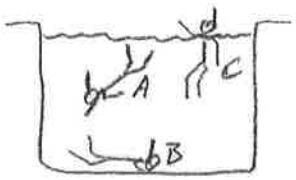
EPS 100 (Stapleton)
Physical Properties: Pressure

Name: Answers

1. In the first picture on the right, which swimmer is experiencing the strongest water pressure?

B



2. What causes the water pressure you feel when you dive?

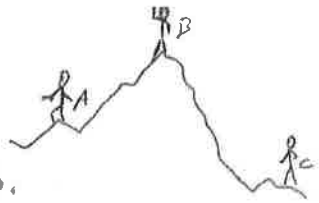
The weight of the water above you

3. In the second picture on the right, who is experiencing the greatest air pressure?

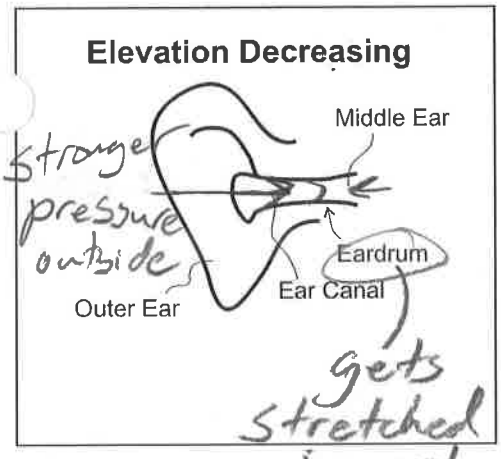
C

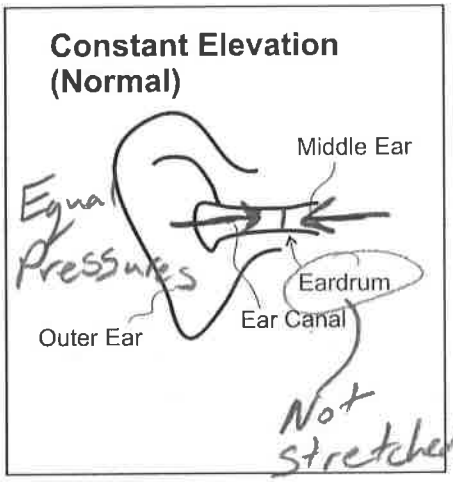
4. What creates the air pressure that we're feeling right now?

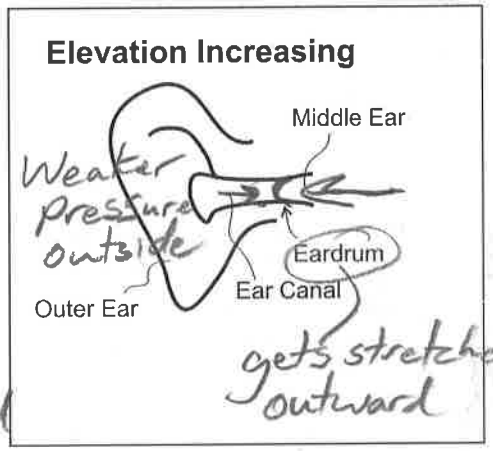
The weight of the air above us.



5. Show why our ear drums hurt when we rapidly descend or rise to different elevations.







6. At sea level, one cubic meter of air weighs about 2.5 pounds and has a mass of about 1.1 kg.

7. Just to prove that air has weight, an empty balloon has a mass of 1.7 g. An inflated balloon has a mass of 2.0 g.

8. Atmospheric Pressure (average air pressure at sea level) = 14.7 psi

9. "psi" stands for pounds per square inch

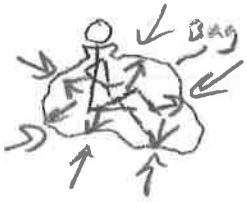
11. According to sources, an average human has about $1.8m^2$ ($\approx$2,800 in^2) of skin. If you consider the force of air pressure pushing on that many square inches, what total force (in pounds) is pushing against an average human's skin?

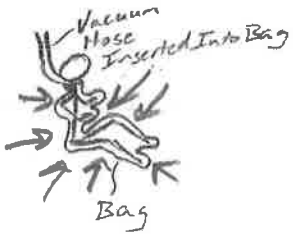
41,160 pounds = 2,800 in^2 (14.7 psi)

12. Why don't we normally feel that force?

- We have equal pressure inside us.
- Pressure is spread out
- Pressure comes from every direction

13. The two people on the right are inside trash bags. One has a vacuum hose inserted in the bag. The other does not. Use arrows to show how the sensation of vacuum packing is caused by air pressure pushing inward from the outside of the bag.

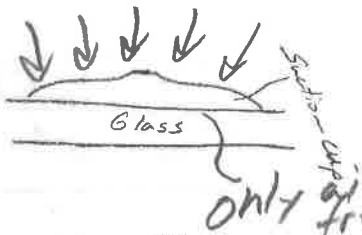




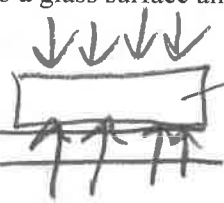
14. We can lift several people by placing them on top of an air bag and inflating the air bag with very little pressure (about 1psi). Why can one pound per square inch of pressure lift so much weight?

Every square inch can lift 1 pound, and the bag surface has 1,500 square inches = 1500 pounds

15. Explain why a suction cup sticks to a glass surface and why a book does not.



only air pushing from outside

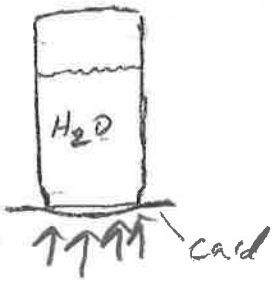


Book has air beneath it, pushing up.

16. What happens if you fill a jar with water, cover it with a laminated card, and then turn the jar upside down? Explain why. Would this work on the moon? Why not?

Water stays in, because air pressure pushes upward on the card

No No air.



15. A helium balloon floats upward. Show and explain how it "knows" which way to go.

Air pressure is stronger on the bottom than on the top.