Flipping Physics Lecture Notes:
3 States of Matter – Solid, Liquid, Gas
http://www.flippingphysics.com/solid-liquid-gas.html

On Earth, the three most common states, or phases, of matter are solid, liquid, and gas.

This table describes the differences between them:

		Fluid	
	Solid	**Liquid**	**Gas**
Fixed Shape?	Yes	No	No
Fixed Volume?	Yes	Yes	No
Distance between particles	Small	Almost as Small as a Solid	Large
Force of attraction between particles	Large	Medium	Small
Kinetic Energy of Particles	Small	Medium	Large
Example: H_2O	Ice	Water	Water Vapor

Flipping Physics Lecture Notes:
Density
http://www.flippingphysics.com/density.html

Density is a material property of any pure substance. For example, the density of pure copper is 8.96 g/cm^3. And, any object made of pure copper, regardless of size, will have that same density of 8.96 g/cm^3.

The symbol for density is ρ. Which is the lowercase, Greek letter "rho".

The equation for density is: $\rho = \frac{\text{mass}}{\text{volume}}$

Let's determine the densities of two, equal diameter spheres. One steel and one wood:

$$\text{diameter} = 50.7mm \Rightarrow r = \frac{\text{diameter}}{2} = \frac{50.7mm}{2} = 25.35mm\left(\frac{1cm}{10mm}\right) = 2.535cm$$

$$V_{\text{sphere}} = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(2.535cm)^3 = 68.2374cm^3 = V_{\text{steel}} = V_{\text{wood}}$$

$$m_{\text{wood}} = ??g \ \& \ m_{\text{steel}} = 535g$$

$$\rho_{\text{steel}} = \frac{m_{\text{steel}}}{V_{\text{steel}}} = \frac{535g}{68.2374cm^3} = 7.84027 \Rightarrow \rho_{\text{steel}} \approx 7.84\frac{g}{cm^3} \text{ (observed value)}$$

$$\rho_{\text{wood}} = \frac{m_{\text{wood}}}{V_{\text{wood}}} = \frac{45g}{68.2374cm^3} = 0.65946 \Rightarrow \rho_{\text{wood}} \approx 0.66\frac{g}{cm^3} \text{ (observed value)}$$

The accepted value for the density of steel is roughly 7.7 – 8.0 g/cm^3.♥
The accepted value for the density of birch wood is roughly 0.5 – 0.8 g/cm^3.♣
So, both of our observed values are within the range of their accepted values.

We have just shown that steel is more dense than wood, and steel has a larger mass per unit volume than wood.

♥ https://hypertextbook.com/facts/2004/KarenSutherland.shtml
♣ https://www.engineeringtoolbox.com/wood-density-d_40.html