

# Teacher Instructions: Planting Corn

**Grade Level:** K - 2

**Task:** Planting Corn

**Standard:** Number Sense and Operations

A farmer planted 12 seeds of corn.

What are some of the different ways he could put them in even rows?

**Teacher Note:** There is a kindergarten version of the task included, but there are no benchmark descriptors or papers available for the task.

**Context – From the Task Author:** This task would be fun to give in spring when students and their parents are starting to think about gardening, or when doing a unit on seeds.

**What the task accomplishes...**

- Asking that the rows be even allows students the opportunity to explore the factors of 12.
- This is a building block for students' understanding of the difference between prime and composite numbers.

**What students will do...**

- Students will use diagrams or materials to solve the problem.
- Some students will be able to label their work with numerical phrases or equations.
- Some students will find one or two solutions and stop, while others will find all possible solutions.

**Time Required:** The task can be completed in less than 45 minutes. Some students will take longer than others to complete the task. Some take longer to begin while others will spend more time finding additional solutions. However, in general the task can be completed in a fairly short period of time.

**Interdisciplinary Links:** This task can be combined nicely with science or nature lessons. The context can be changed to meet the needs of a particular unit.

**Teaching Tips...**

- It is often valuable to ask children to visit the math manipulatives to look for concrete objects that might help them solve their problem.
- Some questions you might pose to students include:
  - "What objects could we use to pretend to be corn seeds?"
  - "How could we use these to show how the farmer could plant the seeds?"
  - "There are many different ways to solve the problem. Can you find some different solutions?"
  - "What other ways can you show?"
- Stress the idea that there are many different ways to plant the corn.
- Talk about what even rows are. Suggest using cubes to give a concrete example.

**Suggested Materials:** Mathematical manipulatives, Crayons, Pencil and Paper

### Possible Solutions...

2+2+2+2+2+2      4+4+4      6+6      12

### Benchmark Descriptors:

- The benchmark descriptors and rubric are designed to help the teacher analyze student thinking and understanding at each of the four performance levels.
- The descriptors are generalizations of what student work could look like.
- It is not possible to anticipate every answer a student can give, so in scoring student work the teacher must use these generalizations to come to their own conclusions as to where a student is performing on the assessment.
- It is recommended that teachers create their own task specific rubric by listing the specific math skills that would make up each section of the four performance levels.

#### Novice

- ✓ The novice will focus on the story rather than solving the problem.
- ✓ In some cases, students use incorrect or inappropriate data.

#### Apprentice

- ✓ The apprentice may begin to break 12 seeds into rows (sub-groups), but at this stage they are unevenly divided.
- ✓ Little or no math language is used to communicate, and some representation is used to communicate a solution or to solve the task.

#### Practitioner

- ✓ The practitioner is able to break the set of 12 into equal sub-groups, but is only able to achieve a single solution.
- ✓ Accurate and appropriate math language is used to communicate, along with labeled mathematical representations of the solution.

#### Expert

- ✓ The expert will find all possible solutions, and may generalize the information from previous mathematics experiences.
- ✓ The expert will use precise math language and notation, and will have labeled diagrams that demonstrate the solutions.

### APS Mathematical Standards...

❖ The math standards stated for this task are aligned to the APS Draft Standards 2000.

**Number Sense and Operations:** Learners will demonstrate number sense through experiences with meaningful mathematical problems while focusing on number meaning, number relationships, relative effects of operations, and multiple representations to communicate sound mathematical thinking.

#### Kindergarten:

Number Meaning: Make connections of number names with quantities to 10.

- **Create** a set of a given size.

Number Relationships: Compare groups and sets to understand the relationships of quantities.

- **Describe** a quantity using the terms more, less, and same.

Number Operations: Model addition and subtraction situations

- **Record** numerical information.

### **First Grade:**

Number Meaning: Extend and model number names of quantities to 20.

- **Represent** and explain the meaning of the numbers 1-20.
- **Form and count** groups of numbers up to 20.

Number Relationships: Increase the number of objects in groups and sets to understand the relationship of quantities.

- **Build** combinations of numbers to 20 in different ways using pictures, stories, and objects to model the combinations.
- **Estimate and compare** quantities up to 20 using pictures, stories, objects, and symbols to model the situation.
- **Determine** relationships between and among small numbers.

Operations: Model and record addition and subtraction in a variety of ways.

- **Develop** strategies and estimation skills for solving addition and subtraction problems.
- **Record** strategies for solving, combining, and separating problems using pictures, numbers, equations and words.

