

Worksheet #1

Problem 1: Suppose we have a rectangle with height x and length $2x$.

- (a) Write a formula for the perimeter of the rectangle in terms of x .

- (b) Write formula for the area of the rectangle in terms of x .

- (c) If we double x how does the perimeter of the rectangle change? If we triple x how does the perimeter of the rectangle change?

- (d) If we double x how does the area of the rectangle change? If we triple x how does the area of the rectangle change?

Problem 2: In physics class you learn that if an object, such as a car, is moving, then its kinetic energy (kinetic means “moving”) is given by the formula

$$E = \frac{1}{2}mv^2$$

where m is the object’s mass and v is the object’s velocity.

If a car crashes, the force the passengers feel (i.e., how hard the crash is) is determined by the kinetic energy.

- (a) Suppose Car 1 crashes into a brick wall at 30 mph, Car 2 crashes into a brick wall at 60 mph, and Car 3 crashes into a wall at 90 mph. Compare how bad the three crashes are. In particular, how much worse is the crash of Car 2 compared to the crash of Car 1? How much worse is the crash of Car 3 compared to Car 1?

- (b) Suppose two cars traveling toward each other at 30 mph have a head-on collision. How bad is this crash compared to the crashes in part (a)?

- (c) Suppose two cars traveling toward each other at 60 mph have a head-on collision. How bad is this crash compared to the crashes in part (a) and the crash in part (b)?

- (d) Suppose two cars traveling toward each other at 90 mph have a head-on collision. How bad is this crash compared to the crashes in part (a), the crash in part (b), and the crash in part (c)?