**Grade 6 Math
Unit 2: Number Relationships**

Name : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Lesson 1: Multiples**
Simply put, a multiple is the product of any two whole numbers (0, 1, 2, 3…).

In the example 2 x 4 = 8, 8 is a multiple of both 2 and 4.

In order to find the multiples of a number, you multiply that number by the whole numbers, starting at 0. In the example of 4, the multiples are as follows:

4 x 0 = 0, 4 x 1 = 4, 4 x 2 = 8, 4 x 3 = 12, 4 x 4 = 16, 4 x 5 = 20

Therefore, the first six multiples of 4 are 0, 4, 8, 12, 16, and 20.

1) Find the first six multiples of the following numbers:

A) 3 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

B) 5 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

C) 6 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

D) 7 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

E) 9 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2) True or false?

A) 28 is a multiple of 6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

B) 32 is a multiple of 8. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

C) 12 is a multiple of 3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

D) 36 is a multiple of 7. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

E) 24 is a multiple of 4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3) Use the number line below to find all of the common multiples of 2 and 3 up to 20. Use different colours to identify each number set.



4) Find the common multiples of following sets of numbers.

A) 4 and 6 between 0 and 30.

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B) 6 and 8 between 0 and 50.

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3) Joe bought some $10 computer games. Damian bought some $15 computer games. They each spent less than $100, but they both spent the same amount. How much could they have spent?

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4) Hot dogs come in packs of 12. Hot dog buns come in packs of 8. Dillon buys the exact amount of hot dogs and buns with none left over. If he bought less than 50, how many could he have bought?

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**Lesson 2: Factoring using arrays**

**Factors** are numbers we can multiply together to get another number. For example, in the equation 6 x 4 = 24, 6 and 4 are both factors of 24. We can use **arrays** to find the factors of a number. Below, arrays are used to find the factors of 24.

xxxxxxxxxxxxxxxxxxxxxxxx (1 x 24)

xxxxxxxxxxxx (2x12)
xxxxxxxxxxxx

xxxxxxxx (3x8)
xxxxxxxx
xxxxxxxx

xxxxxx (4x6)
xxxxxx
xxxxxx
xxxxxx

The inverse of each of these equations is also true. (24x1, 12x2, 8x3 and 6x4)

1. Use arrays to factor the following numbers.

A) 16

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B) 36

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C) 32

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D) 40

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**Lesson 3: Factoring using factor rainbows**
Revision: **Factors** are numbers we can multiply together to get another number. For example, in the equation 6 x 4 = 24, 6 and 4 are both factors of 24.

We can use **factor rainbows** to find the factors of a number. Below, a factor rainbow is used to find the factors of 18.



In this example, we see that 1 x 18 = 18, 2 x 9 = 18 and 3 x 6 = 18. Therefore, the factors of 18 are 1, 2, 3, 6, 9, and 18.

1) Use factor rainbows to find the factors of the following numbers.

A) 12

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B) 24

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C) 42

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D) 56

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**Lesson 4: Prime and composite numbers and prime factorization using factor trees**

A **prime number** is any number, greater than 1, that has two different factors (one and itself). For example, 7 is a prime number because the only equation whose product is 7 is 1 x 7.

A **composite number** is any number that has three or more factors. For example, 9 has three factors because 1 x 9 = 9 and 3 x 3 = 9. Therefore, the three factors of 9 are 1, 3 and 9.

Therefore, 0 and 1 are neither prime nor composite numbers.

**Prime factorization** is a method of “breaking down” a number into all prime numbers. In the example below, a **factor tree** is used to determine that the prime factors of 36 are 2 and 3.



1) Use the factor tree method to find the prime factorization of the following numbers.

A) 16

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B) 24

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C) 30

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**Lesson 4: Prime factorization using repeated division**

Students can also use the **repeated division method** to determine the prime factors of a given number. To determine the prime factors of a number, begin by dividing the number by the lowest prime number, 2. If the number is not divisible by 2, move to the next smallest prime number (3, 5, 7, 11, 13…) Continue to divide until the quotient is 1. Below, the repeated division method is used to find the prime factors of 36.

36 $÷$ **2** = 18

18 $÷ $**2** = 9

9 $÷$ 2 = not divisible

9 $÷$ **3** = 3

3 $÷$ **3** = 1

Therefore, the prime factorization of 36 is 2 x 2 x 3 x 3.

Here’s another example for 27.

27 $÷$ 2 = not divisible

27 $÷$ **3** = 9

9 $÷$ **3** = 3

3 $÷$ **3** = 1

Therefore, the prime factorization of 27 is 3 x 3 x 3.

1) Use the repeated division method to find the prime factorization of the following numbers.

A) 20

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B) 28

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C) 48

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**Lesson 6: Order of Operations (BEDMAS)**

When solving an equation with multiple operations (ex. division, addition), we use the order of operations:

**B**rackets
**E**xponents
**D**ivision and **M**ultiplication
**A**ddition and **S**ubtraction

Example 1:

2 x 3 – 6 $÷$ 2 + 5

In this equation, we start with multiplication and division first, moving from left to right.

2 x 3 – 6 $÷$ 2 + 5

= 6 – 6 $÷$ 2 + 5

We then move to addition and subtraction, moving from left to right.

= 6 – 3 + 5

= 3 + 5

= 8

Example 2:

(3 + 5)$ ÷$ (2 x 2)

In this example, we start with the brackets, moving from left to right.

(3 + 5)$ ÷$ (2 x 2)

= 8 $÷$ (2 x 2)

= 8 $÷$ 4

= 2

1) Complete the following questions using the order of operations.

A) 5 x (6 – 3) x 2 B) 5 x 6 – 3 x 2

C) 8 $÷$ 2 x 3 – 1 D) 6 x 2 $÷$ (2 + 4)

E) 10 – 2 + 6 $÷$ 3 F) 7 + 4 x 4 $÷$ 2

G) 4 + 6 $÷$ 2 + 1 H) (5 + 8) – 4 $÷$ 2

I) 4 x 4 $÷$ (2 + 2) J) 4 x 4 $÷$ 2 + 2

K) 10 – 5 + 3 x 2 L) (8 – 2) x 6 $÷$ 3

**Lesson 7: Positive and negative integers**

So far in grade 6, you have only worked with **whole numbers** (0, 1, 2, 3…). **Integers** include negative numbers as well (…-3, -2, -1, 0, 1, 2, 3…).

1) Place > or < on the line to make each statement true. (< = less than; > = is greater than)

A) -2 \_\_\_\_\_\_ -9 B) -6 \_\_\_\_\_ 1 C) -4 \_\_\_\_\_\_ 4 D) -3 \_\_\_\_\_\_ 6

E) -12 \_\_\_\_\_\_ 4 F) -3 \_\_\_\_\_ -8 G) 2 \_\_\_\_\_\_ -9 H) -5 \_\_\_\_\_\_ 4

2) Place the following integers in order from least to greatest.

A) -5, -10, 3, 7, -1

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

B) 2, -7, -3, -5, -1

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C) 6, -9, 0, 5, -5

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3) Put the following numbers on a number line.

A) -4, 0, 5, -6, 3

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B) -2, -5, 3, 7, -1

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C) -2, 5, 3, 1, -6

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4) One winter morning, Martin gets into his car and notices that the temperature is -3°. During his drive, the temperature increases by 7 degrees. Use a number line to determine the temperature outside when Martin arrives at his destination.

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