### **Second Grade:**

Number Meaning: Extend and model number names with quantities to 100.

- **Develop** fluency and **apply** patterns in skip counting.
- **Compare and defend** the relationship between skip counting, grouping, and multiplication.

Number Relationships: Demonstrate fluent and flexible use of numbers.

- **Construct** relationships of quantities to 18 using part-part whole.

Operations: Model, solve, and record solutions to addition and subtraction problems using a variety of strategies.

- **Invent, present, defend, develop, and record** multiple strategies to solve addition and subtraction problems.

**Patterns, Functions, and Algebraic Concepts:** Learners will demonstrate an understanding of algebraic concepts through experiences with meaningful mathematical problems while focusing on discovering, describing, modeling and generalizing patterns and functions, representing and analyzing relationships, and finding and supporting solutions.

### **Kindergarten:**

Patterns: Demonstrate effective skills to establish an understanding of the predictability and reliability of recurring patterns.

- **Identify, describe, and extend** patterns with familiar objects in both classroom and real-life situations.

**First Grade:**

Patterns: Extend patterning skills that establish a sense of predictability and reliability to more complex patterns.

- **Identify, describe, and extend** patterns with familiar objects in real-life situations.

**Second Grade:**

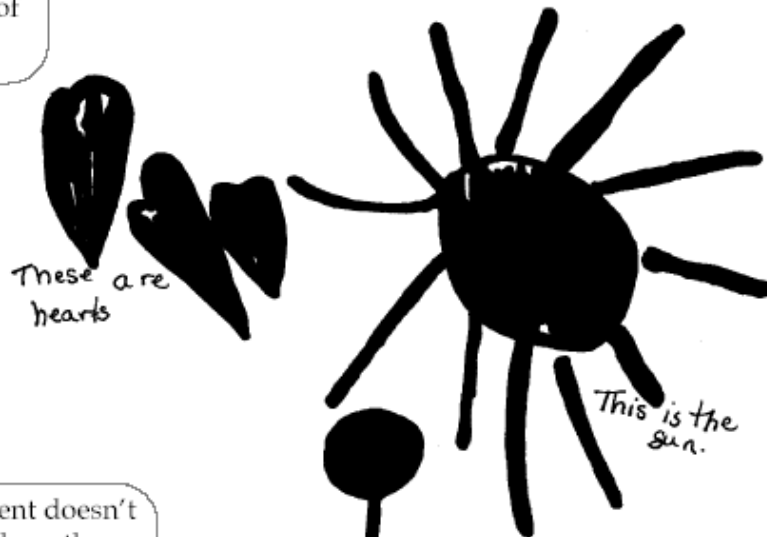
Patterns: Extend patterning skills to include numerical patterns and problem solving, focusing on the predictability and reliability that patterns allow.

- **Identify** patterns in the number system.
- **Develop and apply** more complex patterns and relationships in real-life and math problem situations.

# Benchmark Papers

Novice

The student demonstrates no understanding of the task.



These are hearts

This is the sun.

The student doesn't even show the twelve seeds of corn.

No math language or representations are used.

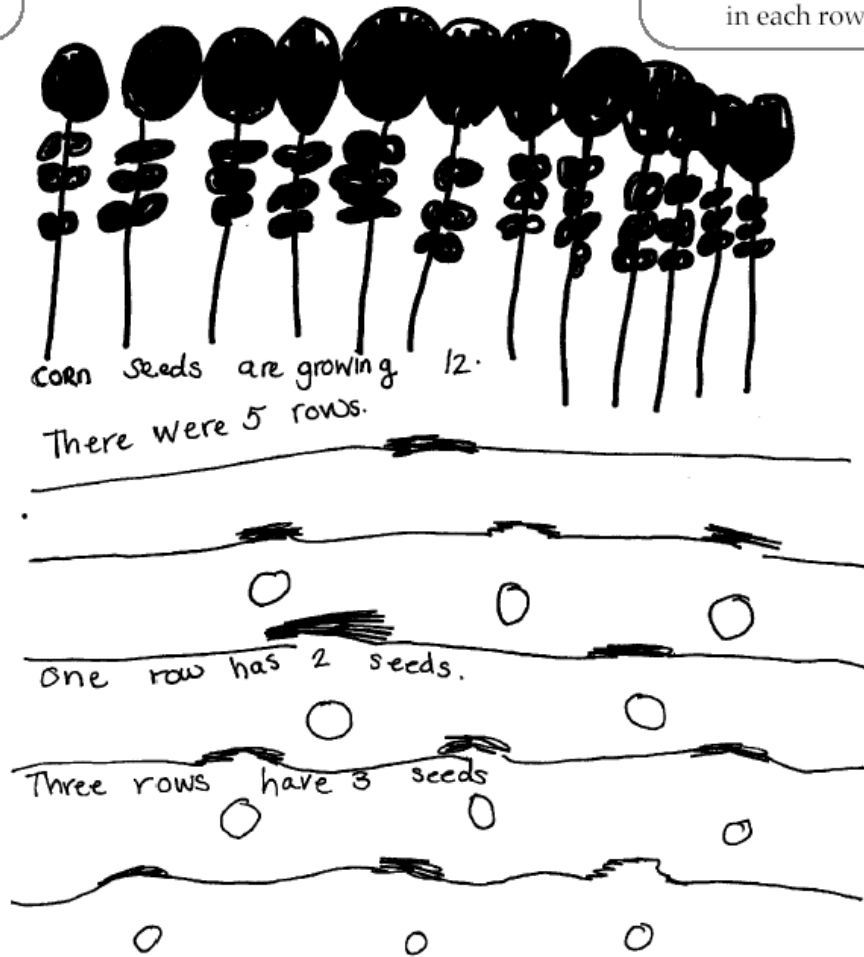
this the corn seeds and that is the corn plant.



