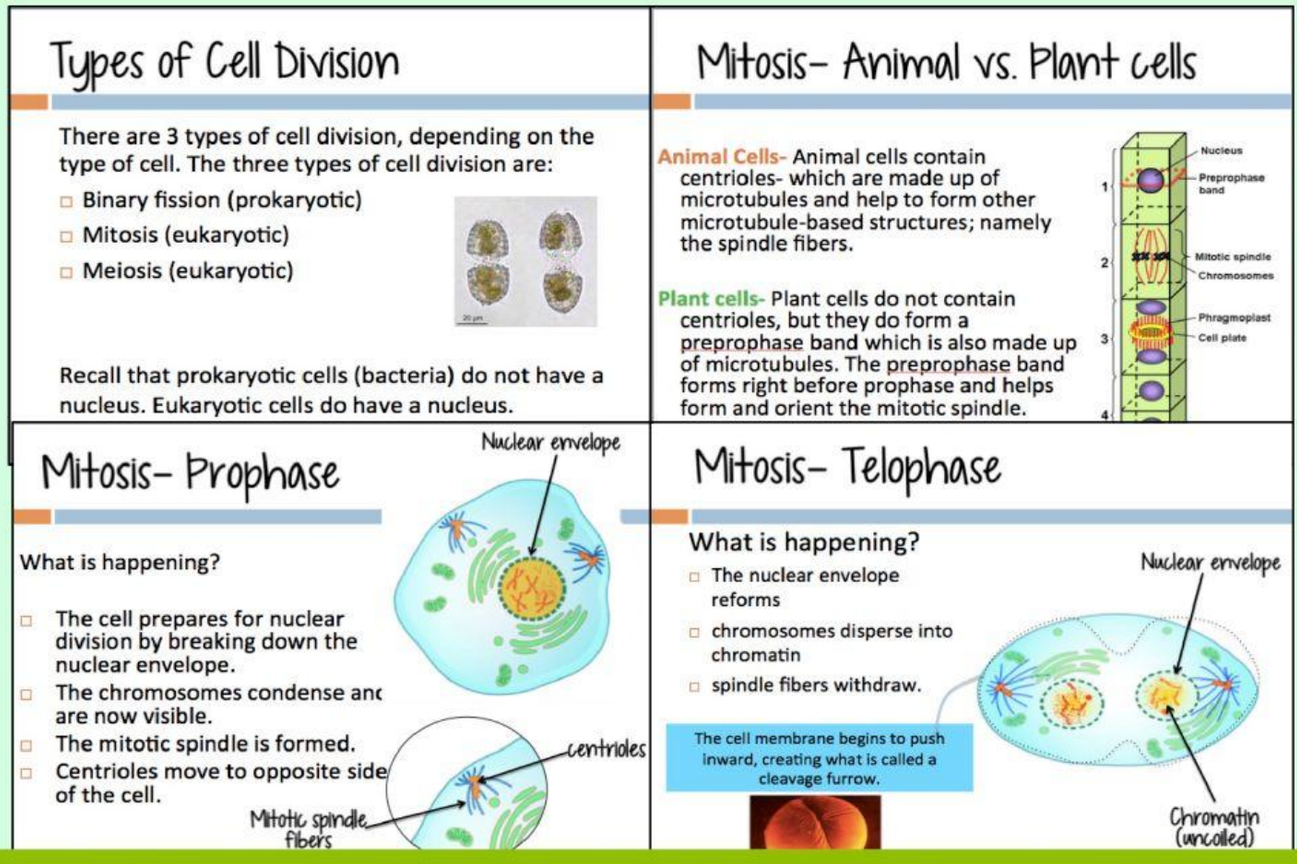
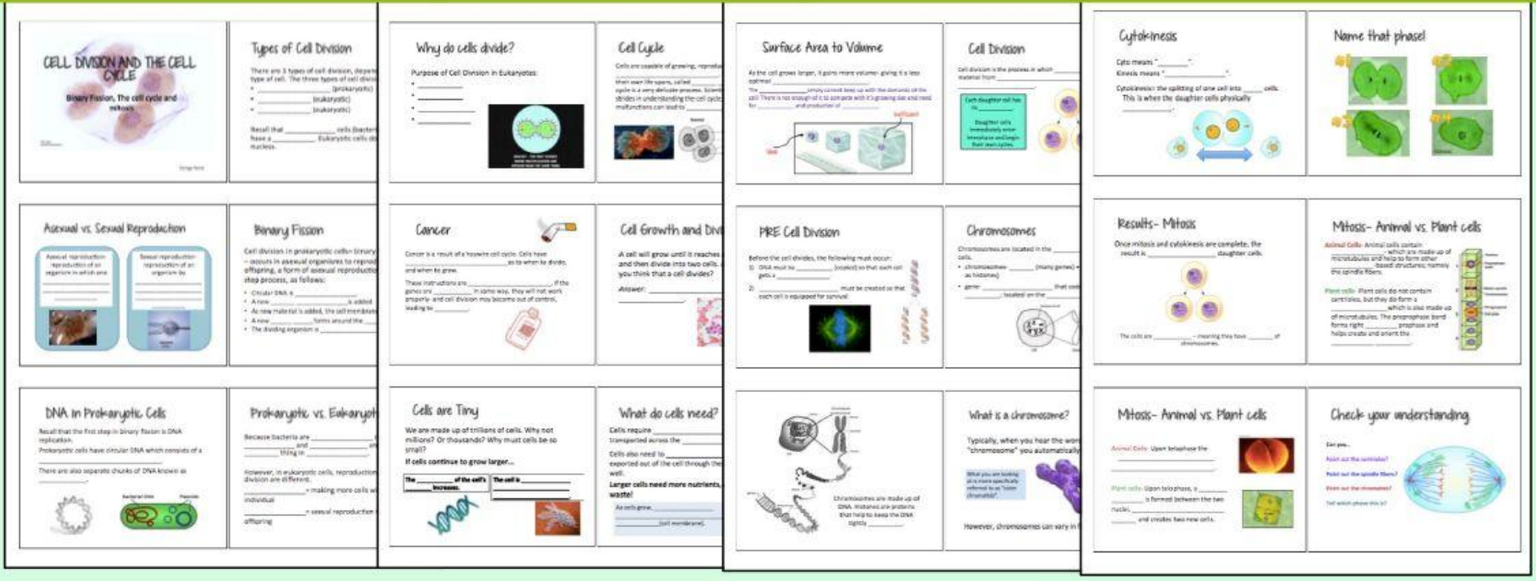
mitosis
Activity Package

