# Practice Exercises - applications using Rational Expressions

## Modelling using Rational Equations

### Health

A pharmaceutical company claims that the concentration of a drug in a patient’s bloodstream will be at least 10% for 8 hours. Clinical tests show that the concentration, *C*, of the drug (as percent) *t* hours after injection is .

1. During what time period is the concentration at least 10%?
2. Is the company’s claim supported by the data?

### Public Health

The rational equation describes the cost, in millions of dollars, to inoculate percent of the population against a particular strain of flu.

1. Find and interpret the restricted values for
2. What percentage of the population could be inoculated for 1 billion dollars?

### Species Extinction

To restore the population of tule elk at Point Reyes, California, 50 elk are introduced into a wildlife preserve. The tule elk population () after years is described by the model

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When the population will reach 125?

### Water Quality

In Palo Alto, California, a government agency ordered computer-related companies to contribute to a pool of money to clean up underground water supplies. (The companies had stored toxic chemicals in leaking underground containers.) The formula models the cost, , in millions of dollars, for removing percent of the contaminants.

1. What percentage of the contaminants can be removed for $2 million?
2. What percentage of the contaminants can be removed for $8 million?
3. Is it possible to remove all of the contaminants? Explain the reasoning behind your answer.

## Proportions

### Tracking Populations

The Pribilof Islands in Alaska supports about half of the global population of Northern fur seals. St. Paul Island, the largest of the Pribilof Islands, has 12 fur seal rookeries (breeding places). In 1961, to estimate the fur seal pup population in the Gorbotch rookery, 4963 fur seal pups were tagged in early August. In late August, a sample of 900 pups was observed and 218 of these were found to have been previously tagged. Estimate the total number of fur seal pups in this rookery.

### Drug Dose

*If a hospitalist places an order for your instructor to receive 14 mg of the same medication, should the nurse comply with the order?*

A medication is to be given to a patient at a rate of 2.8 mg for every 40 pounds of body weight. How much medication should be given to a patient who weighs 190 pounds?

### Similar Triangles

A firefighter needs to estimate the height of a burning building. She estimates the length of her shadow to be 8 feet and the length of the building’s shadow to be 60 feet. Find the approximate height of the building if the firefighter is 5’ tall.

## Distance

**Is the 40 minutes’ worth the risk?**

Charles Farmer, Insurance Institute for Highway Safety vice president for research and statistical services, found that a 5 mph increase in the maximum speed limit was associated with an 8 percent increase in the fatality rate on interstates and freeways. [www.iihs.org](http://www.iihs.org)

### Safe Driving Speeds

By increasing your speed by 10 mph, you can drive the 200-mile trip to your hometown in 40 minutes less time than the trip usually takes. How fast do you usually drive?

## Work

9000 GALLONS IS APPROXIMATELY 1200 CUBIC FEET. iF THEIR BASEMENT IS 40’ X 20’ AND THE WATER ROSE TO 3.5 FEET, HOW LONG WILL THE TWO PUMPS HAVE TO WORK?

### Natural Disasters

As the spring flood waters began to recede in Texas, a young family was faced with pumping the water from their basement. One pump they were using could dispose of 9000 gal in 3 hours. A second pump could dispose of the same number of gallons in 4.5 hours. How many hours would it take to dispose of 9000 gal if both pumps were working?