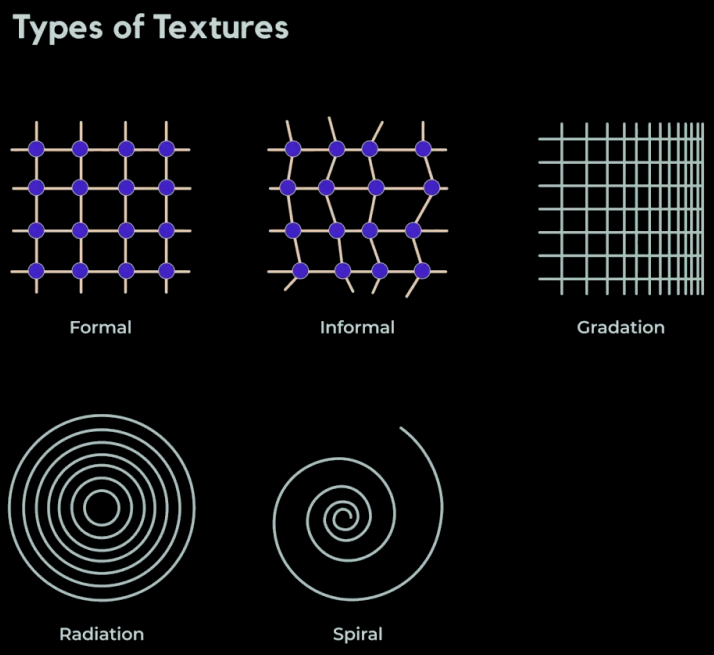
Physical properties of matter

Texture

It represents the feel of a surface or a substance



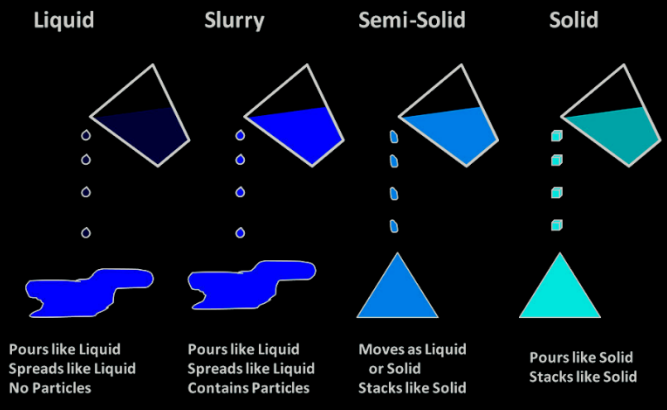
Uniformity (Homogeneity)

It describes how evenly distributed everything in a material is

- Homogenous mixtures have a high uniformity value, meaning that if you sliced them up in half, you find the same distributions in both halves
- Heterogenous mixtures have a low uniformity value, meaning that if you sliced them up in half, you find different distributions in both sides

Consistency

Is the way a substance holds liquid



Strength

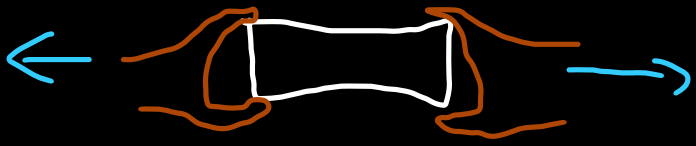
Is the ability of a material to handle forces without breaking or tearing

There are 3 types of strength

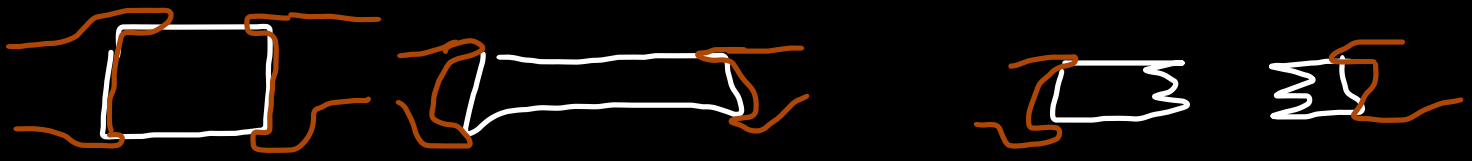
- **Shear strength** refers to resistance to transverse/cutting

- **Compressive strength** is the ability of a metal to withstand pressures pushing on it from opposite directions

- **Tensile strength** refers to the amount of load/stress that a material can handle until it stretches and breaks



In tensile strength a material faces some sort of deformation of necking before breaking apart



In alloys, it is influenced by composition, such as the amount of carbon in carbon steel

