What do you already know about Eggs?

1. Why do birds lay eggs and not carry their developing young inside them?

   _____

   _____

2. Who else lays eggs besides birds? Reptiles Mammals Amphibians Fish Insects

3. Are there any birds who do not lay eggs? Yes No

4. Why are eggs shaped the way they are? Why are they not square?

   _____

   _____

5. Can eggs breathe? Yes No

6. Why are some eggs white, others speckled, and some blue?

   _____

   _____

7. Why are some bird eggs more pointed and others more round than average?

   _____

   _____

8. Does a big egg mean the bird will be big? Yes No

9. What do bird eggs look like inside? Can you name some of the different parts?

   _____

   _____

Vocabulary

Pores: full of small holes (pores); able to be filled (permeated) by water, air, or other materials

Species: often defined as a group of organisms capable of interbreeding and producing fertile offspring. A single, distinct class of living creature with features that distinguish it from others. For example a lion and a polar bear are two different species.

Conical: Having the form of, or resembling a cone.

Clutch: eggs produced by one bird or reptile at a single time, particularly those laid in a nest, a set of eggs.

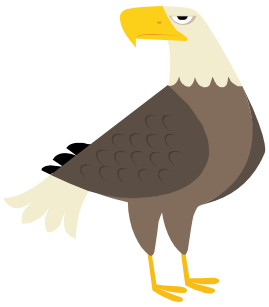
Calcium Carbonate: A chemical combination of calcium, carbon, and oxygen; the main constituent of limestone. It is what causes water hardness. Its chemical symbol is $CaCO_3$. The spots that sometimes appear on glasses in a dishwasher.

1. There are many theories in response to this question. The most prevalent theory is **because they fly** birds lay eggs instead of carrying their young inside them**.** It would be hard to be pregnant and fly. It would make the mother bird too heavy to fly. However, pregnant bats fly, which challenges this theory. Bats have light bones, but they are not completely hollow. A bird's bones are completely hollow, which would make it harder for them to support flying while pregnant.
   Other theories suggest that in some species, **if the mother is killed**, the **chicks may still have a chance** to live on their own or to be raised by another bird such as the father. If a pregnant bat is killed her unborn babies are killed too.
   While the number of eggs laid by a mother bird varies by species, it is true that eggs are often a **source of food to other animals**, and therefore have maintained their role as part of the food chain over time. In the species that lay a lot of eggs, it is easier and **uses less energy to lay eggs**, than to carry many pregnancies.

2. All of the above.
   Some reptiles don't lay eggs, boa constrictors give birth to live young, as do many snakes in the viper family.
   Essentially some other animals keep their eggs inside them until it is time to hatch or come out.
   Even though, it was **not wrong to leave out mammals**, because **the mammals that do lay eggs are exceptions**. There are only two types of mammals that lay eggs: **the platypus, and spiny anteaters**. They are both found in Australia and are known as monotremes (mammals that lay eggs). They do not have nipples, instead they ooze or sweat milk from mammary glands that their young then suck up for nourishment.
   It is also correct that **some fish do not lay eggs**, but give birth to live young. For example some sharks lay eggs and some sharks give birth to live young. Dolphins and whales are mammals and not fish.
   Not all insects lay eggs either. For example, some flies give birth to live maggots.

3. No, all birds lay eggs.

4. There are many answers to this question, and no one will ever know all the answers to nature's reasoning for this design. Examples: So they **can slip out of the bird easily (shape of the oviduct where eggs are formed)**, **easier to rotate**, **sit on**, **hatch out of**, **air ventilation and circulation between the eggs**, etc. It is also worth noting that most offspring develop in a round shape similar to an egg shape, such as mammals.



5. Yes, the **shell is very porous**. This means it has very tiny openings that can not be seen with out a microscope. Sometimes one may hear people talk about pores on their skin, some of these pores can be seen and act similar, but not completely like the egg shell pores. The large end of the egg contains more pores than the small end. **Through the eggshell pores, carbon dioxide and moisture are given off, and oxygen and other gases are let into the egg**.

6. Egg coloration is determined by the female **bird's diet** and **how she nests**. Calcium carbonate is the main construction material for the shell of birds' eggs. **Calcium carbonate** is generally found in different shades of white. Eggs with other colors than white have other minerals mixed in with or layered on top of the calcium carbonate. In environments where a bird can not get a lot of calcium carbonate in her diet, her eggs will generally have speckles or be other colors than just white.

(# 6 continued) Research is still being done on predator's eyesight and egg color. It is believed that some predatory birds can see in different light spectrums and therefore different colored eggs will appear different to them than to us with our human eyesight.

Ground-dwelling birds often produce speckled or streaked eggs that blend in with the ground, gravel, or leaves where the parents build their nest. However, not all speckled eggs blend in with their environments, leading scientific researchers to find that the **pigment chemicals** that create the speckles may **act as a kind of glue**. The speckled or "glued" parts of the shell support thin areas of the shell, therefore **strengthening the shell** and protecting it from breakage during incubation in the nest. The designs, streaks, or speckles on the eggs also make each egg unique and easier for the parents to **differentiate during rotation**. Since many eggs are laid on different days it may also help birds to tell the eggs apart to prepare for the different days in which they will hatch.

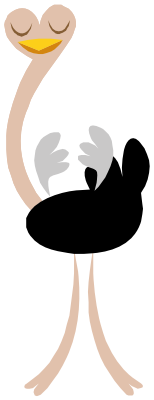
Species that lay **white eggs usually have different forms of protection other than a camouflage** design on the shell. Birds such as woodpeckers lay white eggs, which are **easier to see in the dark holes** where they have hidden their nests. Other species **sit on and guard their eggs the entire time** until they hatch. While, **species with white eggs, that do leave their nests frequently will cover them** with grasses or other plants in the vicinity before leaving them alone.

In other places where the eggs are in no danger of predators, uncamouflaged eggs are laid out in the open and left on the warm sand to incubate. (Elegant Tern)

Other birds such as the Eurasian Cuckoos lay their eggs in the nests of other birds, and therefore lay eggs that **mimic those of the host species in color**.

7. **Eggs that are conical or more pointed at one end roll in a tight circle so they will not roll away or off a cliff.** Cliff-nesting birds usually have eggs that are significantly more pointed than cavity nesting birds. Owls have the roundest eggs of all birds. Other birds that have rounder eggs than average are cavity nesting species of water fowl. These birds nest in small irregularly shaped places. When the mother bird comes and goes from the nest the clutch of eggs are jostled more than eggs in open nesting situations. **The rounder shape of the eggs helps them roll together** during the movement of the mother's many exits and entries.

8. Yes, typically the bigger **the egg, the bigger the bird will be** that will hatch out of it. The Ostrich lays the largest egg, and yet that egg is only about 2% of its body weight. Hummingbirds lay the smallest eggs that are 15% of their body weight. The ostrich is the largest bird, and the hummingbird is the smallest bird known presently.



9. The different parts of the inside of an egg are as follows: yolk, chalazae, air cell, shell membranes, white (thin and thick albumen), germinal disc, and shell membranes. Please **see Part 2 of this lesson for more information.**