

For each of the problems below, do the following:

If you need to take the additional steps we did before, please do so. The following four steps are the ones that you should be doing at a minimum.

- a) Underline the sentence that you will be translating & identify the type of variation.
- b) Clearly define your variables.
- c) Solve for k and give the general formula.
- d) Solve the problem. Show your work and write your answer in a complete sentence.

1. The weight of a ball varies directly with the cube of its radius. A ball with a radius of 2 inches weighs 1.20 pounds. Find the weight of a ball with a 3-inch radius.
2. At sea, the distance to the horizon is directly proportional to the square root of the elevation of the observer. If a person who is 36 feet above the water can see 7.4 miles, find how far a person 64 feet above the water can see. Round your answer to one decimal place.
3. The amount P of pollution varies directly with the population N of people. Kansas City has a population of 450,000 and produces 260,000 tons of pollutants. Find how many tons of pollution we should expect St. Louis to produce if we know that its population is 980,000. Round your answer to the nearest whole ton.
4. Pairs of markings a set distance apart are made on highways so that police can detect drivers exceeding the speed limit. Over a fixed distance, the speed R varies inversely with the time T . In one particular pair of markings, R is 45 mph when T is 6 seconds. Find the speed of a car that travels the given distance in 5 seconds.
5. The weight of an object on or above the surface of Earth varies inversely as the square of the distance between the object and Earth's center. If a person weighs 160 pounds on Earth's surface, find the individual's weight if he moves 200 miles above Earth. Round your answer to the nearest pound. **(Assume that Earth's radius is 4000 miles).** *Hint: Draw a picture of this problem to see what exactly you are trying to find. You will need to use the information given and do an additional calculation before you plug anything in. Come to one of our study groups and/or the Math Lab for help on this problem.*
6. If the voltage V in an electric circuit is held constant, the current I is inversely proportional to the resistance R . If the current is 40 amperes when the resistance is 270 ohms, find the current when the resistance is 150 ohms.
7. Because it is more efficient to produce larger numbers of items, the cost of producing recordable disks is inversely proportional to the number produced. If 4000 can be produced at a cost of \$0.45 each, find the cost per disk when 6000 are produced.
8. The maximum weight that a circular column can hold is inversely proportional to the square of its height. If an 8-foot column can hold 2 tons, find how much weight a 10 foot column can hold.