Contents: Chapter 9

Chapter 9:
Patterns

WOODSHOP

SHAPE PATTERNS

Ahoy, little monsters!

Ahoy, Cap'n!

Whoa!

Are we actually going to make something in Woodshop today?

Aye!

We'll be makin' patterns to decorate my ship.

Cool. It should be super-scary so other pirates don't bother you!

Look! Hearts and butterflies.

Let's start with some basic patterns.

Choose a few shapes and glue them to a board.

The same shapes should repeat in the same order over and over.

When you're done, we can try to figure out how to continue your pattern.

Done!

I've got mine.

How's this?

Yo Ho Ho!

Can you continue each pattern?

Well done!

All of these will look great on my ship.

What comes next in each pattern?

Alex's pattern goes square-circle-square-circle...

After every square is a circle, so circle comes next.

Winnie's goes heart-butterfly-butterfly...

...then it repeats.

So, next in Winnie's pattern is another butterfly.

Aye!

It often helps to find the part of a pattern that repeats.

What's next in Lizzie's pattern?

What's next?

Lizzie's has a dragon, then three little shapes...

...star-circle-star.

So, after the last dragon, we have another star-circle-star.

YOU MAY HAVE GROUPED THE SHAPES ANOTHER WAY.

Lizzie's pattern repeats every 4 shapes.

And Grogg's repeats in groups of 3.

I think it's easiest to see when the pirate symbol is in the middle.

Good work.

Take a look at my pattern.

See if you can tell what's next.

What's next?

Cool! Your shapes have symbols inside.

The pattern of the symbols goes...

...wheel-anchor-ship, wheel-anchor-ship, wheel-anchor-ship.

But, what shapes should they be in?

After wheel is always anchor...

...then ship.

The shapes repeat, too!

Circle-square-circle-square, and it keeps going like that.

So, the anchor has to be in a circle.

And the ship is in a square.

Nice job!

There are many types of patterns.

Some don't even repeat!

For example, what's the next shape in this pattern?

The number of sides keeps growing...

...so, next is an octagon.

AN OCTAGON HAS 8 SIDES. STOP SIGNS ARE USUALLY IN THE SHAPE OF AN OCTAGON.

Grab some brushes and we'll paint them!

I can't wait to decorate my ship with these!

Ms. Q.

Number Patterns

I hear you've been making shape patterns with Captain Kraken.

Today, we'll be looking at patterns with numbers.

Let's start with one you all know.

What comes next in this pattern?

0 1 2 3 4 5 6 ☐

That's just counting. Next is 7.

That's right.

How do we get from each number to the next?

0 1 2 3 4 5 6 7

We always add 1 to get the next number.

Good.

Number patterns follow a rule.

+1 +1 +1 +1 +1 +1 +1

0 1 2 3 4 5 6 7

Here, the rule is...

...add 1 to get the next number.

+1 +1 +1 +1 +1 +1 +1

0 1 2 3 4 5 6 7

Math beasts are always looking for patterns and the rules that describe them.

Can you find the rule for this pattern?

What are the next three numbers?

6 12 18 24 30 ☐ ☐ ☐

Try it.

Starting at 6, we always add 6 to get the next number.

So, the next three numbers are...

...36, 42, and 48.

+6 +6 +6 +6 +6 +6 +6

6 12 18 24 30 36 42 48

That's right. Counting by a number other than 1 is called skip-counting.

You can count by any number.

Instead of counting by 1's, we're counting by 6's.

2's: 2 4 6 8 10 12 14 16 18...

5's: 5 10 15 20 25 30 35 40 45...

7's: 7 14 21 28 35 42 49 56 63...

THE DOTS AT THE END ... MEAN THAT THE PATTERNS KEEP GOING!

Not every pattern is a skip-counting pattern.

Can you find the rule for this one?

1 1 2 3 5 8 13 ☐ ☐ ☐

What's the rule?

That looks like how I used to count!

1 1 2 3 5 8 13

We're not adding the same number every time.

Maybe there's a pattern in the numbers we're adding?

+0 +1 +1 +2 +3 +5 ?

1 1 2 3 5 8 13 ☐ ☐ ☐

The numbers we're adding are the same as the numbers in the list.

Grogg! That's it!

You found the pattern!

