Math Links

GRADE 6 TASKS
Whole numbers, negative numbers, coordinate graphing

MULTIPLICATION PATTERNS

whole number multiplication

1. Find each product:

   $37 \times 3 =$ ____

   $37 \times 6 =$ ____

   $37 \times 9 =$ ____

2. Predict the product of 37×15 and explain your reasoning.

4. Multiply to check your prediction.

5. Predict the missing factors:

   $37 \times$ ____ $= 444$

   $37 \times$ ____ $= 999$

6. What is the pattern? Describe it.

INTERPRETING THE DIVISION ALGORITHM

whole number division

This task requires you to think about the long division algorithm more closely.

1. A student's incorrect work is shown below. Explain the mistake that the student made.

$$
\begin{array}{r}
42 \\
14\overline{)5628} \\
\underline{56} \\
28 \\
\underline{28} \\
0
\end{array}
$$

2. Use the computation below to find the following products.

$$
\begin{array}{r}
189 \\
16\overline{)3024} \\
\underline{16} \\
142 \\
\underline{128} \\
144 \\
\underline{144} \\
0
\end{array}
$$

   a. 189×16

   b. 80×16

   c. 9×16

THE LOCKER PROBLEM

whole number concepts

At a middle school, there are exactly 1,000 students and 1,000 lockers. The lockers are numbered in order from 1 to 1,000. The students conduct the following experiment:

All the lockers start out in the closed position. Student #1 enters the building and opens every locker. Student #2 enters and closes every even numbered locker. Student #3 enters and *changes the position* of every third locker, closing those that are open and opening those that are closed. Student #4 does the same with every fourth locker, Student #5 with every fifth locker, and so on. Show all work and explain all answers.

1. Which students, including Student #1, change Locker #20?

2. How many students change the following lockers?
   a. Locker #29
   b. Locker #36
   c. Locker #81
   d. Locker #120
   e. Locker #360

3. Which lockers does Student #159 change?

4. Which lockers are in the open position after all 1,000 students pass through?

THE CLOCK PROBLEM

whole number concepts; prime numbers

Leave six adjacent numbers of the face of a clock where they are and rearrange some or all of the other six numbers in such a way that the sum of every pair of adjacent numbers on the clock face is a prime number.

THE PROBLEM OF 6s

order of operations

Using exactly six 6s, express as many of the numbers as you can from 0 to 50. You may use any mathematical symbols you know. Write out steps that show your solution is correct.

BASE 2

examining a different number system

We use what's called a base 10 number system. For this task you will research the base 2 number system (also called binary number system) and write some numbers using both representations.

The binary system is very important, because it is the system used internally by almost all modern computers and computer-based devices.

1. List the source(s) you used for your research.

2. Base 10 uses the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. What digits are used in base 2?

3. In base 10, for the places greater than zero, the first six decimal place values are:

Value of place:	100,000	10,000	1,000	100	10	1

In base 2, for the places greater than zero, the first six decimal place values are:

Value of place:						

4. Make a chart, listing the base 10 numbers from 0 to 20 and their corresponding base 2 representations.

5. For base 10, the greatest 6-digit number we can write is 999,999. For base 2, the greatest 6-digit number we can write is 111111. What is the base 10 representation of this number?

6. Write the following base 10 numbers in base 2:

30	35	40	45	50	60

7. Write the following base 2 numbers in base 10:

10101	11001	101010	110011

THE CONSTRUCTION PROJECT

Integers, including negative numbers

Some scuba divers are exploring a coral reef. The surface of the ocean (sea-level) is considered to be at an altitude of zero feet. The bottom of the ocean is 15 feet below the surface. A diver is currently at 8 feet below the surface. The captain is at an altitude of 5 feet on the deck of the boat.

1. Use a vertical number line to show the information described.

   Which locations are best described using negative numbers? Explain.

2. Use your vertical number line to determine if the following statements are true or false. Support your answers with words and at least one relevant mathematical statement (equations or inequalities).

   - The distance between the bottom of the ocean and the diver is greater than the distance between the diver and the surface of the ocean.
   - The diver is closer to the bottom of the ocean than he is to the captain.
   - If the diver went down two feet, he would be 15 feet from the captain.

