Title: 5th Division with Seeds (adapted from Carrie Reinhart's lesson, Whitman College 2010)

Standards addressed:

CCSS Math Content 5.NBT.B.6 *Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.*

Unit connections: Math Division Unit

Description: Given the dimensions of a garden plot, the students will determine how many sunflower seeds they can plant per row and how many rows they will be able to plant.

Objective: The students will measure area of the garden plot using feet and inches. The student will use division to determine how many seeds to plant per row as well as how many rows they will be able to plant.

Time Required: Pre-garden time: 30 min/Garden time: 30 min

Date: April or May

Materials:

- a garden plot, garden tools
- one sunflower seed packet
- Copies of the back of the seed packet – one for each student or pair of students.
- graph paper, pencils
- Yard sticks (one for each pair or small group of students)

Preparation: Plan when to teach this lesson based on when the seeds need to be planted and harvested. Make sure the garden plot is ready. Talk to the teacher about using the document camera, graph paper, and pencils. Be sure to solve all the problems for yourself first to be sure that it will work!

Class Discussion:

Tell the students that you know they have been studying division. Ask them to think of some instances in life outside of school where they might use division. They might say at the grocery store, paying bills, sharing things, etc. Tell them that gardeners also need to use division. Today they are going to use division in the garden.

Walla Walla Garden Lesson

Action:

1. Show the students the seed packet and read the back of it together on the document camera. Open the packet of seeds and show the students the seeds on the inside. Have them estimate the total number of seeds. Give the packet to a pair of students to count.
2. Tell the students that they will be measuring the garden plot where these seeds will be planted. Then they will be able to calculate the number of seeds that will be planted in each row and the number of rows that will be planted.
3. Pass out the graph paper and work through the following problems with the students. Students should write what is in bold, while examples and notes are in italics.
   a. **Number of seeds in seed packet:**
      i. **My estimate _____**
      ii. **The actual number _____**
   b. **Space needed between seeds _____ in** *(according to seed packet)*

When the seeds have been counted, have the students write the number down. Allow them to discuss if their prediction was close or not. The student with the closest guess could be the first to plant a seed if you like!

At this point have the students copy all of the remaining items and then head outside to measure. Tell them to leave plenty of space between letters e, f. g, h, i, and j. When they get outside, they can measure the garden with yard sticks and work on the problems.

   c. **Garden plot length in inches _____ in**
   d. **Garden plot width in inches _____ in**

Letters e and f are optional. They are to review finding area as well as converting inches to feet.

   e. **Garden plot area in inches: _____in (area = length x width)**
   f. **Garden plot area in feet and inches _____ ft _____ in (12 in = 1 ft)**
   g. **Division problem to find the number of seeds per row:**

Rows will be planted following either the length or the width of the garden plot. Guide the students to think about what information they would need to find the number of rows that will be planted. They will need the number of inches in the row (the length or width of the plot) divided by the number of inches apart that each seed needs to be planted. (___ in per row/____ in apart each=___ seeds per row)

   h. **Division problem to find the total number of rows that will be planted:**

The students will need the number of inches in the opposite side of the garden plot (if the rows will be planted among the length of the garden plot, the students will need the width, or vice versa)divided by the number of inches apart that each seed needs to be planted.

(___ in garden width or length/___in apart each=___rows to be planted)

     i.   Multiplication to find number of seeds needed:

The students will need the number of rows and the number of seeds per row.

(___rows x ___seeds per row=___seeds needed)

     j.   Sketch of garden plot with rows and seeds:

4. Once they are finished with the division, have them draw the garden plot and the rows on their graph paper. Each square can represent a certain number of inches. If this will take too much time or is too difficult, it can become an extension activity to be completed later.
5. Now they are ready to plant the seeds!

Example of a Student's Work:

A. Number of seeds in seed packet:
   a. My estimate: <u>35</u>
   b. Actual number: <u>52</u>

B. Space needed between seeds: <u>6 in</u>

C. Garden plot length: <u>48 in</u>

D. Garden plot width: <u>12 in</u>

E. Garden plot area: <u>576 in</u>

   48 x 12 = 576 in

F. Garden plot area in ft and in: <u>4 ft 0 in</u>

   48 ÷ 12 = 4 ft 0 in

G. Division problem to find the number of seeds per row: <u>8 seeds per row</u>

   row = 48 in   seeds need to be 6 in apart

   48 ÷ 6 = 8

H. Division problem to find the total number of rows that will be planted: <u>2 rows will be planted</u>

   plot width = 12 in   seeds need to be 6 in apart

   12 ÷ 6 = 2

I. Multiplication to find the number of seeds needed: <u>16 seeds will be planted</u>

   2 rows x 8 seeds in each row = 16 seeds

J. Sketch of garden plot with rows and seeds:

48 in

*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*

12 in