

Expectation Sheet: DNA & Cell Cycle

NAME: _____

Test is 11/8/17

I can statements:

I can discuss how DNA is found in all organisms and that the structure is common to all living things.

I can diagram and label the DNA molecule.

I can explain how it is the nucleotide bases (ATCG) that codes for an organisms traits. The code is in the bases.

I can explain the importance of DNA replication.

I can sequence the steps in replication, using diagrams, models or written descriptions.

I can use base pairing rules to complete the complementary strand.

I can sequence the stages of Interphase and Mitosis (G1, S, G2) (PMAT).

I can describe what is occurring during each phase of the cell cycle and in interphase and mitosis.

I can describe when and why DNA replication occurs in the cell cycle.

I can explain the importance of the cell cycle in organisms.

I can recognize the differences in Interphase, Mitosis and Cytokinesis.

I can identify factors that cause mutations that disrupt the cell cycle.

I can discuss how rapidly dividing cells can cause diseases such as cancer.

VOCABULARY

- Mitosis
- Chromosomes
- Interphase
- G1,S,G2,M
- Prophase
- Metaphase
- Anaphase
- Telophase
- Cytokinesis
- Cleavage Furrow
- Spindle Fibers
- Cell Plate
- Centrioles
- Somatic
- Enzyme
- DNA Polymerase
- Helicase
- Complimentary Strands
- Semi-conservative
- Template
- Synthesis
- Anti-Parallel

DNA STRUCTURE

Basic Information:

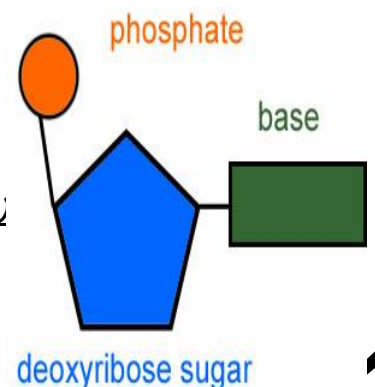
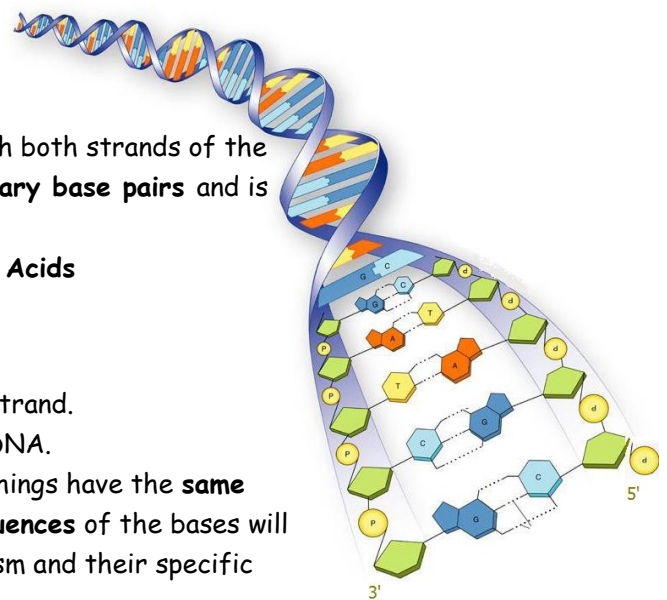
- Other names for DNA
Genetic Materials
Biological Blue Print
- Formed in a **double helix** with both strands of the ladder bonded in **complimentary base pairs** and is **anti-parallel**
- DNA's biomolecules: **Nucleic Acids**
- DNA's Monomer: **Nucleotide**

Nucleotides:

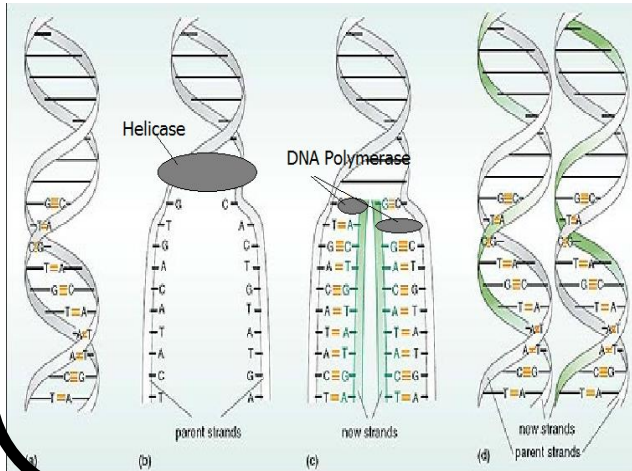
- The basic unit to the DNA Strand.
- All living organisms contain DNA.
- **DNA structures** in all living things have the **same parts**. The **difference in sequences** of the bases will determine the type of organism and their specific traits.
- Contains three parts
 1. **Phosphate**
 2. **Sugar**
 3. **Nitrogenous Bases**