3. Write one more statement about this problem that you could challenge classmates to determine whether it is true or false.

4. Use your number line to answer the following questions.

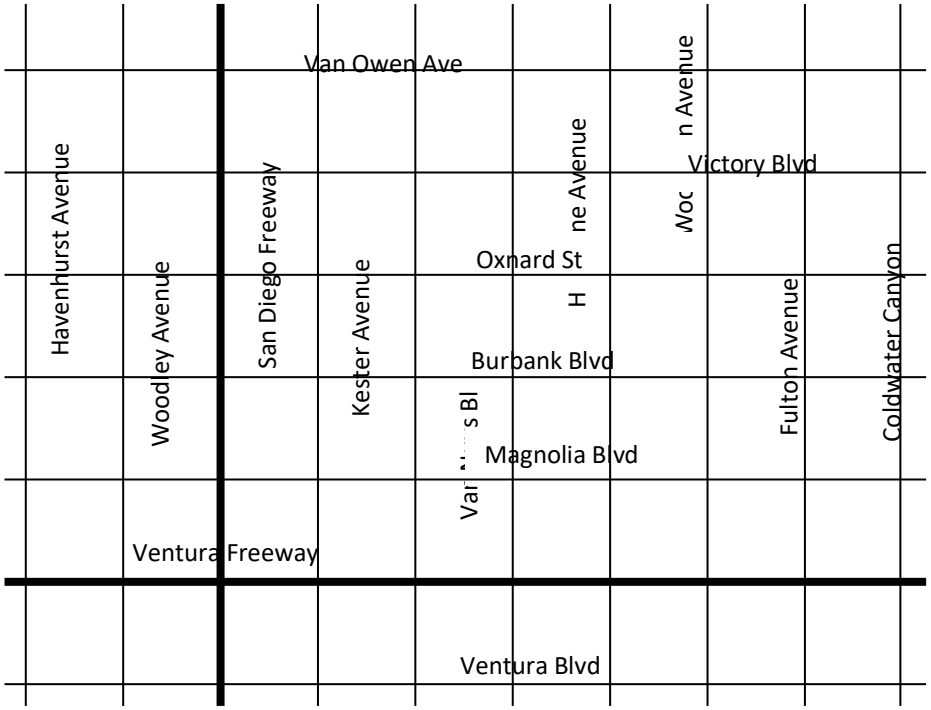
   - What is the distance between the captain and the bottom of the ocean?
   - How far below the surface of the ocean should the diver be so that he is equally distant (equidistant) from the captain and the bottom of the ocean?
   - The captain climbed up from the deck of the boat to the control room. Once in the control room, he was 20 feet from the diver. What's the elevation of the control room? How far is the control room above the deck?

5. Write one more question about this problem that you could challenge classmates to answer.

READING A MAP

Integers including negative numbers; coordinate graphing

This problem uses a map to simulate using a coordinate plane in a real-life context.



Above is a map of the San Fernando Valley in Los Angeles, California. The streets were constructed on a grid, and they are all one-half mile apart. Think of the intersection of the Ventura Freeway and the San Diego Freeway as the origin.

1. What are the coordinates of the airport, located near Woodley and Havenhurst?
2. What are the coordinates of Van Nuys High School, located near Kester and Victory?
3. What are the coordinates of the City Center, located near Victory and Van Nuys?
4. How far is it from the Van Nuys High School to the City Center?
5. If you take the bus down Van Nuys Blvd from Ventura Blvd to Burbank Ave, how far will you travel?
6. Start on corner of Kester and Vanowen, go east on Vanowen, right on Coldwater, end at Magnolia. How does this compare to starting and ending at the same intersections, but taking every right/left/right/left for the pathway. Find two more pathways for starting and ending at the same intersections and compare those distances.
7. The town of Van Nuys is bordered by the 405 Freeway, the 101 Freeway, Fulton, and Van Owen. What is the area of Van Nuys?
8. Write a problem with an answer that shows you know how to identify coordinates in Quadrant III.
9. Write a problem with an answer that shows you know how to find a distance on the map.