

## Science

Directions: Please do one topic per week. You **must** do the work in this order: 1. Comparing Mitosis and Meiosis 2. Dominant and Recessive Traits 3. Genetics and Pedigrees 4. Earth's Interior Plate tectonics and the Earth's Surface 5. Fossils and the fossil record. If we are out longer than 5 weeks you may select one topic each week from one of the other 4 topics to work on.

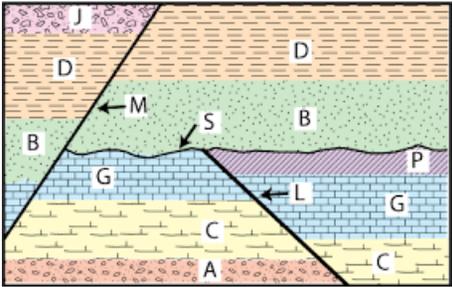
- Learning Outcomes: Students will review key concepts for the 8th Grade Air Assessment
- Task: 8th Grade Science AIR Review Menu

PLEASE LOOK AT BOTH SIDES OF THE PAPER.

I have also included articles on [Comparing Mitosis and Meiosis](#) and [Dominant and Recessive Traits](#).

If you have questions please email me [CrankMa@cpsboe.k12.oh.us](mailto:CrankMa@cpsboe.k12.oh.us)

<p><b><u>Newton's Laws of Motion:</u></b> Create a brochure about Newton's Three Laws of Motion</p> <p>Helpful Links: <a href="https://www.ducksters.com/science/laws_of_motion.php">https://www.ducksters.com/science/laws_of_motion.php</a> <a href="https://www.youtube.com/watch?v=kKKM8Y-u7ds">https://www.youtube.com/watch?v=kKKM8Y-u7ds</a></p>	<p><b><u>Energy:</u></b> Complete 4 Frayer Model Graphic Organizers from the essential vocabulary list below: <u>Key Vocabulary:</u> Potential Energy Thermal Energy Gravitational Potential Energy Elastic Potential Energy Kinetic Energy Mechanical Energy Energy Transformation</p> <p>Frayer Model Example: <a href="https://iris.peabody.vanderbilt.edu/module/sec-rdng/cresource/q2/p07/sec_rdng_07_link_framer_types_03/">https://iris.peabody.vanderbilt.edu/module/sec-rdng/cresource/q2/p07/sec_rdng_07_link_framer_types_03/</a></p>	<p><b><u>Electricity &amp; Magnetism:</u></b> Create a rap or song to explain the different properties of magnets.</p> <p>Helpful Links: <a href="https://www.ducksters.com/science/magnetism.php">https://www.ducksters.com/science/magnetism.php</a> <a href="https://www.youtube.com/watch?v=-aNpmCSZHbk">https://www.youtube.com/watch?v=-aNpmCSZHbk</a></p>
<p><b><u>Earth's Interior, Plate Tectonics and the Earth's Surface:</u></b> Create a graphic organizer about the different type of plate boundaries including:</p> <ul style="list-style-type: none"><li>• Plate motion</li><li>• Type of landforms/events at boundary</li><li>• Real-Life example around the world</li><li>• Type of Process: Constructive or Destructive</li></ul> <p>Helpful Links: <a href="https://www.gns.cri.nz/Home/Learning/Science-Topics/Earthquakes/Earthquakes-at-a-Plate-">https://www.gns.cri.nz/Home/Learning/Science-Topics/Earthquakes/Earthquakes-at-a-Plate-</a></p>	<p><b><u>Famous Minorities in Science:</u></b> Choose a famous (minority) scientist and create a slideshow about their life. Slide Show Criteria:</p> <ul style="list-style-type: none"><li>• 5 slides</li><li>• Birth and death date</li><li>• 3 childhood facts</li><li>• 3 adult/education facts</li><li>• Science contributions</li><li>• At least 1 picture</li></ul> <p>Helpful Links: <a href="https://interestingengineering.com/31-highly-influential-african-american-scientists">https://interestingengineering.com/31-highly-influential-african-american-scientists</a></p>	<p><b><u>Fossils and The Fossil Record:</u></b> Order the rock layers below from oldest to youngest. Justify each layer by using Steno's Laws (Law of Superposition, Cross cutting, etc. )</p>

