Identifying Factors

GOAL

Identify factors to solve problems.

Seedlings to Plant

Grade	Number of seedlings
1	18
2	25
3	29
4	36
5	48
6	56

For an Earth Day project, the students in each grade have a different number of tree seedlings to plant in a park. The students will plant the seedlings in arrays.
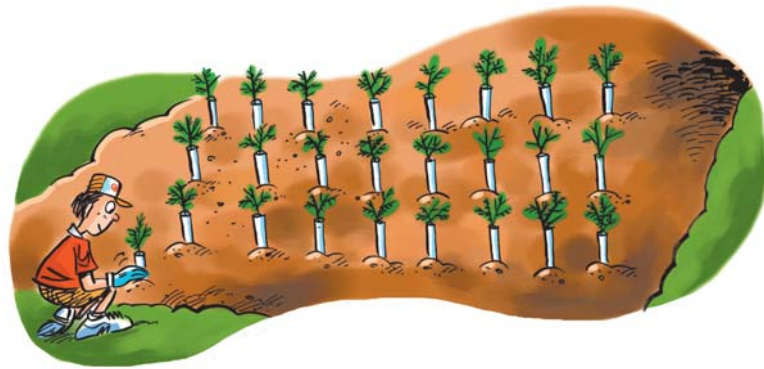
Which number of seedlings can be planted in the greatest number of arrays?

Mai's Arrays

I'll sketch possible arrays using the letter S to represent each seedling. I'll start with the number for Grade 1.

1 row of 18   S S S S S S S S S S S S S S S S S S

2 rows of 9   S S S S S S S S S
                      S S S S S S S S S

3 rows of 6   S S S S S S
                      S S S S S S
                      S S S S S S

The Grade 1 students can plant 18 seedlings in 3 different arrays.

Jason's Factor Rainbow

I can figure out the number of arrays the Grade 1 students can use by identifying the factors of 18.

I'll use mental math to identify pairs of matching factors and write them in a factor rainbow.

I know 4 and 5 are not factors of 18. So my factor rainbow shows that I identified all the factors.
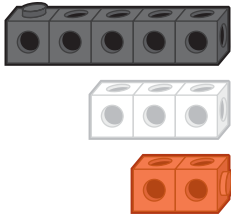
Each pair in the rainbow represents a different array.

The Grade 1 students can plant their 18 seedlings in 3 different arrays.

1 2 3   6 9 18

1-by-18

2-by-9

3-by-6
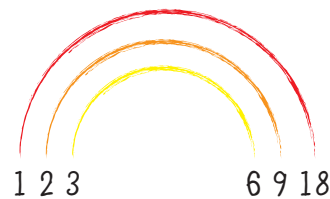
A. How many arrays can be used to plant the seedlings for each of the other grades? Use either Mai's method or Jason's method.

B. Explain why you chose the method you used in Part A.

C. Which number of seedlings from the chart can be arranged in the greatest number of arrays?

Reflecting

D. How are Mai's arrays and Jason's factor rainbow the same? How are they different?

E. How do you know when to stop looking for more factors if you are using arrays? What if you are using factor rainbows? Use an example to explain.

Checking

1. Identify all the factors of each number.
   a) 16
   c) 32
   b) 27
   d) 37

2. Sandeep's class has 50 flowers to plant as another Earth Day activity. Ingrid's class has 60 flowers. Which number of flowers can be planted in more arrays?

Practising

3. Identify all the factors of each number.
   a) 40
   d) 48
   b) 67
   e) 56
   c) 22
   f) 64

4. a) Identify all the factors of 28.
   b) What is another number from 20 to 30 that has the same number of factors as 28?

5. A school in Cochrane, Alberta, has 24 solar panels on the roof to produce electricity.
   a) Sketch the possible arrays that can be made with 24 solar panels.
   b) How can you use the arrays you sketched in part a) to identify all the factors of 24?

6. Nadia wants to display the coins in her coin collection in an array. The number of coins she has can be arranged in only one row or in only one column. If the number of coins is between 20 and 25, how many coins does she have? Show your work.

7. Which factors are missing from each rainbow?

   a) 1 ▢ ▢ 5 ▢ 20

   b) ▢ ▢ ▢ 65

8. Emily has three different lengths of linking cubes. They cannot be taken apart. She is combining them to make these lengths:
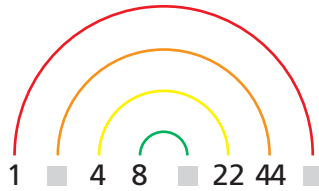
12 cubes, 40 cubes, 34 cubes, 39 cubes, 42 cubes

a) Which lengths can she make using only black?
b) Which lengths can she make using only white?
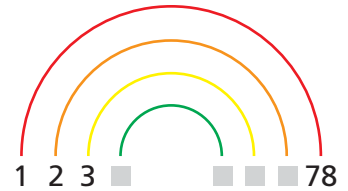**c)** Which lengths can she make using only red?

9. What number is a factor of every whole number? Explain your thinking.

10. Which factors are missing from each rainbow?

**a)**

1 ■ 4 8 ■ 22 44 ■

b)

1 2 3 ■ ■ ■ ■ 78

11. Caleb can arrange the stamps in his collection in eight equal rows with no stamps left over.
a) How do you know that 8 is a factor of the number of stamps in Caleb's collection?
b) How do you know that both 2 and 4 are factors of the number of stamps? Use a sketch to explain.

12. Sage formed square arrays with beads. Each array has fewer than 100 beads. The side lengths of all the square arrays have 2 as a factor. How many beads might be in each array? Explain what you did.
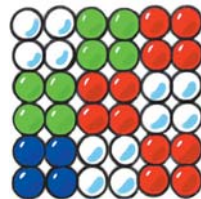
13. What are some different ways to identify all the factors of a number? Use an example from 20 to 40 to explain.