

Winging It

You need

★ bird images (see copymasters) ★ a calculator ★ a classmate

TECHNOLOGY

Early aircraft designers studied birds to learn about flight. Many other technological innovations have been inspired by nature.

Activity

The shape of a bird's wings relates closely to its flying style. Some wings help birds fly long distances, while others are good for fast manoeuvring.



An albatross can glide for hours without using much energy. It averages about 300 kilometres (km) per day, but some days it flies 1 000 km.



A falcon spends a lot of its time soaring, but it needs to be able to manoeuvre quickly when it sees prey.



A duck doesn't spend much time gliding, but it can fly long distances by flapping its wings.

1. The "aspect ratio" of a bird's wing (the relationship between wingspan and wing area) gives us clues as to how a bird flies.
 - a. Using the copymaster images of the albatross and kārearea (New Zealand falcon):
 - i. measure the wingspan (in centimetres)
 - ii. estimate the wing area in square centimetres (cm²).

One way to calculate an aspect ratio is to find the wingspan (the distance from wingtip to wingtip) and the area of the wings. Then multiply the wingspan by itself and divide the result by the wing area: $\text{aspect ratio} = \text{span} \times \text{span} \div \text{area}$.

The aspect ratio isn't the only factor in flight. Wing size is also important!

- b. Calculate the aspect ratio for each bird.
- c. Discuss with a classmate whether a high aspect ratio or a low aspect ratio is best for gliding.





2.

Albatrosses cover large distances, but the prize for the longest recorded flight goes to the kūaka (bar-tailed godwit).

In 2007, scientists used GPS technology to track the journeys of 16 kūaka. One bird, a female known as E7, flew 11 680 km without a break. The flight took about 9 days. Kūaka have a wingspan of 73 cm and a wing area of 520 cm^2 .

- Compare the aspect ratio of a kūaka wing with those of an albatross and a kārearea.
- Discuss with a classmate whether a kūaka is more likely to flap its wings or glide during flight. Do some research to find out whether you are correct.

3.

Like the design of a bird's wings, the design of an aircraft's wings relates to how the aircraft is intended to fly.

- Which aircraft's wings have the higher aspect ratio?
- What does this tell us about how the aircraft flies?