<p><a href="#">Boundary/Tectonic-Plates-and-Plate-Boundaries</a></p> <p><a href="https://oceanexplorer.noaa.gov/facts/plate-boundaries.html">https://oceanexplorer.noaa.gov/facts/plate-boundaries.html</a></p>	<p><a href="https://www.globalcitizen.org/en/content/17-top-female-scientists-who-have-changed-the-worl/">https://www.globalcitizen.org/en/content/17-top-female-scientists-who-have-changed-the-worl/</a></p>	 <p>Helpful Links:  <a href="https://www.youtube.com/watch?v=M2Ex5DIjtfU">https://www.youtube.com/watch?v=M2Ex5DIjtfU</a></p>
<p><b><u>Comparing Mitosis and Meiosis:</u></b>  Create a comic strip that shows the similarities and differences between mitosis and meiosis in a humorous way.  Helpful Links:  <a href="https://www.youtube.com/watch?v=zrKdz93WIVk">https://www.youtube.com/watch?v=zrKdz93WIVk</a>  <a href="https://www.pbs.org/wgbh/nova/miracle/divi_text.html">https://www.pbs.org/wgbh/nova/miracle/divi_text.html</a></p>	<p><b><u>Dominant and Recessive Traits:</u></b>  Research at least 10 dominant and recessive traits that humans can display. Complete a trait Inventory for at least 5 family members/friends</p> <p>Example Trait Inventory:  <a href="https://teach.genetics.utah.edu/content/heredity/files/InventoryOfTraits.pdf">https://teach.genetics.utah.edu/content/heredity/files/InventoryOfTraits.pdf</a></p>	<p><b><u>Genetics: Pedigrees</u></b>  The ability to roll your tongue is caused by a dominant gene (R). If you can't roll your tongue, you are a non-roller and must be homozygous recessive (rr).  A father cannot roll his tongue but a mother can. Of their four children, one daughter cannot roll her tongue. The other daughter and both sons can roll their tongues.</p> <p>Create a pedigree for this family including possible genotypes for each member.  Helpful Links:  <a href="http://www.zerobio.com/drag_gr11/pedigree/pedigree1.htm">http://www.zerobio.com/drag_gr11/pedigree/pedigree1.htm</a></p>

## Biology for Kids

# Cell Division and Cycle

Living organisms are constantly making new [cells](#). They make new cells in order to grow and also to replace old dead cells. The process by which new cells are made is called cell division. Cell division is occurring all the time. Around two trillion cell divisions occur in the average human body every day!

### Types of Cell Division

There are three main types of cell division: binary fission, mitosis, and meiosis. Binary fission is used by simple organisms like bacteria.

More complex organisms gain new cells by either mitosis or meiosis.

## Mitosis

Mitosis is used when a cell needs to be replicated into exact copies of itself. Everything in the cell is duplicated. The two new cells have the same DNA, functions, and genetic code. The original cell is called the mother cell and the two new cells are called daughter cells. The full process, or cycle, of mitosis is described in more detail below.

