



# Problem of the Week

## Problem E

### The Area of the Year

In the diagram,  $\triangle AB_1C_1$  is right-angled with  $AB_1 = 2$  and  $AC_1 = 5$ . Lines  $AB_1$  and  $AC_1$  are extended and many more points are labelled at intervals of 1 unit, so that

$$B_1B_2 = B_2B_3 = B_3B_4 = B_4B_5 = \dots = 1, \text{ and}$$

$$C_1C_2 = C_2C_3 = C_3C_4 = C_4C_5 = \dots = 1.$$

In fact,  $B_1B_j = j - 1$  and  $C_1C_k = k - 1$  for any positive integers  $j$  and  $k$ .

For example,  $B_1B_5 = 5 - 1 = 4$  and  $C_1C_4 = 4 - 1 = 3$ .

Determine the value of  $n$  so that the area of quadrilateral  $B_nB_{n+1}C_{n+1}C_n$  is 2020. That is, determine the value of  $n$  so that the area of the quadrilateral with vertices  $B_n, B_{n+1}, C_{n+1},$  and  $C_n$  is 2020.

