

Unit One HW 4  
Genetics C4

The Cell Cycle (3 min)

1. What are the three main segments of the cell cycle? (growth stage, nuclear division, division of the cytoplasm)
2. What happens in G1? (growth, make cytoplasm and organelles / normal cell function)
3. What happens in the S phase? (duplicate the DNA / 2 copies of each chromosome)
4. What happens in G2? (continue to prepare for cell division / normal function)
5. When do chromosome become visible and form? (prophase of the mitotic stage)
6. What is a sister chromatid? (the copy of a chromosome)
7. When does anaphase begin? (when the chromosomes at the equatorial plate separate and move towards opposite poles)
8. What results after cytokinesis? (two identical cells are formed)

Mitosis and cytokinesis ( 2 min)

1. What is mitosis? (division of the nucleus)
2. What is cytokinesis (division of the cytoplasm)
3. What do the centrioles form during the mitotic phase? (spindle fibers)
4. After anaphase, what are the chromatids now considered to be? (their own chromosome)

Modern Genetics (7 min)

1. What are the building blocks for DNA? (nucleotides form polymer call nucleic acids)
2. What are nucleotides made from? (sugar, nitrogen base, and a phosphate)
3. What do the A-T and C-G form? (the genetic code of DNA)
4. What does complementary base pairs mean? (A can only bind to T // C can only bind to G)
5. What hold the base pairs together? Why is this important? (weak hydrogen bonds / because the strands must separate to decode the gene)

DNA Replication (3 min)

1. What is the function of helicase? (unwinds or separates DNA)
2. What is the function of DNA polymerase? (it allows nucleotides to hydrogen bond with complementary bases pairs on a DNA strand)
3. Why are two different mechanisms required to copy the two strands of DNA? (because the original strands run in opposite directions)

Introduction to Genes (5 min)

1. When the planes came back from battle, what was the significance of the bullet holes? (not critical to planes operation)
2. What do you know if the same gene in many different species has not changed? (you find a gene in many different species and then look to see if any base pairs within the gene has been modified // areas that have never been modified tells you it is a critical area for gene function)

### What Separates Chimps from Humans? (2 min)

1. What chromosome number is discussed in this video? (2)
2. At the genetic level, how similar are humans and chimps? (98%)
3. How many chromosome do humans have? (23 pair)
4. How many chromosomes do chimps have? (24 pairs)
5. What happened to change the course of the two species? (one human chromosome two lines up with two chimp chromosomes //the two chimp chromosomes fused together and became the pathway leading to humans)
6. Significance? (created two species forever incomparable)

### Gene Expression: Initiation of Transcription (2 min)

1. What molecule is required for RNA transcription? (RNA polymerase)
2. Where does this occur? (nucleus)
3. What occurs during translation? (protein synthesis)

### Gene Expression: Transcription and Translation (1 min)

1. What is the name for the nucleotide information used to make protein? (genes)
2. What occurs during transcription? (mRNA formed inside nucleus)
3. What is the mRNA translated into? (amino acid sequence / protein)

### Translation (2 min)

1. When does translation begin? (when mRNA binds to ribosome)
2. What do transfer RNA bring to the ribosome-mRNA complex? (amino acids)
3. How many nucleotides code for one amino acid? (3)
4. What are the three nucleotides on the mRNA called? (codon)
5. What are the three nucleotides on the tRNA called (anticodon)
6. What happens when the ribosome reaches a stop codon? (the ribosome two segments break apart and releases from mRNA / the protein is now free from ribosome and mRNA)

### Protein Synthesis (5 min)

1. What is the first step in protein synthesis called? Location? (transcription, nucleus)
2. What is the second step in protein synthesis called? Location? (translation, cytoplasm)
3. How can you tell DNA from RNA? ( thymine is replaced by uracil in mRNA)
4. About what percent of DNA codes for protein? (about 2%)
5. Where may you find ribosomes in the cytoplasm? (attached to endoplasmic reticulum or in the cytoplasm)
6. What are ribosomes made from? (RNA and proteins)
7. How many mRNA are read at one time to code for one amino acid? Called? (3, codon)
8. What is tRNA called? Purpose? (transfer RNA, bring right amino acid to the codon)
9. What is the three base nucleotide on tRNA called? What does it match to? (anticodon, to codon of mRNA)
10. What type of bond forms between two amino acids? (peptide bond)
11. What is the starting amino acid? (methionine)
12. What codon stops protein synthesis? (UAA)

CRISP(Clusted Regularly Intespaced Short Palindromes) (15 min)

1. What does CRISP allow us to do? (change the genetic code)
2. Why do bacteria have CRISP? (adaptive immune response to virus)
3. Where is CRIP-CAS9 found in nature? Purpose? (bacteria, kill virus and insert palindrome into bacteria genome as a marker)

Out of the Lab and into Society (6 min)

1. What did Mary-Claire King work prove when she was earning her PhD? (human and chimp chromosomes are 98% similar)
2. What chromosome number is the location for the breast cancer gene? (17)3.