Homology Interactive Copy

ATTRACTION LOOP PHRASES:
Touch to start game
Title
Are living things related?
How are living things grouped?
Do fish have backbones?
Do birds have four limbs?
Are frogs tetrapods?
How similar are whales to humans?

INTRO ANIMATION:
Humans and whales have very different limbs that they use in very different ways. But the bones supporting these limbs are startlingly similar. In fact, many animals share this same set of limb bones, inherited from a common ancestor and then modified in a variety of ways. Scientists group animals with such similarities in structure, called homologies, to help determine evolutionary relationships and to place individual species on the tree of life.
And so can you.

EXIT ANIMATION:
These three animals are all mammals. Mammals all have three middle ear bones. But remember that all mammals are also tetrapods. Tetrapods all have, or had, four limbs.
And all tetrapods are vertebrates. Vertebrates all have backbones made of bone or cartilage.
And all vertebrates are part of a much larger group. Vertebrates and other life on Earth share a common ancestor and can be placed on a tree of all life, from bacteria to bears.

YES/NO FEEDBACK:
Good job. Whales do have backbones.
Try again. Whales do not have backbones.
Great work! Now proceed to the next step.

TITLE:
Working Out Relationships
By grouping animals with similar body plans, scientists can determine evolutionary relationships. Can you?

QUESTION #1:
Which ten of these animals have backbones?

LEARN MORE TITLE:
Vertebrates are animals with backbones.

LEARN MORE TEXT:
Vertebrates: Vertebrates are animals with backbones and include all fish, amphibians, reptiles, birds and mammals.

A backbone is made up of a series of small bones, called vertebrae. Backbones enclose and protect the spinal cord, the bundle of nerves that carries information to and from the brain.

Now go return to the game to find the animals that have backbones.

QUESTION #2:
Which seven of these vertebrates have, or had, four limbs?

LEARN MORE TITLE:
Tetrapods: Tetrapods are vertebrates that have, or had, four limbs.

LEARN MORE TEXT:
Tetrapods are vertebrates that have, or had, four limbs and include all amphibians, reptiles, birds and mammals.
All tetrapod limbs are made up of similar sets of bones.
In some species, such as whales and snakes, some limbs have been lost or radically altered as these animals evolved over time.

Now go back to the game to find the vertebrates that have or had four limbs.

* Notice that whale and human forelimbs are made up of the same bones, indicated here by matching colors.
* Notice that the hind limb bones in whales are drastically reduced.
QUESTION #3:
Which four of these tetrapods have three bones in their ears instead of just one?

LEARN MORE TITLE:
Mammals: Mammals are tetrapods with three middle ear bones.

LEARN MORE TEXT:
Mammals are tetrapods with three middle ear bones.
All mammals have three bones in their middle ear called the malleus, incus and stapes, commonly known as the hammer, anvil and stirrup.
The middle ear bones help transmit sounds to the brain.

Now go back to the game to find tetrapods that have three middle ear bones.

**Ear bones are not to scale.**