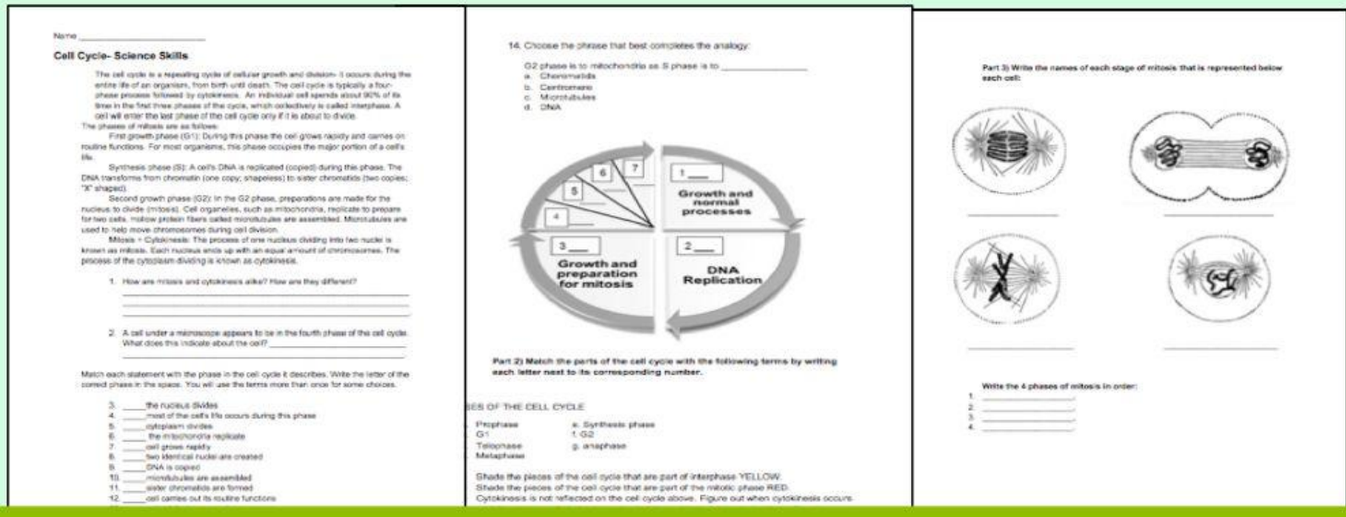
POWERPOINT PLUS CORRESPONDING ACTIVITIES TO HELP TEACH MITOSIS – 45 SLIDES



STUDENT SHEET FOR RECORDING NOTES INCLUDED



PRACTICE SHEETS- THE CELL CYCLE



Name _____

Cell Cycle- Science Skills

The cell cycle is a repeating cycle of cellular growth and division- it occurs during the entire life of an organism, from birth until death. The cell cycle is typically a four-phase process followed by cytokinesis. An individual cell spends about 90% of its time in the first three phases of the cycle, which collectively is called interphase. A cell will enter the last phase of the cell cycle only if it is about to divide.

The phases of mitosis are as follows:

First growth phase (G1): During this phase the cell grows rapidly and carries on routine functions. For most organisms, this phase occupies the major portion of a cell's life.

Synthesis phase (S): A cell's DNA is replicated (copied) during this phase. The DNA transforms from chromatin (one copy; shapeless) to sister chromatids (two copies; "X" shaped).

Second growth phase (G2): In the G2 phase, preparations are made for the nucleus to divide (mitosis). Cell organelles, such as mitochondria, replicate to prepare for two cells. Hollow protein fibers called microtubules are assembled. Microtubules are used to help move chromosomes during cell division.

Mitosis + Cytokinesis: The process of one nucleus dividing into two nuclei is known as mitosis. Each nucleus ends up with an equal amount of chromosomes. The process of the cytoplasm dividing is known as cytokinesis.

