



Problem of the Week

Grade 7 and 8

Where Are You?

Solution

Problem

The integers greater than one are arranged as shown in the following chart.

	P	Q	R	S	T
Row 1			2	3	4
Row 2	7	6	5		
Row 3			8	9	10
Row 4	13	12	11		
Row 5			14	15	16
Row 6	19	18	17		

The pattern continues. Determine the exact position of the integer 2011. State the row number and the column letter (P, Q, R, S, T).

Solution

Observe some of the patterns in the chart.

Each row contains a multiple of 3 in either column Q or column S . To determine the row number, take the multiple of three and divide it by three. The outer numbers in column P or T have a remainder 1 when divided by 3. Numbers that are even and have a remainder 1 when divided by 3 are in column T . Numbers that are odd and have a remainder 1 when divided by 3 are in column P . If the largest number in a row is even, it is in column T . If the largest number in a row is odd, it is in column P . Every number in column R has a remainder 2 when divided by 3.

When 2011 is divided by 3, there is a quotient of 670 and a remainder 1. So 2011 is in column P or T but since 2011 is odd, it is in column P . The 670th multiple of 3, 2010, is in row 670, in column Q , to the right of 2011. In fact, row 670 will contain 2011 in column P , 2010, the 670th multiple of 3, in column Q , and 2009 in column R .

