Sanrio characters

This Logbook Belongs To:

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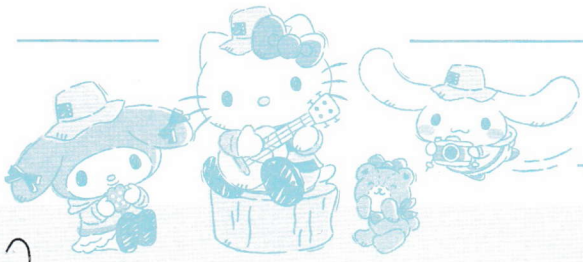
Science Fair 2024-2025!

Sanrio characters Date: Dec 11 2024

STEPS OF THE PROJECT (experimental)

1. Background Research
   - ↳ Understand Topic
     - ↳ Gather Enough
   - ↳ Use research for/to make/come up with testable questions.
   - ↳ Or Problem
   - ↳ Show what research other people are working on.
   - ↳ Investigate
   - ↳ 5 W's
2. Problem Find or Testable questions
   - ↳ Specific
   - ↳ You want to investigate further.
3. Hypothesis
   - ↳ What you think will happen
   - ↳ Based on background research
   - ↳ If... Then... Because...
4. Variables
   - ↳ 3 types
   - ↳ Controlled Variable
     - ↳ Quantity, Value or state that is kept constant throughout the experiment
     - ↳ SAME (KEPT)



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Date: Dec 11 2024

STEPS OF THE PROJECT continued... (experimental)

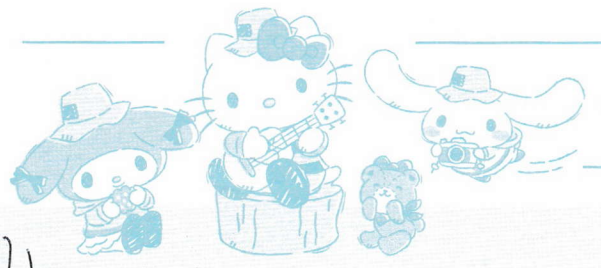
↳ Manipulated Variable
↳ One & ONLY one quantity, value, or state that is ~~purposely~~ changed in the experiment
↳ What will give you the results
↳ What has CHANGED in order to see what happens in the experiment.
↳ Responding Variable
↳ Quantity, Value, or state that changes when a value is manipulated
↳ BASICALLY your results after changing your manipulated variable.
5. Materials
↳ Make a list of materials you need
6. Procedure
↳ Take careful note
↳ Step-by-step explanation of your experiment.
↳ # of trials
↳ Sample size in each trial
↳ Conduct the whole experiment at least 3 times.
↳ Will prove your results can be reproduced.
↳ REPRODUCTBILITY
7. Results + Observations
↳ Collect Data
↳ Qualitative or Quantitative.
↳ Record in Logbook

STEPS OF THE PROJECT continued... (experimental)

↳ Summarize Data (Table or Graph)
↳ Axes labeled correctly
↳ Units of measurement are indicated

8. Conclusion
↳ Final outcome of your investigation
↳ Proven by your data/observations
↳ Prove or disaprove your original hypotheses
↳ REFER back to your hypothesis
↳ Part of your conclusions

9. Applications + Extensions
↳ Explain why people would be interested in your results
↳ Explain how your results can be used
↳ Show how your experiment can benifit people, or how they can use your research/knowledge to make something better.
↳ Evaluate yourself
↳ How you would do your experiment differently in the future
↳ How you can improve upon it if you were ever to do it again.



Sanrio characters Date: Dec 12 2024

TOPIC & DIVISION DECIDE

☆1 Division
☆Up to 5 topics

Interesting

↳ Topic	↳ Division
☆Biochemistry	☆Life & Health Sci
☆Botany/Plant Sci.	☆Physical & Chemical Sci.
☆Chemistry	☆Consumer Goods/Food Sci
☆Consumer Goods	
☆Food Science	
☆Gastroenterology	
☆Genes/Molecular/Microbial Bio.	
☆Heating Cooling	
☆Human Health	
☆Life Science	
☆Nervous System	
☆Psychology	
☆Sociology	
☆Vision/Ophthalmology	

Passionate:

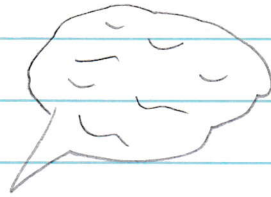
☆Marshmallows - Shelf Life, Materials
☆Chemical Reactions
☆Health - Well-being
☆Eye Sight - Read chart...
☆Digestive - Boys/Girls
☆Genes - DNA How, Why?
☆Plants (envo) - Growth Envos
☆Interactions - Collab

Logbook Sections:
Schedule, daily notes/ideas, background research, contacts, references, experimental procedure/method, data collection sheets, observations/results, conclusion, Vocab, bibliography
???

Date: Dec 12 2024

TOPIC + DIVISION DECIDE continued...

BRAINSTORM



Questions Possible:

- erm... · Marshmallow - How long until it drys up? Shelf Life?
- Gr. 5 · Chemical Reactions - How will ___ react to ___?
- x · Health - How often do we get concerned about our well-being?
- · Eye Sight - When people read the chart, how often do they stop or where do they end?
- · Digestive - Do boys or girls get more digestive problems?
- · Genes - How does your DNA make you up? Why?
- Gr. 4 · Plants - How will ___ effect ___ from growing? How long will it grow with or without ___?
- · Interactions - Under what circumstances will students effectively collaborate well with one another?

Top 5:), ? x 4:)

X ☆ Eye Sight - diseases of eyes

X ☆ Digestive - Stomach, study

✓ ☆ Genes - Interactions between various systems.

X ☆ Interactions - Relationships within Society

TIP: (CONCERNS) CHALLENGE YOURSELF TO A NEW TOPIC!

VOCAB

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NOTE: MOST OF THE VOCAB'S DEFINITION IS FOUND ON GOOGLE

Dec 18 2024

Deferences: The action of mentioning or alluding something

Allude: Suggest or call attention to indirectly; hint at.

Evaluate: form an idea of the amount, number, or value of; assess

Assess: Evaluate or estimate the nature, ability, or quality of

Deoxyribonucleic acid: DNA (dee-cak-see-rai-bow-noo-klay-uhk)

Autosomes: 22 pairs of genes in males & females (the same)

Fetus: An offspring of a human or other mammal in the stages of prenatal development that follow the embryo stage (in humans taken as beginning eight weeks after conception)

Prenatal: Before birth; during or relating to pregnancy.

Embryo: An unborn or unhatched offspring in the process of development, in particular a human offspring during the period from approx. the second to eighth week after fertilization (after which it is usually termed a fetus).

Conception: The action of conceiving a child or of a child being conceived.

Conceive: Become pregnant with (a child).

Offspring: A person's child or children.

Term/ed: Give a descriptive name to; call by a specified name.

Descriptive: Serving or seeking to describe.

Fertilization: The action or process of fertilizing an egg, female animal, or plant, involving the fusion of male & female gametes to form a zygote

Fertilize: Cause (an egg, female animal, or plant) to

Vocab

Sanrio characters

NOTE: MOST OF THE VOCAB'S DEFINITION IS FOUND ON GOOGLE

to develop a new individual by introducing male reproductive material.

Reproductive: Relating to or effecting reproduction.

Reproduction: The action or process of making a copy of something

Fusion: The process or result of joining two or more things together from a single entity

Entity: A thing with distinct & independent existence.

Gametes: Reproductive cell (ga-meets)

Zygotes: Fertilized egg cell that results from the union of a female gamete (egg or ova) with a male gamete (sperm).

Inherits: Derive (a quality, characteristic, or predisposition) genetically from one's parents or ancestors.

Derive: Obtain something from (a specified source) (specific)

Obtain: Get, Acquire, or Secure (something)

Acquire: Buy or obtain (an asset or object) for oneself

Oneself: A person's own self

Asset: A useful or valuable thing, person, or quality

Predisposition: A tendency to do something

Tendency: An inclation toward a particular characteristic or type of behavior

Inclination: A person's natural tendency or urge to act or feel in a particular way; a disposition or propensity

Disposition: A persons inherent + qualities of mind + character.

Inherent: Existing in something as a permanent, essential or characteristic attribute

Essential: Absolutely necessary; extremely important.

BACKGROUND RESEARCH — Sanrio characters — Dec 18 2024

kidshealth.org/en/parents/about-genetics.html#:~:text=What%20Is%20Genetics%3F,brown%20hair%20like%20their%20father.

What IS GENETICS?

☆Study of genes
↳Genes carry info that gets passed from one generation to the next.
↳Also determine why some illnesses run in families & wheter babies will be male or female.

What ARE GENES?

☆Sections of DNA (deoxyribonucleic acid)
↳Found inside every human cell.
↳Can only be seen under a powerful microscope (tiny).
☆Made of 4 chemicals that form pairs in different combos.
↳Combos create codes for different genes.
↳~20,000 genes/person.
↳Code for different traits

4 March 6 2025

What IS A CHROMOSOME?

☆Inside each cell, DNA is tightly wrapped together
↳structures called chromosomes.
↳Every Normal Cell has 23 pairs of Chromosomes (for a total of 46).
↳22 pairs of chromosomes are the same in males & females. (autosomes).

BACKGROUND RESEARCH

Sanrio characters

Dec 18 2024

★23rd pair (last) - sex chromosome - determines the sex of the baby. females have 2 X chromosomes. Males have 1 X chromosome + 1 Y chromosome

Y chromosome.

X chromosome

HOW DO GENES PASS FROM PARENTS TO CHILD?

★To form a fetus, an egg from the mother + sperm from the father come together. The egg + sperm together give the baby a full set of chromosomes.

↳ Half the babies DNA comes from the mother + half from the father.

December 19 2024

What Is a Genetic Disorder???

★Happens when a gene/s has a problem with it's code

↳ Causes a health problem

★Sometimes happens when a child inherits it from 1 or both parents.

↳ Other times only happens to the child

↳ Parents Do not have the genetic disorder

HOW DO GENETIC DISORDERS HAPPEN?

★Different things can cause a genetic disorder.

↳ Change (mutation) in 1 gene on a chromosome

↳ Missing part of a chromosome (deletion

↳ Genes shifting from one chromosome to another (dislocation)

trans + March 7 2025

BACKGROUND RESEARCH

Sanrio characters

Dec 19 2024

↳ An extra or missing chromosome

↳ Too few or too many sex chromosomes.

LOOKING AHEAD

☆Scientists are learning more & more about genetics

☆Worldwide research project: The Human Genome Project created a map of all human genes.

↳ Shows where the genes are located on the chromosomes.

↳ Doctors can use this map to find & treat or cure some kinds of genetic disorders.

↳ There is hope that treatments for many genetic disorders will be developed in the future

BACKGROUND RESEARCH

Dec 27 2024

What is a Gene Mutation? (myoo-TAY-shun)

☆A gene mutation is a change in one or more genes.

↳ Some mutations can lead to genetic disorders or illnesses.

What ARE GENES? (Look @ pg. 9 for more info)

☆Determines things that make a person unique.

☆Also play a role in a persons risk for some diseases & health conditions.

☆Each person has about 24,000 different types of genes.

BACKGROUND RESEARCH

Sanrio characters

Dec 27 2024

What Is DNA? (Look @ pg. 9 + 11 for more details)

- DNA is the carrier of all our genes.
- DNA creates a code using 4 chemicals (familiar) called nucleotides (NEW-klee-uh-tydes)
- Code determines which genes a person has. Dec 30 2024
- DNA is located inside chromosomes

What Is A Chromosome? (More details @ pg 9 + 10) Jan 3 2025

- X-shaped thread-like structure in body's cells.
  - ↳ Contains DNA

What Causes A GENE Mutation? (pg. 10 in depth)

- A gene can mutate because of:
  - ↳ A change in one or more nucleotides of DNA.
  - ↳ A change in many genes
  - ↳ Loss of one or more genes
  - ↳ Rearrangement of genes or whole chromosomes.
- Key word: Change

DO PARENTS PASS GENE MUTATIONS TO CHILDREN?

Background Research

Sanrio characters

Jan 3 2025

Do Parents Pass Gene Mutations To Children?

