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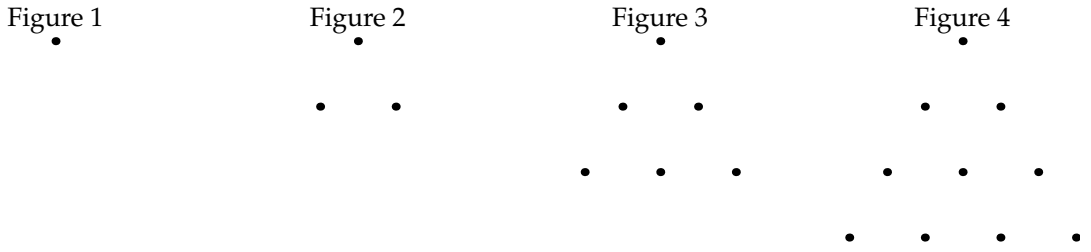
Warm-Up!

Try these problems before watching the lesson.

1. Find the seventh term in the geometric sequence

$$2, 6, 18, \ldots.$$

2. A series of figures are created with dots as shown below. After Figure 1, each figure is created by adding a new row of dots that has one more dot than the previously added row of dots. How many dots total are there in Figure 10?



3. Evaluate the sum

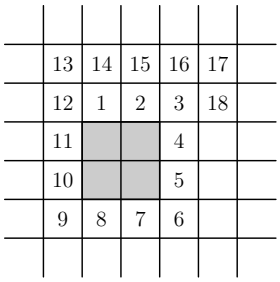
$$(4-3)+(5-4)+(6-5)+(7-6)+\cdots+(2010-2009).$$

4. Evaluate the product

$$\frac{5}{3}\cdot\frac{6}{4}\cdot\frac{7}{5}\cdot\frac{8}{6}\cdot\cdots\cdot\frac{120}{118}.$$

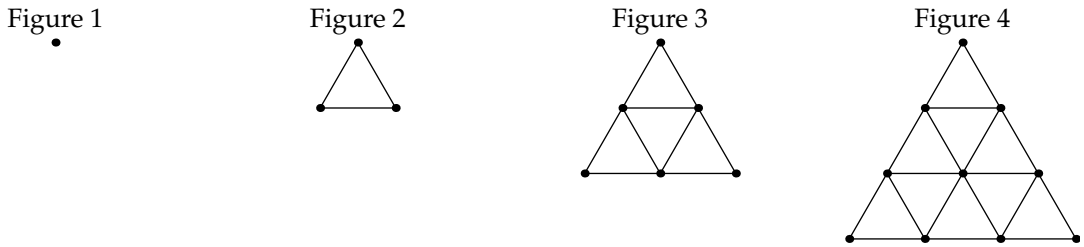
First Problem: Eleven boastful bees are all lined up in a row. Each bee, after the first one, brags that it collected one more than twice as many grains of pollen as the bee in front of it. If the first bee has 100 grains of pollen, how many grains did the last bee collect?

Second Problem: On an infinitely large grid of squares, a two by two region is shaded. Starting in the square above the upper left shaded square, the squares in the grid are numbered with consecutive positive integers, moving in a clockwise direction to the next open square. The figure shows the grid with the first 18 squares numbered. What integer will appear in the 6th square to the right of the square numbered 5?

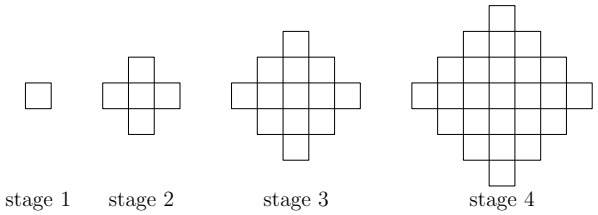


5. What is the value of $3 + 6 - 9 + 12 + 15 - 18 + 21 + 24 - 27 + ... + 84 + 87 - 90$?

6. We draw the same sequence of figures as in Problem 2, but we connect the dots in each figure following the pattern shown below. If each segment from a dot to its nearest neighbors has length 1, then what is the total length of all of the segments in Figure 10?



7. At each stage, a new square is drawn on each side of the perimeter of the figure in the previous stage. How many unit squares will be in stage 10?



8. The first term of an arithmetic sequence is 1, another term of the sequence is 91 and all of the terms of the sequence are integers. How many distinct arithmetic sequences meet these three conditions?

Wow! Share Your Thoughts

Have some thoughts about the video? Want to discuss the problems on the Activity Sheet? Visit the MATHCOUNTS Facebook page or the Art of Problem Solving Online Community (www.artofproblemsolving.com).