Scientific Method, 1.1/1.2 Review

Scientific Method

1. What are the steps of the scientific method?

1. Observation 2. Prediction 3. Hypothesis 4. Planning 5. Conducting 6. Recording 7. Analyze 8. Evaluate 9. Synthesize 10. Communicate

2. What is the difference between an observation and an inference? Give me an example

Observation is something that can be experienced with the 5 senses (sight, touch, taste, smell, hearing) and an inference is an educated guess based on observations.

Example: in the picture above: One bunny is brown, one bunny is grey -observation. An inference is that they are two different types of bunnies.

3. Using the following statement " Getting 8 hours of sleep a night increases performance in school" identify the following

- Hypothesis: "If a student received 8 hours of sleep a night, then the student's performance will improve.
- Independent variable – amount of sleep
- Dependant variable- performance in school
- Control group- group that sleeps whatever they would like
- Experimental group(s)- varies- group that sleeps 8 hours a night
- Control variables – participants, age, gender, standardized test to test perfomance

1.1

1. Why is the reproduction of cells important?

Growth, Repair (think of getting a cut), Reproduction(new organisms)

Provides nutrients and energy (think about what you eat)

2. Be able to identify important cell structures/organelles that are involved in cell reproduction

Cells, cell membrane, nucleus, centrioles, DNA (chromosomes and sister chromatids)

3. How do prokaryotes and eukaryotes differ? Give an example of each.

Prokaryotes: simpler, smaller, have organelles that are not surrounded by membranes (Bacteria)

Eukaryotes: more complex, larger, organelles that are surrounded by membranes. (animal/plant cells)

4. How does sustainability and continuity relate to reproduction?

Sustainability refers to the ability of the environment and the living things it supports to **endure (remain in existence)** into the future. **Reproduction** ensures that organisms have a source of **nutrients** and **energy** to sustain their life processes.

Continuity: how each species of organism continues to **exist** over time, from one **generation** to another. Individual organisms grow, develop and die, However, a species continues to exist into the future ONLY if its members **reproduce**

5. Compare and Contrast Asexual and Sexual Reproduction

Asexual	Sexual
• Offspring come from a single parent • Offspring are genetically identical to parent • Fast reproduction • Lots of offspring • Different types of asexual reproduction	• Involves two parents • Each parent contributes half of the offspring's genetic information • Offspring have genetic information that is different than parents • Less offspring • Genetic diversity • Slow reproduction

6. What is an organism's genetic material? What is its structure?

An organisms genetic material determines how it looks, how it functions and in many cases how it behaves.

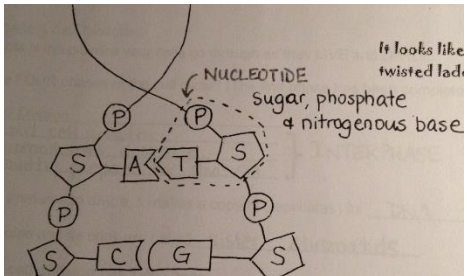
DNA – deoxyribonucleic acid

Set of instructions

Before a cell can reproduce the DNA must be replicated

DNA STRUCTURE

- 2 nucleotides joined together
- nucleotide: sugar, phosphate and nitrogenous base
- Nitrogenous bases: Adenine, Thymine, Guanine, Cytosine
- Complementary base pairing A-T, C-G

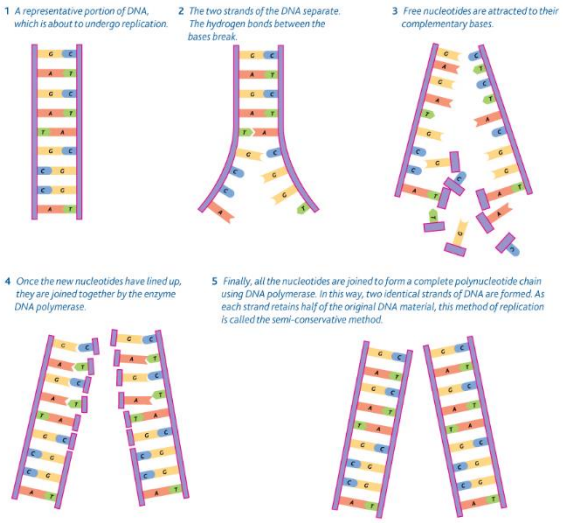


7. What is the difference between gene and genome?

An organisms genome is all of the genes (ie humans have 23 pairs(one from mom, one from dad) of chromosomes, 46 in total). A gene is a segment of DNA that codes for a specific characteristic ie Eye colour)

8. How does DNA replicate?

- DNA molecule opens up
- New bases join opened sides
- Each strand has one parent strand and one new daughter strand
- 1 original strand, 2 when finished

