Problem of the Month
Calculating Palindromes

Level A

Find and list all the ways you can add two counting numbers to equal 12. The order that numbers are added doesn't affect whether two number sentences are the same.

What patterns do you see in the number sentences?

How do you know you have found all possible number sentences?   Explain.

Find and list all the ways you can add three counting numbers to equal 12.

Level B

Pick any 2-digit number where not all the digits are equal. Order the digits from highest to lowest to create the largest number. Next order the digits from lowest to highest to create the smallest number. Find the positive difference between the two numbers. Investigate different solutions you find. Are there patterns? If so, what patterns did you find?

Level C

Pick any 3-digit number where not all the digits are equal. Order the digits from highest to lowest to create the largest number. Next order the digits from lowest to highest to create the smallest number. Find the positive difference between the two numbers. Investigate different solutions you find. Are there patterns? If so, what patterns did you find?

Do two different 3–digit numbers produce the same solution (difference) when following the process?

What can you predict about the solutions (differences) in terms of specific digits (hundreds, tens, ones)?

What other relationships are there between the digits?

Explain your findings

Level D

Pick any 4-digit number where not all the digits are equal. Order the digits from highest to lowest to create the largest number X. Next order the digits from lowest to highest to create the smallest number Y. Subtract to form X-Y. Repeat the process with X-Y. Continue.

Following the process, eventually you will come to a terminating number. What is the terminating number? What makes it terminate?

Can you predict the number of steps to the terminating number?

What is the maximum number of steps?

What are some patterns you notice in the numbers formed along the way to the terminating number?

Compare what happens for 3-digit numbers? 2-digit numbers? 5-digit numbers?

Level E

Numbers may be expressed as the sum of consecutive positive integers.

For example:
     12 = 3 + 4 + 5
     13 = 6 + 7
     25 = 3 + 4 + 5 + 6 + 7

Which numbers can be expressed as consecutive positive integers? How do you know you have found them all? Explain.

Which numbers can be expressed as sums of two consecutive integers? Three?

How many different ways are there of expressing numbers as sums of consecutive integers? Justify your findings.

Investigate numbers that can be expressed as sums of consecutive odd integers. Explain your findings.