What are the next 3 numbers?

For each number...

...we add the number that comes before it to get the number that comes next.

Huh?

+2

1 1 2 3 5 8 13 ☐ ☐ ☐

For example, we add 2 to 3 to get 5.

+3

1 1 2 3 5 8 13 ☐ ☐ ☐

I see. We add 3 to 5 to get 8.

Ohhhh!

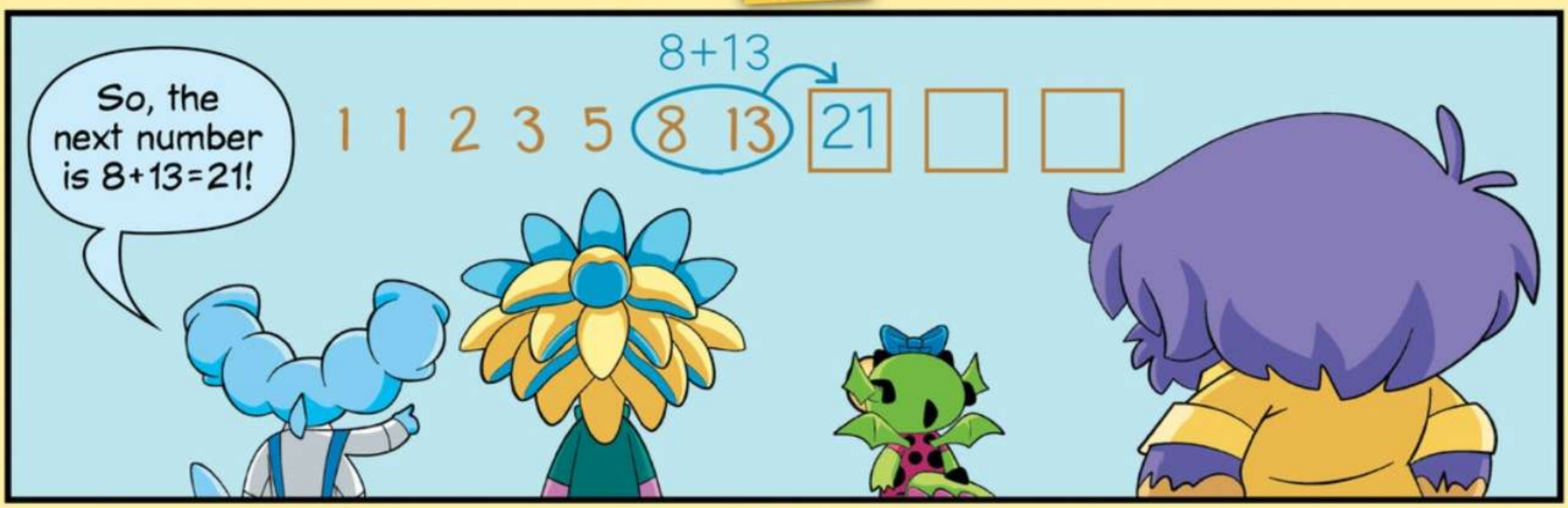
We add two numbers to get the next number.