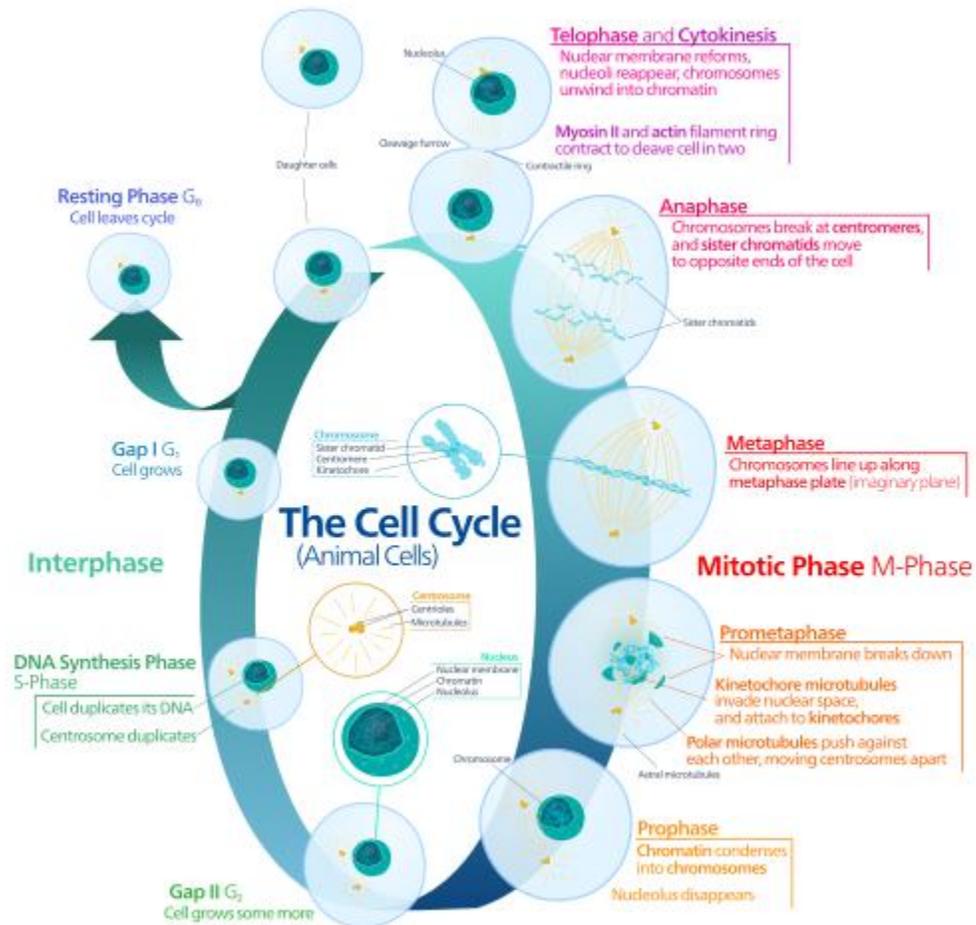
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Examples of cells that are produced through mitosis include cells in the human body for the skin, blood, and muscles.

## Cell Cycle for Mitosis

Cells go through different phases called the cell cycle. The "normal" state of a cell is called the "interphase". The genetic material is duplicated during the interphase stage of the cell. When a cell gets the signal that it is to duplicate, it will enter the first state of mitosis called the "prophase".

- Prophase - During this phase the chromatin condenses into chromosomes and the nuclear membrane and nucleolus break down.
- Metaphase - During metaphase the chromosomes line up along the middle of the cell.
- Anaphase - During anaphase the chromosomes separate and move to opposite sides of the cell.
- Telophase - During telophase the cell forms two nuclear membranes around each set of chromosomes and the chromosomes uncoil. The cell walls then pinch off and split down the middle. The two new cells, or daughter cells, are formed. The splitting of the cells is called cytokinesis or cell cleavage.



Click on picture for larger view

## Meiosis

Meiosis is used when it is time for the entire organism to reproduce. There are two main differences between mitosis and meiosis. First, the meiosis process has two divisions. When meiosis is complete, a single cell produces four new cells instead of just two. The second difference is that the new cells only have half the DNA of the original cell. This is important for life on Earth as it allows for new genetic combinations to occur which produces variety in life.

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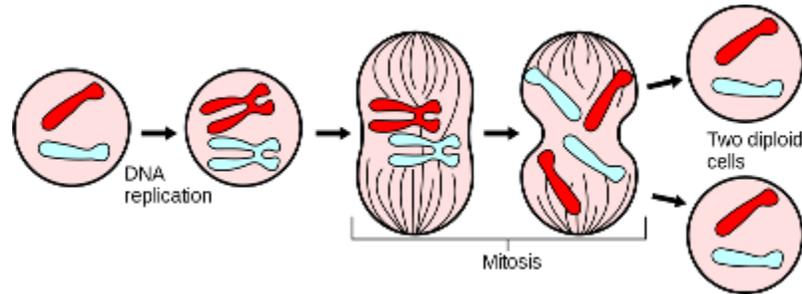
Examples of cells that undergo meiosis include cells used in sexual reproduction called gametes.

