

Name: _____ Hour: _____

Exam 1 Study Guide:

Scientific Method, Cells, Cell Division, Cell Transport

Scientific Method

1. Why do we need to study Biology? List at least 4 reasons why it is important and give examples.

- Understand how living things are structured and how they function (example: cells)
- Understand what hurts our bodies (ex: osmosis, drinking salt water or too much water)
- Understand and develop cures for diseases (ex. Cancer)
- Understand how to be healthy (ex. Osmosis – drinking right amount of water; avoiding smoking; etc)
- It's the study of all living things (we are alive!)

2. What is a hypothesis? How is it usually written? What does it need to be?

A hypothesis is an educated answer based on evidence and research. It is usually written as “if... then...” (example: IF I water a plant more, THEN it will grow taller; IF I put an egg in any liquid, it will be the same size). It needs to be SPECIFIC and TESTABLE.

3. What is a conclusion?

A conclusion is an answer to your hypothesis and states whether the data support or reject it. (example: Watering a plant more does not necessarily make it grow taller; The size of an egg depends on the solution it was put in).

Define the following and give an example from our egg experiment:

4. Constants – The things that are kept the same in an experiment. Example: The type of egg used, the vinegar used to dissolve the shells, the size of jar, the amount of liquid, the place they were kept, the temperature...

5. Independent variable – The one thing that is changed in the experiment (everything else is a constant!) Seen on the X-axis. Example: The type of solution the eggs were put in.

Remember: **I** change the Independent variable

6. Dependent variable – The data you collect. (remember: **d** for data!) It **DEPENDS** on the independent variable. Seen on the Y axis. Example: The size of the eggs (or the texture, color, etc.) The **SIZE** of the egg depended on the **TYPE OF SOLUTION**.

Characteristics of Life

7. List the 8 characteristics of life and explain what they mean:

- 1) Made of cells – all things are made of 1 or more
- 2) Grow – change in size
- 3) Develop – change in shape
- 4) React – respond to stimuli (things like touch, temperature, light, etc. – anything that causes a response)
- 5) Have a lifespan – they die
- 6) Adapt – change in response to their environments (evolution)
- 7) Use energy – get from food (eating) or make own food from the sun (photosynthesis)
- 8) Reproduce – make more of themselves

Cell Theory

8. List the three parts of cell theory

- 1) All living things are made of cells
- 2) Cells are the basic unit of life (building blocks)
- 3) All cells come from other cells

9. What is the difference between a prokaryote and a eukaryote?

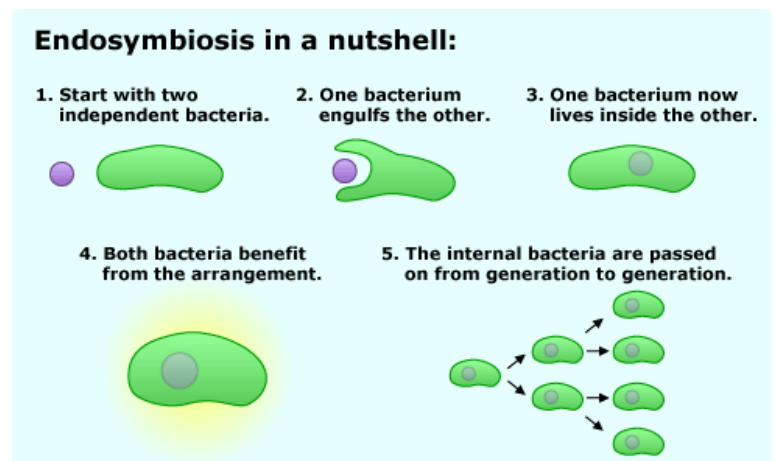
A prokaryote has no nucleus or other organelles (PRO – NO) – only a cell membrane, free-floating DNA, and ribosomes

Eukaryotes do have a nucleus (EU – DO) as well as other organelles. They are more complex.

10. What is the theory of endosymbiosis? Draw a picture.

Larger prokaryotes engulfed (“ate”) smaller ones. Both benefited from the situation.

This is how eukaryotes evolved – the theory states that the nucleus, mitochondria, chloroplast, etc. were originally free-living bacteria!