Nitrogenous Bases (Carry the Genetic Code)

- These molecules make up the **ladder** of the DNA
- Bound by **weak hydrogen bonds**.
- 4 Different Types (2 specific matches) **A-T, C-G**



DNA REPLICATION



DNA Replication is so IMPORTANT!

- This is how new cells get the same genetic material as their parent cells.
- **Growth and development of new identical cells**
- **Cellular repair** allows the organism to heal from an injury and cells to grow back

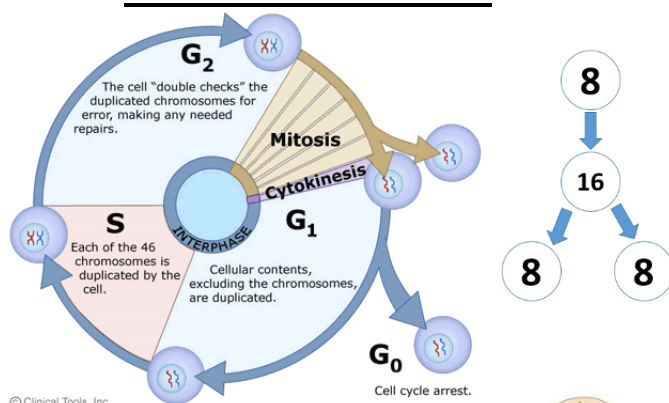
Steps of DNA replication:

1. **Parent Strand**
2. Enzyme **Helicase** unzips the DNA strand by breaking the hydrogens bonds.
3. Enzyme **DNA Polymerase** comes in next and binds the free floating nitrogenous bases to their complimentary bases.
4. **Two new semi-conservative identical strands** are formed.

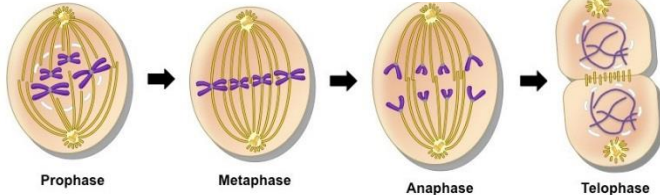
Parent-Strands

They are considered **semi-conservative** (one-new & one-old). Meaning one strand of the DNA is older while the other strand is a newly constructed one.

CELL CYCLE



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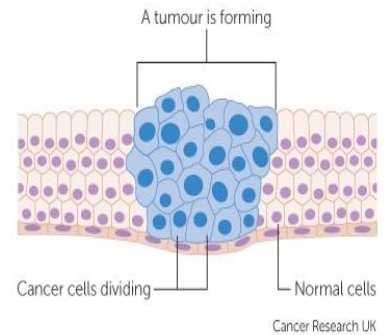


Steps in the Cell Cycle:

1. **Interphase**
 - a. **G₁ Phase**
 - b. **S Phase: (DNA REPLICATION)**
 - c. **G₂ Phase**
2. **Mitosis**
 - a. **Prophase**: Chromosomes get dense, nucleus disappears.
 - b. **Metaphase**: Chromosomes come to the center.
 - c. **Anaphase**: Chromosomes separate to the poles by **spindle fibers**
 - d. **Telophase**: Cell starts form a cleave furrow in the middle to start separation. (Cytokinesis at end of telophase)
3. **Cytokinesis**: Two newly separated daughter cells.
4. **G₀ Phase**: Resting Period (cells that never go to **G₀** create tumors)
5. **Cell goes back into G₁ Phase** and starts the process all over again. (Unless it turns into cancer)

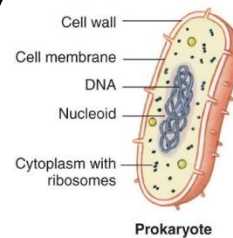
CANCER

- Exposure to carcinogens such as pollutions and radiations will cause mutation.
- The **Result of uncontrollable cellular division**.
- Cells cannot stop dividing.
- The cell never goes into the G₀ Phase and never rests.