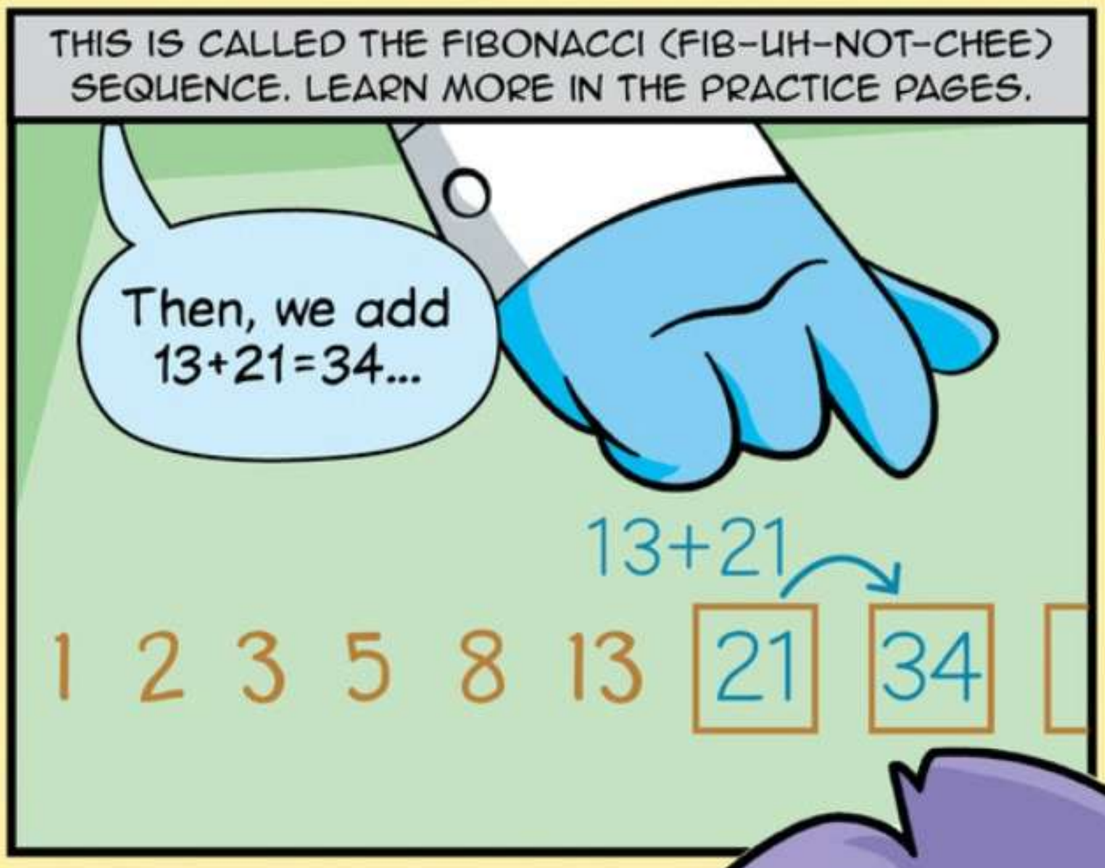
5+8 is 13.