- If a parent carries a gene mutation in their eggs or sperm, it can pass to their child.
- These hereditary (or inherited) mutations are in almost every cell of the person's body throughout their life.
- Hereditary mutations include cystic fibrosis, hemophilia, & sickle cell disease.
- Other mutations can happen on their own during a persons life. (sporadic, spontaneous, or new mutations)
  - ↳ They effect only some cells.
  - ↳ Damage from the sun's ultraviolet radiation or exposure to some types of chemicals can lead to new mutations.
  - ↳ These mutations are not passed from parents to children.

Do All Gene Mutations Cause Health Problems?

- Most gene mutations have no effect on health.
  - ↳ The body can repair many mutations.
- some mutations are even helpful!
  - ↳ ex: people can have a mutation that protects them from heart disease or gives them harder bones.

Background Research

Sanrio characters

Jan 3 2025

THE HUMAN GENOME PROJECT

☆ HGP

☆ One of the greatest scientific feats in history.

☆ Launched in October 1990 & completed in April 2003, the Hgp's signature accomplishment - generating the first sequence of the Human genome - provided fundamental information about the human blueprint, which has since accelerated the study of human biology & improved the practice of medicine.

☆ Project was a voyage of biological discovery led by an international group of researchers looking to comprehensively study all of the DNA (known as a genome)

☆ Completed in 2003 covered 92% of the total human genome sequence.

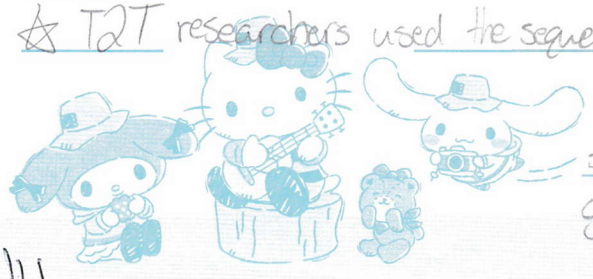
☆ The technologies to find out the last remaining 8% didn't exist at that time.

↳ Scientists knew that the last 8% likely contained information important for fundamental biological processes

☆ Since then, researchers have developed better laboratory tools, computational methods, & strategic approaches.

☆ Final complete human genome sequence was described in a set of six papers in the April 1 2022, issue of Science.

☆ T2T researchers used the sequence as a reference to discover more than 2 million previously unknown sequence variants in the human genome.



BACKGROUND RESEARCH

Sanrio characters

Jan 3 2025

What Is RNA?

☆ Ribonucleic acid is a nucleic acid present in all living cells that has structual similarities to DNA.

☆ RNA is single stranded (most often).

Is RNA In Human Bodies?

☆ Yes humans have both DNA & RNA

↳ DNA is our genetic material & contains the code for making all of the proteins in the body.

↳ RNA is created specifically for protein synthesis.

What Is ATP?

☆ Adenosine triphosphate (i-de-no-seen tri-foss-fate)

↳ energy currency of life.

↳ High NRG molecule found in every cell.

↳ It's job is to store & supply the cell with needed NRG.

☆ All cells perform specific tasks & all cells need NRG to perform these specific tasks.

☆ Cells can come in many different shapes & sizes.

☆ Cells are the building blocks of life

☆ Each cell has a specific function to help the organism to perform tasks necessary for survival.

☆ ATP is responsible for the NRG needed to perform muscle contractions, nerve impulses, metabolism functions & other various life sustaining functions.

Background Research

Sanrio characters

Jan 3 2025

What Is ATP?

*Atp supplies the energy for chemical + mechanical reactions in every cell.

TOPIC @ QUESTION

Jan 5 2025

Brainstorm

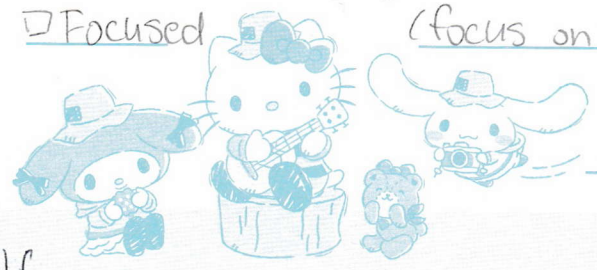
5 Steps for a Strong Research Question

1. Choose a broad topic.
   ↳ Go with a topic that sparks your interest.
2. Do some preliminary reading about the topic.
3. Narrow down to a specific niche.
   ↳ Research is within a feasible scope.
   ↳ Achieve in timeframe.
4. Identify a research problem.
5. Write your research question!
   ↳ Comparitive research
   ↳ Descriptive research
   ↳ Correlational research

*Good research question should be:

☐ Focused (focus on a single problem)

☐ Researchable (answer can be found by collecting empirical data)



Topic Question (Brainstorm☺) — Sanrio characters — Jan 5 2025

☆Good research question should be:

☐ Feasible (do able within timeframe). (Depends on situation.

☐ Specific (all terms should have clear meanings.)

☐ Complex (Cannot be answered with yes or no or with easily found facts.)

☐ Relevant (to your field of study or society.

☆ Targets a currently unanswered question, + contribute knowledge that future research can build on.

☆ Only ONE research question.

☆ Bigger Project

↳ You can also develop multiple research questions around the same problem.

Possible Topic Questions:

- What is DNA + what does it look like?
- How is DNA important, what does it look like + what is it???

TOPIC QUESTION: What Is DNA + What Does It look like?

Checklist: (2 problems) (About a whole topic:)

☑ Focused ☑ Researchable

☑ Feasible ☑ Specific ☑ Complex

☑ Relevant.

Topic Question (Brainstorm)

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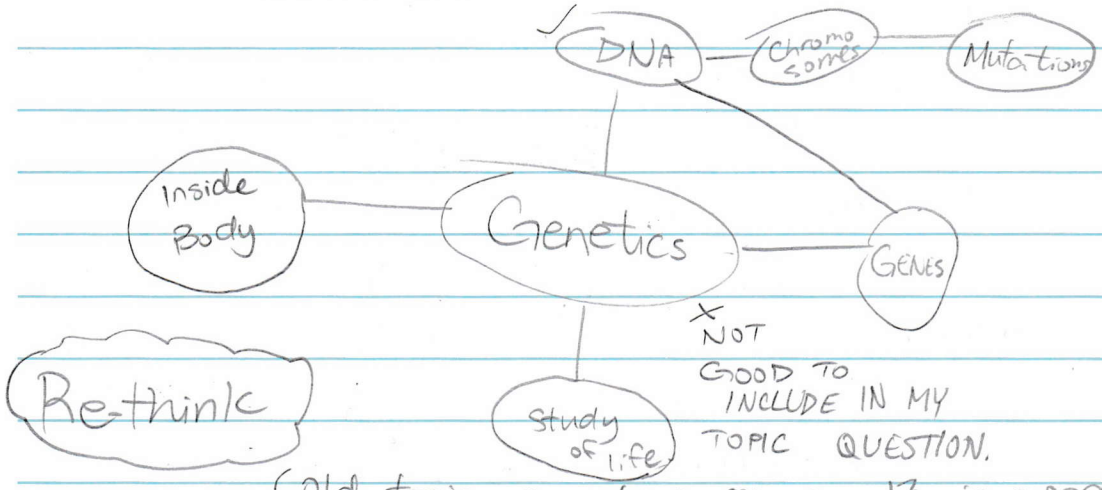
Jan 5 2025

☆ NOT specific about the whole topic
☆ Do not include what are genetics/DNA

IDEAS:

- DNA in depth, what does it look like?
- DNA in picture: what is it & what does it look like?
- The picture of DNA: What is it & what does it look like?
- DNA explained: The sum of it all
- DNA explained: Who are you without it?
- Genetics extentsively explained
- What does DNA look like? What is DNA?

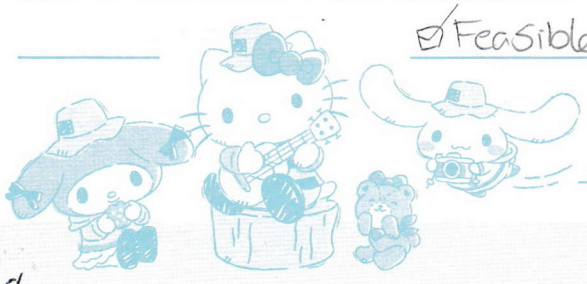
X Changed (Jan 20 2025)



(Old topic question on pg. 17 is good to go!)

TOPIC QUESTION: What is DNA & what does it look like?

Criteria: ☑ Focused (eh 2 problems connect so yes!) ☑ Researchable ☑ Feasible ☑ Specific ☑ Complex ☑ Relevant ☑ Not including my topic descriptions.



Hypothesis Brainstorm — Sanrio characters — Jan 5 2025

If DNA ~~creates a code using~~ 4 chemicals, then DNA (too in depth, needs to be broad & cannot answer the topic question therally)

If DNA creates a code in our bodies then DNA should look like large clumps of genes in our bodies because DNA is tightly wrapped in a chromosome creating 1/23 of genes in our bodies which should look like delicate pieces of our personality.
(too "should look like") ☆ Try to eliminate "should look like". Think deeper?

If DNA is double stranded then I think DNA might look like twisted ladders of our personalities & DNA * could be the key of who we are because, DNA comes from our parents, & DNA is very delicate, tiny, & unpredictable?
* = Maybe (Try out a couple more Hypothesises?)
(Too personal? Something is missing!)

THIS ONE ▽

+Jan a 2025

If DNA creates a code for our personality / characteristic traits then I think DNA is a very complex code that looks like twisted ladders because, based on my background research, your DNA is based off of both your parents DNA, & it took years to map out where your DNA is inside your body! Also, based on the websites where my background research was on, the descriptions & imagery showed that DNA is very twisted & complex!

X Changed (Jan 20 2025)

EXTRA RESEARCH (STEP 4) Sanrio characters Jan 5 2025

CRITERIA / CHECKLIST for this part of the project:

- ☑ ~~What DNA is used for~~
- ☐ ~~More RNA in depth~~ NO NEED ☐ ~~Genetic reprogramming~~ (Jan 13 2025)
- ☑ ~~Citrons Lemon (Haha)~~
- ☑ ~~Structure~~ ALREADY KNOW
- ☑ ~~4 bases (nitrogenous)~~ ALREADY KNOW
- ☑ ~~Epigenetics (do not metion that much on project)~~
- ☐ X + Y chromosomes. Jan 6 2025
- ☑ ~~Ataxia Telangiectasia~~ About the ~~Cistrons~~ (~~Jan 29 2025~~) NO NEED
- ☑ ~~Gene Therapy~~ (Jan 28 2025) SAME
- ☐ ~~Cystic Fibrosis~~ ☐ ~~Genetic programming~~ (Jan 28 2025)
- ☐ ~~Hemophilia~~
- ☐ Sickel cell disease.
- ☐ ~~Suns Ultraviolet Radiation~~
- ☑ ~~More Human Genome (in depth)~~ NO NEED
- ☐ Read Article about X + Y Chromosomes.
- ☐ ~~Proteins~~ NO NEED
- ☐ ~~Cells (organ)~~ NO NEED
- ☐ Read NIH sequence of the Human Genome (Related.)
- ☐ ~~RNA + DNA difference~~ NO NEED

Jan 6 2025

EXTRA RESEARCH (step 4)

WHAT DNA IS USED FOR?

Extra

Research (Step 4)

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Jan 6 2025

↑ Added on March 6 2025.

Where Is DNA Found?

(Before this)?: DNA is a molecule that contains the biological instructions that make each species unique. DNA, along with the instructions it contains, is passed from adult organisms to their offspring during reproduction.

BACK TO WHERE IS DNA FOUND?

☆ DNA is found in organisms called eukaryotes.

↳ Found inside a special area called the nucleus.

↳ Cell is very small

↳ Organisms have many DNA molecules per cell, each DNA molecule must be tightly packaged

↳ Packaged form of DNA = Chromosome.

☆ During DNA replication, DNA unwinds so it can be copied.

↳ (other) DNA also unwinds so that it's instructions can be used to make proteins & for other biological processes.

↳ During Cell Division, DNA is in it's compact chromosome form to enable to transfer to new cells.

☆ Researchers refer to DNA found in the cell's nucleus as clear as nuclear DNA.

☆ Humans & other complex organisms also have a small amount of DNA located in cell structures known as mitochondria. Mitochondria generates the NRG the cell needs to function properly.

