

These pages are taken from the
G4 "Relating Speed and Energy" journal.



Leonardo Da Vinci's Fantastic Flying Inventions



Leonardo Da Vinci was a scientist, artist and inventor that lived in
Florence, Italy from 1452–1519.

Four hundred years before the first powered aircraft flight by the
Wright brothers, Leonardo Da Vinci explored the possibility of
human flight. Using candles for light and a feather quill for a pen,
Leonardo recorded his thoughts and observations on flight in a
magnificent leather bound journal that is now called "Codex On
the Flight of Birds."

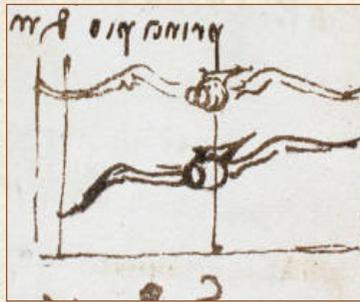


A codex is an old
manuscript or book.
This is a photo of
Leonardo's Codex On
the Flight of Birds.

To figure out the things he needed to know to design a human flying invention, Leonardo studied birds. He drew many illustrations of birds in flight and wrote about his observations in his leather bound journal.



Leonardo noticed that birds flap their wings to take off and gain the speed needed to fly.

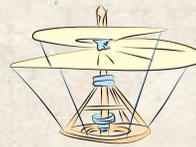


He noticed that a bird's wings can remain still as they glide and soar.

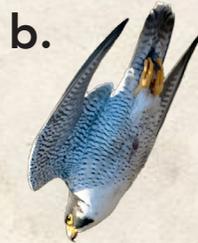


He noticed that birds balance as they fly using their broad, flat tails.

Which bird do you think is flying fastest?



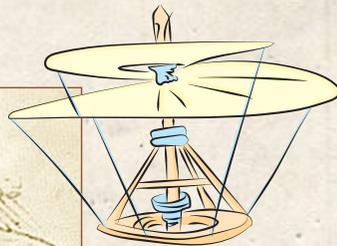
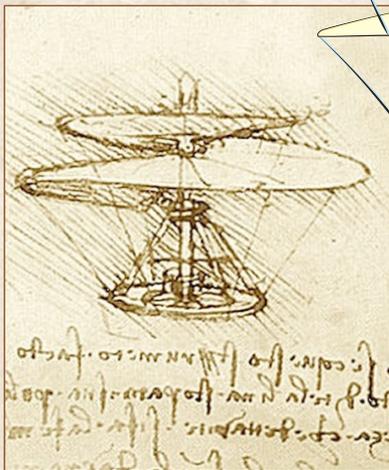
Think,
Pair,
Share



Look at the wing and body positions of these birds in flight. Can you tell which of the birds is flying fastest? Which is flying slowest? Why do you think so?

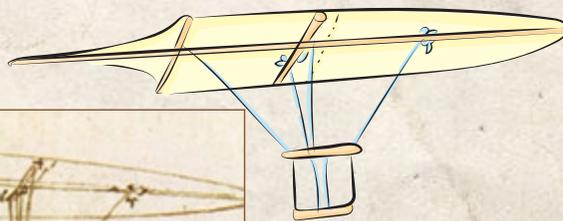
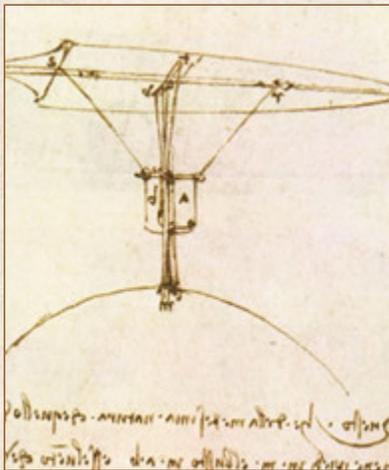
Leonardo's Flying Contraptions

Leonardo took what he learned from observing flight in nature and thought of many ideas for human flight. Leonardo sketched his creative ideas. He proposed building flying contraptions using wood frames bound together with leather strips and silk stretched over the wings. Silk is a light, strong and airtight fabric. These were among the first documented ideas for human flight.



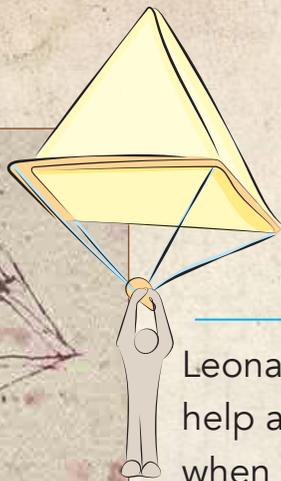
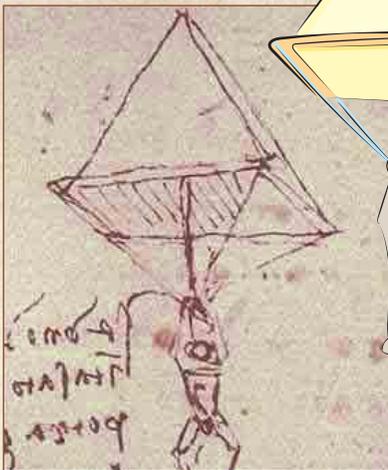
What would you name this flying contraption?

Leonardo imagined a spinning sail shaped like a cork screw. He thought that if it could spin fast enough, it could lift a human into the air. This sketch is the first helicopter-like flying invention documented.



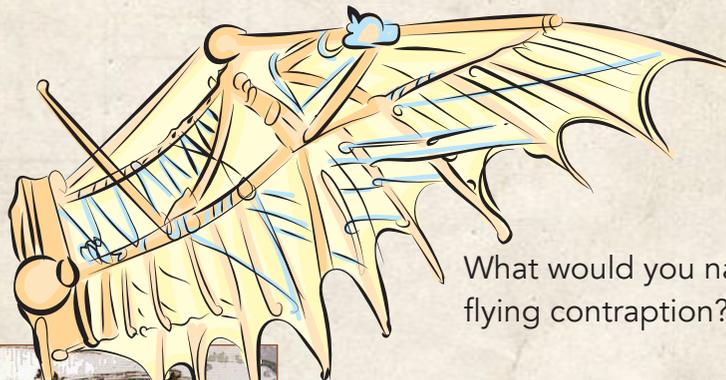
What would you name this flying contraption?

Leonardo imagined that a flat sail could glide across the sky like a bird's wing. He thought that if he could make it large enough, it would lift the weight of a human. This sketch is the first glider-like flying invention documented.



What would you name this flying invention?

Leonardo imagined that a silk sack could help a person float lightly to the ground when falling from a great height. This sketch is one of the first parachute-like flying inventions documented.



What would you name this flying contraption?

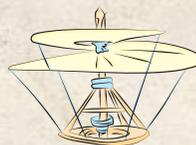


Leonardo imagined that he could fly like a bird if he could construct a gigantic bird wing. This sketch is among the first winged flying inventions recorded.

Leonardo had many ideas for ways humans might fly; however, he was never successful at building any of these inventions.

Do you think any of these flying contraptions could actually fly?

Why or why not?

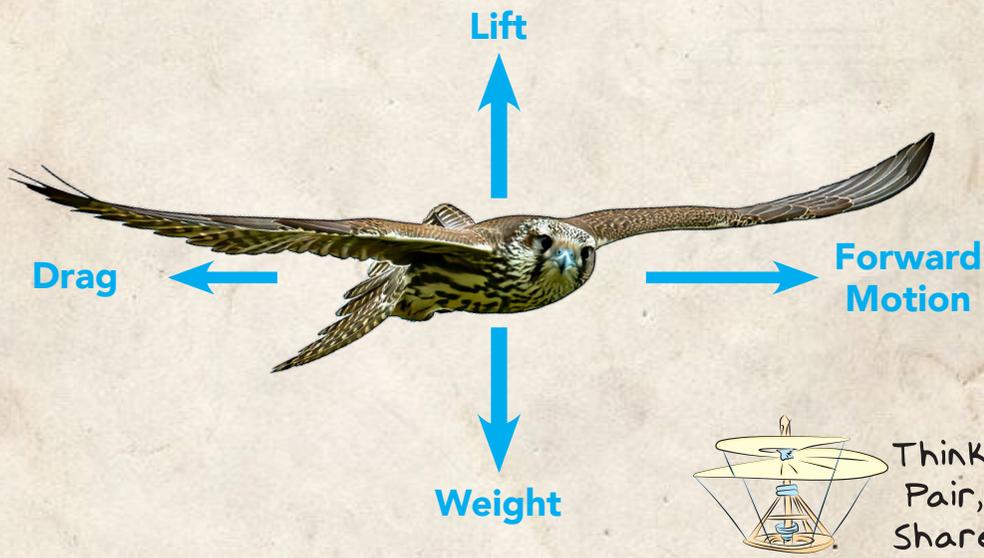


Think,
Pair,
Share

A force is a push or a pull

To understand what makes flight possible, it helps to understand forces. A **force** is a push or a pull on an object. Many forces are involved in a bird's flight, such as the push of the birds wings moving it forward, the downward pull of gravity, air resistance and the lifting force provided by the wings. When the right balance of forces is achieved, a bird flies. Because every force has a strength and every force acts in a specific direction, engineers can draw and label forces using arrows.

Diagram of a Bird's Flight



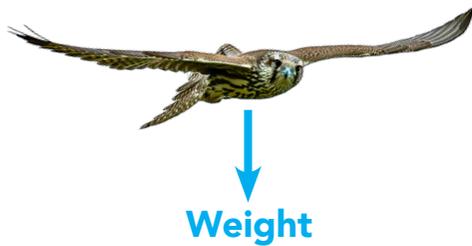
What forces act on a bird in flight?



Weight pulls objects downward

An object's weight is caused by the pull of Earth's gravity. Objects sit on the ground because of gravity's pull. **Weight** is a measure of how strongly gravity pulls on an object.

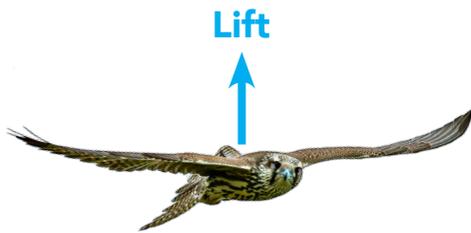
We can measure weight using a scale. Weight is most often measured in units such as grams, pounds and ounces.



These birds are sitting on a scale.

Air pushes on the wings to create lift

While a bird or a paper airplane is flying its weight still pulls down on it. A force must push it up to make it fly. Wings can provide the upward force that help it fly. We call this force **lift**. When the lift force provided by the wings equals the bird's weight, the bird will not fall.



This bird can fly because its wings create lift.