1. How are mitosis and cytokinesis alike? How are they different?

2. A cell under a microscope appears to be in the fourth phase of the cell cycle. What does this indicate about the cell?

Match each statement with the phase in the cell cycle it describes. Write the letter of the correct phase in the space. You will use the terms more than once for some choices.

3. ____ the nucleus divides
4. ____ most of the cell's life occurs during this phase
5. ____ cytoplasm divides
6. ____ the mitochondria replicate
7. ____ cell grows rapidly
8. ____ two identical nuclei are created
9. ____ DNA is copied
10. ____ microtubules are assembled
11. ____ sister chromatids are formed
12. ____ cell carries out its routine functions

14. Choose the phrase that best completes the analogy:

G2 phase is to mitochondria as S phase is to _____

a. Chromatids
b. Centromere
c. Microtubules
d. DNA

Part 2) Match the parts of the cell cycle with the following terms by writing each letter next to its corresponding number.

ES OF THE CELL CYCLE

Prophase — e. Synthesis phase
G1 — f. G2
Telophase — g. anaphase
Metaphase

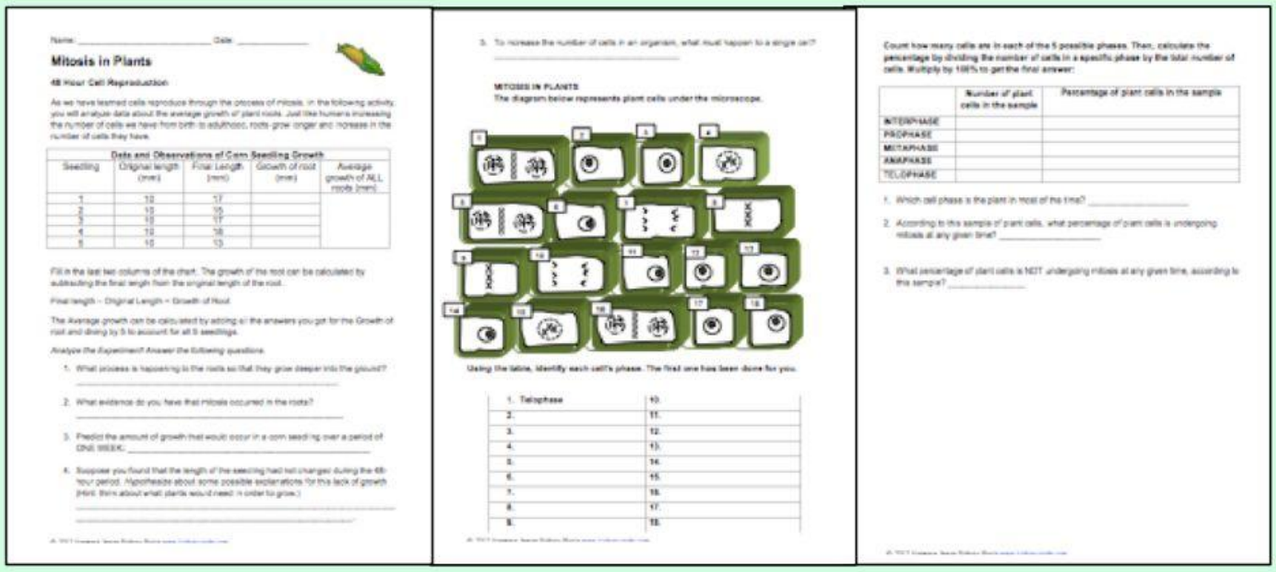
Shade the pieces of the cell cycle that are part of interphase YELLOW.
Shade the pieces of the cell cycle that are part of the mitotic phase RED.
Cytokinesis is not reflected on the cell cycle above. Figure out when cytokinesis occurs.