EXTRA RESEARCH (STEP 4) Sanrio characters Jan 6 2025

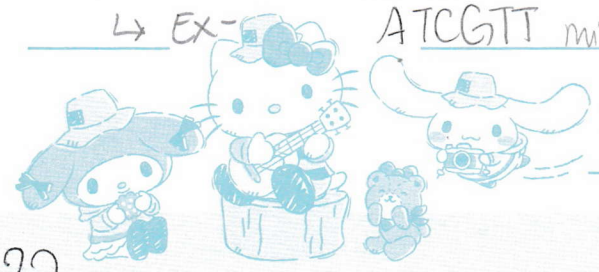
Where Is DNA Found

✡ Sexual reproduction.
↳ Inheriting DNA (Half + Half) pg. 10
↳ However, organisms inherit all of their mitochondrial DNA from the female parent.
↳ Occurs because only egg cells, + not sperm cells, keep their mitochondria during fertilization.

What Is DNA Made Of? Jan 13 2025

✡ Made of chemical building blocks (nucleotides).
↳ Made of three parts: a phosphate group, a sugar group + one of four types of nitrogen bases.
✡ To form a strand of DNA, nucleotides are linked into chains, with the phosphate + sugar groups alternating.
✡ Four types of nitrogen bases found in nucleotides are:
1. Adenine (A)
2. Thymine (T)
3. Guanine (G)
4. Cytosine (C)

↳ The order, or sequence, of the bases determines what biological instructions are contained in a strand of DNA.
↳ Ex- ATCGTT might instruct for blue eyes, while ATCGCT might instruct for brown.



EXTRA RESEARCH (STEP4) Sanrio characters Jan 13 2025

What Is DNA Made Of?

☆complete human genome, for a human contains about 3 billion bases + about 20,000 genes on 23 pairs of chromosomes.

What Does DNA DO?

Jan 14 2025

☆Contains the instructions that are needed for an organism to develop, survive, + reproduce.

↳ To carry out these functions, DNA sequences must bee converted into messages that can be used to produce proteins (the complex molecules that do most of the work in our boodies.

☆Every DNA sequence that contains instructions to make protein is known as a gene.

↳ The size of a gene may vary greatly, ranging from about 1,000 bases to 1 million bases in humans.

↳ Genes only make up about 1% of the DNA sequence.

↳ DNA sequences outside this 1% are involved in regulating when, how, + how much of the protein is made. ↓ control/ maintain.

How Are DNA Sequences Used To Make Proteins?

☆DNA instructions are used to make proteins in a two-step process.

EXTRA RESEARCH (STEP 4)

Sanrio characters

Jan 14 2025

How Are DNA Sequences Used To Make Proteins?

1. Enzymes read the the info in a DNA molecule & transcribe it into a intermediary molecule called messenger ribonucleic acid, or mRNA.
2. The info contained in the mRNA molecule is translated into the "language" of amino acids, which are the building blocks of proteins. The language tells the cells protein-making machinery the precise order in which to link the amino acids to produce a specific protein. This is a major task because there are 20 types of amino acids, which can be placed in many different orders to form a wide variety of proteins.

Who Discovered DNA?

☆ Swiss biochemist Frederich Miescher* (free-drick-me-sher) first observed DNA in the late 1800s.

↳ Nearly a century (100 yrs) passed from the discovery until researchers unraveled the structure of DNA molecule & realized that it's a central importance to biology.

☆ For many yrs, scientists debated which molecule carried lifes biological instructions.

Extra Research (STEP 4) Sanrio characters Jan 14 2025

Who Discovered DNA?

↳ Most thought that DNA was to simple as a molecule to play such a critical role.

↳ Instead, the argued that proteins were more likely to carry out this vital function because of their greater complexity & wider variety of forms.

☆ The importance of DNA became clear in 1953 thanks to the work of James Watson*, Francis Crick*, Maurice Wilkins* (more-reese-will-kins), & Rosalind Franklin* (rose-sa-lind-frank-lin).

↳ Studying x-ray diffraction patterns & building models, the scientists figured out the double helix structure of DNA - a structure that enables it to carry biological info from one generation to the next.

☆ Joshes Watson - 1st NHGRI director.

☆ NHGRI = National Human Genome Research Institute.

What Is DNA The Double Helix?

☆ Uses the term "double helix" to describe DNA's winding, two-stranded chemical structure.

☆ This shape - which looks much like a

EXTRA RESEARCH (STEP 4) Sanrio characters Jun 14 2025

What Is DNA The Double Helix?

twisted ladder - gives DNA the power to pass along biological instructions with great precision.

☆ To understand DNA's double helix from a chemical standpoint, picture the sides of the ladder as strands of alternating sugar + phosphate groups - strands that run in opposite directions.

↳ Each "rung" of the ladder is made up of two nitrogen bases, paired together by hydrogen bonds.

↳ Because of the highly specific nature of this type of chemical pairing, base A always pairs with base T, + likewise C with G.

☆ If you know the sequence bases on one strand of a DNA double helix, it is easy to figure out the sequence of bases on the other strand.

☆ DNA's unique structure enables the molecule to copy itself during cell division.

↳ When a cell prepares to divide, the DNA helix splits down the middle + becomes two single strands.

↳ These single strands serve as templates for building two new, double-stranded DNA molecules - each a replica of the original DNA molecule.

EXTRA RESEARCH (STEP 4) Sanrio characters Jan 14 2025

What Is DNA The Double Helix?

↳ In this process, an A base is added wherever there is a T, a C where there is a G, + so on until all of the bases once again have partners.

↳ In addition, when proteins are being made, the double helix unwinds to allow a single strand of DNA to serve as a template.

↳ The template strand is then transcribed into mRNA, which is a molecule that conveys vital instructions to the cell's protein-making machinery.

MESSENGER RNA (MRNA)

☆ Type of single stranded RNA involved in protein synthesis.

☆ Made from a DNA template during the process of transcription.

☆ The role of mRNA is to carry protein info from the DNA in a cell's nucleus to the cell's cytoplasm (watery interior), where the protein-making machinery reads the mRNA sequence + translates each three-base codon into it's corresponding amino acid in a growing protein chain.

CONCEPTS (STEP 5)

Sanrio characters

Jan 16 2025

What Is Epigenetics?

☆Refers to how things diet, physical activity, & stress levels can change not only our own health, but of our future descendants.

What Happens In Epigenetics?

☆ Affect what genes are turned on & off.

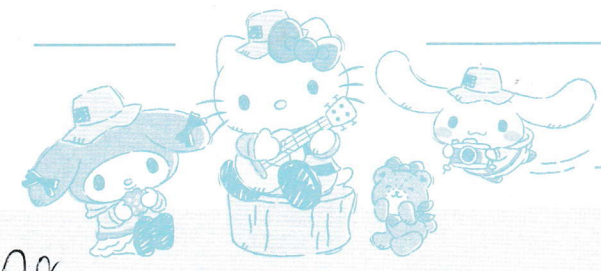
☆ DOESN'T CHANGE THE DNA CODE.

↳ Just what genes are turned on & off.

↳ Changes can be passed down in families.

What Causes Epigenetic Changes?

Can Happen Because Of:	Leading To:
Physical Activity	A lower risk of some types of cancer.
Being overweight or having diabetes during pregnancy.	Having a baby who is overweight or more likely to get diabetes later in life.
Exposure to chemicals used in some pesticides, plastics, flame retardants, & cosmetics.	An increased risk of cancer.
long-lasting emotional stress.	mood problems later in life
not getting enough to eat in early life.	Obesity later in life
Smoking	Increased risk of asthma & lung cancer.



CONCEPTS (STEP 5)

Sanrio characters

Jan 16 2025

The Future Of Epigenetics & Health Care

☆As the learn more, researchers have started developing medicines that targets some epigenetic changes.
↳Also finding changes linked to illnesses.

What Is Gene Therapy?

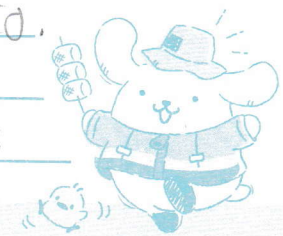
Jan 17 2025

☆Involves using genes to fight or prevent diseases.
↳Might mean replacing a gene that isn't working properly, adding a "good" gene into a person who has a disease, or blocking a gene that is causing a problem.
☆Already available to treat some diseases.
↳Many other types of gene therapy are being studied to see how safe they are, & if they can work to treat or prevent other diseases.
↳Slow process.
↳Because experts have to make sure that the benefits are worth the possible risks.

Ataxia Telangiectasia (ay-tax-see-uh) (Tuh-lang-jee-ick-tay-shuh) (AT Gene)

†Jan 20 2025

☆A genetic condition that leads to:
↳Unsteady Walking (ataxia)
↳Uncontrolled body movements



CONCEPTS (step 5)

Sanrio characters

Jan 17 2025

What Is Ataxia-Telangiectasia?

↳ A weak immune system

↳ Clusters of small blood vessels on the eyes + skin (telangiectasias)

What are the Signs & Symptoms of Ataxia-Telangiectasia?

✻ Children with Ataxia-Telangiectasia have uncoordinated movements that get worse over time.

↳ Unsteadiness when toddler begins to walk.

↳ Child may sway when sitting or standing.

✻ Often the "Telangiectasias" appear during a child's preschool years. (not everyone with the condition will have these

Jan 20 2025

What are the Signs & Symptoms of Ataxia-Telangiectasia? (continued...)

✻ Getting Older= have trouble walking, talking, chewing, & swallowing.

↳ They may have:

- Poor hand coordination
- Balance problems.
- Trouble reading because they cannot control their eye movements.

What are the Signs & Symptoms of Ataxia-Telangiectasia? (continued...)

- Muscle jerks & twitches.

☆ MOST children need a wheelchair when they are a teen.

☆ Other problems can happen including:

- Poor growth & late puberty
- Sinus infections & lung infections.
- Coughing & breathing problems.
- Type 2 diabetes.
- An increased risk for some types of cancer, especially blood (leukemia) & immune system (lymphoma) cancers.

What Causes Ataxia-Telangiectasia?

☆ Happens when a mutation in the gene makes a protein called ATM protein.

↳ Children born with the condition inherited 2 changed ATM genes from each parent.

☆ Key Point: Everyone has 2 ATM genes. (1 from their mother & one from father).

↳ 1-2 ATM genes changed = Ataxia-Telangiectasia.

↳ "Altered"

↳ "Normal" & "Altered" copy.

EXCONCEPTS (STEP 5) Sanrio characters Jan 20 2025

What Causes Ataxia-Telangiectasia? (Continued...)

☆A child might have ATM protein that doesn't work as it should or no ATM protein at all.

☆ATM protein helps repair damaged DNA.

☆Without the ATM protein needed, cells in the brain (cerebellum) that controls balance & movement die.

How is Ataxia-Telangiectasia Diagnosed?

☆To diagnose it, doctors may order:

- Blood Tests
- Genetic Tests
- MRI scans of the brain.

☆Some people have small amounts of ATM protein + milder symptoms.

↳ Mild Types of Ataxia-Telangiectasia (usually) are diagnosed in later life.

☆If you know (parents) that u have an AT gene, or a family member, doctors can do genetic testing to diagnose it before a baby is born.

Jan 28 2025

How is Ataxia-Telangiectasia Treated?

☆Cared for by a health care team.

↳ Neurologists, immune Specialists, lung specialists, dietitians, & therapists.

CONCEPTS (STEP 5) Sanrio characters Jan 28 2025

How is Ataxia-Telangiectasia Treated?

- No specific treatments.
- Doctors want to identify & treat problems early.
  - ↳ Treat infections with antibiotics
  - ↳ Give intravenous gamma globulin for children who get a lot of infections.
  - ↳ Check lung function & treat lung symptoms.
  - ↳ Refer a child to a feeding specialist to help prevent choking.
  - ↳ Keep track of growth & make sure a child takes in enough calories.
  - ↳ Watch for signs or symptoms of cancer (such as swollen glands, easy bruising, or weight loss).
- Kids should get physical therapy, occupational therapy, & speech therapy (movement, coordination, speech, etc...).

How can Parents Help?

- Most kids with Ataxia-Telangiectasia will need help in school.
  - ↳ Challenges with reading, writing, talking, & getting around school. (IEP (individualized education program) & any other special help needed.

