



Combining Like Terms



Let's start with some vocabulary.

A 3D rendered scene of Noah's Ark. The ark is a large, tan-colored structure with a rounded roof and two small white circular windows. On the deck, there are several animals: two white elephants, two white ducks with yellow beaks, two orange giraffes, two yellow kangaroos, and two blue rhinos. The ark is set against a blue sky with light clouds. In the foreground, there is a large blue whale on the left and two smaller blue dolphins on the right, all swimming in the blue water.

Numbers are called **constants** because their value remains the same, or constant.

A 3 in problem #34
means exactly the same thing
as a 3 in problem #7.

A 3D rendered scene of Noah's Ark. The ark is a large, tan-colored structure with a rounded roof and two small white circular windows. On the ark, there are several animals: two white elephants, two white ducks, two orange giraffes, two blue rhinos, and two orange kangaroos. The ark is floating on a blue sea. In the foreground, there are three blue dolphins: one large one on the left and two smaller ones on the right. The sky is a gradient of blue and purple.

The Greek letter, **π** is a **constant** even though it is a letter.

It always represents exactly the same number
3.1415926...

We may round it to different places, depending on how accurate we want to be, but it is always the same number.

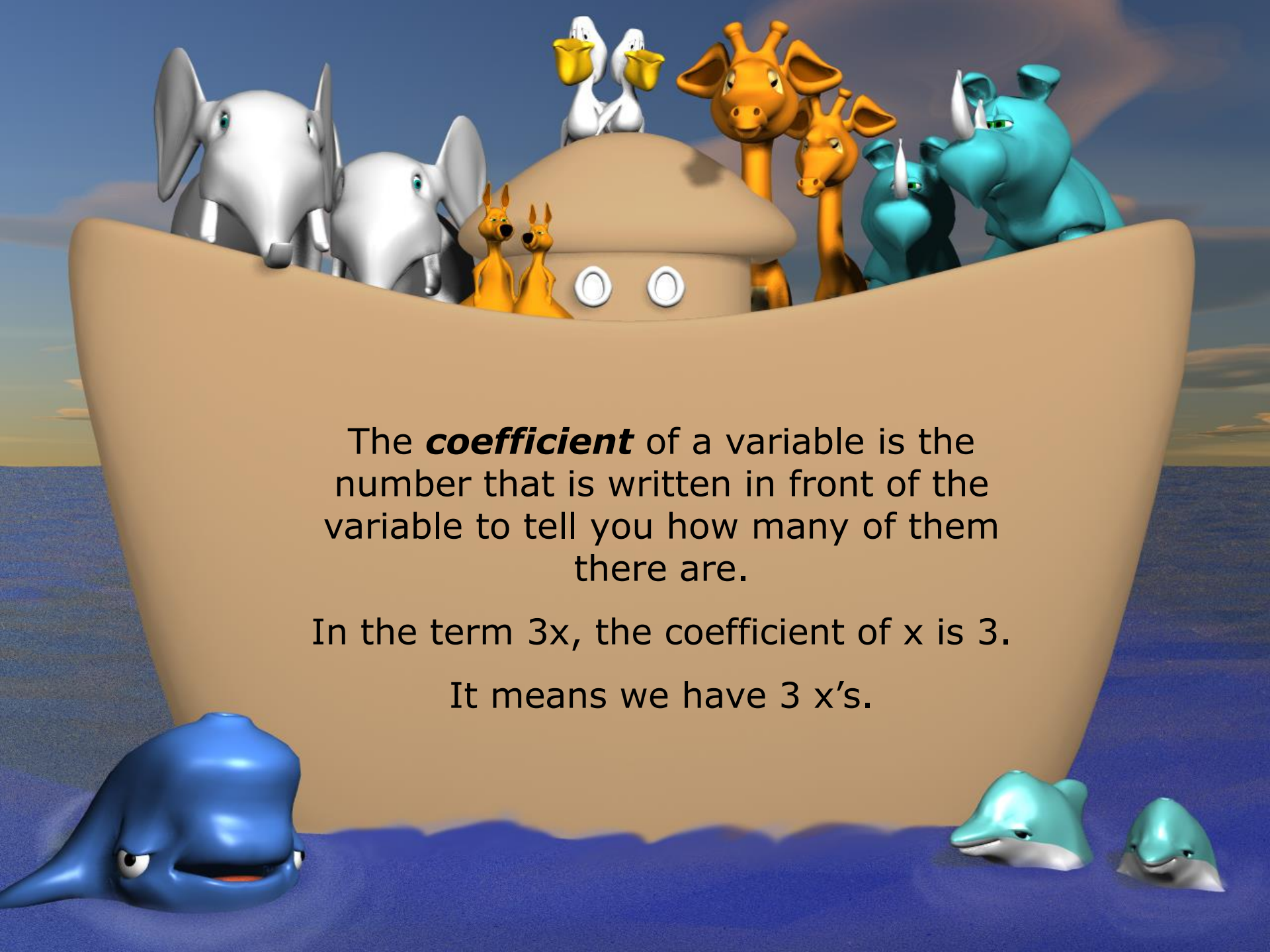
π

A 3D illustration of Noah's Ark. The ark is a large, tan-colored structure with a curved roof. Inside the ark, there are several animals: two white elephants, two white ducks, two orange giraffes, two blue rhinos, and two yellow kangaroos. Outside the ark, there are three blue whales in the water. The background shows a blue sky with some clouds and a blue sea.

A **variable** is a letter that stands for a number.

In one problem, x might stand for 3.
In another problem, x might stand for 7.


It's called a variable because its value can change – **vary** – from problem to problem.



The ***coefficient*** of a variable is the number that is written in front of the variable to tell you how many of them there are.

In the term $3x$, the coefficient of x is 3.

It means we have 3 x 's.

A 3D rendered scene of Noah's Ark. The ark is a large, tan-colored boat with a central house-like structure. On the ark, there are two white elephants, two white ducks, two orange giraffes, two blue rhinos, and two orange kangaroos. The ark is on a blue sea. In the foreground, there are three blue dolphins: one large one on the left and two smaller ones on the right.

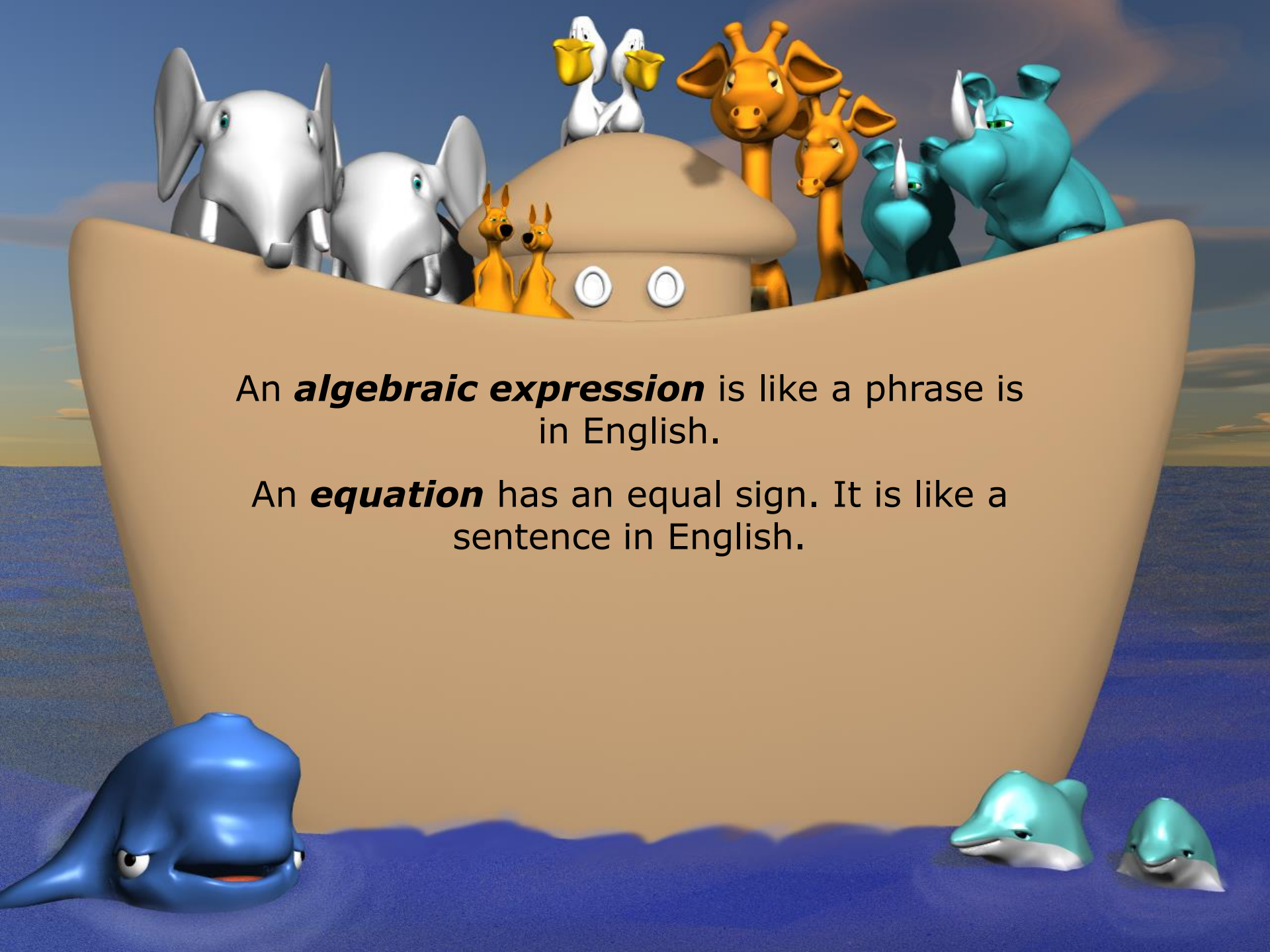
If a variable doesn't have a coefficient, the coefficient is understood to be 1.

