



The University of Georgia

Mathematics Education Program

J. Wilson, EMAT 6600

Grass Consumption by Oxen

By Leighton McIntyre

Goal: To calculate ages of children in a recent census

Grass Consumption by Oxen



Problem

If 6 acres of grass, together with what grows on the 6 acres during the time of grazing, keep 16 oxen for 12 weeks, and 9 acres keep 26 oxen 9 weeks, how many

oxen will 15 acres keep 10 weeks, the grass growing uniformly all the time?

Solution

Set up the following table

Acres	Oxen	Weeks
6	16	12
9	26	9
15	X	10

Let us examine a few things that will happen. First of all there must be an initial amount of grass. Then some grass must grow during this time and so let us consider that the grass grows uniformly.

Denote by a , the initial amount of grass

Denote by b , grass grown per acre per week

Denote by c , amount of grass eaten per ox per week

We can set up 3 equations corresponding to the information in the table as follows:

$$[1] 6a + (6)(12)b = (16)(12)c \Rightarrow 6a + 72b = 192c$$

$$[2] 9a + (9)(9)b = (26)(9)c \Rightarrow 9a + 81b = 234c$$

$$[3] 15a + (15)(10)b = (10)(X)c \Rightarrow 15a + 150b = (10)(X)c$$

Solving equation [1] for a gives

$$a = 32c - 12b$$

Plugging that into equation [2] gives

$$9(32c - 12b) + 81b = 234c \Rightarrow 27b = 54c \Rightarrow b = 2c$$

Plugging in for a and b in [3] gives

$$15(32c - 12b) + 150(2c) = (10)(X)c$$

$$15(32c - 12(2c)) + 150(2c) = (10)(X)c$$

$$15(10c) + 150(2c) = (10)(X)c$$

$$420c = (10)(X)c$$

$$42 = X$$

Hence 42 oxen will take 10 weeks to consume 15 acres of grass.
