

SMS-303: Integrative marine sciences, physics.

Quiz Lab 1.

- 1. The diffusion coefficient has units of:**
 - a. $\text{Length}^2/\text{time}$.
 - b. $\text{Length}/\text{time}^2$.
 - c. $\text{Length}/\text{time}$.
 - d. None of the above.

- 2. Diffusion of heat:**
 - a. can be described as a continuous macroscopic process.
 - b. can be described as a discrete microscopic process.
 - c. is linked to the kinetic energy of molecules.
 - d. all of the above.

- 3. Diffusion is a process that:**
 - a. decreases gradients (spatial differences in concentration) in the ocean.
 - b. increases gradients (spatial differences in concentration) in the ocean.
 - c. does not affect gradients (spatial differences in concentration) in the ocean.
 - d. does not exist in the ocean.

- 4. Increasing temperature:**
 - a. will tend to decrease the diffusion of solutes.
 - b. will not change the diffusion of solutes.
 - c. will tend to increase the diffusion of solutes.
 - d. will tend to decrease the diffusion of heat.

- 5. Diffusion and entropy (entropy is a measure of disorder):**
 - a. are related in that diffusion increases entropy.
 - b. are related in that diffusion decreases entropy.
 - c. are related in that entropy decreases diffusion.
 - d. are not related.

6. Diffusion:

- a. is the dominating nutrient transport mechanism into the upper ocean.**
- b. is the dominating nutrient transport mechanism within a breaking wave.**
- c. is the dominating nutrient transport mechanism in rivers.**
- d. is the dominating nutrient transport mechanism into a phytoplankton cell.**

7. Double diffusion relates to:

- a. processes arising from similar diffusion rates of heat and salt in the ocean.**
- b. processes arising from similar diffusion rates of nutrients and heat in the ocean.**
- c. processes arising from different diffusion rates of nutrients and heat in the ocean.**
- d. processes arising from different diffusion rates of heat and salt in the ocean.**

8. The diffusion coefficients of heat and solutes:

- a. Have the same magnitude.**
- b. Have opposite signs.**
- c. Have the same units.**
- d. Have opposite positions.**

9. Biased random walk:

- a. is similar to a diffusion plus a drift**
- b. is similar to a drift.**
- c. is similar to a diffusion.**
- d. none of the above.**

10. When molecule diffuse:

- a. all the molecule go down gradient.**
- b. some go up and some go down gradient, but the net transport is down gradient.**
- c. some go up and some go down gradient, but the net transport is up gradient.**
- d. All the molecule go up gradient.**