

**TEKS 5A** – describe the stages of the cell cycle, including deoxyribonucleic acid (DNA) replication and mitosis, and the importance of the cell cycle to the growth of organisms

1. Which of the following is a correct statement about the events of the cell cycle?

- A** Little happens during  $G_1$  and  $G_2$  phases of the cell cycle.
- B** DNA replicates during the S phase of interphase.
- C** Mitosis is usually the longest phase of the cell cycle when the cell is growing.
- D** Interphase consists of the  $G_1$ , S,  $G_2$  phases, and mitosis.

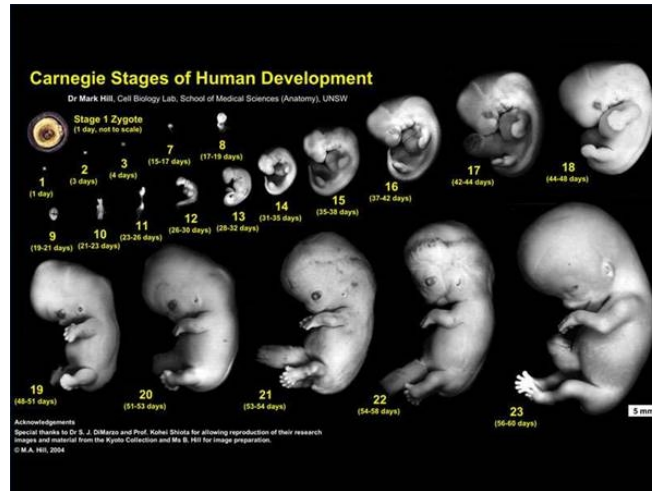
2. The M phase of the cell cycle consists of both mitosis and cytokinesis. Mitosis refers to \_\_\_\_\_, whereas cytokinesis refers to \_\_\_\_\_.

- A** Cell/cytoplasmic division, cell plate formation in animal cells
- B** Cell/cytoplasmic division, nuclear division
- C** Nuclear division, cell/cytoplasmic division
- D** Nuclear division, replication of nuclear material

3. A laboratory assistant was told to watch the mitosis of a eukaryotic cell under the microscope and inform the lead scientist when the cell entered prophase. What should the assistant expect to look for to indicate that the cell is in prophase?

- A** The chromosomes gather at opposite ends of the cell and uncoil, and then two new nuclear envelopes form around this genetic material.
- B** The sister chromatids separate into individual chromosomes and are moved apart.
- C** The chromosomes line up across the center of the cell, and each chromosome is connected to a spindle fiber.
- D** The chromatin condenses into chromosomes, the nuclear envelope breaks down, and a spindle begins to form.

4. The cell cycle is important to the growth of organisms. In humans, for example, mitosis begins shortly after the egg is fertilized by the sperm, producing vast numbers of cells needed for the embryo to take form. The diagram below represents the stages of human embryo development during the first 23 weeks.



During the process of mitosis, one parent cell divides to create –

- A four new genetically different daughter cells.
- B two new genetically identical daughter cells.
- C three new genetically identical daughter cells.
- D two new genetically different daughter cells.

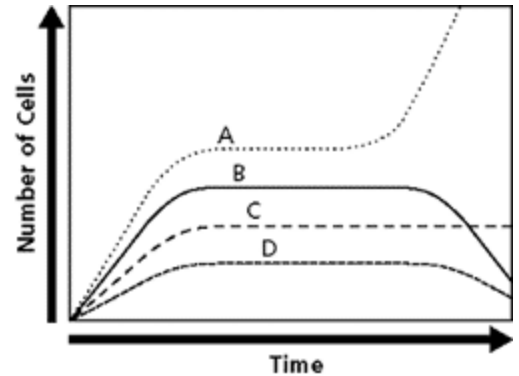
## TEKS 5D – recognize that disruptions of the cell cycle lead to diseases such as cancer

5. All forms of cancer are characterized by –

- A an abnormal, unregulated production of cells
- B the aggregation of cells into a mass called a tumor
- C the spreading of abnormal cells to tissues across the body
- D the inhibition of DNA replication in affected cells

6. A scientist studying cancer collected data from various types of cells. The data was placed into the line graph below. Which of the following statements explains why the cells depicted in line A are most likely cancerous?