Part 3) Write the names of each stage of mitosis that is represented below each cell:

Write the 4 phases of mitosis in order:

1. _____
2. _____
3. _____
4. _____

PRACTICE SHEETS- MITOSIS



Name: _____ Date: _____

Mitosis in Plants

48 Hour Cell Reproduction

As we have learned cells reproduce through the process of mitosis. In the following activity you will analyze data about the average growth of plant roots. Just like humans increasing the number of cells we have from birth to adulthood, roots grow longer and increase in the number of cells they have.

Data and Observations of Corn Seedling Growth

Seedling	Original length (mm)	Final Length (mm)	Growth of root (mm)	Average growth of ALL roots (mm)
1	10	17		
2	10	15		
3	10	17		
4	10	16		
5	10	13		

Fill in the last two columns of the chart. The growth of the root can be calculated by subtracting the final length from the original length of the root.

Final length – Original Length = Growth of Root

The Average growth can be calculated by adding all the answers you got for the Growth of root and diving by 5 to account for all 5 seedlings.

Analyze the Experiment! Answer the following questions.

1. What process is happening to the roots so that they grow deeper into the ground?
2. What evidence do you have that mitosis occurred in the roots?
3. Predict the amount of growth that would occur in a corn seedling over a period of ONE WEEK: _____
4. Suppose you found that the length of the seedling had not changed during the 48-hour period. Hypothesize about some possible explanations for this lack of growth (Hint: think about what plants would need in order to grow.)

5. To increase the number of cells in an organism, what must happen to a single cell?

MITOSIS IN PLANTS

The diagram below represents plant cells under the microscope.

Using the table, identify each cell's phase. The first one has been done for you.

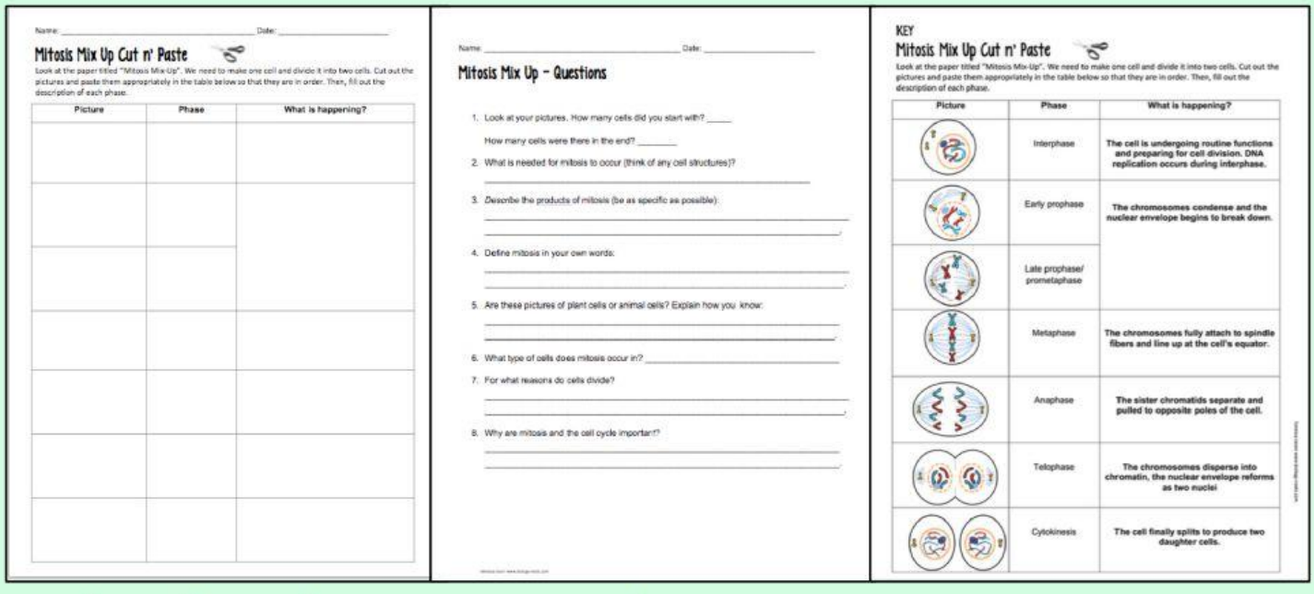
1. Telophase	10.
2.	11.
3.	12.
4.	13.
5.	14.
6.	15.
7.	16.
8.	17.
9.	18.

