

Appendix A: Modeling problems using rational algebraic expressions

1. You'd like to buy a swimming pool, and after considering your options, you narrow the choice down to two. The rectangular one has a width 3 times its depth and its length is 6 feet more than its width. A circular pool has a diameter that is twice the width of the rectangular one, and it is 2 feet deeper.
 - (i) Express the volumes of the circular and rectangular pools
 - (ii) Find the ratio of the two volumes
 - (iii) The volume of the rectangular pool is 2592 cubic feet. How many gallons of water are needed to fill the circular pool if 1 gallon is approximately 0.134 cubic feet.
2. For 1960 through 1990, a model for the total amount of material, T (in millions of tons), that was recycled in the United States can be written:

$$T = \frac{3(t + 330)}{4(40 - t)}$$

where $t = 0$ represents 1960.

- (i) Of the total recycled materials, write an expression that represents the decimal percent (by weight) that was paper.
 - (ii) Of the total recycled materials, write an expression that represents the decimal percent (by weight) that was aluminum.
 - (iii) Of the total recycled materials, write an expression that represents the decimal percent (by weight) that was glass.
3. For 1960 through 1990, the amount of paper, W , (in millions of tons) used in the United States can be modeled by:

$$W = \frac{5000}{3(51 - t)}$$

where $t = 0$ represents the year 1960. Write an expression for the amount of paper products used and *not* recycled. Sketch the graph of W and the model for non-recycled paper on the same coordinate system. What can you conclude from the two graphs?

The above examples are taken from:

Larson, Kanold, Stiff [1998]: Algebra 2: An Integrated Approach, D.C. Heath & Co., 539, 566.