What Else Should I Know?

CONCEPTS A (STEP 5)

Sanrio characters

Jan 28 2025

What Else Should I Know?

- Radiation damages DNA that can't be repaired well without the ATM protein.
- So children with Ataxia-Telangiectasia should not get X-rays or CT scans unless absolutely necessary.
- Learn how Ataxia-Telangiectasia runs in families.
  - ↳ Genetic counselor
    - ↳ Can also help you about testing other family members.
- The A-T childrens project
- The national Ataxia Foundation.

About Genetic Programming!

- Aka: GP
- Is a type of Evolutionary Algorithm (EA), a subset of machine learning.
- EA's are used to discover solutions to problems humans do not know how to solve, directly.
- Free of human preconceptions or biases, the adaptive nature of EA's can generate solutions that are comparable to, & often better than the best human efforts.
- Inspired by biological evolution & it's fundemental mechanisms, GP software systems implement an algorithm that uses random mutation, crossover, a fitness function, & multipe generations of evolution to resolve a user-defined task.

CONCEPTS (STEP 5) Sanrio characters Jan 28 2025

About Genetic Programming!

☆GP can be used to discover a functional relationship between features in data (symbolic regression), to group data into catergories (classification), & to assist in the design of electrical circuits, antennae, & quantum algorithms.

☆GP is applied to software engineering through code synthesis, genetic improvement, automatic bug-fixing, in developing game-playing strategies, etc...

☆Generational GP Algorithm.

Genetic Reprogramming Definition

☆Occurs when gene networks within a cell are repressed or activated in order to convert one cell type into another. (Ha Ha Ha)!.

What is the Sun's Ultraviolet Radiation?

☆Ultraviolet (UV) radiation is a form of energy that the sun produces.

☆ You can't see UV radiations because its wavelengths are shorter than visible light.

CONCEPTS (STEP 5) Sanrio characters Jan 28 2025

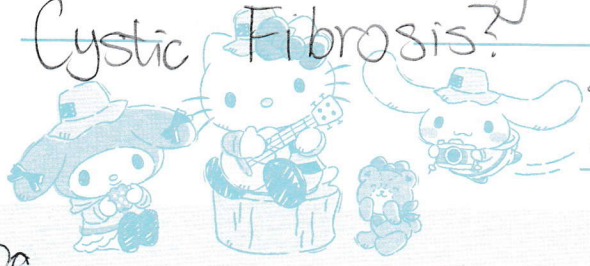
What is the Sun's Ultraviolet Radiation?

- The UV NRG that the sun produces reaches the Earth & provides vitamin D for your body to help you survive.
- Can also find in human-made sources like tanning beds.
- Exposure to too much ultraviolet radiation greatly increases your risk of developing skin cancer.

What is Cystic Fibrosis? (sis-stick fi-bro-sas)

- Cystic fibrosis (CF) is an inherited disease in which the body makes very thick, sticky mucus.
- The mucus causes problems in the lungs, pancreas, & other organs.
- People with CF get lung infections often.
  - ↳ overtime, they have more trouble breathing.
  - ↳ Also have digestive problems that make it hard to gain weight.

What are the Signs & Symptoms of Cystic Fibrosis?



- CF can cause symptoms soon after a baby is born.

CONCEPTS (STEP 5) Sanrio characters Jan 28 2025

What are the Signs & Symptoms of Cystic Fibrosis?

- The 1st sign a baby might have cystic fibrosis is an intestinal blockage called meconium ileus.
- Other kids don't have symptoms until later on.
- CF can be mild or severe, depending on the person.
- Symptoms may include:
  - Lung infections or pneumonia.
  - Wheezing.
  - Coughing with thick mucus
  - Bulky, greasy bowel movements.
  - Constipation or diarrhea
  - Trouble gaining weight or poor height growth.
  - Very salty sweat.

↳ Some kids may also have nasal polyps (small growths of tissue inside the nose), frequent sinus infections, & tiredness.

How is Cystic Fibrosis Diagnosed?

- Newborn screening tests catch most cases of CF.

CONCEPTS (STEP 5) Sanrio characters Jan 28 2025

How is Cystic Fibrosis Diagnosed?

✡ If the screening test is positive, or if a child has cystic fibrosis symptoms, doctors do a painless sweat test.
↳ They collect sweat from an area of skin (usually the forearm) to see how much chloride (a chemical in salt) is in it.
✡ People with CF have higher levels of chloride
✡ Most children with CF are diagnosed by the time they're 2 yrs old.
✡ But someone with a mild form may not be diagnosed until they are a teen.

Jan 29 2025

How is Cystic Fibrosis Treated?

✡ Kids with CF have it for their whole lives.
✡ Doc's use different medicines depending on a child's needs.
✡ All people with CF will need to:

- Regularly exercise (+Mar 3 2025)
- Use an inhaler or nebulizer
- Do breathing exercises & cough ON purpose.
- Wear a therapy vest that shakes the chest.
- Have chest physical therapy (when a parent or trained person bangs gently on the chest or back.

Loosen + clear mucus

CONCEPTS Sanrio characters Jan 29 2025

(STEP 5)

How is Cystic Fibrosis Treated?

- Washing hands well & often.
- Avoiding people who are sick.
- Staying at least 6ft away from others with CF
- Taking preventive antibiotics.
- Taking enzymes - helps kids with CF to digest food & get nutrients from it.
- Eat a high calorie diet & take vitamin supplements, when needed.

Prevent or Fight lung infections.

What Causes Cystic Fibrosis?

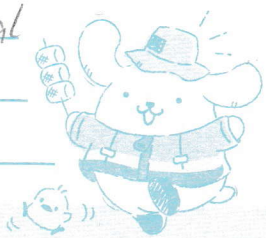
☆ Caused by a mutation in the gene that makes cystic fibrosis transmembrane regulator (CFTR) protein.

☆ To have CF, a baby must get two copies of the CF gene, one from each parent.

What Happens in Cystic Fibrosis?

☆ In CF, the body makes abnormal (unusual) CFTR protein or none at all.

☆ Without normal CFTR protein, the cells lining the pathways (tubes) inside some organs, make thick, sticky mucus instead of the normal thin, watery kind.



CONCEPTS (STEP 5)

Sanrio characters

Jan 29 2025

What Happens in Cystic Fibrosis?

- Thick mucus can trap bacteria, in the lungs, leading to infection, inflammation, & breathing problems.
- Mucus can also block the path where digestive enzymes flow between the pancreas & the intestines.
- This makes it hard for a child to digest food & get the vitamins & nutrients they need from it.
- Thick mucus can also affect the liver, the sweat glands, & the reproductive organs.

How can Parents Help?

- Follow the treatment plan.
- Offer encouragement.
- Turn to the care team.
- Learn all you can about CF. -Cystic Fibrosis Foundation website.
- Teach self-care as your child gets older.

What is Hemophilia? (he-mow-fee-lee-uh)

- Is a rare disease that prevents blood from clotting it as it should.

CONCEPTS (STEP 5)

Sanrio characters

Jan 29 2025

What is Hemophilia?

- Happens because the body doesn't make enough of a protein called a clotting factor.
- Clotting helps stop bleeding after a cut or injury.
  - ↳ If clotting doesn't happen, someone can bleed easily or longer than normal.
- Different treatments can help control bleeding in most people with hemophilia.

What are Signs & Symptoms of Hemophilia?

- People with mild hemophilia bleed longer than normal after an injury or surgery.
- People with severe hemophilia might also bleed for no reason at all.
- This type of bleeding - spontaneous bleeding, usually happens to a joint.
- Symptoms of hemophilia may vary, depending on how much clotting factor a person has & where the bleeding is:
  - Bleeding a joint - bubbly feelings swelling, tenderness, stiffness, & trouble using the joint.
  - Bleeding in a muscle - pain, swelling, warmth, & a bruise over the area.

CONCEPTS (STEP 5)

Sanrio characters

Jan 29 2025

What are Signs & Symptoms of Hemophilia?

- Bleeding in a muscle (continued...) - Babies & toddlers who have bleeding in a muscle or joint might be fussy or refuse to crawl or walk.
- Bleeding in the digestive system - black or bloody poop, or blood in vomit.
- Bleeding in the brain - headache, vomiting, sleepiness, or seizures.

What Causes Hemophilia?

- Clotting factors control bleeding by helping the body form a clot.
- Our bodies have 13 clotting factors that work together to clot blood.
- Having too little of factors VIII or IX is what causes hemophilia.

What are the Types of Hemophilia?

- 2 main types - hemophilia A & hemophilia B
- Hemophilia A - more common, happens when there isn't enough factor VIII.
- Hemophilia B - less common, happens when there is too little factor IX.

CONCEPTS (STEP 5)

Sanrio characters

Jan 29 2025

What are the Types of Hemophilia?

- Hemophilia can be mild, moderate, or severe, based on the amount of the clotting factor in the blood.
- The lower level of clotting factor, the more likely the person is to bleed.

Who Gets Hemophilia?

- Hemophilia is a genetic disorder.
- Happens when there is a gene mutation.
- Usually inherited.
- Hemophilia mostly affects boys but, girls & women can be hemophilia carriers with mild hemophilia A.
  - ↳ They may have mild bleeding symptoms & can pass the gene to their children.

Feb 4 2025

How is Hemophilia Diagnosed?

- Doctors order blood tests, including:
  - Complete blood count (CBC)
  - Prothrombin Time (PT)
  - Activated partial thromboplastin time (PTT)
  - Factor VIII activity test
  - Factor IX activity test.
- If hemophilia runs in the family, doctors can do prenatal (before birth) testing with amniocentesis or chorionic villus sampling.

CONCEPTS (STEP 5) Sanrio characters Feb 4 2025

How is Hemophilia Diagnosed?

☆ More often, when the baby is born, they'll test a sample of blood from the umbilical cord.
☆ Few babies are diagnosed with hemophilia in the first 6 months of life.
↳ CUZ they're unlikely to have an injury that would lead to bleeding.
☆ Bleeding may happen after a circumcision, which can then lead to hemophilia.
☆ As kids get older & more active, a doctor might suspect hemophilia if a child bruises easily & bleeds too much when injured.

How is Hemophilia Treated?

☆ Hemophilia treatment centers can provide full care to kids with hemophilia.
↳ CDC's website.
☆ The medical care team for kids with hemophilia usually includes:
- A hematologist (A doctor who treats blood conditions).
- A nurse who specializes in conditions relating to bleeding.
- Orthopedists (doctors who care for bones, joints, & muscles)
- Physical therapists to help with strengthening, stretching, & joint health.
- Social workers &/or psychologists to help kids & parents cope with hemophilia.

How is Hemophilia Treated?

☆ Main treatment for hemophilia = factor replacement therapy.
↳ The treatment gives the clotting factor it needs.
↳ It is given intravenously (IV, into a vein).
☆ A person may get factor replacement on a regular schedule (prophylaxis) or as a treatment for bleeding.
☆ Several products are now available.
☆ Talk about treatment options with the hemophilia care team.
☆ Factor replacement can be done:
- at a hospital or hemophilia treatment center.
- at home by a nurse
- at home by the person with hemophilia or someone else, after being trained.

☆ Doctors can also give medicines to help control bleeding during procedures & surgeries.
☆ Some people with hemophilia develop inhibitors (antibodies to the clotting factor).
☆ Their bodies see the new clotting factor as an invader & develop antibodies that block it's clotting action.
↳ That can make the hemophilia hard to treat, & requires different factor replacement therapy.

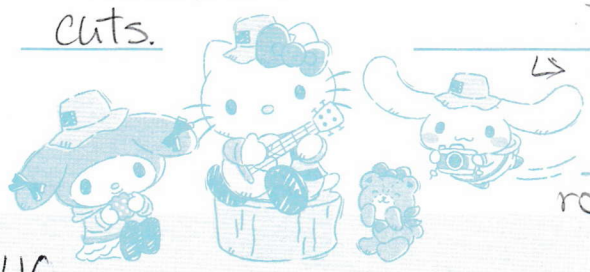

CONCEPTS (STEP 5) Sanrio characters Feb 4 2025

How can Parents Help?

☆ Help your child with hemophilia & get the best care & avoid bleeding problems as much as possible.

