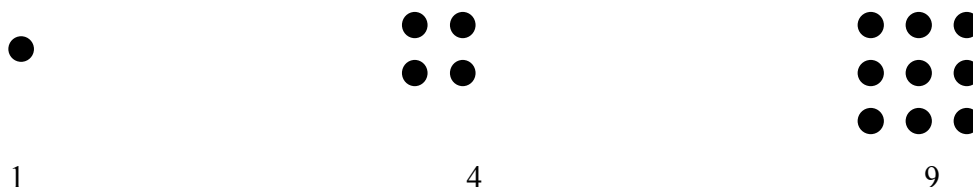


Shape Up

You've learned that square numbers are those that can be represented by a square array, as shown below.

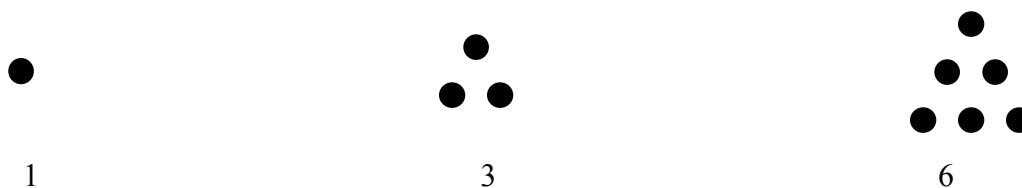


But did you know that there are other figurate numbers?

A figurate number is a number that can be represented by a regular geometrical arrangement of equally spaced points.

In other words, when a certain number of dots can be arranged to form a certain figure, or shape, that number is known as a figurate number. As you have seen, square numbers are one example of figurate numbers. But, there are others!

The numbers shown below are known as triangular numbers. Notice that the arrangements of dots form triangles.

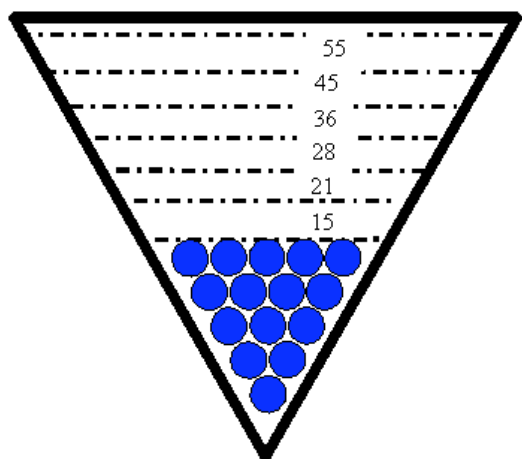


EXPLORE TRIANGULAR NUMBERS

Try drawing the first twelve triangular numbers. Start with the sample sequence shown above. Draw and label your triangles on the dot paper provided. The triangles will stand out clearly if you use a colored marker to make your dots.

Some numbers can be both square and triangular numbers. Other than the number 1, there is one number less than 100 that is both square and triangular. What is it? Use the NOTES page to show and explain your work.