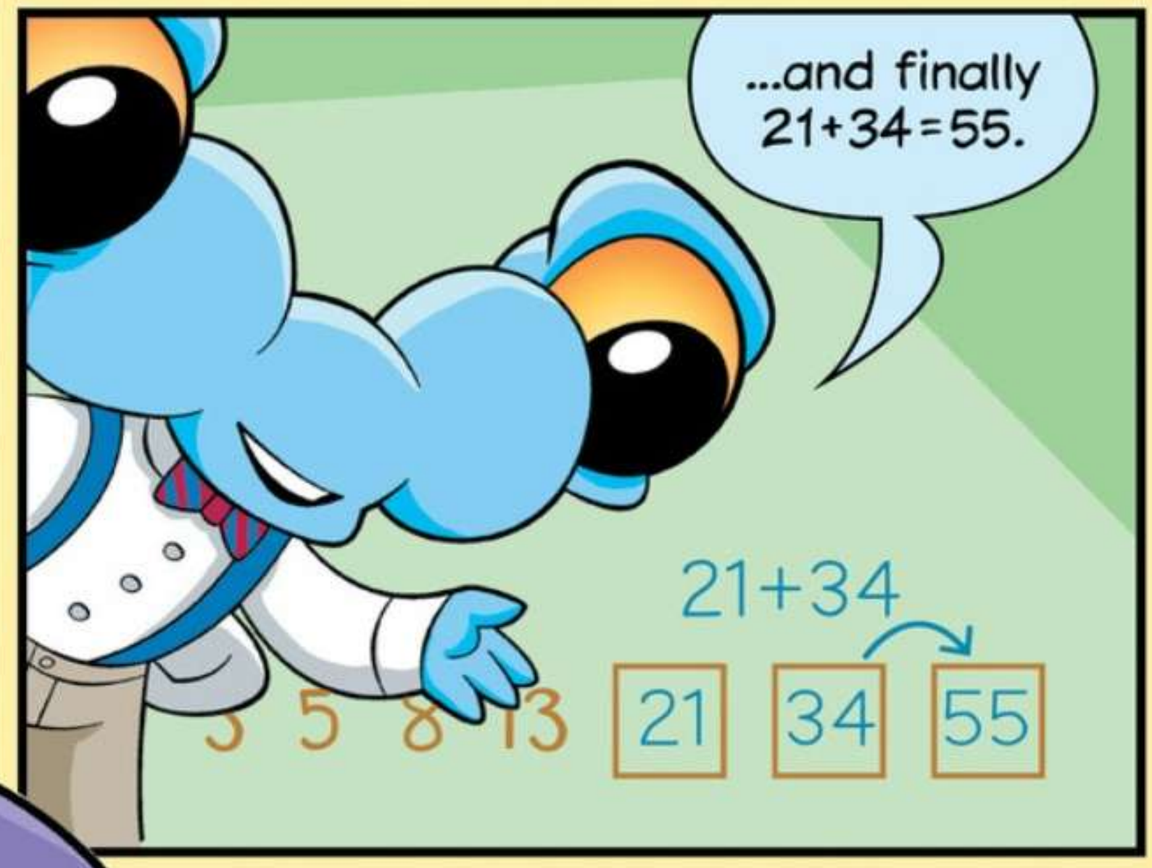
5+8

1 1 2 3 5 8 13 ☐ ☐ ☐

What's next?


So, the next number is 8+13=21!
8+13
1 1 2 3 5 8 13 21


THIS IS CALLED THE FIBONACCI (FIB-UH-NOT-CHEE) SEQUENCE. LEARN MORE IN THE PRACTICE PAGES.
Then, we add 13+21=34...
13+21
1 2 3 5 8 13 21 34


...and finally 21+34=55.
21+34
3 5 8 13 21 34 55


I must have been a child genius!
thirteen
eight
turtie foe
twenny one
fordy twelve!
elebenty sebbin!
Maybe not.

MATH CLUB

Special Patterns

Good afternoon, little monsters!

Welcome back to Math Club!

You've already learned about number patterns and shape patterns.

Today we're going to look at patterns of numbers that make shapes!

Huh?

Who remembers what a ***perfect square*** number is?

WE FIRST LEARNED ABOUT PERFECT SQUARES IN CHAPTER 6 OF BEAST ACADEMY 1B.

If you can make a square grid with the same number of dots in every row and column...

...then the total number of dots is a perfect square.

This square has 9 dots, so 9 is a perfect square.

A 1-by-1 square has 1 dot.

A 2-by-2 square has 4 dots.

A 3-by-3 square has 9 dots.

So, 1, 4, and 9 are all perfect squares!

1

4

9

?

?

That's right!

What are the next two perfect squares after 9?

Try it.

A 4-by-4 square has 4+4+4+4 dots. That's 16!

And a 5-by-5 has 25.

1 4 9 16 25

Right! The list of perfect squares goes on forever.

144 121 100 81

Forever!

Yep. And perfect squares are not the only numbers that make shapes.

Maybe you can guess what we call these numbers.

1 3 6 10

Guess.

Instead of arranging dots to make squares, you made triangles!

Are they...

...triangle numbers?

That's right.

The total number of dots we use to make a triangle like this is called a ***triangular number***.

1, 3, 6, and 10 are all triangular numbers.

1 3 6 10

Can you find the next triangular number?

1 3 6 10 ?

What's next?

The triangles keep getting bigger.

The first triangle has 1 dot.

The second triangle has 2 dots on the bottom row. The third has 3, and the fourth has 4.

So, the fifth triangle has 5 dots on the bottom row.

That makes 15 dots total, so the fifth triangular number is 15.

1 3 6 10 15

Excellent! Like perfect squares, the list of triangular numbers goes on forever.

136 120 105 91 78

Cool!

Triangular Numbers: 1 3 6 10 15

? ? ? ?

And, there's lots of cool stuff to learn about them!

Try this! Add the pairs of triangular numbers that are next to each other.

What do you get?

Triangular Numbers: 1 3 6 10 15

1+3 is 4.

3+6 is 9.

6+10 is 16.

10+15 is 25.

Triangular Numbers: 1 3 6 10 15

Perfect Squares: 4 9 16 25

Whoa!

These are all perfect squares!

That's cool!

Do you think the pattern will continue?

How can we tell if it never ennnnnnnddddddsssss...

ennnnnnnnnddddddddsssssss

Grogg!

FIND OUT IN THE PRACTICE!