Math Kangaroo Level 5-6

Multiples, Factors, and Divisibility

Warm Up

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Math Kangaroo Level 5-6

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Warm Up

MK 2004 # 7

Which of the following numbers is not a factor of 2004?

(A) 3 (B) 4 (C) 6 (D) 8 (E) 12

What we have learned

Lesson 2: Patterns ✓

Lesson 3: Algebraic Thinking ✓

Lesson 4: Ratio & Proportion ✓

Lesson 5: Multiples, Factors, and Divisibility

Lesson 6: Time, Clocks, and Calendars

Lesson 7: 2D Geometry

Lesson 8: 3D Geometry

Lesson 9: Hands On

Vocabulary

Integer: The integers are the set of numbers that do not contain fractions or decimal parts.

Example: ..., -3, -2, -1, 0, 1, 2, 3,

Factor: An integer that is being multiplied by another integer.

Product: The result when you multiply factors together.

Example: factor × factor = product

Multiples

Multiples of a number are the product when you multiply that number by an integer.

Example: The first few positive multiples of 3 are 0, 3, 6, 9, 12, 15, …

One easy way to find multiples is known as skip-counting.

Example: Skip-count by 5's 5, 10, 15, 20, 25, …

Common multiples are numbers that are shared multiples of two or more numbers.

The common multiples of 3 and 5 are: 0, 15, 30, 45, 60, …

Math Kangaroo Level 5-6

Multiples, Factors, and Divisibility

Prime Factors and Composite Numbers

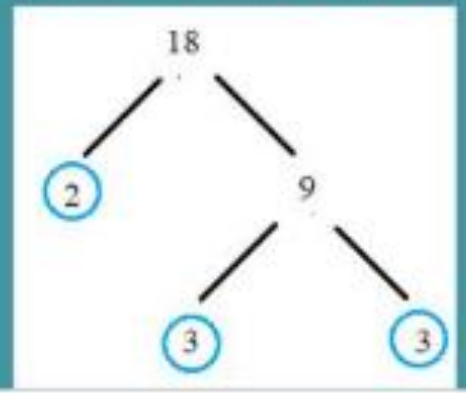
A number is prime if it is only divisible by itself and 1. The first few examples are: 2, 3, 5, 7, 11, 13, 17, 23

A number that is factorable, not prime, is called a composite number.

You will sometimes be asked to find the prime factorization of a number. A factor tree is a useful tools for this.

Example: Find the prime factors of 18

$18 = 2 \times 3 \times 3 = 2 \times 3^2$



Divisibility

Divisibility is a close cousin of finding factors. A number is divisible by its factors. Divisibility is often determined by shortcuts, which can be combined.

Divisible by	Rule
2	Even number, last (rightmost) digit is 0, 2, 4, 6, or 8
3	The sum of the digits is divisible by 3
4	The last two digits are divisible by 4
5	The last digit is a 0 or 5
6	Even and the sum of the digits is divisible by 3 (rules for 2 and 3)
7	Cross off last digit, double it and subtract from what remains. Result is divisible by 7
8	The last three digits are divisible by 8
9	The sum of the digits is divisible by 9
10	The last digit is 0

MK 2000 # 7

1. How many twos and fives are there among the prime factors of the number 2000?

MK 2000 # 11

2. How many two-digit numbers are divisible by both 2 and 7?

MK 2004 # 15

3. Thomas, Roman, Andrew, and Michael said the following about a certain number. Thomas said, "This number is equal to 9." Roman said, "This number is prime." Andrew said, "This number is even." Michael said, "This number is equal to 15." Only one of the statements given either by Roman or Thomas is true, and only one of the statements given either by Andrew or Michael is true. What number are they talking about?

MK 2000 # 17

4. John comes to the computer lab every day, Karl every 2 days, Stan every 3 days, Adam every 4 days, Paul every 5 days, and Peter every 6 days. Today they are all at the computer lab. In how many days will they all be there together again?

MK 2010 # 26

6. How many five-digit numbers in the form 1_82_ are there that are divisible by 12 and all of whose digits are different?

Wrap Up

- [x] Some Math Kangaroo problems can be solved by finding the factors or multiples of numbers. The rules of divisibility can be useful shortcuts for finding factors.

- [x] When considering the factors of a number, remember that 1 is always a factors.

- [x] Prime numbers have no factors other than themselves or 1.