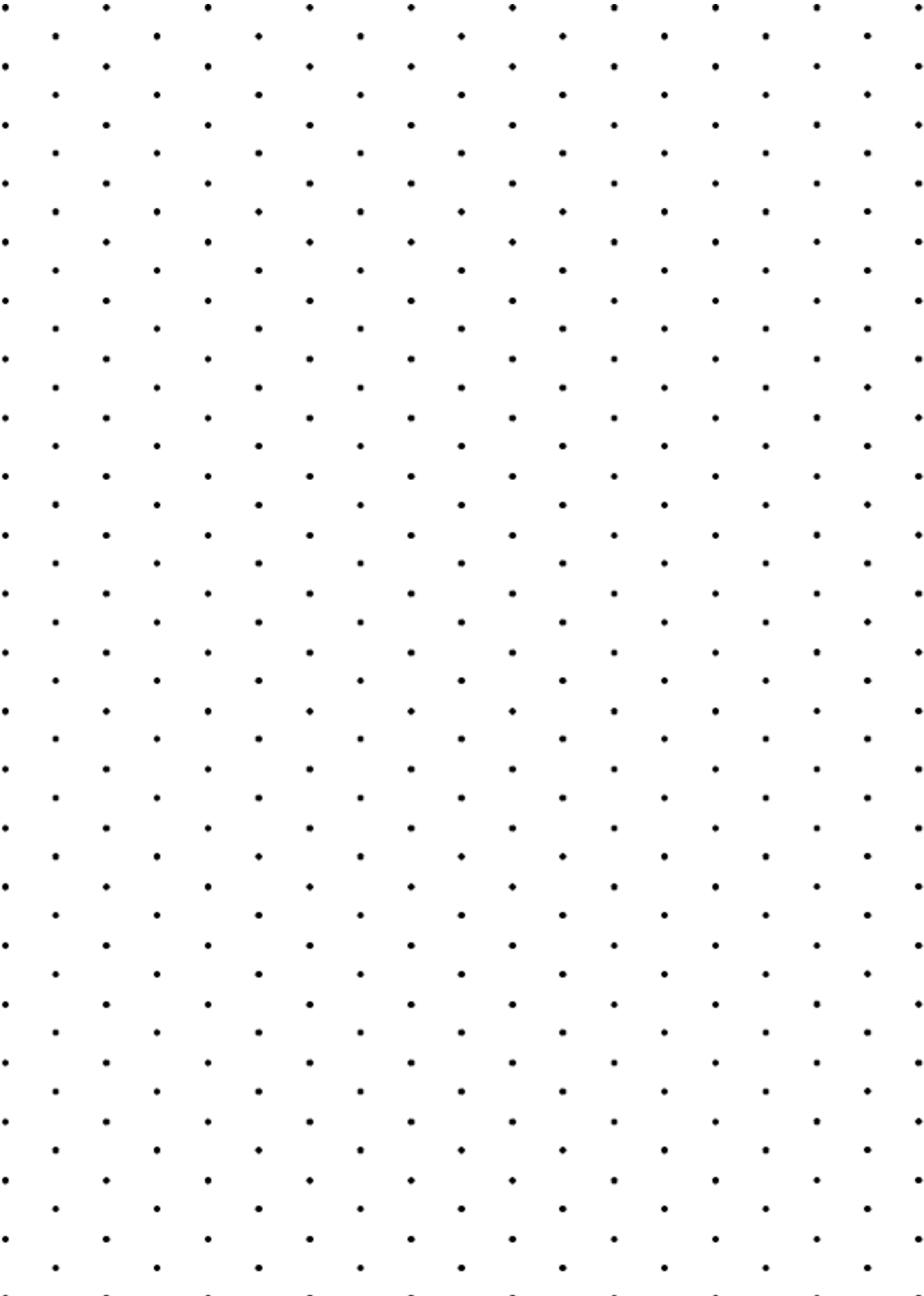
TRIANGULAR NUMBERS IN THE REAL WORLD



Pharmacists often use a triangular tray to count pills quickly. This way, they don't need to count pills out one by one. By filling the flat tray in a single layer, the pills naturally form a triangular number – just like you've been drawing. The pharmacists can tell how many pills are in the tray by how many rows the triangle forms. The tray is labeled, as shown in the diagram, so that the amount can be read directly from the tray.

Your Challenge

Draw your own triangular counting tray that could be used to count pennies. Use a ruler and a penny to sketch your tray on a large piece of construction paper. Label your tray with gridlines like the ones shown above.



RECOGNIZING PATTERNS WITHIN TRIANGULAR NUMBERS

As you have worked with triangular numbers, have you noticed a pattern? How can you calculate what the next triangular will be before you draw it. Write sentences and/or create a labeled chart to clearly explain this pattern. HINT: Notice that one row is added to the triangle each time.

REFLECTION

Write thoughtful answers to the questions below. Be sure to use several complete sentences and to explain your ideas clearly.

- ☐ In your opinion, would the triangular tray be a practical and efficient way to count pennies? Why or why not?
- ☐ In what other jobs might a triangular counting tray be useful? What could it be used to count?
- ☐ Is it easier for you to make a list of the square numbers or a list of the triangular numbers? Why?
- ☐ What new ideas did this project help you learn?
- ☐ What was most challenging about this project?
- ☐ What questions or new ideas has this project made you wonder about?

GOING BEYOND

Visit the website below.

Figurate Numbers

<http://math.youngzones.org/FigurateNumbers.html>

Read this page and then choose a different type of figurate number to explore by clicking on a link at the bottom of the page. Can you use dot paper or graph paper to draw another sequence of figurate numbers?

Student and Teacher Evaluation

	4	3	2	1
My final project is accurate, and shows that I have applied mathematical ideas or learned new mathematical ideas.	I did a great job! This is a good example of my best work.	I did a good job, with just a few areas to improve.	If I could do this again, there are several things I would change.	There are many ways that I could have done better on this.
COMMENT:				
I followed each step in the directions carefully.	I did a great job! This is a good example of my best work.	I did a good job, with just a few areas to improve.	If I could do this again, there are several things I would change.	There are many ways that I could have done better on this.
COMMENT:				
I used my creativity and imagination to create a final project that is unique and represents my own thoughts and ideas.	I did a great job! This is a good example of my best work.	I did a good job, with just a few areas to improve.	If I could do this again, there are several things I would change.	There are many ways that I could have done better on this.
COMMENT:				
I made effective use of class time. I was able to get myself started quickly, answer questions for myself, and stay on task.	I did a great job! This is a good example of my best work.	I did a good job, with just a few areas to improve.	If I could do this again, there are several things I would change.	There are many ways that I could have done better on this.
COMMENT:				
My presentation was clear and detailed. The students in the class learned new information about my topic.	My presentation was well done. Students learned about the topic.	My presentation was good, but there are one or two things I would improve.	Students learned a few new facts, but I could have been louder or more organized.	I needed to be more prepared for my presentation.
COMMENT:				