$$x = 1x$$

A 3D illustration of Noah's Ark. The ark is a large, tan-colored structure with a rounded roof and two small white circular windows. On the roof, there are two white ducks with yellow beaks. On the deck, there are two grey elephants, two yellow kangaroos, two orange giraffes, and two blue rhinos. The ark is floating on a blue sea. In the foreground, there are three dolphins: a large blue one on the left and two smaller blue ones on the right. The sky is a mix of blue and orange, suggesting a sunset or sunrise.

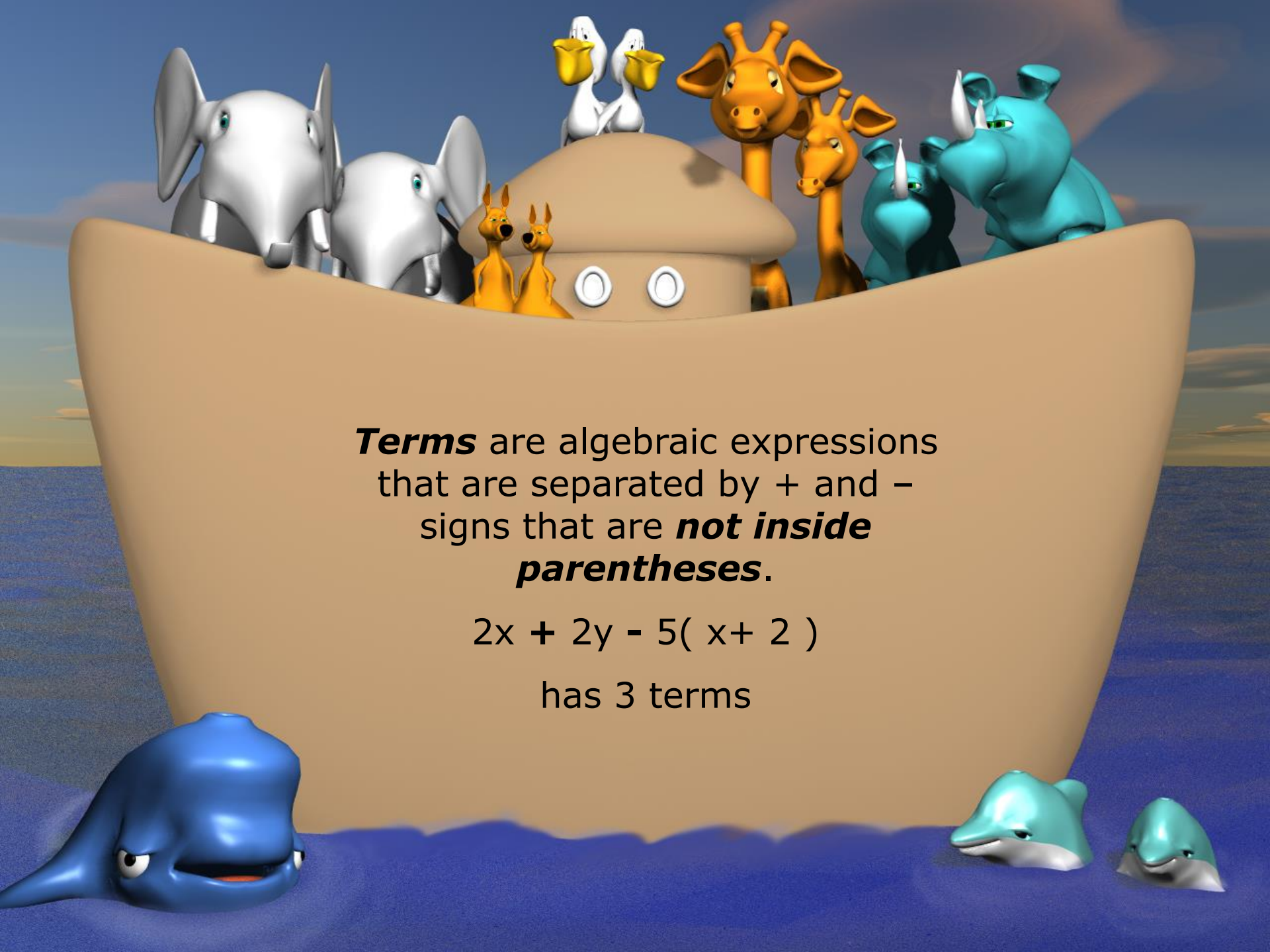
An ***algebraic expression*** is any combination of variables, constants, grouping symbols and arithmetic operations.

