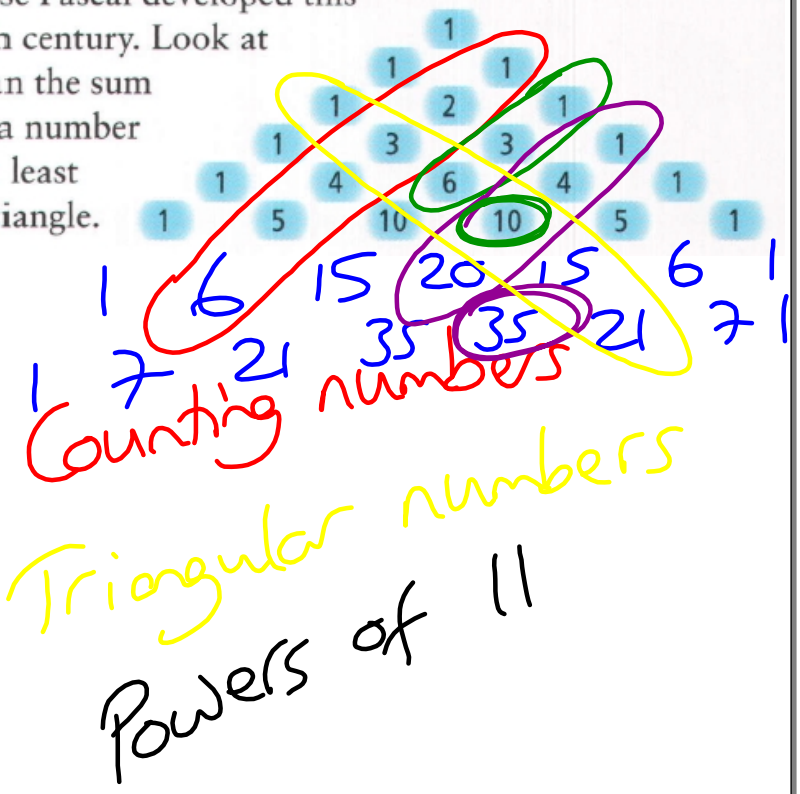
Identifying Patterns

Nov 20-18:34

French mathematician Blaise Pascal developed this number triangle in the 17th century. Look at the third diagonal. How can the sum 1 + 3 + 6 help you predict a number in the triangle? Describe at least three patterns in Pascal's triangle.



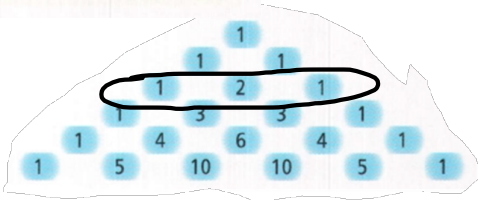
Nov 20-19:00

1. Jeremy is making an ice cream sundae. He has two toppings: sprinkles and chocolate chunks.

a) How many different sundaes can he make with no toppings? one topping? two toppings?

b) Where can you find these numbers in Pascal's triangle?

a) No toppings → 1
One topping → 2
Two toppings → 1



Row 2 gives a total of 4

$[2^2]$

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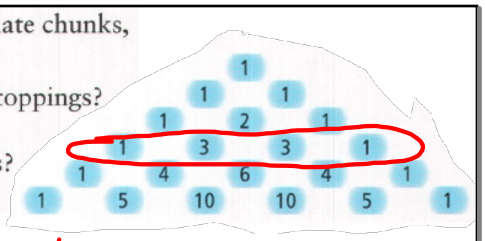
2. Jodi has three toppings for her sundae: sprinkles, chocolate chunks, and blueberries.

a) How many different sundaes can Jodi make with no toppings? one topping? two toppings? three toppings?

b) Look at Pascal's triangle. Can you find these numbers?

c) How many ways can Jodi serve her ice cream?



a) No toppings → 1
One topping → 3
Two toppings → 3
Three toppings → 1

[S+CC, S+B, CC+B]

Row 3 gives a total of 8

$[2^3]$

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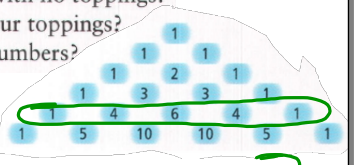
3. Liam found marshmallows too. He has four toppings available.

a) Predict how many different sundaes Liam can make altogether.

b) How many different sundaes can Liam make with no toppings? one topping? two toppings? three toppings? four toppings?

c) Look at Pascal's triangle. Can you find these numbers?



a) No toppings → 1
One topping → 4
Two toppings → 6
Three toppings → 4
Four toppings → 1

S + CC
S + B
S + M
CC + B
CC + M
B + M

S + CC + B
S + CC + M
CC + B + M
S + B + M

Row 4 gives a total of 16

$[2^4]$

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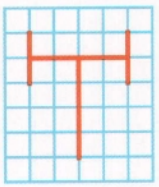
Example 1: Extend a Fractal Tree

Fractal trees show a visual pattern. Examine this fractal tree.