Count how many cells are in each of the 5 possible phases. Then, calculate the percentage by dividing the number of cells in a specific phase by the total number of cells. Multiply by 100% to get the final answer:

	Number of plant cells in the sample	Percentage of plant cells in the sample
INTERPHASE		
PROPHASE		
METAPHASE		
ANAPHASE		
TELOPHASE		

1. Which cell phase is the plant in most of the time? _____
2. According to this sample of plant cells, what percentage of plant cells is undergoing mitosis at any given time? _____
3. What percentage of plant cells is NOT undergoing mitosis at any given time, according to this sample? _____

Mitosis in Plant Cells



Name: _____ Date: _____

Mitosis Mix Up Cut n' Paste

Look at the paper titled "Mitosis Mix-Up". We need to make one cell and divide it into two cells. Cut out the pictures and paste them appropriately in the table below so that they are in order. Then, fill out the description of each phase.

Picture	Phase	What is happening?

Name: _____ Date: _____

Mitosis Mix Up - Questions

1. Look at your pictures. How many cells did you start with? _____
   How many cells were there in the end? _____
2. What is needed for mitosis to occur (think of any cell structures)?
3. *Describe* the products of mitosis (be as specific as possible):
4. Define mitosis in your own words:
5. Are these pictures of plant cells or animal cells? Explain how you know:
6. What type of cells does mitosis occur in? _____
7. For what reasons do cells divide?
8. Why are mitosis and the cell cycle important?

KEY

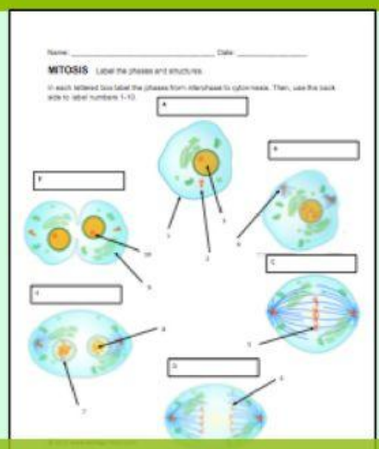
Mitosis Mix Up Cut n' Paste

Look at the paper titled "Mitosis Mix-Up". We need to make one cell and divide it into two cells. Cut out the pictures and paste them appropriately in the table below so that they are in order. Then, fill out the description of each phase.

Picture	Phase	What is happening?
	Interphase	**The cell is undergoing routine functions and preparing for cell division. DNA replication occurs during interphase.**
	Early prophase	**The chromosomes condense and the nuclear envelope begins to break down.**
	Late prophase/ prometaphase	
	Metaphase	**The chromosomes fully attach to spindle fibers and line up at the cell's equator.**
	Anaphase	**The sister chromatids separate and pulled to opposite poles of the cell.**
	Telophase	**The chromosomes disperse into chromatin, the nuclear envelope reforms as two nuclei**
	Cytokinesis	**The cell finally splits to produce two daughter cells.**

Mitosis Mix Up- cut n' paste

PRACTICE SHEETS- MITOSIS



Name: _____ Date: _____

MITOSIS Label the phases and structures.

In each lettered box label the phases from interphase to cytokinesis. Then, use the back side to label numbers 1-10.

A

B

C

D

E



Mitosis Poster Guidelines: 60 possible points

1) Each project must be done on an **8 x 11** sheet of paper

2) Choose which cell type (plant or animal) you would like to use for this project. Make sure you acknowledge that mitosis is slightly different for each, and depending on which one you choose you must depict an accurate drawing with the correct structures.