An algebraic expression does **not** have an equal sign.



An ***algebraic expression*** is like a phrase is
in English.

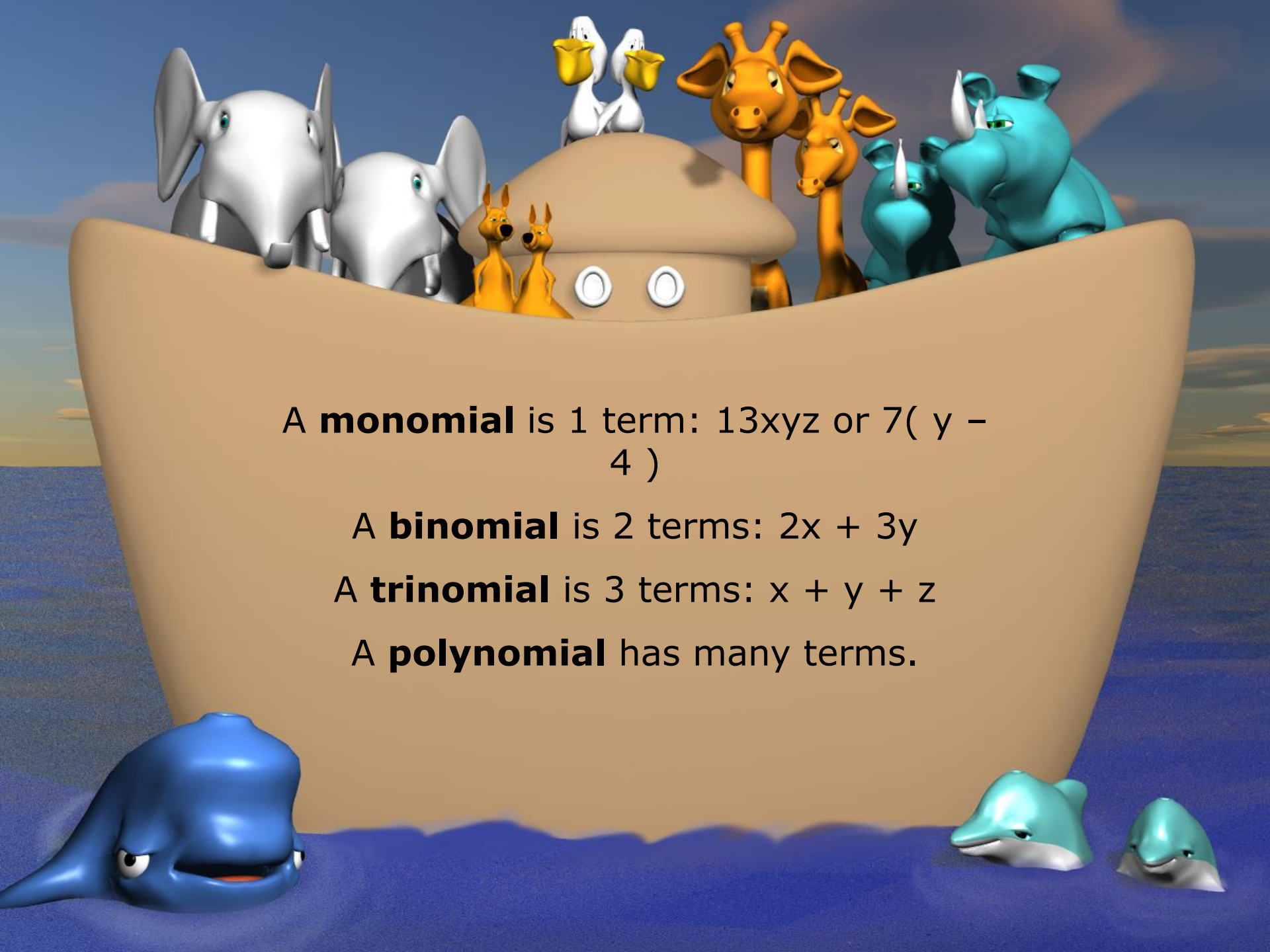
An ***equation*** has an equal sign. It is like a
sentence in English.



