

1. What is the difference between absolute humidity and relative humidity?

Absolute is the actual amount of water vapor in air.  
Relative is the fullness expressed as a percentage.

2. Humans are generally comfortable at relative humidities between 25% and 60%. What does a relative humidity of 50% mean?

The air is half full of water vapor.

3. Define dew point.

The temperature at which air will become saturated (100% RH)

4. What is the relationship between the air's water vapor capacity and the air's temperature?

Hot air can hold more water vapor than cold air

5. Explain the reason for that relationship.

Water needs energy in order to be a vapor (gas). Hot air can provide more energy.

6. What typically happens to the relative humidity of air as air heats up?

RH decreases.

7. Explain why relative humidity changes in this way as air heats up.

Heating causes air's vapor capacity to increase. If it does not pick up more vapor, it will be less full. Example:

8. What happens to the relative humidity of air when it rises? Explain why.

RH increases. Rising air cools, decreasing its vapor capacity and thus increasing its fullness.

9. Describe a situation in which relative humidity increases while temperature remains constant. Explain why relative humidity is increasing.

When air evaporates water from the Earth's surface, vapor is added to the air.

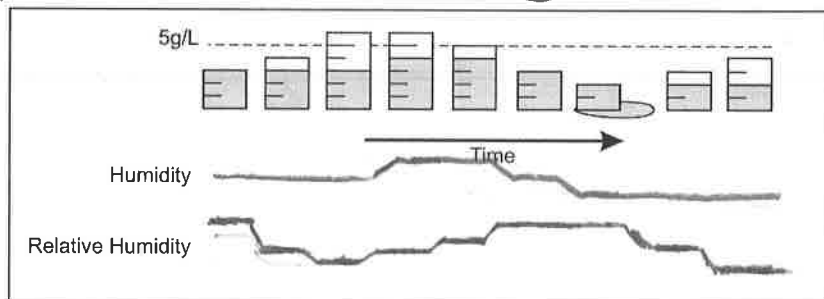
10. At what time of day does air most often reach the dewpoint? Why?

Early morning, because the air is coldest.

11. What happens to the relative humidity of air that travels from outside into a heated house during the winter? Explain why.

*RH decreases because the air heats up, increasing vapor capacity and decreasing fullness.*

12. The containers on the right represent a mass of air with its evaporated water vapor. Sketch rough line graphs showing how the air's humidity and relative humidity are changing over time.



13. A heat pump has a condenser and an evaporator...

- a. What happens in each one?

*Condenser - Refrigerant condenses (gas → liquid)*  
*Evaporator - Refrigerant evaporates (liquid → gas)*

- b. Which one is hot, and which one is cold? For each one, explain why.

*Condenser → Hot. Condensing releases heat*  
*Evaporator → Cold. Evaporation absorbs heat.*

14. What is the purpose of a heat pump's compressor? [There are two - sort of.]

- Increase pressure so that the refrigerant will condense.*
- Heat up condenser (hotter than surroundings)*

15. What is the purpose of a heat pump's evaporator? [There are two - sort of.]

- To provide a low pressure environment so that refrigerant can evaporate.*
- To get cold! (cooler than surroundings)*

16. A refrigerator is a type of heat pump. Instead of having a condenser and an evaporator, the refrigerator has evaporating coils and condensing coils. Where, relative to the refrigerator, should each of these types of coils be located?

*Condenser → outside fridge*  
*Evaporator → inside fridge.*

17. The diagram below shows a type of heat pump system. Trace the path of heat as it gets pumped through the system. Show where heat enters the system, where it leaves the system, and how it gets from its entry point to its exit point.

