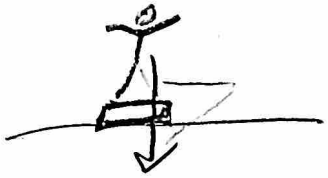
ESS Term 1 Review
Part 1

Name: Key

Define each of the following:

1. Mass – Stuff (amount of stuff in something) matter
2. Volume – size (amount of space something takes up)
3. Density – Crowdedness
4. Weight – The force of a planets gravity pulling on an object.

Examine the objects below.

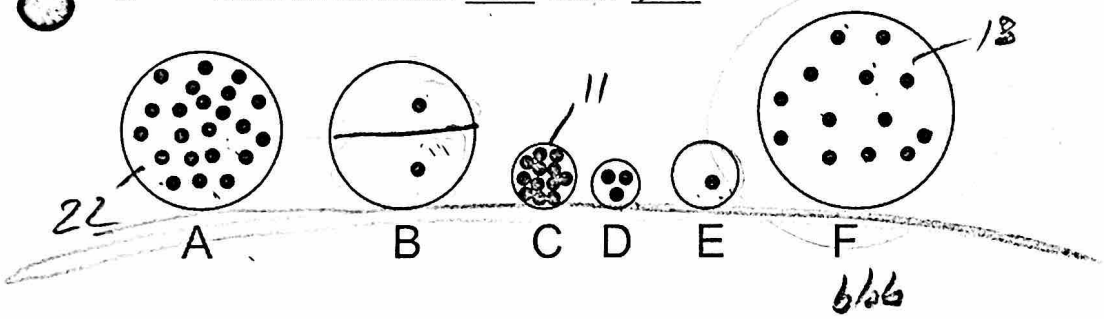


Which object has the most volume? E Least? D

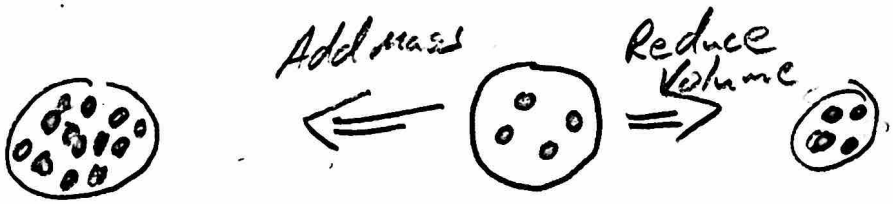
Which has the most mass? A Least? E

Which has the most weight? A Least? E

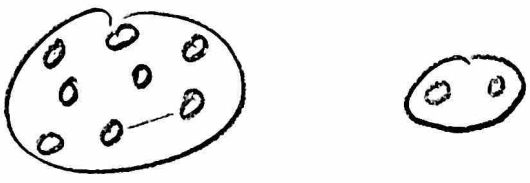
8. Which is most dense? C Least? B



9. Show two fundamentally different ways to make this ~~box~~ more dense. In each case, explain what changes you made to mass, volume, or weight.



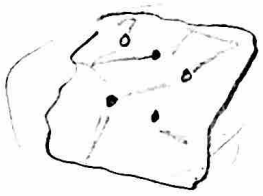
10. Draw two objects (similar to my drawing above) that have different masses but similar densities.



11. Suppose you heat a sealed container full of gas (this could be air, hydrogen, or something else)...

a. What happens to the motion of the gas molecules?

Speed up



b. What happens to the pressure of the gas?

Increases

c. What is pressure, and why does it change?

The force of the gas particles pushing. They push harder when they move faster.

d. If the container is stretchy, what will happen to its volume? Why?

Bigger. The gas particles pressure pushes it outward.

e. If the container is stretchy, what will happen to its density? Why?

Density decreases, because the size increases, so it is less crowded inside.

12. Suppose you compress a sealed container full of gas (this could be air, hydrogen, or something else)...

a. What happens to the temperature of the gas?

Heats up

b. Explain why compression changes the temperature in this way.

When you squeeze, you push the gas particles, and make them go faster.

d. What has happened to the volume of the gas? Why?

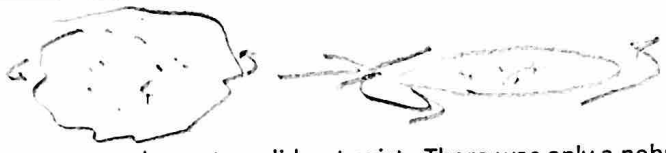
size decreases, because I compressed it.

e. What has happened to the gas' density? Why?

More dense → I compressed it, so its particles are more crowded.

12.5 List the colors of stars, from hottest to coolest.

Blue, White, Yellow, Orange, Red

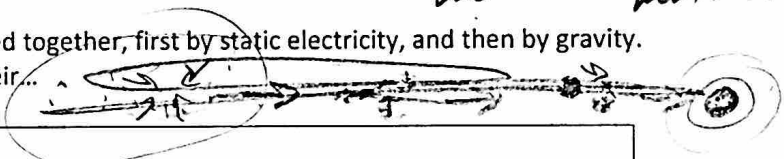


13. Approximately 4.6 billion years ago, our solar system did not exist. There was only a nebula. Soon the nebula began to change, and a protostar began to form. During this period of change, what happened to the nebula's...

Property	Change in Property (+, -, or =)	Explanation (explain why, or how you know)
Mass	=	The amount of stuff (dust and ice) did not change.
Volume	-	Gravity pulled it together (smaller)
Density	+	Same stuff in smaller space → more crowded
Temperature	+	Compression pushes molecules and speeds them up → faster = hotter
Rotational Speed	+	Like a figure skater (arms pull in, skater speeds up). Also → Compression speeds up spinning, as well as particle motion.

Similar

14. Planets formed as tiny bits of matter were pulled together, first by static electricity, and then by gravity. As these planets formed, what happened to their...



Property	Change in Property (+, -, or =)	Explanation (explain why, or how you know)
Mass	+	Stuff gets added (dust + ice)
Volume	+	Gets bigger
Density	+	More gravity will compress it as it grows.
Temperature	+	Compression heats it

white ⇒ red H+H+H+H → He

15. About 5 billion years from now, our Sun will begin to change. It will turn into a giant. During this period of change, what will happen to the Sun's...

Property	Change in Property (+, -, or =)	Explanation (explain why, or how you know)
Mass	= *	No stuff enters or leaves the star.
Volume	+	Helium in the core pushes the fusing hydrogen outward.
Density	−	Same stuff in bigger space → less crowded
Temperature	−	- Fusion is less intense outside the core - Expansion causes cooling
Color	turn red	Red is a colder color

16. As soon as our Sun's red giant stage is over, the Sun will change again. During this next period of change, what will happen to the Sun's...

red → white

Property	Change in Property (+, -, or =)	Explanation (explain why, or how you know)
Mass	=	No stuff enters or leaves the star
Volume	−	Cooling slows down the particles, allowing gravity to compress them
Density	+	Same stuff in a smaller space → more crowded
Temperature	− then +	→ First it cools, because fusion stops. → Then it heats up due to compression
Color	Turns white	Eventually compression heats it up so it turns white (a hotter color)