## Diploids and Haploids

The cells produced from mitosis are called diploids because they have two complete sets of chromosomes.

The cells produced from meiosis are called haploids because they only have half the number of chromosomes as the original cell.

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## Binary Fission

Simple organisms such as bacteria undergo a type of cell division called binary fission. First the DNA replicates and the cell grows to twice its normal size. Then the duplicate strands of DNA move to opposite sides of the cell. Next, the cell wall "pinches" off in the middle forming two separate cells.

# Hereditary Patterns

We all have heard how we get certain traits from our parents such as the color of our eyes or how tall we are. These traits are passed on by genes in our DNA. Half of our DNA comes from our mother and half from our father.

Scientists have discovered that genes are inherited in certain patterns. What genes your parents and grandparents have, affects what genes you have. On this page we will learn how those patterns work.

We learned some of the basics about inheritance on the [Mendel and Inheritance page](#). You can also go to our [DNA](#) page and our [chromosome](#) page to learn more.

## The Basics

A few things you should know about genes and inheritance:

Gene - Inside the DNA molecule are sections of information called genes. Each gene tells the cell how to make a certain protein which may determine a trait such as the color of the eyes.

Allele - While the section of DNA is called a gene, a specific pattern in a gene is called an allele. For example, the gene would determine the hair color. The specific pattern of the hair color gene that causes the hair to be black would be the allele.

## Dominant and Recessive Genes

Each child inherits two genes for each trait from their parents. Some genes are more dominant than others. For example, brown eyes are dominant over blue eyes. If someone has a brown eyed gene and a blue eye gene, they will have brown eyes. They will only have blue eyes if both genes are blue.

The brown eyed gene is called the **dominant** gene and the blue eyed gene is the **recessive** gene.

## Writing out the Genes

In order to write out the specific allele a person has for a gene, you write a letter representing the gene from the mother and a letter for the gene from the father. Dominant genes are written with capital letters and recessive genes with lower case letters. Here is an example:

We use the capital letter "B" to represent the dominant brown-eyed gene and a lower case "b" to represent the recessive blue-eyed gene.

- Bb - one brown gene, one blue gene (this person will have brown eyes)
- BB - both brown genes (this person will have brown eyes)
- bb - both blue genes (this person will have blue eyes)

## Punnet Square

The main way to figure out the pattern of inheritance that could come from two parents is using a Punnet square. A Punnet square shows all the possible combinations of genes from the parents.

We will use the example of a plant that could have a purple flower or a white flower. The purple gene is dominant and we write it "P." The white gene is recessive, so we write it "w." Here is an example of a Punnet square where one parent has two purple genes "P" and

the other parent has two white "w" genes.

	P	P
w	Pw	Pw
w	Pw	Pw

Each child has the same gene pattern "Pw". They all have the dominant P gene and will all have purple flowers.

Here is another example where each parent has a purple gene and a white gene (Pw):

	P	w
P	PP	Pw
w	Pw	ww

In this case, you can see that 75% of the children will have a dominant "P" gene and will have a purple flower. However, 25% of the children have "ww" genes and will have a white flower.

### More Punnet Square Examples

In this example, one parent is PP and the other Pw.

	P	P
P	PP	PP
w	Pw	Pw

All of the children will have purple flowers, but because one parent has a recessive "w" gene, 50% of the children will pass on the "w" gene.

Now look at what happens if only one parent has a single dominant P gene where one parent is "Pw" and the other "ww".

	P	w
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w	Pw	ww
w	Pw	ww

You can see that 50% of the children will have white flowers and 50% purple.

### **Interesting Facts about Hereditary Patterns**

- All of an individual's genes together are called the genotype.
- The physical appearance that results from the alleles (for example, the actual purple flower) is called the phenotype.
- If the two genes are the same (for example, ww or PP), this is called homozygous.
- If the two genes are different (for example Pw), this is called heterozygous.
- Sometimes gene types have "codominance" meaning that neither gene is dominant over the other. One example of this is blood type where one parent has type A and the other has type B. The child will have blood type AB.
- Some traits are determined by multiple genes.