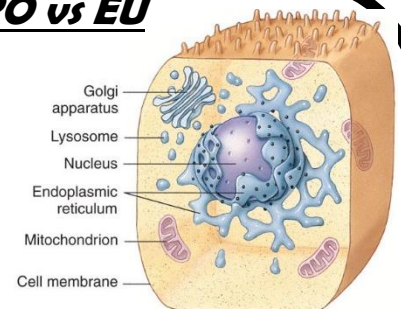
Cancer Research UK

PRO vs EU



Prokaryote

All Bacteria



Eukaryote

Everything except Bacteria

Pro=No Nucleus/Eu=True Nucleus

DNA Locations:

Pro: Cytoplasm
Eu: Nucleus

Membrane-Bound Organelles

Pro: None
Eu: Present

Ribosomes – in both

Pro: Present
Eu: Present

Eukaryotic ONLY

Membrane-Bound Organelles List:

1. Nucleus
2. Lysosomes
3. E.R.
4. Golgi
5. Mitochondria

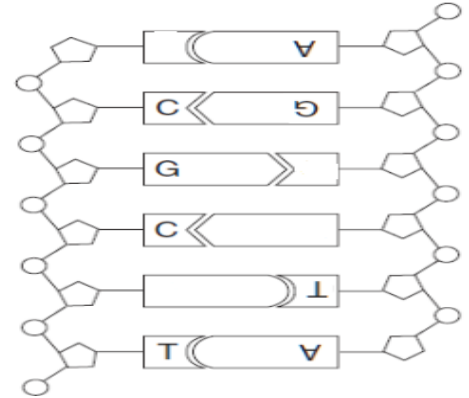
Expectation Sheet

Review - DNA & Cell Cycle

NAME: _____

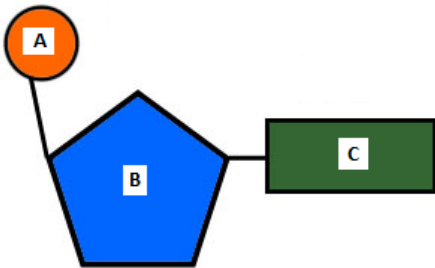
PERIOD _____

Look at the DNA strand on the right.



- Fill in the missing bases . . .
- Circle one nucleotide . . .
- What type of bond holds these bases together? _____
- How many nucleotides are in this image of DNA? _____
- If there was 26% Adenine, how much thymine would there be? _____
- If there was 20% guanine, how much Cytosine would be present? _____
- If there was 14% guanine, how much thymine would there be? (show your math)
- If there was 24% adenine, how much guanine would there be? (show your math)
- Traits are determined by the genetic code, what part of the DNA actually carries the code? _____
- What is semi conservative DNA? _____
- What is anti-parallel DNA? _____
- Write the complimentary bases for the following strands:
 3' ATC CGG GCA TTC GCC 5' 5' TTA GTA CCC TAG GGT AAC 3'

- What determines what an organism is and their specific traits? _____
- (YES / NO) Does a human and potato have the same DNA molecular parts?
- (YES / NO) Does a human and a potato have the same nitrogenous base sequence within their DNA?
- What is the monomer of a DNA molecule? _____
- What is the polymer of a DNA molecule? _____



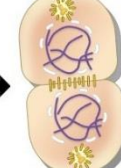
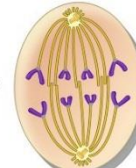
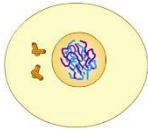
- What is the name of this structure? _____
- Name structure A _____
- Name structure B _____
- Name structure C _____
- What is the polymer of this structure? _____
- Which part of this structure carries the genetic code

- What are the four bases possible on a DNA nucleotide?

_____, _____, _____, _____

24. Fill in the steps to this cellular process:

Cell Cycle



What happens at the very end of mitosis to split the cells?

