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Resource ID#: 29510

Primary Type: Lesson Plan

Creating Factor Pair "Trees"

In this lesson, students will practice identifying factor pairs of whole numbers. Students will then draw a triangle around their factor work so that it resembles a triangular tree. Students will then circle all of the prime numbers inside the tree. The circles might represent the balls or ornaments on a holiday tree if doing this lesson around the holidays. This lesson does not teach an understanding of factors or prime numbers but is, rather, a practice of the students' knowledge of these concepts.

General Information

Subject(s): Mathematics

Grade Level(s): 4

Intended Audience: [Educators](#)

Suggested Technology: Overhead Projector

Instructional Time: 45 Minute(s)

Freely Available: Yes

Keywords: factors, factor pairs, whole numbers, multiple, prime number, composite number

Instructional Component Type(s): [Lesson Plan](#), [Project](#), [Teaching Idea](#), [Instructional Technique](#), [Formative Assessment](#), [Student Center Activity](#)

Instructional Design Framework(s): [Direct Instruction](#), [Cooperative Learning](#)

Resource Collection: CPALMS Lesson Plan Development Initiative

Lesson Content

Lesson Plan Template: General Lesson Plan

Learning Objectives: What should students know and be able to do as a result of this lesson?

- Students will be able to find all factors pairs of a given whole number.
- Students will explain that a composite number has more factors than 1 and the number itself.
- Students will state that a prime number only has the factors 1 and the number itself.

Prior Knowledge: What prior knowledge should students have for this lesson?

- Students should be able to understand what the term factor means. For example, factors are the numbers you multiply together to get another number. The numbers 3 and 4 are factors of the number 12.
- Understanding of prime and composite numbers is a prerequisite for this lesson.

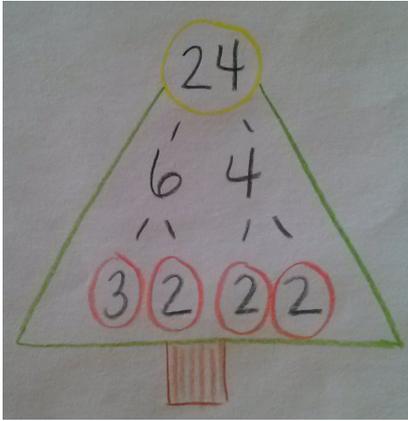
Guiding Questions: What are the guiding questions for this lesson?

1. How can you find the factor pairs of a number?
2. What happens when you multiply the factors together?
3. How do you know if a number is a prime number?
4. How do you know if a number is a composite number?

Teaching Phase: How will the teacher present the concept or skill to students?

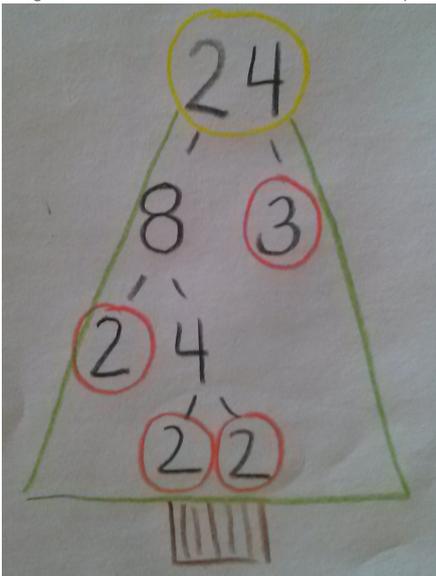
1. Begin the lesson with the formative assessment.
2. Review the terms prime and composite by asking students to group the factors of 24 into prime or composite.
 - A prime number can be divided evenly only by 1, or itself. It must be a whole number greater than 1.
 - A composite number is a whole number that can be divided evenly by numbers other than 1 or itself.
3. Group the students into pairs. (This can be as simple as assigning a shoulder partner or grouping by student ability. Teachers should use their professional judgment to effectively group their particular students.)

4. Ask the pair of students to write the number 24 on a sheet of paper or wipe-off board and to draw two diagonal lines down from the number. Ask them to put the following 2 factors under the number 24, 6 and 4 diagonally below.
5. The teacher rotates in the classroom and asks an open ended question such as, "What kind of number is 6 and how do you know?"
6. Ask them to think of the factors for the numbers 4 and 6. Students turn to their partners and discuss the possible factors.
7. Students should then share that $2 \times 2 = 4$ and $3 \times 2 = 6$.
8. Explain to students they will now draw more diagonal lines below the numbers 4 and 6. The numbers 2 and 2 will be below number 4 and the numbers 3 and 2 will be below the number 6.
9. Now ask the students to determine what kind of numbers 2,2,2, and 3 are and why. The teacher may show a sample response to the prompt.
10. Students share with their partner what they think about the numbers and then share out to the teacher.
11. The teacher may want to pose an open ended question to get responses such as, "What kind of number is 3 and how do you know?"
12. The teacher may ask for a thumbs up if the numbers are prime numbers. If there is consensus that the numbers are prime numbers then ask the students to use colored pencils to circle the prime numbers.
13. Then ask the students to draw a triangle around the factor pairs in order to make it look like a triangular tree.

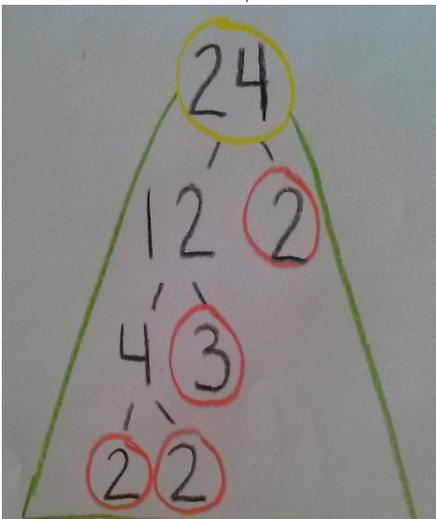


Guided Practice: What activities or exercises will the students complete with teacher guidance?

