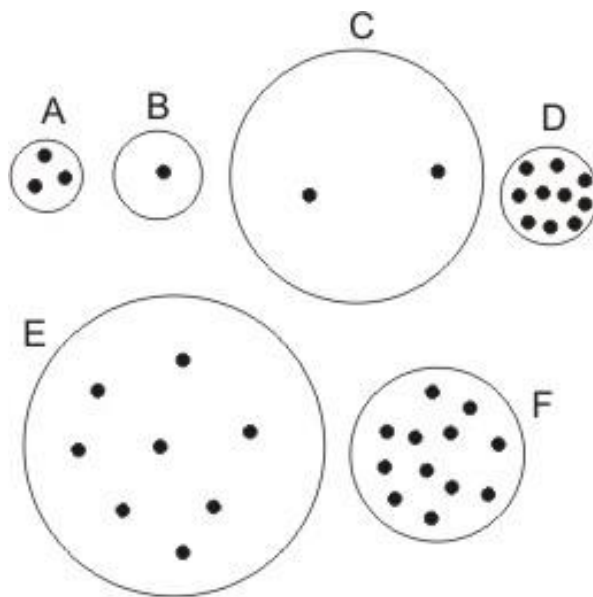


Physical Properties of Matter, with an emphasis on Density

Match each term to the appropriate description: Volume, Mass, Weight, Density

1. _____ The amount of “**stuff**” in something.
2. _____ The amount of space something takes up; how big something is; **size** in three dimensions
3. _____ How compressed or **crowded** the stuff inside an object is; a ratio of stuff to size. $Density = \frac{mass}{volume}$
4. _____ The **force of gravity** pulling an object toward a planet.

The circles on the right represent objects with varying masses, volumes, and densities. The dots inside the objects represent identical particles of “stuff.” The rest of the object is empty space.



5. Which object has the greatest volume? _____
6. Which object has the least volume? _____
7. Which object has the greatest mass? _____
8. Which object has the least mass? _____
9. Which object has the greatest density? _____
10. Which object has the least density? _____
11. *Which object has the greatest weight? _____
12. *Which object has the least weight? _____
13. There are asterisks above because, in special circumstances, all of the objects can have the same weight. Explain.

Read the descriptions below and decide whether each property increases (+), decreases (-), or stays the same (=). *Some answers will vary depending on your assumptions (such as whether air has significant mass).*

Description of Change	Property	Change in Property (+, -, or =)	Explanation
14. A dry towel is squeezed.	Mass		
	Volume		
	Density		
	Weight		

15. A piece of paper loses its corner when the corner is cut off and thrown away.	Mass		
	Volume		
	Density		
	Weight		

16. A balloon is inflated by mouth.	Mass		
	Volume		
	Density		
	Weight		

17. A moon rock is taken to the Earth.	Mass		
	Volume		
	Density		
	Weight		

18. An actor needs to gain weight for a movie, so he packs on an extra 40 pounds of fat.	Mass		
	Volume		
	Density		
	Weight		

19. An army recruit has his head shaven (buzzed).	Mass		
	Volume		
	Density		
	Weight		

20. A plastic bottle of water splits open when the water inside freezes	Mass		
	Volume		
	Density		
	Weight		

21. An earthworm stretches as it inches forward.	Mass		
	Volume		
	Density		
	Weight		

22. Someone takes your stick of solid wood, drills some holes in it, and gives it back to you.	Mass		
	Volume		
	Density		
	Weight		

23. Someone exercises and gets much stronger, but her weight does not change.	Mass		
	Volume		
	Density		
	Weight		

24. A hot air balloon is hovering over your town. The pilot turns on the flame, and the balloon begins to rise.	Mass		
	Volume		
	Density		
	Weight		

Film Canister Submarine

Using a film canister, some weights, some effervescent tablets, some water, and a drill (or the equivalent) your goal is to create a film canister “submarine” that sinks to the bottom of an “ocean” of water, comes to a complete stop, and then (after a while) rises back to the top of the water – all by itself.

- Design a and test a solution
- Clearly describe your procedure so that it could be repeated by a very literal reader.
- Explain how changes in your submarine’s volume, mass, and density cause it to sink and then rise.
- Explain what is causing those changes.