☆ Tips:

- Enroll your child in a hemophilia treatment center.
- Go to all regular doctor's visits.
- Give all prescribed medicines as directed.
- Work with your care team so you know the exact steps to take if your child is injured or bleeding.
- Follow the doctor's instructions about which activities or sports are OK & which to avoid.
- Find a dentist early. Your child should brush their teeth twice a day with fluoride toothpaste & floss everyday. Keeping the teeth healthy can help prevent the need for dental procedures.
- Check with the doctor before any procedures & surgeries.
- Tell your child's school staff, friends, & all caregivers that your child has hemophilia, they should know:
  - ↳ How to recognize signs of bleeding
  - ↳ How to treat bleeding from minor scrapes & cuts.
  - ↳ When to call the doctor.
  - ↳ When to go to the emergency room.



CONCEPTS (STEP 5) Sanrio characters Feb 4 2025

What Else Should I Know?

☆ Hemophilia treatment has come a long way.
☆ Most people lead full, healthy lives with careful management of their condition.
☆ Info + support through your child's care team & online @:
- The National Hemophilia Foundation.
- World Federation of Hemophilia.

☆ Doctors & scientists continue to work on other treatments, such as better & convenient ways to give replacement factor & gene therapy.
☆ Thanks to advances like these, kids with hemophilia can lead more active lives.

What is Sickle Cell Disease?

☆ Is a group of conditions in which red blood cells are not shaped as they should.
☆ Red blood cells normally look like round discs, but in sickle cell disease, they're shaped like sickles, or crescent moons.
☆ The sickle shaped cells cause problems because:
- They are stiff & sticky & block small blood vessels when they get stuck together. This stops blood from moving as it should, which can lead to pain & organ damage.


CONCEPTS (STEP 5) Sanrio characters Feb 4 2025

What is Sickle Cell Disease?

- They break down faster than normal red blood cells. That leads to too few red blood cells, a condition called anemia.
- Damage the walls of blood vessels.
- Red blood cells carry oxygen around the body
- Healthly blood cells last in the body for a few months until the body makes new ones to replace them.

☆ Kids with anemia feel tired, have low energy, & might not grow as they should.

- Medicines can help people with sickle cell disease have fewer problems.

What is Sickle Cell Disease? Feb 14 2025

☆ Medicines
↳ Different types (watch video).
↳ Have less pain, fewer serious problems & more NRG so they can feel better.
☆ 2 most common = pain & anemia
☆ Pain caused = Pain Crisis or Vaso occlusive Crisis. (Vas-sow-occlusive-crisis).
↳ Pain may happen in any part of the body.

CONCEPTS (STEP 5) Sanrio characters Feb 14 2025

What is Sickle Cell Disease?

↳ Cold, stress, illness, or dehydration can bring on pain but often there is no obvious trigger.

↳ Pain may last very long. (hours - longer).

☆ Sometimes pain can be managed at home, but some with severe pain may need treatment in the hospital.

☆ Signs of anemia:

- Paleness often seen in skin, lips, or nailbeds.
- Tiredness
- Dizziness
- Being short of breath.
- Feeling lightheaded (faint/dizzy).
- Being irritable (easily annoyed/mad).
- Trouble paying attn
- A fast heartbeat.

☆ People with sickle cell anemia may have jaundice (skin & whites of the eyes look yellow).

↳ Happens cuz the sickle shaped red blood cells breaks down faster than normal cells.

What Problems can Happen?

☆ Some can have problems that need to be taken care of by a doctor right away.

CONCEPTS (STEP 5)

Sanrio characters

Feb 14 2025

What Problems can Happen?

- Acute chest syndrome: caused by inflammation, infection, & blocked small blood vessels of the lung. Signs: chest pain, coughing, trouble breathing, & fever.
- Aplastic crisis: When a body temporarily does not make enough red blood cells, which can cause severe anemia. Signs: paleness, extreme tiredness, & a fast heartbeat.
- Hand-foot syndrome: Painful swelling of fingers & toes (dactylitis (dact-till-light-tus)) is the 1st sign of sickle cell anemia in some infants.
- Infection: Kids with sickle cell disease are at risk for some bacterial infections. WATCH OUT FOR FEVERS (38°C or higher), which can be signs of infection. Get medical care right away if a fever happens.
- Priapism (pry-a-pi-zum): Males with sickle cell disease can have painful, long lasting erections (penis enlargement & firmness). If not treated quickly, damage can cause problems with getting erections in later life.
- Splenic sequestration crises (sple-nick) (seh-qua-stray-tion) (cry-sees (plural of crisis)):

CONCEPTS (STEP 5) Sanrio characters Feb 14 2025

What Problems can Happen?

- Splenic sequestration crises: The spleen (an organ) traps the abnormal red blood cells & gets very large. That can lead to serious, quick drop. in the # of red blood cells in the bloodstream. Signs: Paleness, weakness or extreme tiredness, an enlarged spleen & belly pain.
- Stroke: Sickle-shaped cells can block small blood vessels in the brain, causing a stroke. Signs: headache, seizures, weakness in the arms & legs, speech problems, a facial droop, or loss of consciousness (not aware of surroundings).

☆ People with sickle cell disease are also at risk for problems such as leg ulcers (all-sirs) (leg pain), bone or joint damage, gallstones (gaal-stones) (Pebble-like pieces of material in the gallbladder (an organ)), kidney damage, & eye damage!

☆ Kids can have delayed growth & delayed puberty.

☆ The frequency & severity of symptoms varies a lot between different people with sickle cell disease.

What Causes Sickle Cell Disease?

☆ Group of conditions passed down in families through their genes.

CONCEPTS (STEP 5)

Sanrio characters

Feb 14 2025

What Causes Sickle Cell Disease?

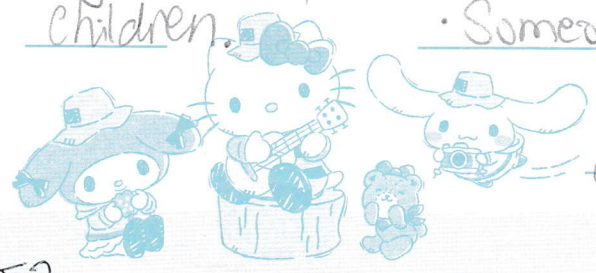
☆ The type of sickle cell disease a person has depends on the hemoglobin genes each parents passes down to them.
☆ Hemoglobin is the protein inside red blood cells that carries oxygen.
☆ Someone with sickle cell disease has at least one sickle cell gene or a gene for a different type of abnormal hemoglobin.
☆ The genes cause the body to make hemoglobin that causes the red blood cells to become sickle-shaped.

What Causes Sickle Cell Disease?

Feb 15 2025

☆ How sickle cell genes can run in families:

- A child who gets 2 sickle cell genes, one from each parent = Sickle cell disease.
- A child who gets a sickle cell gene from one parent & a normal hemoglobin gene from the other parent = Sickle cell trait. Most people with sickle cell trait don't have symptoms, but they can pass the sickle cell gene to their children.
- Someone who gets a sickle cell gene from one parent & another kind of abnormal gene



What Causes Sickle Cell Disease?

from the other parent may have a different form of sickle cell disease, such as hemoglobin SC disease, or sickle beta thalassemia.

How is Sickle Cell Disease Diagnosed?

☆ Sickle cell disease & sickle cell trait usually are found at birth with a blood test during routine newborn screening tests.

↳ A second blood test (hemoglobin electrophoresis) will confirm the diagnosis.

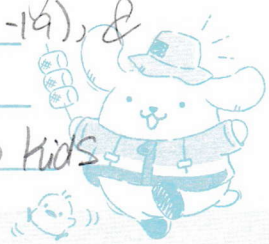
☆ Sickle cell disease also might be diagnosed before a baby is born with a test on the amniotic fluid or with a sample of tissue from the placenta (organ).

How is Sickle Cell Disease Treated?

☆ Sickle cell disease is a lifelong condition.

☆ Types of treatments in a treatment plan:

- Immunizations (shots); & daily doses of penicillin to help prevent infection. Kids with sickle cell disease should get all recommended vaccinations, including the pneumococcal flu, Coronavirus (COVID-19), & meningococcal vaccines.
- Folic acid supplements (foe-lick), can help kids make new red blood cells.



CONCEPTS (STEP 5) Sanrio characters Feb 15 2025

How is Sickle Cell Disease Treated?

- Medicines to help manage pain when it does happen.

☆A doctor may recommend other treatments for a child with sickle cell disease:

- Hydroxyurea (hi-drahk-see-u-ree-a): A daily medicine that makes the cell less sticky. That helps decrease the frequency & intensity (intense) of painfulness & many other problems. This treatment is strongly recommended for children with sickle cell disease!
- Blood transfusions (transferring/donating blood): for severe anemia or to treat or prevent some problems.
- Voxelator (vak-sa-later) / Oxbryta (ox-bree-ta): a daily medicine to reduce sickling (sickle-shaped) & increase the # of red blood cells by helping them hold on more tightly to oxygen.
- Crizanlizumab (cri-zan-lie-zoo-mab) / Adakveo (A-dak-v-o): A medicine given by IV infusion (Intravenous line) (In-tra-venus) that can help make red blood cells more slippery & can reduce pain crises.
- L-glutamine (glu-ta-mean): A daily medicine taken by mouth to reduce pain.

☆Stem cell transplant (marrow transplant) is the only proven cure for sickle cell disease. Transplants are very complex & risky but often successful. They're currently an option for some paitents.

CONCEPTS (STEP 5) Sanrio characters Feb 15 2025

How is Sickle Cell Disease Treated?

☆ Scientists & doctors are using clinical trials to develop new medicines to treat & prevent problems.
☆ They're also studying gene therapy as a potential cure for sickle cell anemia by changing or replacing the abnormal gene that causes it.

When Should I Call the Doctor?

☆ Get emergency medical care right away if your child has any of these problems:

- Fever (38°C or higher).
- Pain that isn't getting better with medicine.

Feb 19 2025

When Should I Call the Doctor?

- Chest pain
- Severe headaches or dizziness
- Severe stomach pain or swelling.
- Shortness of breath or trouble breathing.
- Extreme tiredness
- Skin that's yellow or very pale.
- A penis erection that is not going away or is very painful.
- Sudden change in vision.
- Seizures
- Weakness or trouble moving part of the body.
- Numbness or tingling.
- Slurred speech.
- Loss of consciousness (passing out).


CONCEPTS (STEP 5) Sanrio characters Feb 19 2025

How can Parents Help?

☆ learn all you can about Sickle cell disease.
☆ Take your child to all visits with their doctors & specialists.
↳ Keep track of any symptoms & share your concerns.
☆ Help your child avoid pain crisis triggers.
↳ Encourage your child to drink lots of liquids & get enough rest.
↳ In cold weather, your child should dress warmly & not stay out too long.
↳ In hot weather, your child should limit time outdoors & drink lots of fluids.
↳ Help your child learn ways to manage stress.
↳ Talk to the doctor about with activities are OK for your child & which to avoid.
↳ Make sure your child takes all prescribed medicines.
↳ Make healthy choices! - Eat healthy foods & stay active!
☆ As your child gets older, make sure they know not to smoke, drink alcohol, or use drugs because these can cause pain & other problems.
☆ The CDC
☆ Sickle cell disease association of America.

NOTE

Sanrio characters

Feb 19 2025

NOTE: PG. 28-56 are all part of STEP 5-Concepts, I never noticed before!!! Fixing will be done.

(STEP 6) CONCLUSION BRAINSTORM Feb 21 2025

How to Write a Strong Essay Conclusion

(may be helpful for key details!).

⊠Goals

↳ tie together the main parts (relate back to hypothesis (on a seperate piece of paper)).

↳ Leave a strong impression (applications + extensions).

↳ Show why it matters (applications + extensions).

⊠STEPS!

1. Return to your thesis/hypothesis.

· 1st sentence - signal this is coming to an end by returning to your overall argument (topic question).

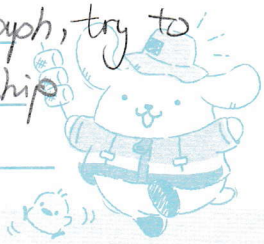
· AVOID REPEATING THE THESIS/HYPOTHESIS (DON'T COPY!)

↳ Try to rephrase it to show what you did to make your thesis/hypothesis move forward!