1. Explain to students that there are different possible factor pairs for the number 24. The teacher should model the following factor pair by using the numbers 3x8. Model again for students how to outline the factor pair with a triangle and circle the prime numbers to resemble a holiday tree.



2. Now, ask students to create another factor pair on their own for 24 using 2×12 . Have students outline with the triangle and circle the prime numbers. Students share with the class their factor pairs. The teacher will review the responses.





3. While students are working at this time the teacher should be circulating the room and monitoring student progress.
4. During Independent Practice the teacher can provide individual or small group instruction for those students who are struggling with factoring.

Independent Practice: What activities or exercises will students complete to reinforce the concepts and skills developed in the lesson?

1. Students will work independently by creating factor pairs from numbers given to them by the teacher.
2. The teacher gives students a few composite numbers to practice making into factor pairs and then the trees as described above.
3. Numbers such as **30**, **48** and **72** can be given as examples. Allow the students to choose their own factor pairs for each number and create their trees. Remind students to circle the prime numbers. (Summative Assessment)
4. Allow students to decorate and add details to their trees, encourage them to be as creative as they wish.
5. During this time there will be more time for independent practice or more time for remediation if students need it. The teacher may gauge this by student performance during this phase of the lesson. For example, if a couple of students demonstrate difficulty identifying factor pairs for 30 such as 15×2 or 10×3 the teacher should pull these students for small group. The teacher might use a strategy such as the one provided in the following link, "work from the outside in!", to help students visualize finding the factor pairs of a number. This site also features a factor calculator, which may prove helpful.
<http://www.mathsisfun.com/numbers/factors-all-tool.html>
6. As students are working the teacher should be circulating the room and monitoring student progress. The teacher provides support during the practice by asking questions that will probe for student understanding.

Closure: How will the teacher assist students in organizing the knowledge gained in the lesson?

1. The teacher should bring the students back to whole group and have them bring the trees they created during Independent Practice.
2. The students will share their trees with the class for the factor pairs they chose.
3. Students will be asked to show their understanding of factorization. Ask students to show how they made their tree and how the process of factorization helps them understand the prime factors of a composite number.
4. Ask students to compare different strategies for finding the factor pairs for the numbers in the Independent Practice activity.
5. You might pose the question, "I wonder if all numbers can be decomposed to only prime factors." Ask the students to prove or disprove this idea.
6. If you wish, you could give a quick Summative Assessment of this lesson by giving the students 3 numbers to factor to prime numbers.

Summative Assessment

1. At the end of the lesson students are asked to determine the factor pairs for given whole numbers between 1-100.
2. Students will also be asked to determine if all of the numbers are prime or composite when they have found all factor pairs.

Formative Assessment

1. Start the lesson by asking students to work in pairs to conduct a cooperative learning activity.
2. Ask students to practice factoring numbers in order for the teacher to determine the students' foundational skills.
3. Students will generate all factor pairs for the given number using their Prior Knowledge.
4. The teacher can use the following dialogue, "What can 24 be divided by evenly? How do you know?" OR "What factors can you multiply to make this number? Can you think of other factors that can multiply to make this number?"
5. Provide students with the following numbers and ask them to find all factor pairs.
 1. 12
 2. 25
 3. 36
6. This also allows for a baseline to show student growth.
7. Student strategies will be established for scaffolding.

Feedback to Students

- During the guided practice the teacher moves between pairs and asks probative questions.
- The teacher gives feedback immediately to the student pairs.
- Open ended questions will be asked to encourage students to explain their understanding of factors.
- Questions such as:
 - Is this number a prime number?, How do you know?
 - How can you use the inverse operation with factors?
 - Is this number a composite number?
- Discussions with partners and teachers will give information to the teacher. The teacher may share student responses for a discussion.

Accommodations & Recommendations

Accommodations:

- Differentiated Content: For struggling students start with a simpler composite number such as 4.
- Allow students to work in pairs for the Independent Practice activity.

Extensions: An extension of the lesson could include teaching students how to present the factors in exponential form. For example, $2 \times 2 \times 2 \times 3 = 24$ can be written as $2^3 \times 3 = 24$. Students can practice writing their answers exponentially.

Suggested Technology: Overhead Projector

Special Materials Needed:

- The teacher may want to make this a holiday activity by providing colorful paper.
- Students can use colored pencils and make the factor tree as a part of a holiday card for their family.
- Paper or wipe-off boards

Further Recommendations: Make this a fun activity for students so they can apply skills in a meaningful way. For other times of the year, the students could turn the trees into party hats and the prime numbers could be polka dots.

Additional Information/Instructions

By Author/Submitter

- This lesson supports the alignment of Mathematical Practice standard MAFS.K12.MP.7.1. Look for and make use of structure.
- Students will especially enjoy this lesson during the holidays.

Source and Access Information

Name of Author/Source: Anonymously Submitted

Is this Resource freely Available? Yes

Access Privileges: Public

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Aligned Standards

Name	Description
MAFS.4.OA.2.4:	Investigate factors and multiples. a. Find all factor pairs for a whole number in the range 1–100. b. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1–100 is a multiple of a given one-digit number. c. Determine whether a given whole number in the range 1–100 is prime or composite.