Terms are algebraic expressions that are separated by + and - signs that are ***not inside parentheses.***

$$2x + 2y - 5(x + 2)$$

has 3 terms

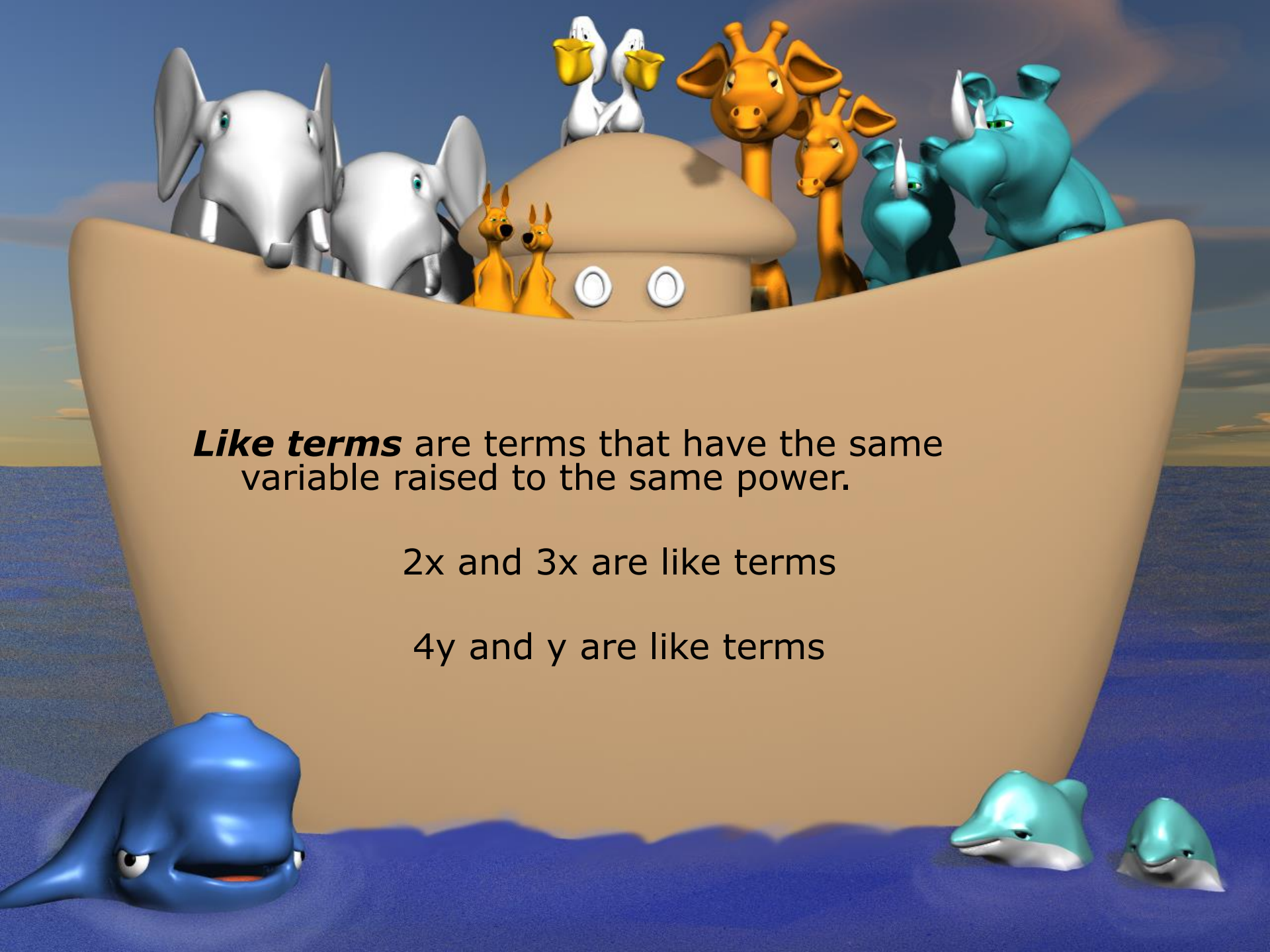


A **monomial** is 1 term: $13xyz$ or $7(y - 4)$

A **binomial** is 2 terms: $2x + 3y$

A **trinomial** is 3 terms: $x + y + z$

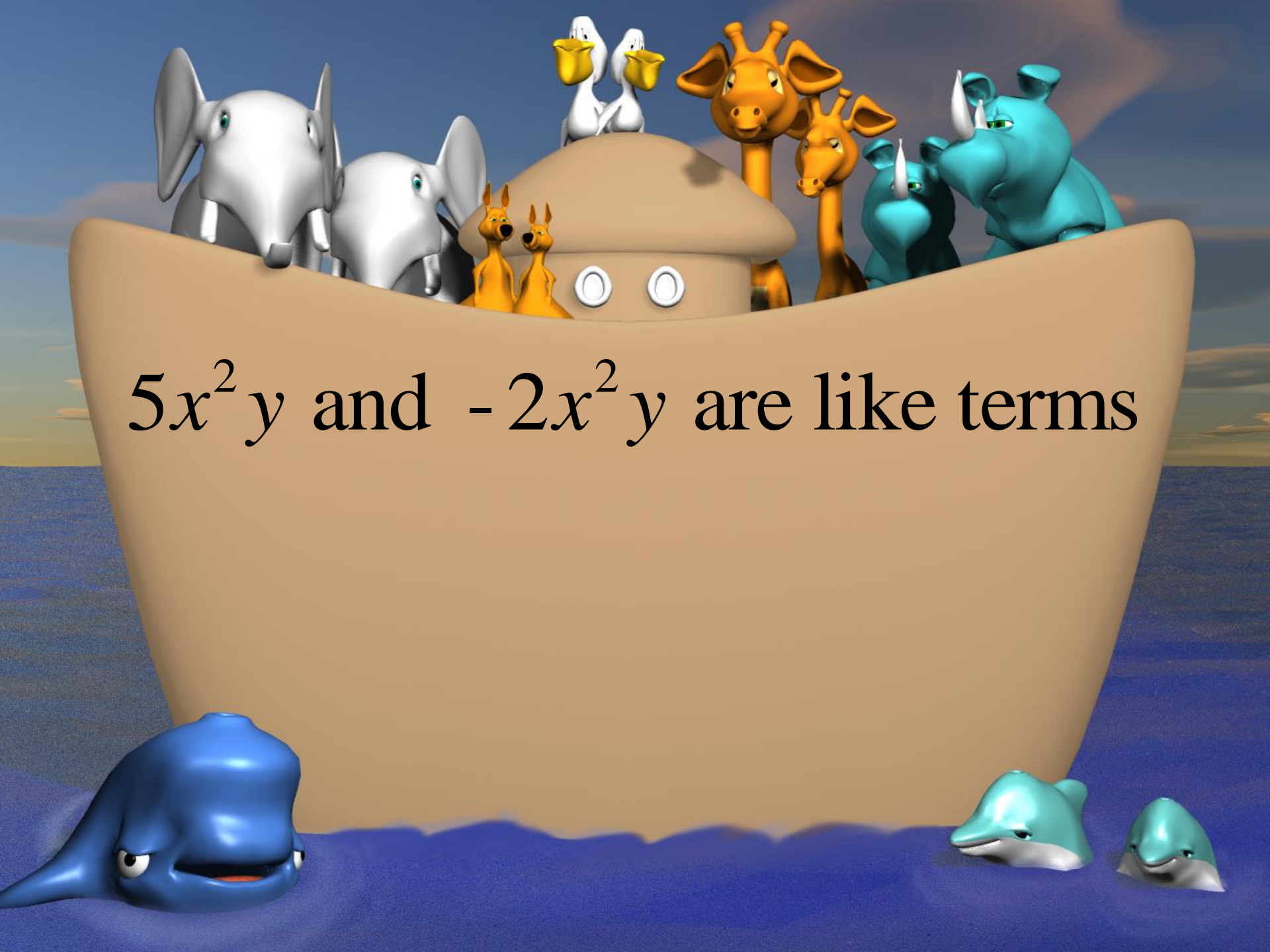
A **polynomial** has many terms.

A 3D illustration of Noah's Ark. The ark is a large, tan-colored structure with a rounded roof and two small circular windows. On the roof, there are two white ducks with yellow beaks, two orange giraffes, two blue rhinos, and two yellow kangaroos. On the deck, there are two large grey elephants and two smaller yellow kangaroos. The ark is floating on a blue sea. In the foreground, there are three dolphins: a large blue one on the left and two smaller teal ones on the right. The sky is a mix of blue and orange, suggesting a sunset or sunrise.