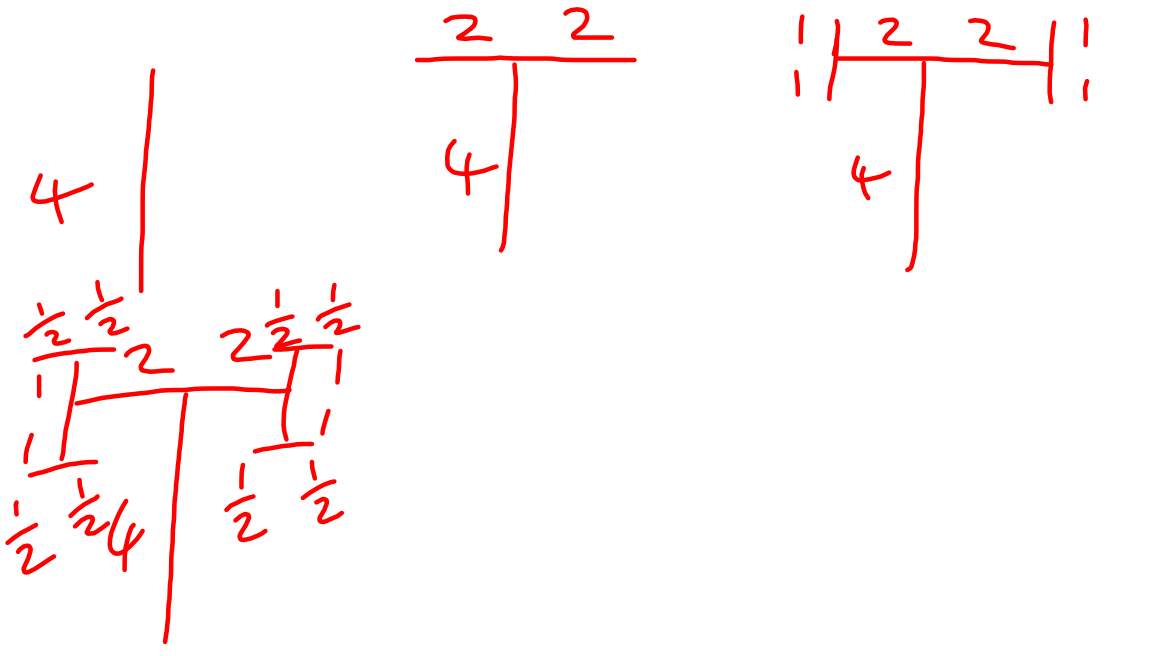
a) Describe how new branches are created.

b) Copy the fractal tree onto grid paper. Extend the branches to one more stage.



fractal

- a pattern of shapes, lines, or colours that gets smaller as it repeats



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Example 2: Identify a Number Pattern

Describe and model each **sequence**. Then, write the next three terms.

a) $2\frac{1}{2}, 4\frac{1}{2}, 6\frac{1}{2}, 8\frac{1}{2}, \ldots$ $10\frac{1}{2}, 12\frac{1}{2}, 14\frac{1}{2}$

b) 3, 6, 12, 24, ... 48, 96, 192

c) 28, 24, 20, 16, ... 12, 8, 4

a) Rule is to add two to the previous number.

b) Rule is to multiply the previous number by two.

c) Subtract four from the previous number.

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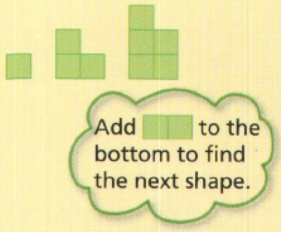
Copy the Key Ideas box

Key Ideas

- Some patterns are based on geometric shapes or lines.
- Other patterns are based on number operations.
- To identify a pattern:
  - Find the first shape or number.
  - Describe how new shapes or numbers are generated.
  - Look for repeated sets of operations.



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