Lecture 6 Proportions and Change

Robert Lowe

January 23, 2019

Change According to Proportions

Direct Proportions

- When something increases by a proportion, this is called a direct proportion.
- Suppose we have a proportion $a : b :: c : d$. If an increase in a causes a proportional increase in c, then $a : b :: c : d$ is a direct proportion.
- You must read the nature of a problem to know whether it is increasing and therefore a direct proportion.

Inverse Proportions

- When something decreases by a proportion, this is called an inverse proportion.
- Using the letters a, b, c, and d from the previous problem, if an increase in a causes a decrease in c, then the corresponding inverse proportion is $a : b :: d : c$.
- You must read the nature of a problem to know wheter it is decreasing and therefore an inverse proportion.

Changing According to Percents

Increasing, Amount, and Markup

- Recall the term amount. amount = base + percentage.

Decreasing, Difference, Discount

- Recall the term difference. difference = base − percentage.

Percentage and Proportion Problems

1. A besieged town, containing 22,400 inhabitants, has provisions to last 3 weeks; how many must be sent away that they may be able to hold out 7 weeks? [1]
2. If 8 workers in 24 days working 10 hours a day can reap 48 acres of wheat, how many acres could 12 workers reap in 20 days of 12 hours each?

[1] Transcribed from: *A Treatise on Arithmetic* by J. H. Smith. 1878

3. If a staff of 4ft casts a shadow 7ft in length, what is the height of a tower which casts a shadow of 198ft at the same time? [2]

4. A homeowner sells their house at a loss of 20%. If the selling price was $\$60,000.00$, what was the original price of the home?

5. In the erection of a house I paid twice as much for material as for labor. Had I paid 6% more for material, and 9% more for labor, my house would have cost $1284.00; what was its cost?[2].

[2]Transcribed from: *The Proressive Higher Arithmetic* edited by Daniel Fish. 1878