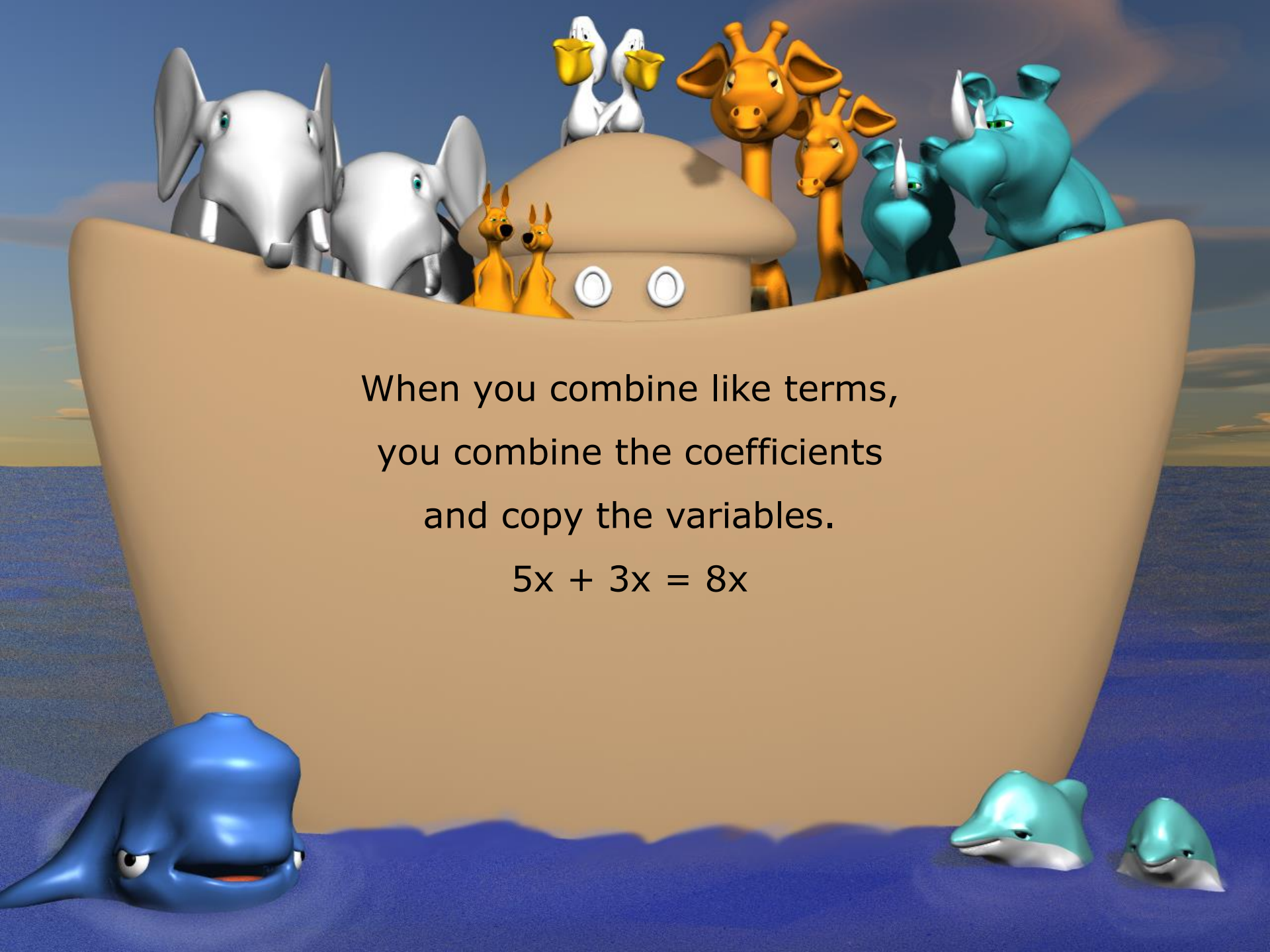
Like terms are terms that have the same variable raised to the same power.

