Name: _____ Date: _____

The Triangle Where Numbers Add Up

Circle group

Some number patterns hide in plain sight. One looks like a triangle made of numbers. It is called Pascal's triangle. It is named for a French mathematician who studied it. People in other places knew it long before him.

Start with a single 1 at the top. The next row has two 1s. Here is the rule. Every new row begins and ends with 1. Each number in the middle is made by adding the two numbers just above it.

Try it. The third row is 1, 2, 1, because 1 plus 1 is 2. The fourth row is 1, 3, 3, 1. The fifth row is 1, 4, 6, 4, 1. Check the 6. The two numbers above it are 3 and 3. They add up to 6.

The triangle has surprises. Add up each row. You get 1, 2, 4, 8, and 16. Each one is double the last. Look just inside the 1s. You will see 1, 2, 3, 4, the counting numbers.

You only need a pencil, paper, and one rule to keep growing it.

Questions

1. What is the triangle called?

_____

_____

2. How do you make a number in the middle of a row?

_____

_____

3. What numbers are in the fifth row?

_____

_____

4. What happens when you add up each row?

_____

_____

5. Why does the passage say people in other places knew about the triangle?

_____

_____

6. What do you need to keep growing the triangle?

_____

_____

Words to know

pattern: numbers or shapes that repeat by a rule
mathematician: a person who studies numbers and shapes
middle: the part that is between the two ends
double: two times as much

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

The Triangle Where Numbers Add Up

Triangle group

Some number patterns hide in plain sight. One of the most famous looks like a triangle made of numbers. It is called Pascal's triangle, named for a French mathematician who studied it. People in other parts of the world knew about it long before him.

Start at the top with a single 1. The next row has two 1s. Now comes the rule. To build any new row, begin and end with 1. Every number in the middle is made by adding the two numbers just above it.

Try it. The third row is 1, 2, 1, because 1 plus 1 makes 2. The fourth row is 1, 3, 3, 1. The fifth row is 1, 4, 6, 4, 1. Check the 6. The two numbers above it are 3 and 3, and they add up to 6.

The triangle holds surprises. Add up each row. You get 1, then 2, 4, 8, and 16. Each total is double the one before it. Look along the edge, just inside the 1s. You find the counting numbers 1, 2, 3, 4, and so on.

You do not need to be a famous mathematician to explore it. With a pencil, a sheet of paper, and one simple rule, you can keep growing the triangle forever and keep finding new patterns.

Questions

1. What is the triangle in this passage called?

_____

_____

2. How do you make a number in the middle of a row?

_____

_____

3. What numbers are in the fifth row?

_____

_____

4. What happens when you add up each row?

_____

_____

5. Why does the passage say people in other parts of the world knew about the triangle?

_____

_____

6. What do you need to keep growing the triangle?

_____

_____

Words to know

pattern: numbers or shapes that repeat by a rule
mathematician: a person who studies numbers and shapes
middle: the part that is between the two ends
double: two times as much

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

The Triangle Where Numbers Add Up

Square group

Certain number patterns hide in plain sight, and one of the most famous resembles a triangle constructed entirely from numbers. It is called Pascal's triangle, in honor of a French mathematician who studied it carefully, although people in other parts of the world had known about it long before he did.

Begin at the top with a single 1. The next row contains two 1s. Now comes the important rule. To build any new row, you start and finish with 1, and every number in the middle is produced by adding together the two numbers directly above it.

Try it yourself. The third row is 1, 2, 1, because 1 plus 1 equals 2. The fourth row is 1, 3, 3, 1, and the fifth row is 1, 4, 6, 4, 1. Check the 6 to be sure. The two numbers above it are 3 and 3, and together they make 6.

The triangle is full of surprises. If you add up every row, you get 1, then 2, 4, 8, and 16, and each total is double the one before it. If you look along the edge, just inside the 1s, you discover the counting numbers 1, 2, 3, 4, and so on.

You do not have to be a famous mathematician to explore it. With only a pencil, a sheet of paper, and one simple rule, you can keep growing the triangle forever and continue finding new patterns as you go.

Questions

1. What is the number triangle in this passage called?

_____

_____

2. How is a number in the middle of a row produced?

_____

_____

3. What numbers make up the fifth row?

_____

_____

4. What do you discover when you add up each row?

_____

_____

5. Why does the passage mention that people in other parts of the world knew about the triangle?

_____

_____

6. What do you need in order to keep growing the triangle?

_____

_____

Words to know

pattern: numbers or shapes that repeat by a rule
mathematician: a person who studies numbers and shapes
middle: the part that is between the two ends
double: two times as much

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

For the teacher: The Triangle Where Numbers Add Up

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

Circle: The Triangle Where Numbers Add Up

Easier · 149 words · Flesch-Kincaid grade 2.2

1. Pascal's triangle.
2. Add the two numbers just above it.
3. 1, 4, 6, 4, 1.
4. You get 1, 2, 4, 8, and 16. Each is double the last.
5. To show that people knew about it long before Pascal.
6. A pencil, paper, and one rule.

Triangle: The Triangle Where Numbers Add Up

This passage · 188 words · Flesch-Kincaid grade 3.3

1. Pascal's triangle.
2. Add the two numbers just above it.
3. 1, 4, 6, 4, 1.
4. The totals are 1, 2, 4, 8, and 16, each double the one before.
5. To show that the triangle was known long before Pascal studied it.
6. A pencil, a sheet of paper, and one simple rule.

Square: The Triangle Where Numbers Add Up

Harder · 213 words · Flesch-Kincaid grade 6.7

1. Pascal's triangle.
2. By adding together the two numbers directly above it.
3. 1, 4, 6, 4, 1.
4. The totals are 1, 2, 4, 8, and 16, and each is double the one before.
5. To show that the triangle was known long before Pascal studied it.
6. A pencil, a sheet of paper, and one simple rule.