

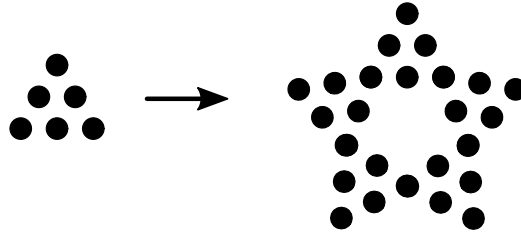


Problem of the Week

Problem E

Dot Dot Dot

Ponto forms a triangle using dots, and then puts five of these triangles together to make a star. When he does this, the dots in the bottom corners of each adjacent triangle overlap. An example is shown below.

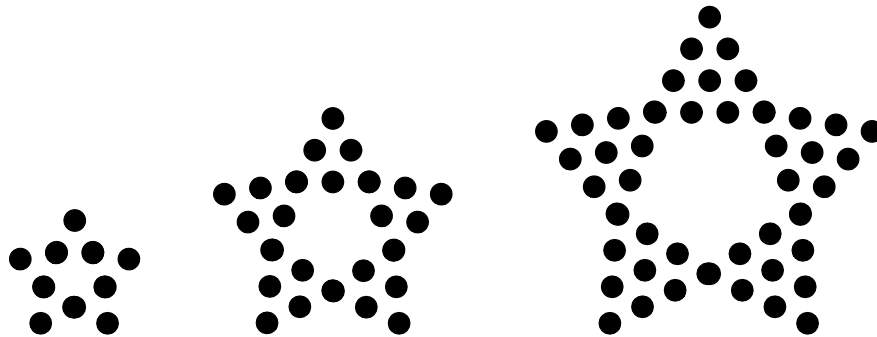


Ponto creates a sequence of such stars as follows.

- Each triangle in the first star has a row with one dot on top of a row with two dots.
- Each triangle in all subsequent stars has one more row than the triangles in the previous star. This new row is placed at the bottom of each triangle and has one more dot than the row above it.

The first three stars in the sequence are shown. They have 10, 25, and 45 dots showing, respectively.

Which star in the sequence will have 20 020 dots showing?



NOTE:

In solving the above problem, it may be helpful to use the fact that the sum of the first n positive integers is equal to $\frac{n(n+1)}{2}$. That is,

$$1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$$