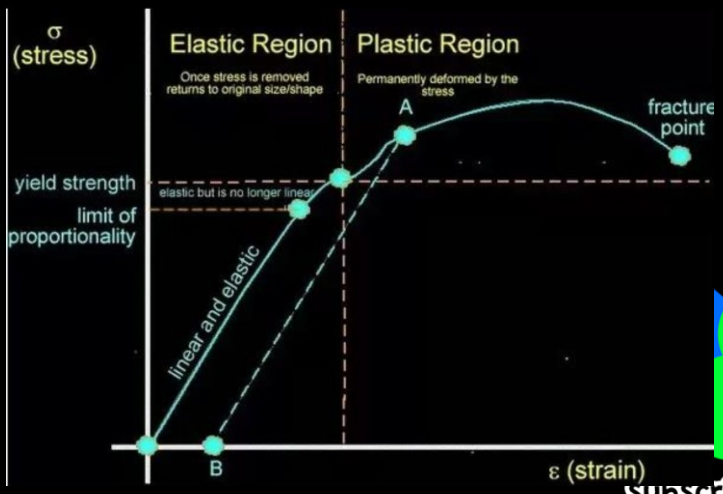
Elasticity

is the ability of a material to resume its normal shape after being stretched or compressed

- **Stress** is the force affecting an area and is calculated like this Force/Area
- **Strain** is the change in spatial dimension, either length/angle/volume, normally it is represented in displacement

At first, elastic materials have **stress** proportional to **strain**

Until they reach the **limit of proportionality** where the stress isn't proportional to the strain, but the material is still elastic until we reach the **plastic limit** where any further deformation will stay permenant



STRESS STRAIN GRAPH

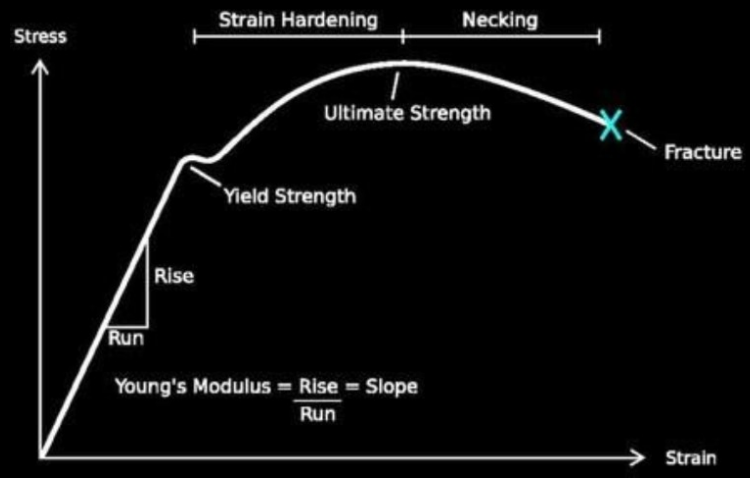
Yield strength is a point where any more deformations cannot revert back to normal (becomes from elastic to plastic)

Ultimate strength is the point before rupture

Young modulus is equal to $\frac{stress}{strain} = \frac{force/area}{displacement}$

A part of stress is called **rise**

A part of strain is called **run**



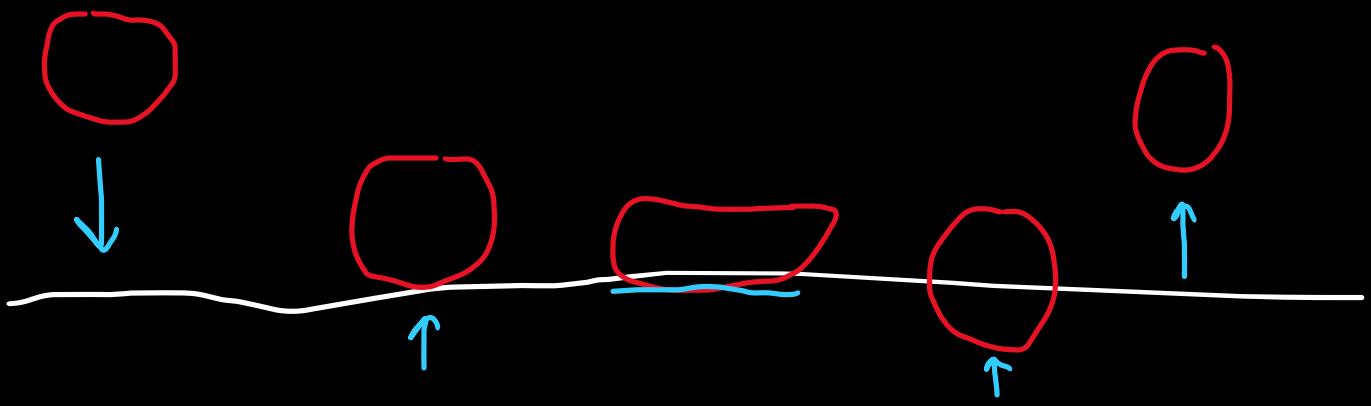
Bounce

It refers to a material's ability to return to its original position, it is directly proportional with the material's elasticity

How bouncing works?

Let's imagine a ball falling, once it hits the ground it

- Stretches due to the force applied on it
- Returns back to its original shape because of its elasticity
- it's original shape makes it stuck to the ground, so it goes up, generating an upward bounce force



Malleability

It determines how easy it is to roll/hemmer out the material without breaking it apart

For example

- Copper is malleable/flexiable so it's used to make wires

The opposite of malleable is **brittle/unflexible**

Temperature affects malleability

the higher it is, the more malleable a material is

Alloys

Are metallic compounds made up of one metal and one more metal or non metal elements

Examples