Chapter 7 Forces in Fluids

Section 3 Fluids and Motion

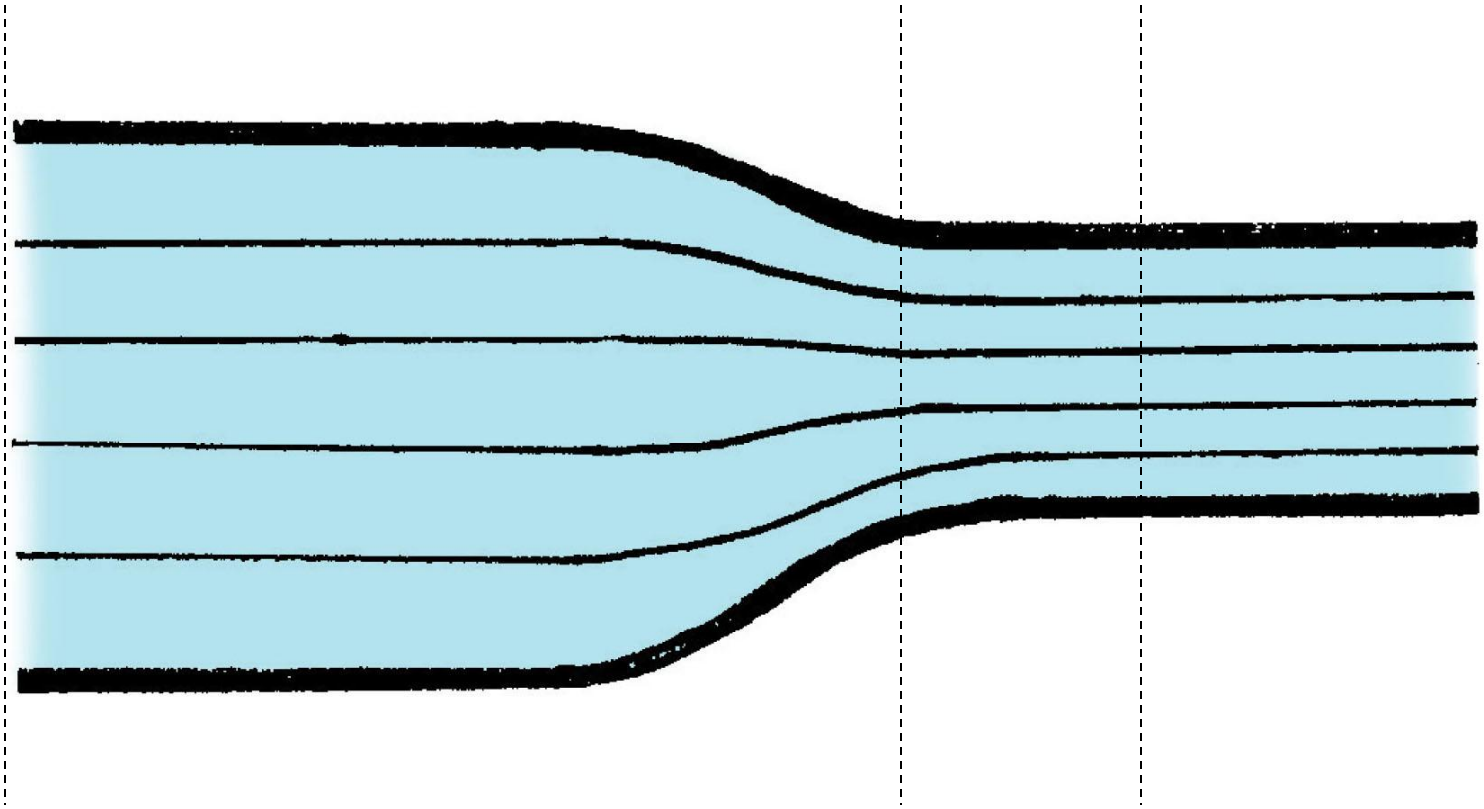
Essential Questions 7-3

- What is the relationship between pressure and fluid speed?
- What are the roles of lift, thrust, and wing size in flight?
- What is drag and how does it affect lift?
- What is Pascal's principle?

Bernoulli's Principle

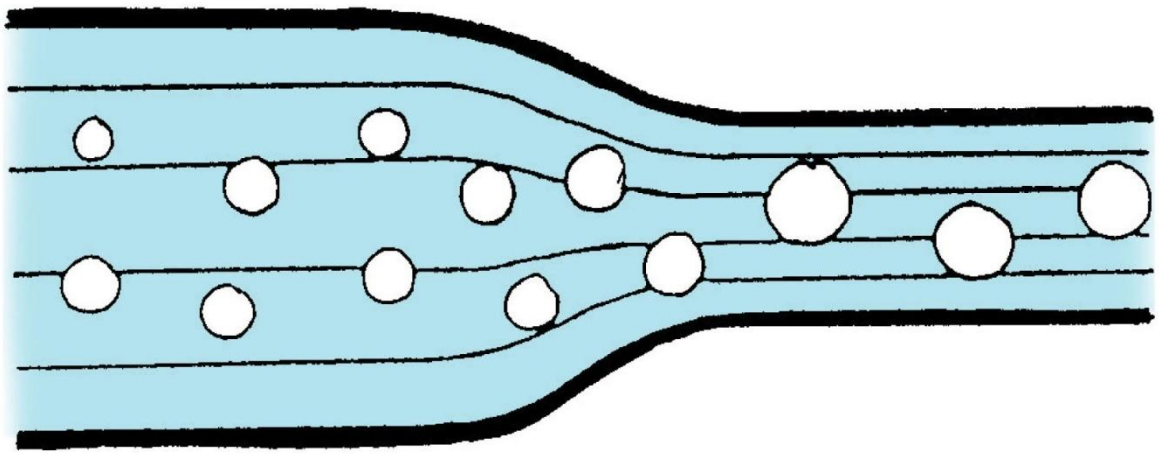
- Flow is faster when the pipe is narrower
- Put your thumb over the end of a garden hose
- Energy conservation requires that the pressure be lower in a gas that is moving faster
- Has to do with the work necessary to compress a gas (PV is energy, more later)

