Lesson Title: Understanding Prime Factors
Course: 6th Grade Mathematics
Designer: Annissa Foster

Learning Outcomes/Intentions

Formal Unit Outcome(s): N6.2 Demonstrate understanding of factors and multiples (concretely, pictorially, and symbolically) including:
• determining factors and multiples of numbers less than 100
• relating factors and multiples to multiplication and division
Indicator(s): f. Determine the prime factors of a whole number and explain the strategy used to determine the factors.
g. Explain how the composite factors of a whole number can be determined from the prime factors of the whole number and vice versa.

Objective: Students will be able to find the prime factors of a whole number. They will also be able to work backwards to find a whole number using prime factors.

Mathematical Processes: Students will use **reasoning** to reach conclusions and develop their logical thinking when looking for prime factors. Learners will also be able to **communicate** by sharing their findings during the group discussion.

Essential Questions: Can you find the prime factors of a number? Can you display a factor tree? Can you find a composite product using prime factors?

First Nations Content

N/A

Assessment Evidence

Formative Assessments (Assessment for Learning):
Learners will show they achieved the outcomes through mostly informal processes.
Questioning - See below
Students will also be given feedback throughout the lesson through class discussion as the teacher evaluates how students are doing.

Summative Assessments (Assessment of Learning):
N/A

Materials

A bag of prime numbers cut up into individual squares that will contain four 2's, four 3's, four 5's, and four 7's. (One bag per every two students).
Paper for each student

Pencil for each student

Learning Plan

Learning Experiences & Instruction:

Engage: Begin the class by informing students that today they will be determining the prime factors of a whole number. We are going to determine the prime factors using a factor tree.

Begin with the number 10 and write this number on the board.

Ask: What two numbers can we multiply together to receive the product 10?

Students may say 1x10, or 2x5. Under the ten in a triangle formation draw a 2 and a 5 with a line connecting each back to the ten.

Ask: When looking at the number 2, are there any two digits that when multiplied will give us the answer 2, other than 1 multiplied by itself? (No.)

When looking at the number 5, are there any two digits that when multiplied will give us the answer 5, other than 1 multiplied by itself? (No, because as we have discussed in a previous lesson, both 2 and 5 are prime numbers).

This means that the prime factors of 10 are 2 and 5. Let's look at a more complicated number. Write the number 12 on the board.

Ask: What two numbers can we multiply together to receive the answer 12?

Students may say 2x6, or 3x4. Acknowledge that we could choose either route and end up at the same answer. Let's start with 2x6 and write this under the 12 in the same manner as before.

Ask: Can we extend the tree further under the 2? (No - 2 is a prime number so we can't extend the tree any further in this direction).

Ask: When looking at the number 6 are there any two digits that when multiplied together will give us 6? Students will say 2x3. Write 2 and 3 under the 6.

Both of these numbers are prime so we cannot extend the tree any further. Show students that all the numbers at the bottom of their respective routes represent the prime factors of the whole number. For 12 this would be 2, 2, 3. Now let's go back and try the other route of 3x4. Write 12 on the board and then 3x4 underneath. Break these down in the same manner as before. Point out to students that no matter what route is taken at the beginning, we will still end up at the same prime factors (2, 2, 3).

Show students that you can also do the inverse of this to find the original number. Write on the board the multiplication equation 2x2x3=12.

Explore:

Have students work individually on the numbers 16, 24, 30, 45, and 66 and write down the multiplication statement associated. Have them record their answers and then discuss with the class. Break students into pairs and distribute the bags of prime numbers. Explain to students that these bags contain prime numbers under 10. Students can work together to find different combinations of three or four prime numbers to find different products (no more than four prime numbers - too complicated otherwise). Have them record their answers.

Remind students to pay attention to the commutative property, and encourage them to find an organized way to keep track of the combinations they've used. Walk around the classroom and give students feedback. They will likely not be able to come up with all of the different combinations but students could share in a class discussion if there is time.

Extend:
Create a factor tree for a three digit number and write a multiplication statement using the factors.

Reflection