2. Cell Structure and Function

Starter Quiz · 课前小测

AP Biology Name: _____ Score: _____

1. An **organelle** is…
   - ☐ a small structure inside a cell with a specific job
   - ☐ a whole organ, like the heart
   - ☐ a type of cell
   - ☐ a molecule of DNA
2. Why must most cells stay very small?
   - ☐ A small cell has a high surface-area-to-volume ratio for fast exchange
   - ☐ Small cells weigh less
   - ☐ Small cells have more DNA
   - ☐ Big cells cannot hold water
3. The plasma membrane is built mainly from a…
   - ☐ phospholipid bilayer
   - ☐ single layer of protein
   - ☐ sheet of DNA
   - ☐ solid wall of cellulose
4. In **diffusion**, particles move…
   - ☐ from high concentration to low concentration
   - ☐ from low concentration to high concentration
   - ☐ only upward
   - ☐ only if pushed by a pump
5. **Passive transport** moves substances…
   - ☐ down the gradient, using no energy
   - ☐ up the gradient, using ATP
   - ☐ only into the cell
   - ☐ only when the cell is dead
6. As a cell gets bigger, its surface-area-to-volume ratio falls.

   ☐ True ☐ False

7. The model of the membrane, with proteins floating in a moving lipid sheet, is the _____ mosaic model.

   _____

8. Diffusion is **passive** — it needs no energy from the cell.

   ☐ True ☐ False

9. The organelle that stores DNA and controls the cell is the _____.

   _____

10. A cube of side 2 has surface area 24 and volume 8. What is its SA:V ratio (surface ÷ volume)?

    _____

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Answers · 答案

AP Biology

1. **a small structure inside a cell with a specific job**

   An **organelle** is a specialised structure inside a cell — like the nucleus or a mitochondrion — each doing a specific job.

2. **A small cell has a high surface-area-to-volume ratio for fast exchange**

   A small cell has a large **surface area** relative to its **volume**, so materials diffuse in and out fast enough.

3. **phospholipid bilayer**

   The membrane is a **phospholipid bilayer** — two layers of phospholipids with proteins embedded in them.

4. **from high concentration to low concentration**

   Diffusion is the net movement of particles down their **concentration gradient** — high to low.

5. **down the gradient, using no energy**

   Passive transport goes down the concentration gradient and costs the cell no energy.

6. **True**

   Volume grows faster than surface area, so the **SA:V ratio** falls as size increases.

7. **fluid**

   In the **fluid mosaic** model the lipids move like a fluid, and proteins are scattered through them like a mosaic.

8. **True**

   Diffusion is **passive**: particles move on their own random motion, so the cell spends no ATP.

9. **nucleus**

   The **nucleus** holds the DNA and directs everything the cell does.

10. **3**

    $24 \div 8 = 3$. A smaller cube (side 1) would give $6 \div 1 = 6$ — a higher ratio.