Problemoids

Grade 4
Math Challenge

Revised Edition

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1. Lucky Combination

Zoey was telling her mother about her first day at school. After talking about her teacher and her classmates, Zoey said to her mother, "My locker number at school is a three-digit number. The product of the digits is 12. The sum of the digits is 9. The digit in the tens place is higher than the digit in the hundreds place and lower than the digit in the ones place. Do you know what my locker number is?"

Her mother smiled and replied, "I do."

Do you?

Hint 1

Identify the conditions of the solution. Does the problem tell whether or not the same digit can appear more than once in Zoey's number?

Hint 2

Make a list of three-digit numbers using groups of three different one-digit numbers that sum to 9.

Hint 3

Identify the conditions of the solution. Which group of numbers in your list has a product of 12?

1. Lucky Combination: Looking-Back Questions

(A) Suppose the problem is the same, except the digits sum to 10, and their product is 30. What is the locker number?

(Hint: *Make a list* of three different one-digit numbers that sum to 10, and examine their products.)

(B) Suppose the problem is the same, except the digits sum to 12, and their product is 42. What is the locker number?

(C) Suppose the problem is the same, except the digits sum to 20, and their product is 216? What is the locker number?

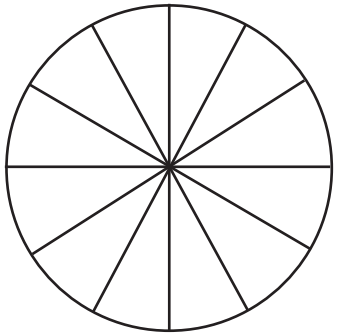
(D) Use the conditions in part C, and suppose the sentence "The digit in the tens place is higher than the digit in the hundreds place and lower than the digit in the ones place" were changed to "All of the digits of my locker number are different." What solution would you offer?

16. Pizza Pieces

Carmine, the pizza chef and geometry whiz, is willing to cut your pizza almost any way you choose. The only things that he insists on are that each cut be straight and that each cut go from edge to edge all the way across the pie.

One day Scarlett asks Carmine to cut a round mushroom and pepperoni pizza six times.

"If I cut it the usual way, you'll get 12 pieces of pizza," Carmine says, pointing to a picture on the wall. "But you can get more than 12 pieces if I cut it another way."



"I have a few friends coming over," Scarlett told him. "Cut it so that I get as many pieces as possible using six cuts."

How many pieces of pizza will Scarlett take home if Carmine makes the largest possible number of pieces using six straight cuts going from edge to edge all the way across the pie?

Hint 1

Use all given and implied information. Explore ways to increase the number of pieces using straight cuts all the way across the pie.

Hint 2

Solve a simpler problem. What is the largest number of pieces Scarlett could get if she told Carmine to cut the pizza three times? Four times?

Hint 3

Make a chart, and *search for a pattern* in the chart. One has been started for you.

Number of Cuts	Largest Number of Pieces
1	2
2	4
3	?
4	?

16. Pizza Pieces: Looking-Back Questions

(A) How many pieces could Scarlett get with eight cuts?

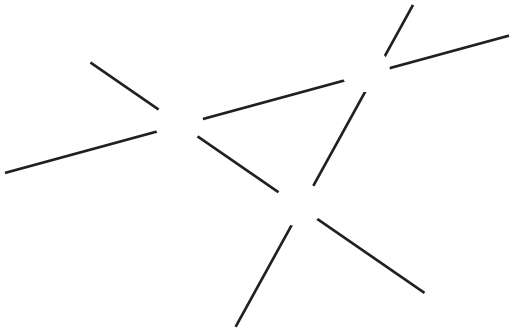
(Hint: *Search for a pattern*, and *use all given and implied information* to extend the pattern to eight cuts.)

(B) Scarlett is going to cut a loaf of bread three times. What is the largest number of pieces of bread she can get?

(Hint: *Solve a simpler problem.* What is the largest number of pieces of bread that Scarlett can get with one cut? Two cuts?)

(C) As the players on the all-star team are introduced and run onto the field, each one shakes hands with the players already on the field. If the all-star team has 10 players, how many handshakes are there altogether?

(D) A new computer game looks similar to an old game called Pick-Up Sticks. In the new game, the "sticks" are straight lines all the same length, and players must place 10 sticks in a pile. Wherever sticks touch each other, they cut each other in two. For example, the following image shows three sticks in a pile that together produce nine pieces:



What is the largest number of pieces that a player can produce with 10 sticks?