25. In which stage does DNA replicate? _____

26. What is the longest stage of the cell cycle? _____

27. What process is DNA preparing for when it replicates? _____

28. Why does DNA replicate before cell division? _____

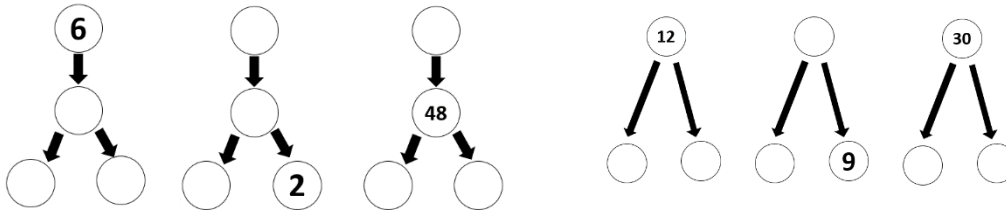
29. Which enzyme unzips DNA? _____

30. Which enzyme adds new nucleotides to the original "parent" strands? _____

31. The end result of replication is _____

32. Cancer cells do not enter the Go phase (the resting period), what do they do? _____

33. Fill in the chromosomal number for each cellular division if mitosis occurred.

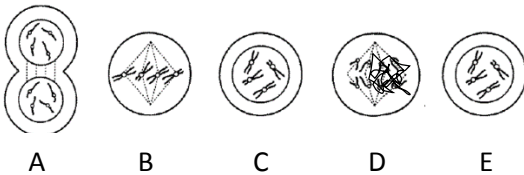


34. How do the daughter cells compare to each other after mitosis? _____

35. How do the daughter cells compare to the original cell after mitosis? _____

36. How many times did the cell divide during mitosis? _____

37. Put the following mitosis phases in the correct order. _____, _____, _____, _____, _____



38. Circle the Answer that describes what is happening in each of the following stages of the cell cycle:

Interphase: DNA is (REPLICATING / UNWINDING / SEPERATING)

Prophase: The (RIBOSOMES / CELL MEMBRANES / CHROMATIN) is condensing into chromosomes and the nucleus is (DISAPPEARING / GETTING BIGGER / DOUBLING)

Metaphase: The chromosomes are migrating to the (TOP / MIDDLE / BOTTOM)

Anaphase: Chromosome get (PULLED APART / PUSHED TOGETHER / DISAPPEAR)

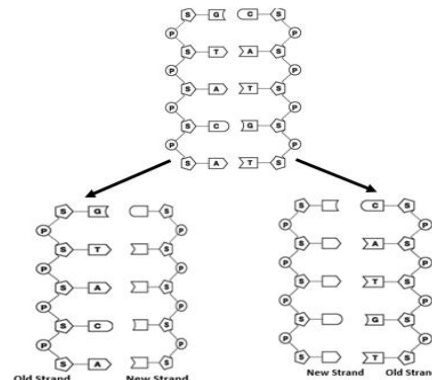
Telophase: The cell starts to (GROW BIGGER / DIVIDE / SHRINK) and the nucleus (REAPPEARS / DISAPPEARS)

Use the image to left to answer questions 39-41

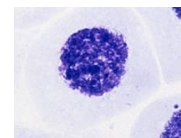
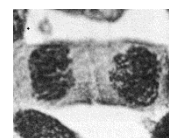
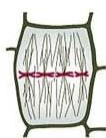
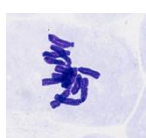
39. Circle the "original" strands in the resulting DNA.

40. How do the 2 new DNA strands compare to each other?

41. What is meant by DNA being a "Semi-Conservative" model?



42. Match that Phase. **Prophase, Telophase, Anaphase, Metaphase, Interphase, Cytokinesis**



A

B

C

D

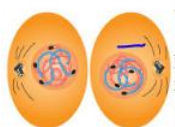
E

F

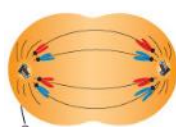
G

H

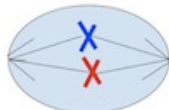
I



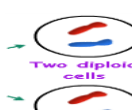
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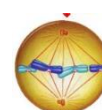
H



K



L



M

- a. _____
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____
- g. _____

- h. _____
- i. _____
- j. _____
- k. _____
- l. _____
- m. _____

PRO VS Eu (Use the Wordbank Below to Help You Answer the Questions)

43. Where is the DNA Found in Prokaryotic cells? _____
44. This organism is classified as a Prokaryote. _____
45. Where is the DNA found in a Eukaryotic cells? _____
46. These two organisms are classified as Eukaryotic. _____ and _____.
47. Which cell contains membrane-bound organelles? _____.

Eukaryote	Plants	In the cytoplasm
In the Nucleus	Bacteria	Animals