3) Include interphase followed by the 4 states of mitosis, followed by cytokinesis. Your poster will have 5 drawings total.

4) Your poster must be clearly labeled and neat. All visible significant structures must be labeled in each drawing (i.e., centrioles).

5) Each drawing must have a description next to it with a summary of what is happening during that specific stage (be sure it is clear as to which description matches which drawing).

6) Each drawing must be clearly **numbered** in the correct order.

Each drawing is worth 10 points

1 point) the drawing is numbered correctly

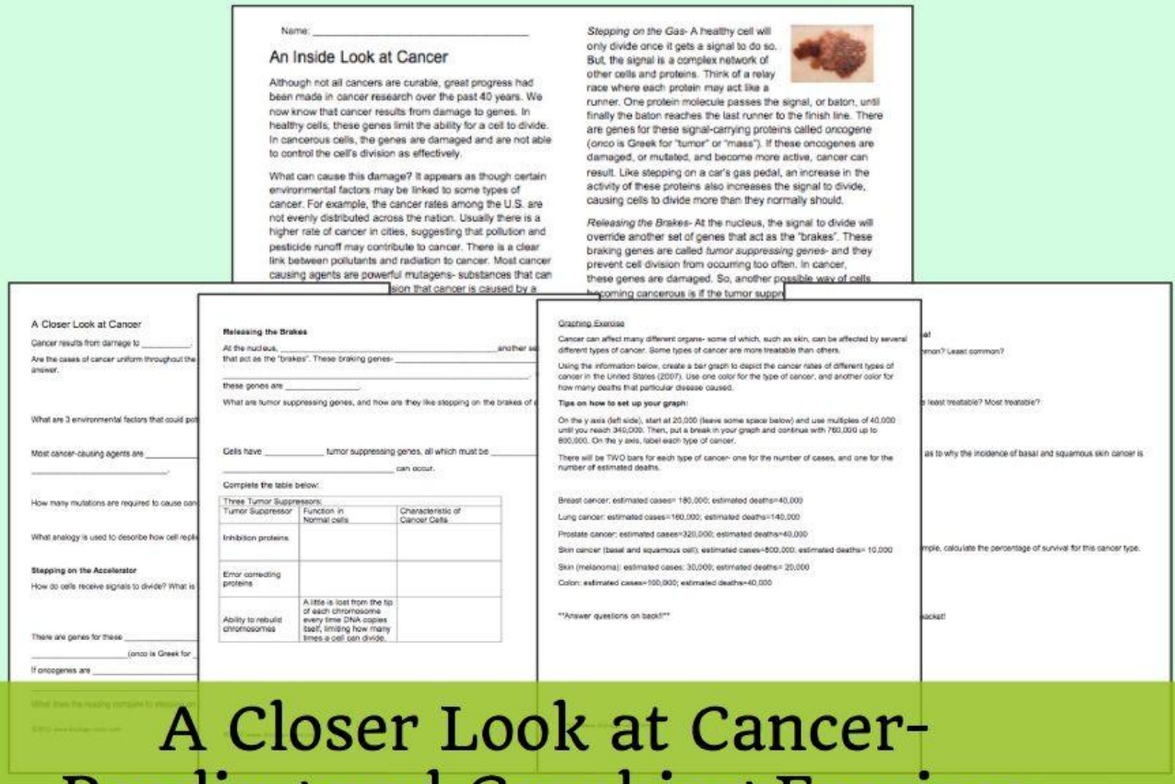
4 points) the drawing is accurate, properly labeled and neat

4 points) the description is accurate, properly labeled and neat

1 point) creativity (color, appealing to the eye)

} 10+6=60 points

Mitosis Labeling and Poster Rubric



Name: _____

An Inside Look at Cancer

Although not all cancers are curable, great progress had been made in cancer research over the past 40 years. We now know that cancer results from damage to genes. In healthy cells, these genes limit the ability for a cell to divide. In cancerous cells, the genes are damaged and are not able to control the cell's division as effectively.