# Apprentice

The student's diagram is labeled.

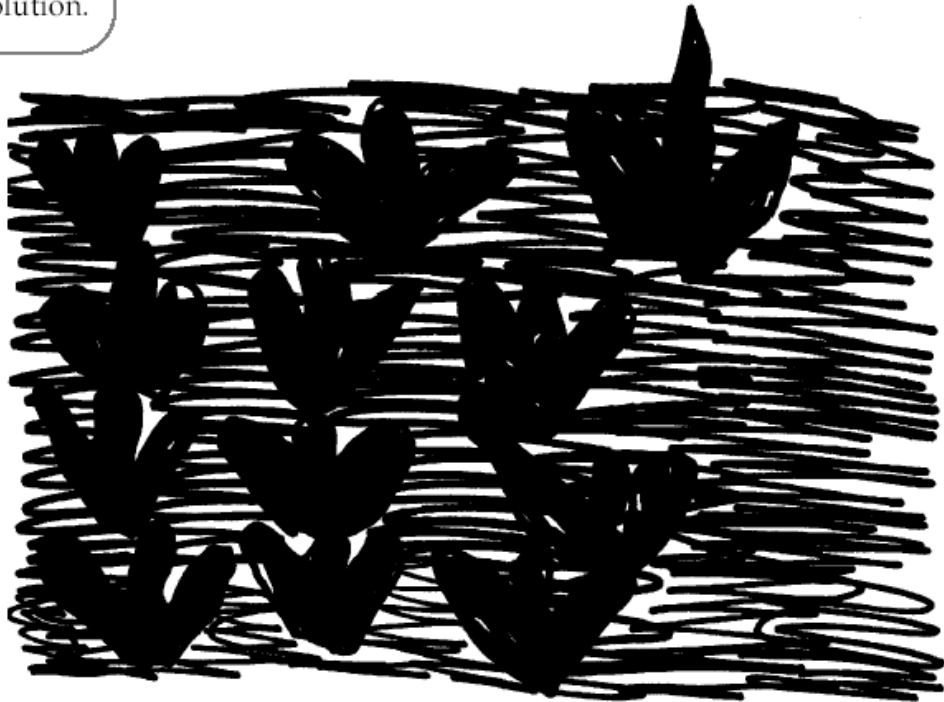
The student uses twelve seeds of corn and tells the amount of rows, but neglects to put an even number in each row.



Some math language is used to communicate.

# Practitioner

The student achieves one correct solution.



" 3 in each row.  
There are 4 rows."  
 $3 \times 4 = 12$  seeds

Some math language is used to communicate.

# Expert

The student achieves all correct solutions.

12 "We had twelve seeds in one row"

..... 6	..... 4	..... 6
..... 2	..... 4	..... 2
"We had twelve seeds. We put six in each row"	..... 4	..... 2
..... 2	"We had three rows. We put four in each row"	..... 4
..... 2	..... 2	..... 3
..... 2	..... 2	"We had four rows. We put three seeds... we had twelve altogether"
..... 2	..... 2	

"We had six rows. We put two in each row"

There are 5 ways in all

Correct math language and diagrams are used.

The student makes mathematically relevant observations.