$2x$ and $3x$ are like terms

$4y$ and y are like terms

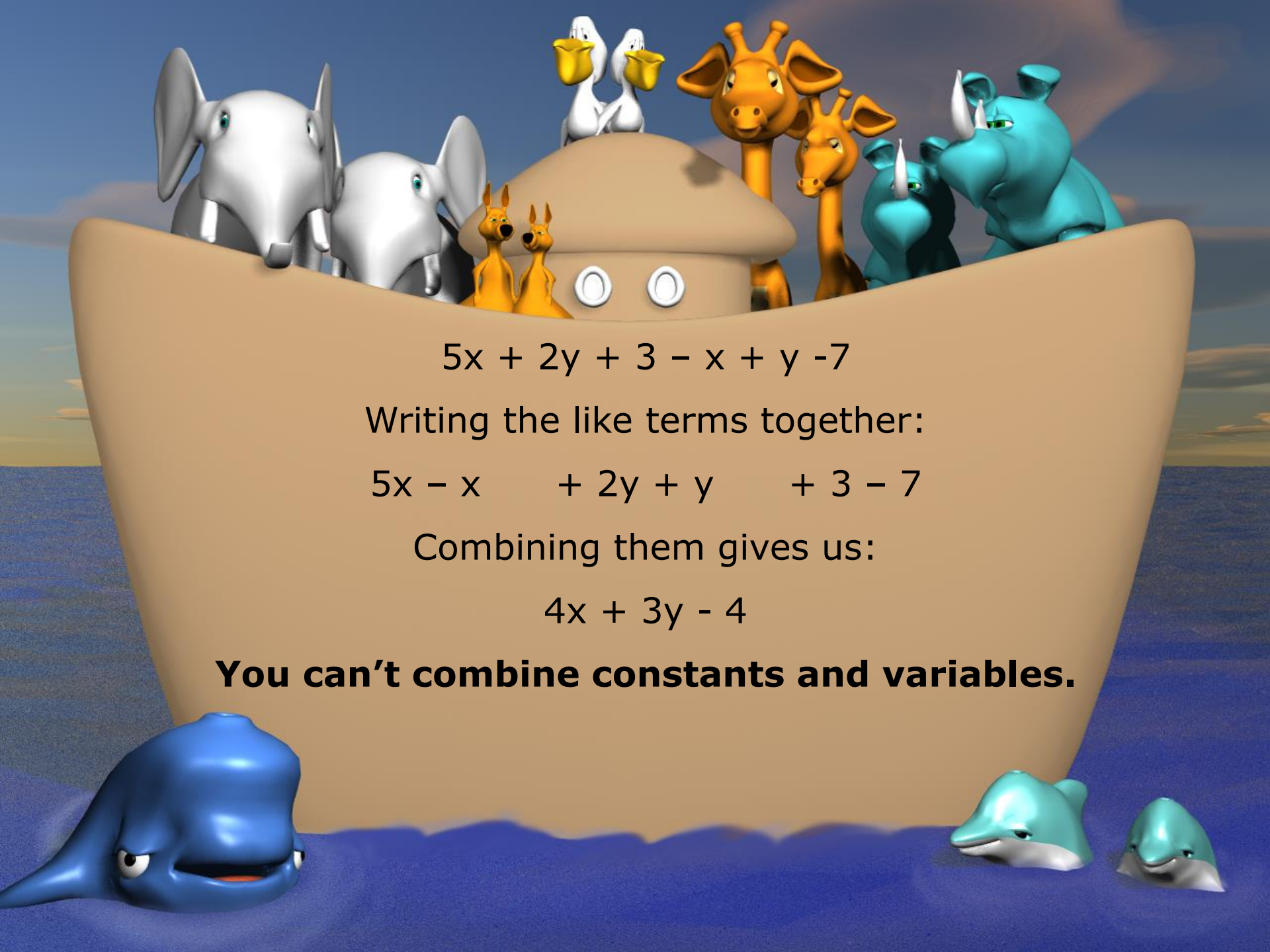


$5x^2y$ and $-2x^2y$ are like terms

A cartoon illustration of Noah's Ark. The ark is a large, tan-colored structure with a rounded roof and two small white circular windows. On the ark, there are several animals: two white elephants, two white ducks with yellow beaks, two orange giraffes, two yellow kangaroos, and two blue rhinos. In the foreground, a large blue whale is swimming in the water on the left, and two smaller blue dolphins are swimming on the right. The background shows a blue sky with some clouds and a blue sea.

When you combine like terms,
you combine the coefficients
and copy the variables.

$$5x + 3x = 8x$$



$$5x + 2y + 3 - x + y - 7$$

Writing the like terms together:

$$5x - x + 2y + y + 3 - 7$$

Combining them gives us:

$$4x + 3y - 4$$

You can't combine constants and variables.


$$5(x + 2) - 3(x + y - 7)$$

$$5x + 10 - 3x - 3y + 21$$

watch your signs!

Writing the like terms together:

$$5x - 3x - 3y + 10 + 21$$

Combining them gives us:

$$2x - 3y + 31$$



Combining like terms is easy!

Just pair them up with their buddies!