

Preview Problems

Grades 6-7 (in AY 2017-18)

Name: _____

- The first four problems are from a problem solving contest held as part of the Fresno Math Circle in May 2017. We frequently do problems like these in our meetings. In addition, we solve puzzles, play math strategy games, and do various group activities. Some examples are given as problems 5 through 7 here.
- Spend as much time as needed on these problems. Do not worry if you do not solve all problems. These problems are very challenging. While a number of our participants solved a few of them, none solved all problems. These problems are meant for you to see if you enjoy the problems we do at the Fresno Math Circle.
- For each problem, explain how you solved it (and show your calculations), and write your answer in the answer box. Please provide good and clear explanations in full sentences. We would like to see your reasoning, not just a correct answer.
- Have fun! If you enjoy solving problems and puzzles like these, you will definitely enjoy participating in the Fresno Math Circle.
- Parents: please scan your child's solutions and send them to fresnomathcircle@gmail.com no later than 1 week after the application date. Your child's work will be reviewed along with the application form.

1. A rectangular garden 50 feet long and 10 feet wide is enclosed by a fence. To make the garden larger, while using the same fence, its shape is changed to a square. By how many square feet does this enlarge the garden?

Answer:

2. Rachael, Elaine and Connie have a total of 58 beads. Rachael and Elaine have a total of 34 beads. Elaine and Connie have a total of 42 beads. How many beads does Elaine have?

Answer:

3. A rabbit loves cabbage and carrots. In a day, he eats 9 carrots, or 2 heads of cabbage, or 1 head of cabbage and 4 carrots. But some days he only eats grass. Over the last 10 days, he ate a total of 30 carrots and 9 heads of cabbage. On how many of these 10 days did he eat only grass?

Answer:

4. Which is larger:

$$A = 2016 \cdot (1 + 2 + 3 + \cdots + 2017), \text{ or}$$

$$B = 2017 \cdot (1 + 2 + 3 + \cdots + 2016)?$$

Answer:

5. Each star represents a digit. Digits can be used more than once in each puzzle. Find all the missing digits in this correctly solved problem.

$$\begin{array}{r}
 * * \\
 * * \\
 * * \\
 + \quad 3 \\
 \hline
 3 * *
 \end{array}$$

6. In this puzzle, each letter represents a digit. If a letter appears more than once, then it represents the same digit in all of those instances. However, different letters represent different digits. Determine the value of each letter.

$$\begin{array}{r}
 Y Y \\
 + Y Y \\
 \hline
 X Y Z
 \end{array}$$

Answer:

7. This game is called Game 24. The goal is to make the quantity 24 using each of the following numbers exactly once and any operations and parentheses, in as many different ways as possible:

$$2, \quad 3, \quad 4, \quad 6.$$

For example, here is one way: $6 \times 3 + 2 + 4$.

Can you think of some other ways to make 24 using these numbers?