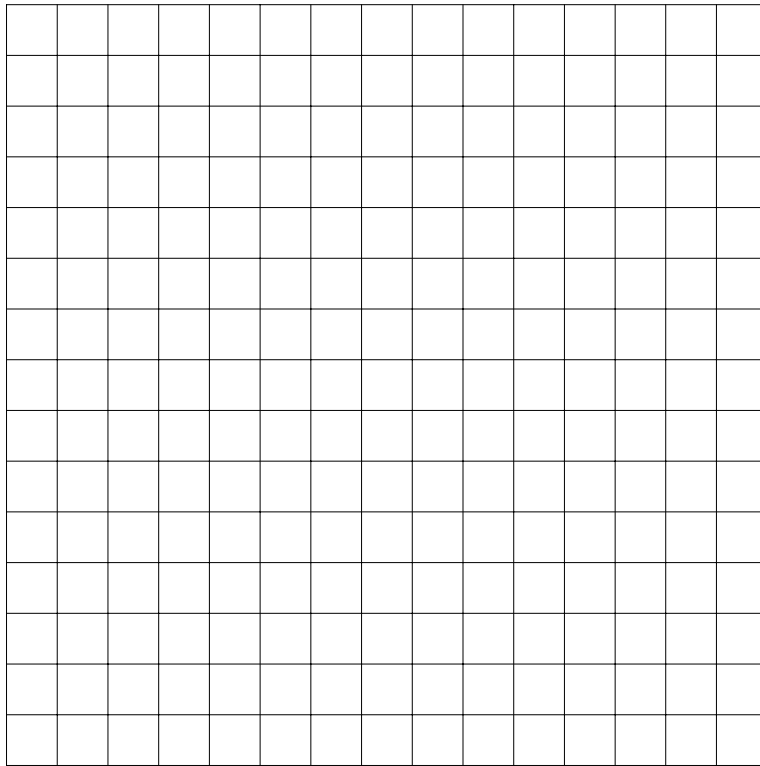
- On the grid below, plot the *Breaking Distance* as a function of *Speed*.



6. Create a table that a police officer could use to determine the speed of a car from its skid marks.

7. If a car produces a skid mark of 100 feet, what was the speed of the car?
8. What type of function do you think best models the skid mark data? Justify your reasoning.

9. Enter the skid mark data into the lists of your calculator. Use your calculator and what you know about function transformations to determine a function, S , where x is the length of the skid mark and $S(x)$ is the speed of the car. It may take several educated ‘guesses’ and adjustments to get a model that fits the data. Record your function and sketch the graph below.



10. What is the relationship between the functions D and S ? Describe the relationship in terms of patterns produced by each function, each functions' table of values, its formula and its graph.

Part C

11. Provide several examples of situations when it would be useful to determine the inverse of a function.

12. Why might it be useful to recognize that two functions are inverses of one another?