What can cause this damage? It appears as though certain environmental factors may be linked to some types of cancer. For example, the cancer rates among the U.S. are not evenly distributed across the nation. Usually there is a higher rate of cancer in cities, suggesting that pollution and pesticide runoff may contribute to cancer. There is a clear link between pollutants and radiation to cancer. Most cancer causing agents are powerful mutagens- substances that can

Stepping on the Gas- A healthy cell will only divide once it gets a signal to do so. But, the signal is a complex network of other cells and proteins. Think of a relay race where each protein may act like a runner. One protein molecule passes the signal, or baton, until finally the baton reaches the last runner to the finish line. There are genes for these signal-carrying proteins called oncogene (onco is Greek for "tumor" or "mass"). If these oncogenes are damaged, or mutated, and become more active, cancer can result. Like stepping on a car's gas pedal, an increase in the activity of these proteins also increases the signal to divide, causing cells to divide more than they normally should.

Releasing the Brakes- At the nucleus, the signal to divide will override another set of genes that act as the "brakes". These braking genes are called *tumor suppressing genes*- and they prevent cell division from occurring too often. In cancer, these genes are damaged. So, another possible way of cells becoming cancerous is if the tumor suppr

son that cancer is caused by a

A Closer Look at Cancer

Cancer results from damage to _____.

Are the cases of cancer uniform throughout the answer.

What are 3 environmental factors that could pot

Most cancer-causing agents are _____

_____.

How many mutations are required to cause can

What analogy is used to describe how cell repli

Releasing the Brakes

At the nucleus, _____ another se

that act as the "brakes". These braking genes- _____

_____.

these genes are _____.

What are tumor suppressing genes, and how are they like stepping on the brakes of

Cells have _____ tumor suppressing genes, all which must be _____

_____ can occur.

Complete the table below:

Three Tumor Suppressors:		
Tumor Suppressor	Function in Normal cells	Characteristic of Cancer Cells
Inhibition proteins		
Error correcting proteins		
Ability to rebuild chromosomes	A little is lost from the tip of each chromosome every time DNA copies itself, limiting how many times a cell can divide.	

Graphing Exercise

Cancer can affect many different organs- some of which, such as skin, can be affected by several different types of cancer. Some types of cancer are more treatable than others.

Using the information below, create a bar graph to depict the cancer rates of different types of cancer in the United States (2007). Use one color for the type of cancer, and another color for how many deaths that particular disease caused.

Tips on how to set up your graph:

On the y axis (left side), start at 20,000 (leave some space below) and use multiples of 40,000 until you reach 340,000. Then, put a break in your graph and continue with 760,000 up to 800,000. On the y axis, label each type of cancer.

There will be TWO bars for each type of cancer- one for the number of cases, and one for the number of estimated deaths.

Breast cancer: estimated cases= 180,000; estimated deaths=40,000

Lung cancer: estimated cases=160,000; estimated deaths=140,000

Prostate cancer: estimated cases=320,000; estimated deaths=40,000

Skin cancer (basal and squamous cell): estimated cases=800,000; estimated deaths= 10,000

Skin (melanoma): estimated cases: 30,000; estimated deaths= 20,000

Colon: estimated cases=100,000; estimated deaths=40,000

Answer questions on back!