Bernoulli's Principle



Bernoulli's Principle

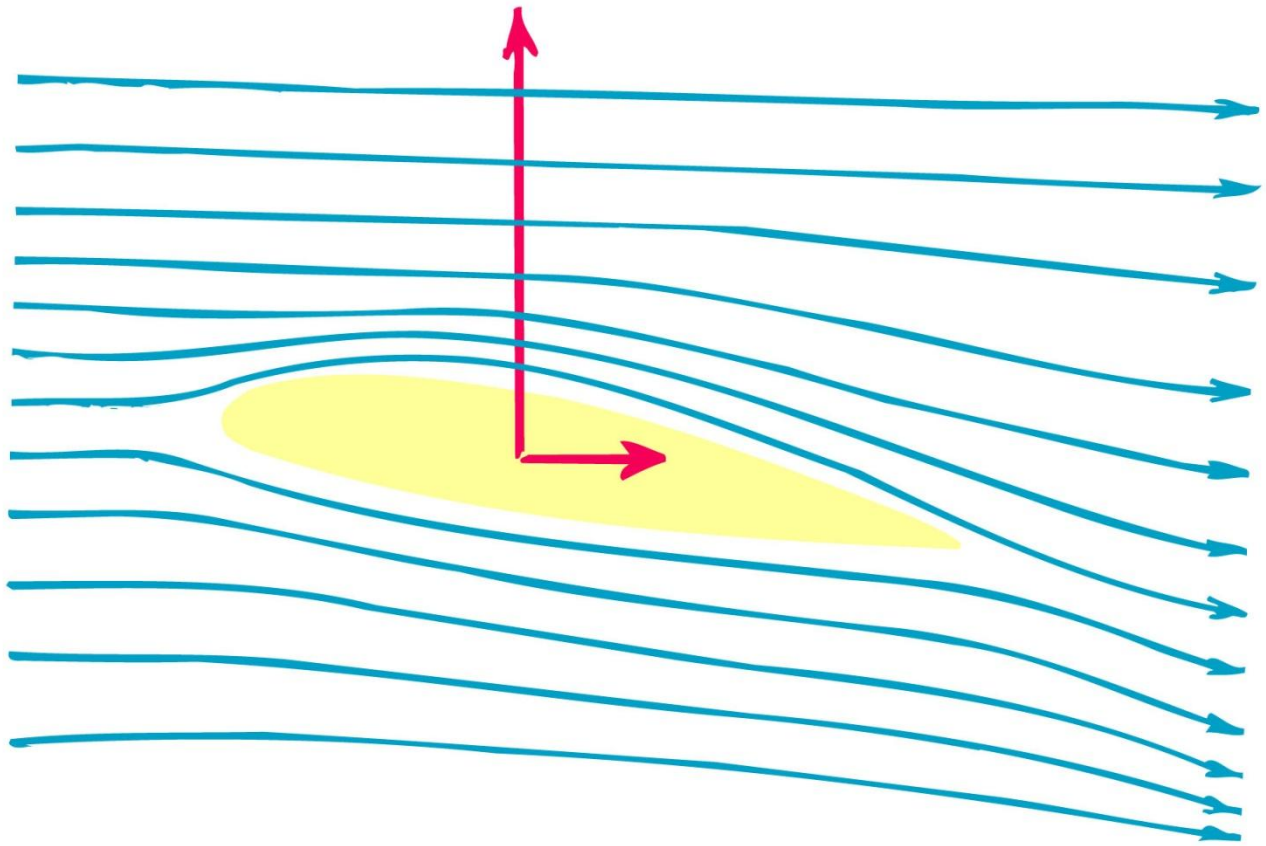
- *When the speed of a fluid increases, internal pressure in the fluid decreases.*



Factors that Affect Flight

- Wing shape helps planes fly
  - Fast-moving air above wing, exerts less pressure than air below the wing
  - Greater pressure below the wing pushes up – this is known as lift

Bernoulli's Principle



Thrust and Lift

- Thrust – forward force produced by the plane's engine
- Lift – upward force provided by shape of wings
- This means the stronger the engine, the smaller the wings
    - Jets have small wings
    - Gliders (no engine) has bigger wings

Drag and Motion in Fluids

- Drag - force that opposes motion through a fluid
  - Why it is harder to run in water
- Turbulence – an irregular or unpredictable flow of fluids

Bernoulli and Birds

- Birds do not have engines – they must flap their wings
- Smaller the bird, more it has to flap it's wings
  - Ex: hummingbird
- Bigger birds soar – flapping their wings less
  - Ex: buzzard

Pascal's Principle

- Change in pressure in an enclosed fluid is transmitted equally to all parts of the fluid
- Hydraulic devices use liquid to move or lift objects