

**SMS-303: Integrative marine sciences, physics.**

**Quiz Lab 1.**

**1. Diffusion:**

- a. is the process whereby a solute is transported from low to high concentration.**
- b. is the process whereby a solute is transported from high to low concentration.**
- c. is the process whereby a solute maintain its concentration.**
- d. is the process whereby a solute concentration is reduced.**

**2. Diffusion:**

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

**3. 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 heat and salt in the ocean.**
- d. processes arising from different diffusion rates of nutrients and heat in the ocean.**

**4. The diffusion coefficient has units of:**

- a. Length<sup>2</sup>/time.**
- b. Length/time<sup>2</sup>.**
- c. Length/time.**
- d. None of the above.**

**5. The diffusion coefficients of heat and solutes:**

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

**6. Increasing temperature:**

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

**7. Diffusion and entropy (entropy is a measure of disorder):**

- a. are related in that diffusion decreases entropy.**
- b. are related in that diffusion increases entropy.**
- c. are related in that entropy decreases diffusion.**
- d. are not related.**

**8. Diffusion is a process that:**

- a. increases gradients (spatial differences in concentration) in the ocean.**
- b. decreases 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.**

**9. Biased random walk:**

- a. can be modeled by a drift.**
- b. can be modeled by a diffusion.**
- c. can be modeled by a diffusion plus drift**
- d. none of the above.**

**10. Diffusion of heat:**

- a. can be described as a continuous macroscopic process.**
- b. can be described as a discrete microscopic process.**
- c. a & b.**
- d. is derived from the chemical energy of molecules.**