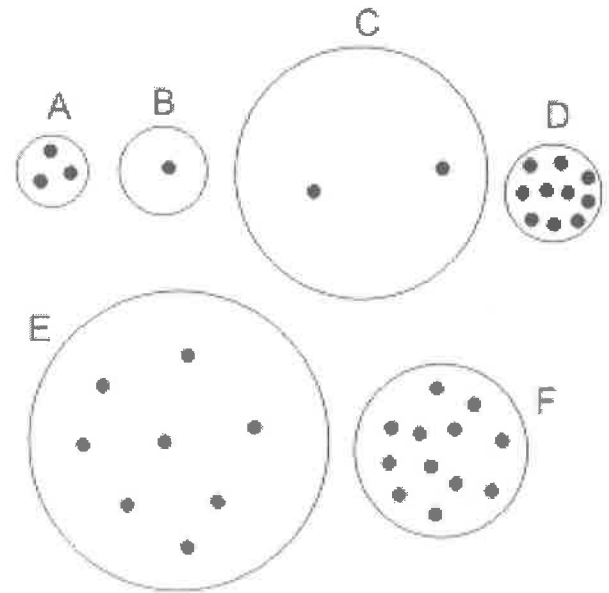




Match each term to the appropriate description: Volume, Mass, Weight, Density

- Mass The amount of "stuff" in something.
- Volume The amount of space something takes up; how big something is; **size** in three dimensions
- Density How compressed or **crowded** the stuff inside an object is; a ratio of stuff to size
- Weight 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.



- Which object has the greatest volume? E
- Which object has the least volume? A
- Which object has the greatest mass? F
- Which object has the least mass? B
- Which object has the greatest density? D
- Which object has the least density? C
- *Which object has the greatest weight? F
- *Which object has the least weight? B

13. An object's density determines whether or not it will float.

14. There are asterisks above because, sometimes, all of the objects can have the same weight.

Explain. In the absence of gravity, they all have no weight

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).*

* → ignores mass of air

Description of Change	Mass	Volume	Density	Weight
15. A dry towel is squeezed	=*	↓	↑	=*
16. A piece of paper loses its corner when the corner is cut off and thrown away.	↓	↓	=	↓
17. A balloon is inflated.	=*	↑	↓	=*
18. A rock is taken to the moon.	=	=	=	↓
19. An actor needs to gain weight for a movie, so he packs on an extra 40 pounds of fat.	↑	↑	↓	↑

Description of Change	Mass	Volume	Density	Weight
20. An army recruit has his head shaven (buzzed).	↓	↓	?	↓
21. A plastic bottle of water splits open when the water inside freezes	=	↑	↓	=
22. An earthworm stretches as it inches forward. ?	=	=	=	=
23. Someone takes your favorite stick of solid wood, drills bunch of holes in it, and gives it back to you.	↓	↓	=	↓
24. Someone exercises and gets much stronger, but her weight does not change.	=	↓	↑	=
25. A hot air balloon is hovering over your town. The pilot turns on the flame, and the balloon begins to rise. ?	↓	=	↓	↓
26. You give an example:	+	=	+	+
27. You give an example:	↑	↑	↑	↑
28. You give an example:	=	↑	↓	=
29. You give an example: *	=	↓	↑	↑
30. You give an example:	↓	↓	=	↓

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

On a separate paper (one per group)