2. Review your main points.

· Remind audience of some of the key points (if many) that you used to support your argument.

· DO NOT simply summarize each paragraph, try to tie it all together to show the relationship between the points.



How to Write a Strong Essay Conclusion Continued...

Sanrio characters

Feb 21 2025

3. Show why it matters.
- Zoom out & take a broader view of the topic
- Consider the implications
  - ↳ What does it add to understanding or what new questions does it raise?
  - ↳ Any practical suggestions or predictions about what might happen next?
  - ↳ Can your ideas be applied to different contexts or connected to a broader debate or theme?
  - ↳ Leave the reader with a lingering sense of interest in your topic.

⊠ Common mistakes to AVOID!

✧ Don't include new evidence
- Related topics that weren't covered can be briefly mentioned.
- Essential evidence or ideas should appear earlier in the project.

◊ Don't undermine your argument
- ↳ Don't include:
  - "This is just one approach among many.
  - "There are good arguments on both sides of this issue.
  - "There is no clear answer to this problem.
- ↳ Your own position should come across clearly & confidently.

uncertain confused

◊ For a stronger conclusion, Avoid non-specific concluding phrases like!

How to write a Strong Essay Conclusion continued...

Sanrio characters

Feb 21 2025

- "To sum up."
- "In conclusion."

↳ Those phrases can make your writing sound weak.

☆ Jump right into your conclusion.

BRANSTORM

☆ Start with "My hypothesis was {accepted/rejected} because ....".

☆ Must include:

- Why
- Where + When
- How

This one!!! ◡

Try 1: My hypothesis was accepted ~~because~~ due to my research, Scientists are working on new ways to solve genetic disorders & all things about them such as epigenetics, gene therapy, & so on! Feb 24 2025

NOTE: I wrote this note down today ⟶ Feb 24 2025 to summarize what I did yesterday without my logbook, I marked that down on my 'Every day science fair to-do's' but just for reference, I started typing about some of the info I had saved online!

Feb 24 2025

Applications + Extensions

☆ Roles/Questions:

- How can I research this further?
- New Questions?

Applications & Extensions (STEP 7)

Sanrio characters

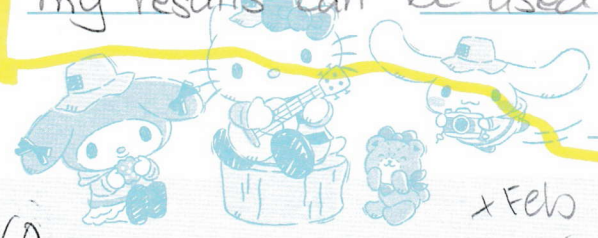
Feb 24 2025

- Things you want to address?
- Experiments I could undertake.
  ↳ Support my conclusion.
- Why should people care?
- How does it affect the real world? (How is it used/how can it benefit the real world?

BRAINSTORM

Sentence starters: To, Additionally, People, My, Without, Therefore

~~Applications~~ & Extensions - To research furthermore, I can look more into what previous trials & errors have been done and see how it can impact my research. Additionally, I can also try some of the things listed in my research to see if it can help me physically and mentally. Therefore, I can go ~~get some~~ have some yearly checks with a healthcare professional to observe any similarities or differences in my genes? People should care about genetics because our genes are very important and if not taken care of seriously, it can lead to several diseases, some life-long. My results matter because you may think that genes aren't that important but they actually play a crucial role in our lives. Without any of the genes inside your body, you would be a whole different person and probably have a genetic disorder. That is how my results can be used in the real world and why people should care about genetics.



+Feb 28
+Mar 5 2025

CONCLUSION- RE-EDIT

Sanrio characters

Feb 28 2025

CONCLUSION: My hypothesis was accepted because ~~due to~~ as found in my research, Scientists are working on new ways to ~~solve~~ cure genetic disorders. ~~& all things about them~~ Such as epigenetics, ~~&~~ and gene therapy! Overtime, scientists have found more ~~&~~ and more information on how to ~~cure~~ get rid of. genetic disorders!

Most of the types of → genetic disorders use treatments that help make it less painful. for example, cystic fibrosis, hemophilia, sickle cell disease, and ataxia-telangiectasia!

Sentence starters: My, Overtime, Such, Most, For.

Todd 4 Mar. 2025 3+4

NOTE for cue cards include pronunciations! March 2 2025

↳ Deoxyribonucleic acid
↳ Ribonucleic acid
↳ Deletions
↳ Adenine
↳ Frederich Miescher.
↳ Ataxia-Telangiectasia
↳ Cystic fibrosis
↳ Hemophilia
↳ Epigenetics.
↳ Thymine
↳ Guanine
↳ Cytosine
↳ Amino acids
↳ Double helix.
↳ Mucus

March 3 2025

↳ Pneumonia
↳ Hereditary
↳ Prevention
↳ Clotting

March 4 2025

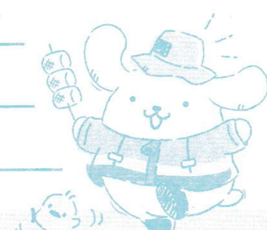
↳ Beta globin
↳ Hemoglobin

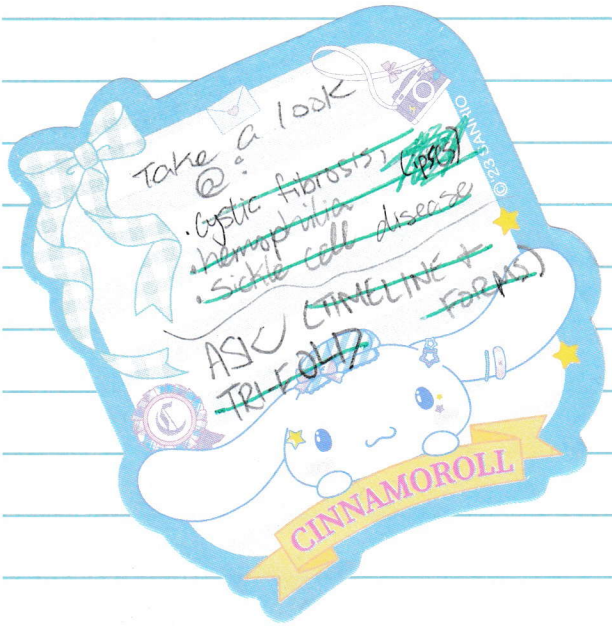
March 5 2025

↳ Anemia
↳ Intestine
↳ Constipation
↳ Nucleotide.
↳ Nitrogen.

March 7 2025

↳ Translocations
↳ Chromosomes.





POINT OF VIEW

21.5

27.9

length

width

Futher definitions for words

Sanrio characters

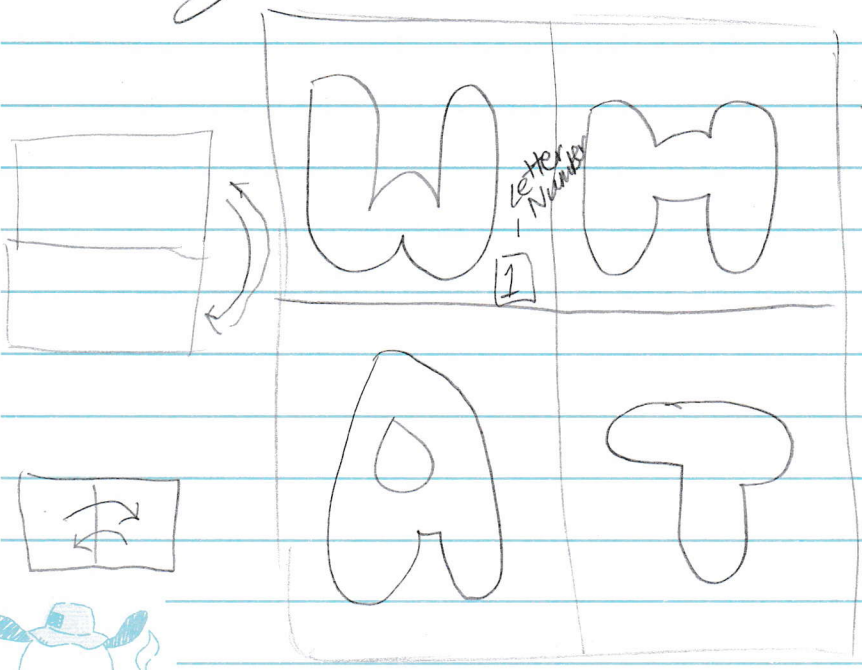
March 4 2025

✡ Hemoglobin gene - provides instructions to make a protein (beta globin).

March 5 2025

✡ Bulky - large & Heavy.
✡ Tissues - A group of cells that have similar structure & that function together as a unit.
✡ Nitrogen - A chemical on the periodic table (atomic #7). A gas with no taste or colour. Forms most of Earth's atmosphere, & is part of all living things.
✡ Atmosphere - a layer (envelope) of gases surrounding the Earth (what lets us breath).
✡ Nucleotides - basic structural unit of nucleic acids - DNA & March 6 2025

Page Design #TITLE March 7 2025



- Colored Paper
✡ split into 4 then cut.
✡ TIP: Draw/outline with pencil for letters.
✡ Fold & draw lines before you cut/split into quarters.

Materials:
- Colored paper
- Ruler
- Scissors
- Pencil + Eraser.

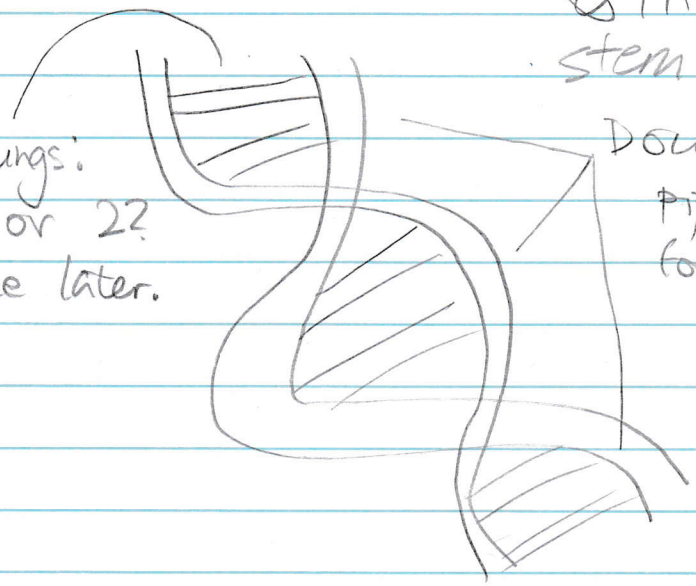
PROTOTYPE DESIGN

Sanrio characters

MARCH 7 2025

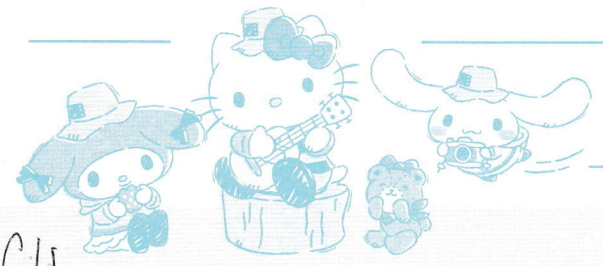
Materials needed:
- Hot glue gun? or just regular glue?
- Pipe cleaners

TIP: Double for one stem so less unbalanced!



Rungs:
1 or 2?
See later.

Double/2 Pipe cleaners for strands.



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NOTE: MOST OF THE VOCAB'S DEFINITION IS FOUND ON GOOGLE

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Propensity: An inclination or natural tendency to behave in a particular way

Mutation: Change in one gene on a chromosome

Deletion: A missing part of a chromosome

Translocation: Genes shifting from one chromosome to another

Nucleotide: A compound consisting of a nucleoside linked to a phosphate group. Nucleotides form the basic structural unit of nucleic acids such as DNA.

Compound: A substance made of molecules that contain two or more elements bonded together.

Nucleoside: A compound commonly found in DNA or RNA, consisting of a purine or pyrimidine based linked to a sugar.

(fos-fate) **Phosphate**: A salt or ester of phosphoric acid, containing PO_4^{3-} or a related anion group such as $-OPO(OH)_2$

Nucleic acid: A type of acid, that is found in all living cells & contains the genetic information passed from parents to children.

