Forces in Fluids

Fluid – any material that \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of its container

 Fluids include:

Flow happens when \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

All fluids exert \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Pressure –

 Equation:

 Pressure is measured in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Fluids exert pressure \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in all \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Bubbles:

Atmosphere – layer of \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and other gases surrounding the earth

Atmospheric pressure – pressure caused by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* At sea level, you have a weight of about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pushing on every cm2 of your body
* Why don’t you feel it?

As you increase in altitude, what happens to the atmospheric pressure? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Altitude sickness –

Water pressure \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ as depth \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Water is about \_\_\_\_\_\_\_\_\_\_ times more \_\_\_\_\_\_\_\_\_\_\_\_ than air

 Water exerts \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than air

 Diving sickness –

Fluids flow from areas of \_\_\_\_\_\_\_\_\_\_\_\_\_ pressure to \_\_\_\_\_\_\_\_\_\_\_\_\_ pressure

 Carbonated pop:

* gas inside the can is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ than gas outside so when opened, gases will

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Breathing:

* Inhale – diaphragm \_\_\_\_\_\_\_\_\_\_\_\_\_ making lung space \_\_\_\_\_\_\_\_\_\_\_\_\_\_. Air pressure outside is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so it flows \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Exhale – diaphragm \_\_\_\_\_\_\_\_\_\_\_\_\_ making lung space \_\_\_\_\_\_\_\_\_\_\_\_\_\_. Air pressure inside lungs is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so it flows \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Tornados:

* Air pressure inside tornado is \_\_\_\_\_\_\_\_\_\_ while air pressure outside is \_\_\_\_\_\_\_\_\_\_\_\_\_. This causes air and other objects in its path to be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the tornado

Buoyant force – the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that fluids exert on all matter

 There is \_\_\_\_\_\_\_\_\_\_\_\_ pressure at the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of an object because pressure

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ with depth. This results in an \_\_\_\_\_\_\_\_\_\_\_\_\_\_ buoyant force on the object

Archimedes’ principle – the buoyant force of an object is \_\_\_\_\_\_\_\_\_\_\_\_\_ to the\_\_\_\_\_\_\_\_\_\_\_\_ of the fluid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by the object

* The weight of the object \_\_\_\_\_\_\_\_\_\_\_\_\_ affect buoyant force

An object will sink if its weight is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the buoyant force

An object will only float if its weight is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the buoyant force

Density –

 Objects that are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the surrounding fluid will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Objects that are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than the surrounding fluid will \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Changing Overall Density

* Mass
* When water is added to the ballast tanks of a submarine, the mass \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so the density also \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. When water is removed, mass \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so density \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Volume
* Inflated swim bladders in fish create \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so the density \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Shape
* a hollow shape increases the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so the density \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Bernoulli’s Principle – fluid pressure \_\_\_\_\_\_\_\_\_\_\_\_\_\_ as the speed of the fluid \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 What happened to the ball in the running water?

 Why did this happen?

Factors that affect flight:

1. Air has to travel faster on top of the wing and creates \_\_\_\_\_\_\_\_\_\_\_\_\_ pressure. Slower moving air below the wing has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pressure. This creates an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ force.
2. Lift - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ force on an object \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a liquid
3. Thrust – the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ produced by the engine
4. Wing size – jet engines produce a lot of \_\_\_\_\_\_\_\_\_\_ so the wing size can be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Gliders produce \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ so the wing size must be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Birds – small birds must flap his wings \_\_\_\_\_\_\_\_\_\_\_\_ to stay in the air. Large birds can flap \_\_\_\_\_\_\_\_\_\_\_\_\_ and still stay in the air

 Draw how a curve ball works

Drag – force that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ motion in a fluid

 Often caused by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ which is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ flow of fluids

 Lift is often \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ when turbulence causes \_\_\_\_\_\_\_\_\_\_\_

Pascal’s Principle – change in \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in an enclosed fluid is transmitted \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to all parts of the fluid

 Hydraulic devices use \_\_\_\_\_\_\_\_\_\_\_ because they cannot be squeezed into smaller areas easily

 Hydraulic devices help move heavy objects by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Example: