Cell Cycle Activity Group\_\_\_\_\_\_\_\_

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| --- | --- |
| Name: | Date: |
| Course: Honors Biology Period 1 2 3 4 5 6 7 8 9  | Teacher: McQuade |

**Objectives:**

**Next Generation Science Standards**

**HS-LS1-1** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells

**HS-LS1-4** Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

**HS-LS3-1** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

**Learning Objectives**

* The student can make predictions about natural phenomena occurring during the cell cycle.
* The student is able to describe representations and models that illustrate how genetic information is copied for transmission between generations.
* The student is able to describe representations and models illustrating how genetic information is translated into polypeptides.
* The student can describe the events that occur in the cell cycle.
* The student can create a visual representation to illustrate how changes in a DNA nucleotide sequence can result in a change in the polypeptide produced.
* The student is able to construct scientific explanations that use the structures and mechanisms of DNA and RNA to support the claim that DNA is the primary source of heritable information.

**Day 1: Pre-Lab**

Identify the following parts and describe their function/ role in maintaining homeostasis within the cell

|  |  |  |
| --- | --- | --- |
| Cell Part | Organelle Name | Function |
| http://timvandevall.com/wp-content/uploads/animal-cell-diagram-unlabled.png |  |  |
| http://timvandevall.com/wp-content/uploads/animal-cell-diagram-unlabled.png |  |  |
| http://timvandevall.com/wp-content/uploads/animal-cell-diagram-unlabled.png |  |  |
| http://timvandevall.com/wp-content/uploads/animal-cell-diagram-unlabled.png |  |  |
| http://timvandevall.com/wp-content/uploads/animal-cell-diagram-unlabled.png |  |  |

Define the following words:

1. Gene
2. Chromosome
3. Adaptation
4. How many chromosomes do humans have?
5. How many pieces of DNA are in each chromosome?
6. How many pieces of DNA does a human have?
7. What does the plastic egg represent? What is this organelles role in maintaining homeostasis?
8. What do the strips of paper inside the egg represent? What is their role in maintaining homeostasis?
9. What does the plastic baggy represent? What is this organelles role in maintaining homeostasis?

**Day 2: Lab Activity**

1. Write all of the DNA sequences your group is working with in the chart below

|  |  |
| --- | --- |
| Sequence 1 |  |
| Sequence 2 |  |
| Sequence 3 |  |
| Sequence 4 |  |

1. Every person in your group should choose 1 chromosome to work with
2. Copy the DNA sequence in the space provided below
3. Transcribe your DNA sequence into mRNA in the space provided below
4. Translate your mRNA sequence using the codon chart and beads.
5. Sketch what your protein looks like in the space below

|  |  |
| --- | --- |
| DNA Sequence |  |
| mRNA Sequence |  |
| Proteins made |  |

Questions

1. Does your protein look the same as anyone else’s in your group? Explain why.
2. Does your protein look like any other groups protein?
3. In the chart below, list at least 5 proteins that you have learned about and briefly describe their functions?

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|  |  |

1. Explain why different cells need different collections of proteins.
2. Given what you know about DNA 🡪 RNA 🡪 Protein, predict what you think the outcome would be of a change in the DNA Sequence to the sequence of RNA and to the protein that is made.
3. Would a cell with a change in its DNA sequence be able to do its job? Explain why or why not

**Day 3: Lab Activity**

1. Cells need a way to copy their chromosomes and correctly divide them up into two equal groups when they divide. It is your job to come up with a procedure to do this within your group. Be as descriptive as possible and write a procedure to do this for your cell. Be Careful! If this isn’t done correctly your cell could die :X

Write your procedure below. Feel free to include diagrams showing what each step would look like. (This must be done collaboratively as a group! Everyone in the group should have the same procedure.)

**Day 4: Lab Activity**

|  |  |
| --- | --- |
| **Part 1** | 1. Obtain your cell.
2. Start a stop watch.
3. Everybody in the group should find the chromosome that they choose to use for in Day 2 of the lab.
4. Write how many chromosomes there are total for the whole cell in the chart below.
5. Once everyone has their chromosome, they should build 2 copies of their protein.
6. Once everyone has 2 copies of their proteins, stop the timer and record the time in the chart below.
 |
| **Part 2** | 1. Reset and start your timer.
2. Copy your DNA sequence onto the extra strip of paper provided strip of paper. Make sure to write neatly so it could be read.
3. Double check it for mistakes, remember, a mistake in the sequence means your cell could die.
4. Once everyone has made a copy of their chromosome and checked it. Stop the timer and record how long it took in the chart below.
5. Write how many chromosomes there are total for the whole cell in the chart below.
 |
| **Part 3** | 1. Reset and start your timer.
2. Obtain an extra set of organelles and cut them out
3. Once all organelles are cut out, stop the timer and record the time in the chart below.
4. Write how many chromosomes there are total for the whole cell in the chart below.
 |
| **Part 4** | 1. Reset and start your timer.
2. Follow your procedure to divide up your chromosomes and put a complete set into each nucleus.
3. Stop the timer and record the time in the chart below.
4. Write how many chromosomes there are total for the whole cell in the chart below.
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| **Part 5** | 1. Reset and start your timer.
2. Put 1 nucleus (with chromosomes) into each of the smaller plastic baggies, along with one of each organelle and protein you made.
3. Stop the timer and record the time in the chart below.
4. Write how many chromosomes there are total for each whole cell in the chart below.
5. **Call me over to verify completion of this and receive your points!**
6. Disassemble your proteins and put the beads back into the main bag.
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**Data Table**

|  |  |  |
| --- | --- | --- |
|  | Time | # of Chromosomes |
| Part 1 |  |  |
| Part 2 |  |  |
| Part 3 |  |  |
| Part 4 |  |  |
| Part 5 |  |  |
| Average |  |  |

1. Use the circle below to make a pie graph showing the relative amounts of time you spent on each part. Briefly (1 sentence) describe what you were doing during each part.
2. In your own words, explain how the structure of DNA codes for the structure of proteins.
3. Why was it important to copy the DNA before dividing the cell into two?
4. Predict what would happen if you lost a chromosome in your cell.(Hint: think about the protein it codes for)
5. Predict what would happen if you had an extra copy of one of the a chromosomes in your cell.(Hint: think about the protein it codes for)
6. List 3 different types of cell found in your body and briefly describe their role in keeping you alive.

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| --- | --- |
| Cell Type | Function in Maintaining Homeostasis |
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