Purine (pure-een): A colorless crystalline compound with basic properties, forming uric acid or oxidation

Pyrimidine (per-rem-ideen): A colorless crystalline compound with basic properties.

Ester: An organic compound made by replacing the hydrogen of an acid by an alkyl or other organic group.

(fos-four-ic) **Phosphoric**: Relating to or containing phosphorus.

(fos-for-us) **Phosphorus**: A chemical that can be white, red, violet or black. Each allotrope, is toxic & super flammable. Human bodies need a little phosphorous to make DNA. Phosphorous shines in the dark & burns when in the air.

(a-tom-ic) **Atomic Number**: The number of protons in an element.

(a-la-trope) **Allotrope**: One or more forms of a chemical element that can exist

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in the same physical state.

Property: The qualities & characteristics of a substance that describe & identify it

PO_4^{3-}: Phosphate

$OPO(OH)_2$: A chemical formula.

$(OH)_2$: Two oxygen atoms & two hydrogen atoms

OPO: Organ procurement organization.

Organ: Is a collection that structurally form a functional unit specialized to perform a particular function. ex: heart, kidneys, & lungs.

(chris-tal-lin) **Crystalline**: Having the structure & form of a crystal ; composed/made up of crystals. (Sometimes confused with crystallin (same pronounciation)).

(you-rick) **Uric**: Relating to urine

(you-ran) **Urine**: a watery, typically yellowish fluid stored in the bladder & discharged through the urethra. (pee)

(you-reef-thra) **Uretha**: The tube through which urine leaves the body. It empties urine from the bladder.

Bladder: An organ inside the body that stores urine until it can be excreted.

(ex-creet-ted) **Excreted**: To get rid of/eliminate such as solid waste or urine from the body.

(Ox-sa-day-tion) **Oxidation**: The process of a substance or chemical element

Oxidizing: when a substance combines with oxygen & loses hydrogen to form another substance.

Hydrogen: A chemical on the periodic table, It's the lightest & most common atom in the universe by far. Hydrogen keeps the stars burning. It has no color & was the very first atom! Hydrogen + Oxygen = H_2O (water)

(alk-kull) **Alkyl**: A group of atoms that consist of a alkane that has one hydrogen atom removed.

Consist: Be composed or made up of.

Composed: Constitute or make up (a whole)

Constitute: Be a part of a whole

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Alkane: Any gas in a group that contains only carbon & hydrogen atoms, with the carbon atoms joined together in a simple chain.

(alk-ka-line) **Alkaline**: Having the properties of alkali, or containing alkali; having a pH greater than 7.

(alk-ka-lie) **Alkali**: A chemical that dissolves in water. An alkali is the chemical opposite of an acid & turns litmus paper blue.

Dissolve: Break(s) down.

(Lit-mus) **Litmus paper**: A piece of paper that tests whether a substance is acidic, neutral, or a base.

(Her-red-dit-tary) **Hereditary**: Describes the passing of genetic information from parent to child through the genes in sperm & egg cells. Also called inherited

(In-hair-re-ted) **Inherited**: Derived genetically from one's parents or ancestors.

Fundamental: Forming a necessary base or core; of central importance.

Biological: (of a member of a persons family) genetically related; related by blood.

Biological: relating to biology or living organisms.

Organism: An individual animal, plant, or single-celled life form.

Cell: The smallest unit that can live on it's own & that makes up all living organisms & the tissues of the body.

Tissue: Any of the distinct types of material of which animals or plants are made, consisting of specialized cells & their products.

Distinct: Recognizably different in nature from something else of a similar type.

(Gee-nome) **Genome**: The complete set of DNA in an organism.

(fair-ri-ant) **Variants**: A form or version of something that differs in some respect from other forms of the same thing or form a standard.

(Differ-rent) Science Fair 2024-2025

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(Dif-fer) **Differ**: Be unlike or dissimilar
(Diff-fer-ent) **Dissimilar**: not alike ; different
Voyage: A long journey involving travel by sea or in space.
Synthesis: The production of chemical compounds by reaction from simpler materials. (to make)
(feas-a-ble) **Feasible**: Possible to do easily or conveniently.
Conveniently: In a way that fits well with particular needs, activities, + plans.
Particular: Used to single out an individual member of a specified group or class.
(spe-ci-fied) **Specified**: Identify clearly + definitely.
Relevant: Closely connected or appropriate to what is being done or considered.
(core-ra-lay-tion) **Correlational**: A connection or relationship between two or more facts, numbers, etc.;
(nitch) **Niche**: A comfortable or suitable position in life or employment.
(your carry-out) **Eukaryote**: Organisms whose cells contain a nucleus + other membrane-bound organelles
Cell Division: The process by which a single parent cell splits to form new cells, known as daughter cells. There are two types of cell division: mitosis + meiosis
Compact: Closely + neatly packed together ; dense.
Enable: Give (someone or something) the authority or means to do something.
Nucleus: A dense organelle present in most eukaryotic cells, typically a single rounded structure bounded by a double membrane, containing the genetic material
Nuclear: Relating to the nucleus of a cell.
Dense: Closely compacted in substance.
(Might-a-con-dree-a) **Mitochondria**: Are membrane-bound cell organelles (mitochondrion, singular) that generate most of the chemical energy needed to power

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the cell's biochemical reactions. Chemical energy produced by the mitochondria is store in a small molecule called ATP.

Mitochondrion: Mitochondria is it's plural noun.

Membrane-bound cell: Is surrounded by a membrane known as the cell membrane, also referred to as the plasma membrane.

(Orgeun-nell) **Organelle:** Is a subcellular structure that has one or more specific jobs to perform in the cell, much like an organ does in the body.

(noo-cle-eye) **Nuclei:** An organelle that stores genetic information.

(rye-ba-sown) **Ribosome:** An organelle that assembles proteins.

Parent cell: A cell that is the source of other cells, as a cell that divides to produce two or more daughter cells, or a stem cell that is a progenitor of other or is the first in a line of developing cells.

Daughter Cell: The cells that are formed after cell division. They are know as daughter cells because they are the progeny of the mother or parent cell. Daughter cells can eventually become parent cells themselves. Although, not all daughter cells will be capable of cell division.

(My-toe-sis) **Mitosis:** A type of cell division that results in two daughter cells each having the same number & kind of chromosomes as the parent nucleus, typical of ordinary tissue growth.

(My-Oasis) **Meiosis:** A type of cell division that results in four daughter cells each with half the number of chromosomes of the parent cell, as in the production of gametes & plant spores. Sometimes confused with miosis.

(My-Oasis) **Miosis:** Excessive constriction of the pupil of the eye.

(Chris-tae) **Cristae:** Folds in the inner mitochondria membrane. These folds increase the surface area of the inner membrane where energy production occurs. An increased surface area

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allows the mitochondria to produce more energy at a faster rate.

(Chris-ta) **Crista:** Cristae is it's plural noun.

Protein: A molecule made up of amino acids. Proteins are needed for the body to function properly. They are the basis of body structures, such as skin + hair, + of other substances such as enzymes, cytokines, + antibodies.

Bound: Two or more atoms are joined together by a chemical bond.

Chemical bond: Holds atoms together to form molecules.

(Mem-brain) **Membrane:** A microscopic double layer of lipids + proteins that bounds cells + organelles + forms structures within cells.

(Plas-ma) **Plasma:** Is the liquid portion of blood. About 55% of our blood is plasma, + the 45% are red blood cells, white blood cells, + platelets that are suspended in the plasma.

Assemble: To come together in a single place or bring parts together in a single group.

Source: A place, person, or thing from which something comes or can be obtained.

Stem Cell: Cells with the potential to develop into many different types of cells in the body. They serve as the repair system for the body. There are two main types of stem cells: embryonic stem cells + adult stem cells.

Potential: Latent qualities or abilities that may be developed + lead to future success or usefulness.

Latent: (of a quality or state) existing but not yet developed or manifest; hidden or concealed.

(man-ni-fest) **Manifest:** Clear or obvious to the eye or mind.

Developing cells: Cells that are developing (becoming more mature).

Developing: Growing + becoming more mature, advanced, or elaborate.

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Elaborate: develop or present (a theory, policy, or system) in detail.

(Ma-ture) **Mature:** fully developed physically; full-grown.

Theory: A supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained.

Intended: Planned or meant.

Supposition: An uncertain belief.

Principle: A kind of rule, belief, or idea that guides you.

Policy: A course or principle of action adopted or proposed by the government, party, buisness, or individual.

(Pra-geny) **Progeny:** A descendant or the descendants of a person, animal, or plant; offspring.

Spore: A cell that certain fungi, plants (moss ferns), & bacteria produce. Certain bacteria makes spores as a way to defend themselves. Spores have thick walls. They can resist high temperatures, humidity, & other environmental conditions.

Humidity: Is a measure of water vapor in the air.

(due) (point) **Dew Point:** The temperature the air needs to be cooled to (at constant pressure) in order to acheive a relative humidity (RH) of 100%. At this point, the air cannot hold more H_2O in the gas form.

Excessive: More than is necessary, normal, or desirable; immoderate.

Immoderate: Not sensible or restrained; excessive.

Sensible: Practical & reasonable.

Practical: Of or concerned with the actual doing or use of something rather than with theory or ideas.

Restrain: Prevent (someone or something) from doing something; keep under control or within limits.

Constriction: The action of making something narrower by pressure

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or of becoming narrower; tightening.

(A-me-no) **Amino Acids:** Are molecules that combine to form proteins. Amino Acids + proteins are the building blocks of life.

(En-sime) **Enzyme:** Is a biological catalyst + is almost always a protein. It speeds up the rate of a specific chemical reaction in the cell. The enzyme is not destroyed during the reaction + is used over + over.

(Sight-toe-kine) **Cytokines:** Are signaling proteins that help control inflammation in your body. They allow your immune system to mount a defense if germs or other substances that can make you sick enter your body. Too many cytokines can lead to excess inflammation + conditions like autoimmune diseases.

Immune System: Is a network with several parts that work together to protect your body from threats.

(Path-tho-gen) **Pathogen:** A bacterium, virus, or other microorganism that can cause disease.

Microorganism: A microscopic organism, especially a bacterium, virus, or fungus.

(Back-tee-re-um) **Bacterium:** A member of a large group of unicellular microorganisms which have cell walls but lack organelles + an organized nucleus, including some that can cause disease.

Lack: The state of being without or not having enough of something.

Inflammation: Is your body's response to an, illness, injury or something that doesn't belong in your body (ex- germs or toxic chemicals). Inflammation is a normal + important process that allows your body to heal.

Chronic: (of an illness) persisting for a long time or constantly recurring.

Persisting: continue firmly or obstinately in an opinion or a course of action in spite of difficulty, opposition, or failure.

Spite: A desire to hurt, annoy, or offend someone.

(Ob-sti-nut-ly) **Obstinately:** In a way that shows that you refuse to change your

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opinions, way of behaving, etc... when other people are trying to persuade you to. (stubborn)

Opposition: Resistance or dissent, expressed in action or argument.

Dissent: The expression or holding of opinions at variance with those previously, commonly, or officially held.

Antibodies: Proteins that protect you when an unwanted substance enters your body. Produced by your immune system, antibodies bind to these unwanted substances in order to eliminate them from your system. (Immunoglobulin = Another word for antibodies).

Bind: Substances attaching to others.

(e-muw-no-glaw-be-lence)

Immunoglobulins: Another word for Antibodies.

Lipids: Are fatty compounds that perform a variety of functions in your body. They're a part of your cell membranes & help control what goes in & out of your cells. They help with moving & storing energy, absorbing vitamins & making hormones. Having too much of some lipids is harmful. A lipid panel can tell you if you have normal levels.

Hormones: Are chemical substances that act like messenger molecules in the body. After being made in one part of the body, they travel to other parts of the body where they help control how cells & organs do their work.

Lipid panel: Is a blood test that measures lipids.

Red blood cells: A type of blood cell that is made in the bone marrow & found in the blood. Red blood cells contain a protein called hemoglobin, which carries oxygen from the lungs to all parts of the body.

Bone marrow: Is the soft fatty tissue inside of bone cavities. Components of your blood including red & white blood & platelets form inside of your bone marrow.

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Components: A part or element of a larger whole, especially a part of a machine or vehicle.

Bone Cavities: Also known as the medullary cavity. It is a hollow part of bone that contains bone marrow.