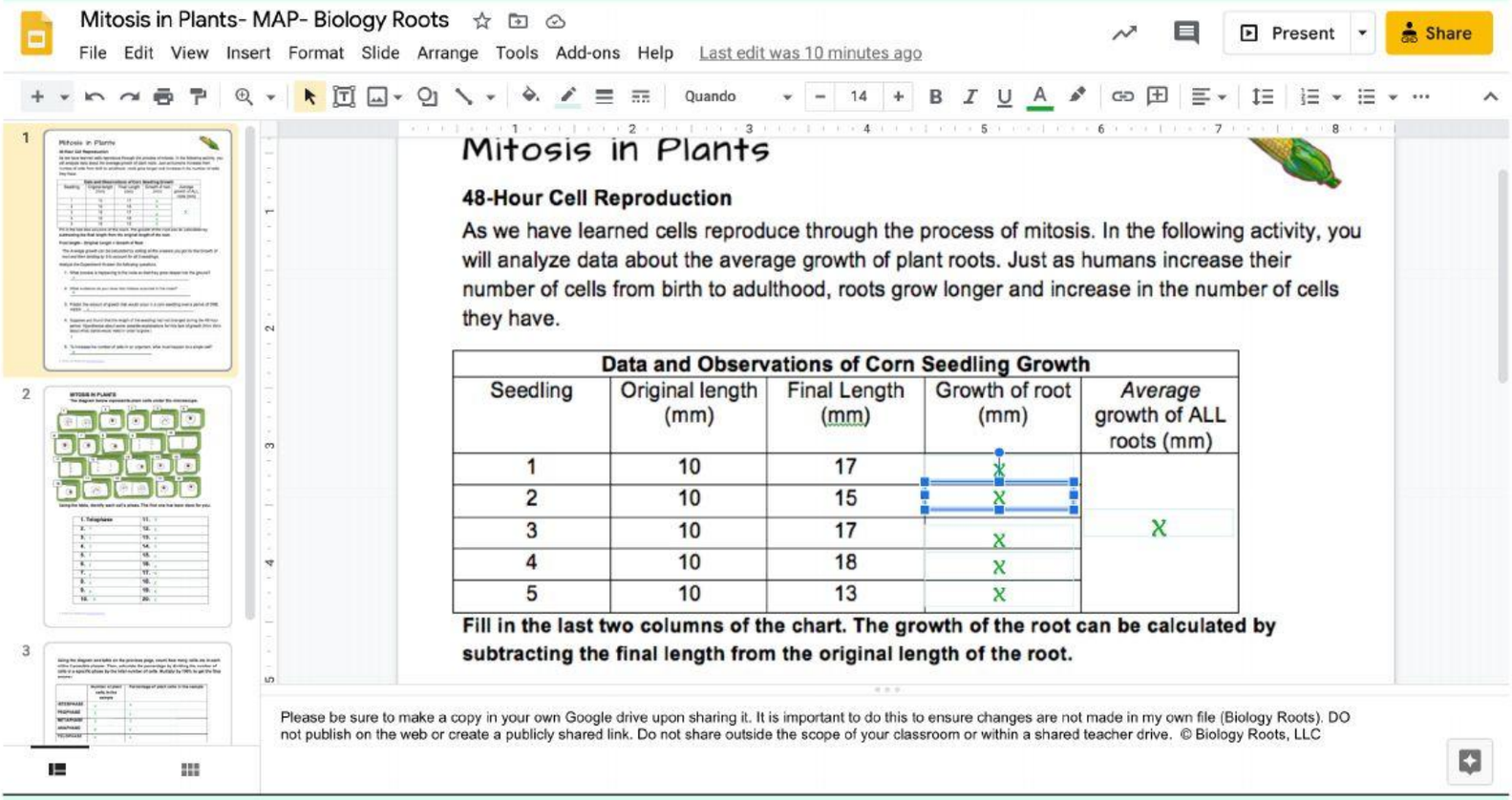
A Closer Look at Cancer- Reading and Graphing Exericse

"Must do" **mitosis** activity package
Includes an editable PowerPoint
plus 5 corresponding activities

biology roots
Classroom resources to promote scientific literacy and curiosity.

GOOGLE

AVAILABLE AS BOTH *paperless* DIGITAL *and* TRADITIONAL *print*



RESOURCES ALSO INCLUDED ON GOOGLE SLIDES:

- CELL CYCLE SCIENCE SKILLS
- AN INSIDE LOOK AT CANCER
- MITOSIS MIX UP
- MITOSIS IN PLANTS

biology roots

Classroom resources to promote *scientific literacy* and curiosity.

Thank you so much for supporting biology roots

I am so excited that you will be using my resources to *benefit* your classroom. Listed below are some categories of products that I offer in my TpT store:

Digital Interactive Notebooks	Complete Units- No prep!
Paper Interactive Notebooks	Super Duper Science Sub Plans
Captivating Presentations	Terrific Task Cards

Copyright Notice and Terms of Use © Vanessa Jason ("Biology Roots")

All rights reserved by author. This product is to be used by the original purchaser only. This purchase grants one license for personal use. Duplication for other classes or by other teachers or for use in school wide distribution is strictly forbidden. Posting Biology Roots products on the internet in any form is strictly forbidden and violates the DMCA. Not for public display, including ANY websites. Violations are subject to the penalties of the Digital Millennium Copyright Act.



It IS Okay to...	It is NOT Okay to...
Use this for *personal use only* in your classroom as often as you would like, every year!	• Share this resource with your coworkers or friends unless you buy additional licenses, • (1 per each additional teacher), which are offered at a discount. • Post this item to your school website, personal website, file-sharing website, ANY website, without consent from the author, Vanessa Jason.

biology roots

Sign up for my newsletter to receive exclusive offers.



Subscribe to get a free science sub plan from Biology Roots!

Email Address

Sounds good!