- A The cancer cells stopped dividing when they became tightly packed together.
- B The cancer cells have begun to die off.
- C The cancer cells have experienced a disruption of the cell cycle and cannot control cell division.
- D The cancer cells are unable to synthesize DNA.

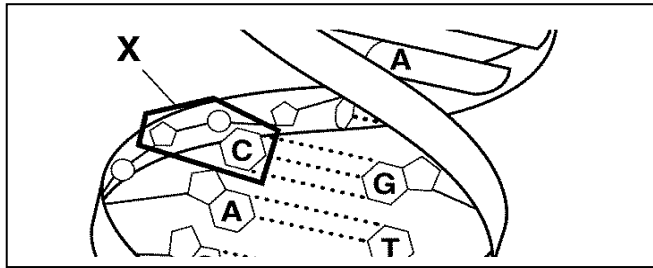


**TEKS 6A** –identify components of DNA, and describe how information for specifying the traits of an organism is carried in the DNA

7. Why will knowledge of the human genome enable scientists to better understand proteins involved in human diseases?

- A DNA contains the information used to make proteins.
- B Nucleic acid molecules have shapes similar to those of proteins.
- C The bases that make up DNA are also present in RNA.
- D Chromosomes can combine to form proteins.

8. In the figure **X** is pointing to the building block of DNA, which is:



- A** amino acid
- B** nucleotide
- C** polysaccharide
- D** pyrimidine

9. Erwin Chargaff studied the DNA of organisms within a single species. Chargaff discovered that the amount of adenine is about equal to the amount of thymine. Which of these explains why the ratio of adenine to thymine is nearly 1:1?

- A** Adenine and thymine pair with each other.
- B** Adenine binds with phosphates, while thymine binds with nitrates.
- C** Adenine and thymine are identical in chemical composition.
- D** Adenine bases contain a form of thymine.

10. The individuality of an organism is determined by the organisms

- A** nitrogen base sequence
- B** the order of the phosphates and sugars
- C** polymers
- D** amino acids

3' AATCGC 5'

11. Which of the following nucleotide base sequences complements the section of DNA modeled above?

- A 5' UTCGCA 3'
- B 5' TTAGCG 3'
- C 5' GCGATT 3'
- D 5' TTUCGC 3'

**TEKS 6B** – recognize that components that make up the genetic code are common to all organisms

| Organisms  | Nitrogenous Bases |         |          |         |
|------------|-------------------|---------|----------|---------|
|            | Adenine           | Guanine | Cytosine | Thymine |
| Human      | 30.4%             | 19.6%   | 19.9%    | 30.1%   |
| Ox         | 29.0              | 21.2    | 21.2     | 28.7    |
| Salmon     | 29.7              | 20.8    | 20.4     | 29.1    |
| Bacteria   | 24.7              | 26.0    | 25.7     | 23.6    |
| Sea urchin | 32.8              | 17.7    | 17.3     | 32.1    |

12. In the table above all organisms have

- A No nitrogenous bases in common with each other.
- B The same four nitrogenous bases in common with each other.
- C Human and Ox only share adenine in common with each other.
- D Bacteria and Sea Urchin have no common nitrogenous bases.

13. The components that make up the genetic code are common to all organisms. If a segment of a gene contains 27 nucleotides, none of which are stop or starts codons, how many amino acids does this segment code for?

- A** 3 amino acids
- B** 9 amino acids
- C** 27 amino acids
- D** 81 amino acids

14. Which component of the genetic code differs between DNA and RNA?

- A** Three nucleotides per codon
- B** The presence of adenine (A) in codons
- C** The presence of uracil (U) in codons
- D** The presence of amino acids in codons