Cell Organelles: Define/give the function of the following:

11. Nucleus – “control center” of the cell – controls all cell activities. Contains chromosomes/DNA. ONLY in eukaryotes (plant and animal cells)

12. Cell Membrane – Surrounds the cell. Controls what goes in or out of the cell. Provides structure and support.

13. Golgi – packages and “ships” proteins.

14. Chloroplast – only found in plant cells. Photosynthesis occurs here.

15. Ribosome – where proteins are made.

16. Protein – molecules that perform many important functions in a cell. Making and using proteins is a cell’s job!!

17. Chromosomes – Contain genetic information (DNA). Found in the nucleus.

18. Endoplasmic Reticulum (ER) – Transports materials in the cell.

Cell Division

19. Purpose of Mitosis: Replace dead cells, grow and heal the body

20. What happens when Mitosis is not controlled? Cells divide too much and it can cause cancer.

21. What is the difference between a SPECIALIZED and UNSPECIALIZED cell?

A specialized cell has a specific function. When they divide they only turn into that type of cell (ex bone cells come from bone cells, muscle cells from muscle cells).

An unspecialized cell does not have a specific function. An unspecialized cell can turn into any type of cell (ex stem cells can turn into anything).

22. What is the relationship between structure and function? Give an example.

Structure is the form or shape and function is the job. The structure of a cell lets the cell do its job. Ex: Nerve cells send messages, and they have a long extension to send them faster. OR red blood cells are very round and small, to help them flow through the blood.

23. What is a stem cell and why is it special?

A stem cell is an UNSpecialized cell and it can become any cell type. Most cells go through cell division to make more of the same type of cell. Stem cells are very important for medicine – grow new organs, create new nerve cells for paralyzed people, etc.

Cell Membrane & Transport

24. What is the structure of the cell membrane?

2 layers (lipid bilayer), has channels to let things in and out.

25. What does selectively permeable mean?

Only lets certain things and certain amounts in and out.

26. What is the difference between active and passive transport?

Passive transport uses no energy and molecules move from high to low concentration.

Active transport uses energy and molecules move from low to high concentration.

27. What are the 3 types of passive transport? (list and define)

- 1) Diffusion – movement of molecules through the cell membrane
- 2) Facilitated Diffusion – movement of molecules through a protein
- 3) Osmosis – movement of water through the cell membrane

28. What are the 2 types of active transport? (list and define)

- 1) Endocytosis and exocytosis – large items push through the membrane in or out
- 2) Protein pumps – molecules are pumped through the membrane proteins from low to high concentration

Solutions: Define and give an example of the following:

29. Solute – the material that gets dissolved – usually a solid. Ex sugar, salt, Kool Aid powder.

30. Solvent – the liquid that does the dissolving – ex. Water

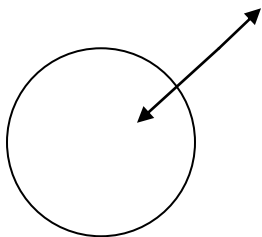
31. Solution – mixture of the two – ex. Kool-Aid drink, salt water.

32. Hypotonic (what does it mean and what happens to the cell?) – There is more solute inside the cell / more water outside the cell. Water flows IN to the cell (from high to low concentration) and the cell swells. “HIPPO” = hypo

33. Hypertonic (what does it mean and what happens to the cell?) – There is more solute outside the cell / more water inside the cell. Water flow OUT of the cell (from high to low concentration) and the cell shrinks.

34. Isotonic (what does it mean and what happens to the cell?) - There are equal amounts of solute and solvent inside and outside of the cell so water flows in and out equally. The cell stays the same size.

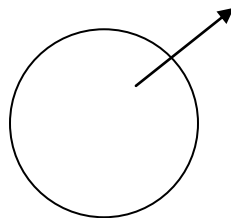
35. Draw arrow to show water movement. Label the tonic type and what happens to the cell:



(equal water and solute
on both sides)

ISOTONIC

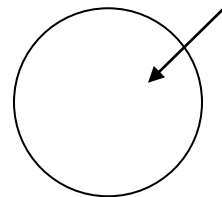
Cell will stay the same



(More solute outside,
more water inside)

HYPERTONIC

Cell will shrink



(More solute inside,
more water outside)

HYPOTONIC

Cell will swell