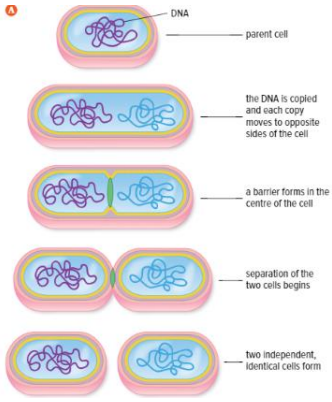


****** Complete Check your understanding on pg 13******

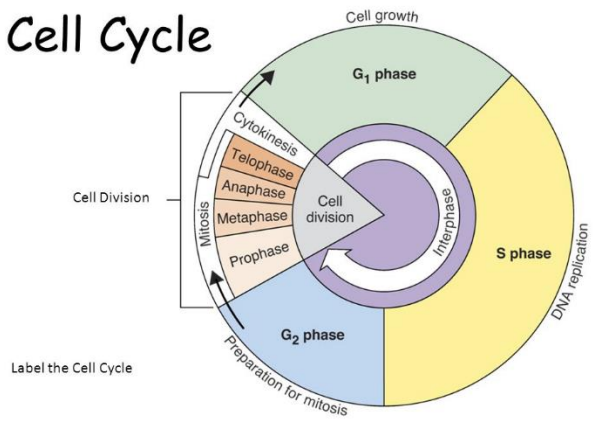
1.2

9. How do bacteria replicate?

Binary Fission



10. What is the cell cycle? Which organisms use the cell cycle? Give an example.



Eukaryotes use the cell cycle (humans)

11. What are the stages of the cell cycle? What happens at each stage?

#1 Interphase:

The phase of growing and working. 90% of the total time of the cell cycle. cell makes copies of all of its organelles, replicates its chromosomes (DNA). When the chromosome replicates it is known as sister chromatids

#2 Mitosis

- Phase 1: Prophase:
    - Sister chromatids formed during Interphase shorten and thicken. Each chromosome contains two copies of the same DNA. Sister chromatids have joined at the center and now look like an X. Nuclear membrane breaks down to allow chromosomes to spread out. Centrioles move to opposite poles of the cell. Form spindle fibres which will later move the chromosomes
- Phase 2: Metaphase:
    - Sister chromatids attach to the spindle fibers and line up along the “middle plate”. Spindle fibers guide sister chromatid movement. Sister chromatids line up along the middle of the cell.
- Phase 3: Anaphase
    - Sister chromatids are pulled apart. Now called chromosomes
- Phase 4: Telophase
    - 2 nuclear membranes form. Spindle disappears. Chromosomes lengthen and thin. Each nucleus contains a complete copy of the cell’s DNA

#3 Cytokinesis

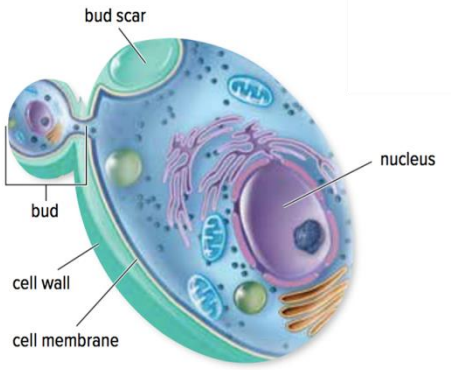
- Cytoplasm and organelles are divided. Two separate cells form. The cells then begin interphase

12. What happens if cell division is not regulated?

When cell division and growth is uncontrolled it can lead to a mass of cells (tumour). Tumours can be benign(stay in one place) or cancerous which can spread to other parts of the body. Cancer can be a result of unregulated cell growth. Caused by mutations in the gene that controls cell division. Mutations can be caused by things such as smoking, radiation(sun), chemicals, infectious diseases etc.

13. What is budding?

- Parent cell grows a bud that pinches off to become a separate cell
    - New cell is smaller than original cell at first
    - Eventually grows to the same size as other yeast cells



14. How do moulds reproduce?

- Spore formation
    - Moulds form spores that are genetically identical to the mould cells they come from
    - Spores are released into the air from a structure called a *sporangium*
    - When a spore lands in a favourable environment (warm, moist), it grows and divides by mitosis and cytokinesis

15. What is vegetative propagation?

Type of Asexual reproduction

- *New plants grow from a portion of the roots, stems, or leaves from an existing plant*
- New plants are **clones** (copies) of the parent plant

16. What is artificial vegetative propagation? Give an example

Artificial vegetative propagation uses techniques to produce plants with specific characteristics

- Grafting, cutting, splitting, air layering, simple layering, tissue culture
- **** have a general understanding of all

**** Complete Check your understanding on pg 35****

Topic 1.1 Why is the reproduction of cells important?

- ☐ Reproduction ensures that life exists beyond its present generation.
- ☐ Why do cells reproduce
    - Do all cells reproduce? If so do they reproduce at the same rate? Examples
- ☐ Reproduction transfers genetic information from parents to offspring.
    - Compare and Contrast the two types of reproduction
- ☐ What is the genetic material in your cell?
    - Where do you find it?
    - What is its structure?
    - How does it replicate?

Topic 1.2 What are different ways that living things reproduce asexually?

- ☐ Bacteria reproduce by binary fission.
    - How does this occur
- ☐ All eukaryotic cells reproduce by the cell cycle.
    - What are the phases of the cell cycle?
    - What happens in each phase?
- ☐ Yeasts reproduce by budding.

- How does this happen?

- ☐ Moulds reproduce using spores.
  - How does this happen?
- ☐ Plants have many ways to reproduce asexually.
  - Give examples