(meh-dull-lary) **Medullary**: relating to the inner region of an organ, tissue, or structure.

(he-ma-glow-bin) **Hemoglobin**: A protein inside red blood cell's that carries oxygen from the lungs to tissues & organs in the body & carries CO_2 back to the lungs.

White blood cells: Also known as leukocytes, are responsible for protecting your body from infection. As part of your immune system, white blood cells circulate in your blood & respond to injury or illness. There are five types of white blood cells.

(neu-tro-fills) **Neutrophils**: The most common type of white blood cell in your body. Helps protect your body from infections by killing bacteria, fungi, & foreign debris.

(limp-fuh-sites) **Lymphocytes**: Consist of T-cells, natural killer cells, & B-cells to protect against viral infections & produce proteins to help you fight infection (antibodies). (A type of white blood cell).

(e-a-sin-ne-phil) **Eosinophils**: Identifies & destroys parasites, cancer cells, & assists basophils with your allergic response. Larger than most cells. Make up less than 5% of all white blood cells in your body.

(base-a-phils) **Basophils**: Produce an allergic response like coughing, sneezing, or a runny nose.

(mo-no-sites) **Monocytes**: Defend against infection by cleaning up damaged cells.

(pair-ra-site) **Parasites**: An organism that lives in or on an organism of other species (its host) & benefits by deriving nutrients at the others expense.

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(Luke-a-site) **Leukocyte:** Also known as white blood cells.

(plate-lets) **Platelets:** Or thrombocytes, are small, colorless cell fragments in our blood that form clots & stop or prevent bleeding. Platelets are made in our bone marrow, the sponge-like tissue inside our bones.

Fragment: A small part broken or seperated off something.

(throm-ba-site) **Thrombocytes:** Another term for platelet.

Clots: A thick mass of coagulated liquid, especially blood, or of material stuck together.

(co-lag-guw-late) **Coagulated:** (of a fluid, especially blood) change to a solid or semisolid state.

Semisolid: Highly viscous; slightly thicker than semifluid.

(vis-kiss) **Viscous:** having a thick, sticky consistency between solid & liquid; having a high viscosity.

Consistency: The way in which a substance, typically a liquid, holds together; thickness or viscosity.

(vis-koss-sity) **Viscosity:** the state of being thick, sticky, & semifluid in consistency, due to internal friction.

Semifluid: Having a thick consistency between a solid & a liquid.

Semi: half or partially

Suspended: Hanging or floating in the gas or liquid.

(Em-bree-on-nick) **Embryonic stem cells:** stem cells that come from embryos that are 3-5 days old. At that stage, the embryo is called a blastocyst & has about 150 cells. These are pluripotent stem cells, meaning they can divide into more stem cells or can become any type of cell in the body. This allows embryonic stem cells to be used to regenerate or repair diseased tissue & organs.

(Blast-assist) **Blastocyst:** A stage of the embryo which is 3-5 days old. A blastocyst has about 150 cells.

Regenerate: (of a living organism) regrow (new tissue) to

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NOTE: MOST THE VOCAB'S DEFINITION IS FOUND ON GOOGLE

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replace lost or injuried tissue.

(plur-ri-poe-tent) **Pluripotent stem cells:** A cell that is able to develop into many different types of cells or tissues in the body.

(fore-rain) **Foreign:** of, from, in, or characteristic of a country or language other than one's own.

(you-ni-cell-you-lar) **Unicellular:** An unicellular organism consists of a single cell.

Adult stem cells: Are found in small numbers in most adult tissues (bone marrow, or fat, etc...). Adult stem cells have a more limited ability to rise to various cells of the body. Adult cells altered to have properties of embryonic stem cells.

Altered: change or cause to change in character or composition, typically in a comparatively small but significant way.

Composition: The nature of something's ingredients or constituents; the way in which a whole or mixture is made up.

(cun-stit-chew-went) **Constituent:** A component part of something.

(bay-ta) **Beta cells:** Are cells that make insulin, a hormone that controls the level of glucose in the blood. Beta cells are found in the pancreas within clusters of cells known as islets. In type 1 diabetes, the body's immune system mistakenly destroys the beta cells.

(pan-cree-us) **Pancreas:** A glandular organ located in the abdomen.

Glands: A organ that makes one or more substances. Endocrine glands release the substances directly into the blood stream. Exocrine glands release the substances into a duct or opening to the inside or outside of the body.

Insulin: Is a hormone that lowers the level of glucose

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in the blood. It's made by the beta cells of the pancreas & released into the blood when the glucose level goes up, (after eating, etc...). Insulin helps glucose enter the body's cells, where it can be used for energy or stored for futher use.

(Glue-coas) **Glucose:** Is the main type of sugar in the blood & is the major source of energy for the body's cells. Glucose comes from the foods we eat or the body can make it from other substances. Glucose is carried to the cells through the bloodstream. Several hormones, including insulin, control glucose levels in the blood.

(I - let) **Islet:** A portion of tissue structually distinct from surrounding tissues.

Transcribe: put (thoughts, speech, or data) into a written or printed form.

Regulating: control or maintain the rate or speed of (a machine or process) so that it operates properly.

(in-ter-me-dee-air-ree) **Intermediary:** A person who acts as a link between people in order to try to bring about an agreement or reconciliation; a mediator

Reconciliation: The restoration of friendly relations.

Biochemist: an expert in or student of the branch of science concerning the chemical processes occuring with living organisms.

Unraveled: Undo or investigate & solve or explain (something complicated or puzzeling).

Vital! Absolutely necessary or important; essential.

Diffraction: (a pattern caused by) a change in the direction of light, water or sound waves.

Standpoint: An attitude to or outlook on issues, typically arising from ones circumstances or beliefs.

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Outlook: A person's point of view or general attitude to life.

Arising: (of a problem, opportunity, or situation) emerge; become apparent.

Emerge: Move out of the way from something & come into view or become apparent, important, or prominent.

Prominent: Important; famous.

Apparent: Clearly visible or understood; obvious.

Rung: A horizontal support on a ladder for a persons foot.

Transcription: The process by which genetic information represented by a sequence of DNA nucleotides is copied into newly synthesized molecules of RNA, with the DNA serving as a template.

Synthesized: made by synthesis, especially chemically.

Sythesis: The production of chemical compounds by reaction from simpler materials.

(sight-toe-pla-zim) **Cytoplasm:** Cyto = cell, Plasm = Stuff. Is the gelatinous liquid that fills the inside of a cell. It is composed of water, salts, & various organic molecules.

(Suh-lat-ness) **Gelatinous:** Having the consistency of jelly.

Corresponding: Analogous or equivalent in character, form, or function; comparable.

(a-na-la-guss) **Analogous:** Comparable in certain respects, typically in a way which makes clearer the nature of the things compared.

(o-bee-city) **Obesity:** The state or condition of being very fat or overweight.

Asthma: A chronic disease in which the bronchial airways in the lungs become narrowed & swollen. Making it difficult

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to breathe.

(Brang-ke-ul) **Bronchial**: Having to do with the bronchi, which are the larger air passages of the lungs, including those that lead from the trachea (windpipe) to the lungs & those within the lungs.

(Brang-kai) **Bronchi**: Is Bronchus's (brang-cus) plural noun. Is any of the major air passages of the lungs that diverge from the windpipe.

Diverge: (of a road, route, or line) seperate from another route, especially a main one, & go in a different direction.

Windpipe: the air passage from the throat to the lungs; the trachea.

(tray-kee-uh) **Trachea**: Also known as a windpipe.

Pesticide: a substance used for destroying insects or other organisms harmful to cultivated plants or to animals.

Cultivated: refined & well educated

Refined: A refined substance has been made pure by removing other substances from it.

Flame retardants: Various chemicals applied to materials to prevent burning or slow the spread of fire. The term applies to the function, not a specific composition, of these chemicals.

Jan 5
2025

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Steps Of The Project (Research)

1. Background Research
   - ↳ First step to any science fair project.
   - ↳ Helps to understand more about the topic you are interested in. ↳ can help you come up with a question or problem. (Gain more insight on the topic).
2. Find a problem or testable question.
   - ↳ Should be specific
   - ↳ Should be something you want to research.
3. Hypothesis (or thesis)
   - ↳ Challenge a current viewpoint.
   - ↳ Analyze data in a new way.
   - ↳ Should predict the outcome,
     - ↳ "If _ then _ because ___" format.
   - ↳ Thesis
     - ↳ Original point of view
     - ↳ Should be based on research.
     - ↳ Can be written in many forms.
   - ↳ Use your hypothesis (or thesis) to keep your research focused + specific.
4. Research.
   - ↳ Majority of work will happen.
   - ↳ Wide Variety of Sources.
     - ↳ Books
     - ↳ Internet Websites
     - ↳ Scientific Journals.
     - ↳ Papers
     - ↳ Interviews with experts in the field
   - ↳ Controversy (Keep things balanced)
     - ↳ Explore both sides of the issue.
   - ↳ Scientific principles
     - ↳ Rules or laws that are central to your research.
     - ↳ Make sure you can explain (Keep it simple?)

Steps Of The Project (Research) continued...

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↳Demonstration
↳Examples of the underlying scientific principle or law is helpful.
↳You should also be able to explain. the conditions for known expections to the scientific principles in question.
5. Concepts
↳Key Points
↳Problems
↳Issues
↳Related to your research subject.
↳Pros + Cons
↳Make sure your information is accurate.(+ complete)
6. Results + Conclusion
↳Product of your research
↳Keep Records!
↳Research
↳Sources
↳Evolution of your thoughts + ideas in a logbook
↳Conclusion:
↳Final outcome of your investigation as supported by the research.
↳Answer your question or problem.
↳Relate it to your thesis/hypothesis.
7. Applications + Extensions
↳How can I research this further?
↳Additional Research?
↳New Questions?
↳Things you want to address?
↳Experiments that you could undertake, in order to support your conclusion.
↳Explanation of Why people should care?
↳How does it affect the real world?

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Steps Of The Project (research) continued...

↳How can your results be used in the real world?

Science Fair 2024-2025 {NOTES}

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Jan 20 2025

GOAL OVERALL:

☆Identify + understand what DNA + Genetic Disorders are + why they happen + effects.

TWEAKS:

☆Topic Question (Add new thing about Genetic Disorders)
☆Hypothesis (Redo: Guess (not already something I know), try, + create?).

TOPIC QUESTION:

Before: What is DNA & What Does it Look Like?

Tweaking:
- What are Genetic Disorders, What is DNA, & What Does it Look Like?
- What is DNA, What are Genetic Disorders, & What Does DNA Look Like?
- What is DNA & What Does it Look Like? Additionally, What are Genetic Disorders?
- What is DNA, What Does it Look Like, ~~&~~ and what are Genetic Disorders? (Mar 3 2025)

Final: What is DNA, What Does it Look Like, & What are Genetic Disorders?

HYPOTHESIS:

MUST NEEDS:
☆Things that idk & want to know. ☆Genetic Disorders
☆Estimations ☆Causes, Diseases
☆Format - If, then, because. ☆Related things to topic question.

→

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Science Fair 2024-2025 (NOTES) Jan 20 2025

HYPOTHESIS:

Before: If DNA creates a code for our personality/characteristic traits then I think that DNA is a very complex code that looks like twisted ladders because, based on my background research, your DNA is based off of both your parents DNA & it took years to map out where your DNA is inside your body? Also, based on the websites where my background research was on, the description & imagery showed me that DNA is very twisted & complex?

Brainstorm:

If DNA may have special disorders or diseases, then I think that ~~DNA~~ genes can contain & change many unique ways of behaviour or characteristic traits due to the personal daily habits you do every day because as ~~based on~~ found in my background research, many different ~~like~~ conditions may lead you to specific genetic diseases & conditions. Those conditions or diseases may even change the structure of your DNA? So, that is why I think ~~DNA~~ special can change or recreate your ~~DNA~~ genes ~~due to special genetic disorders or diseases~~ affecting your daily life.
~~The question is how? & why?~~

→ Genetic disorders or ~~diseases~~ (Feb 24) 2025

↓ Change most DNA into genes

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Edited on March 5 2025

Science Fair 2024-2025

Feb 22 2025

Science Fair layout

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Trifold: 48 in x 36 in

Type all except for TITLE.

Inclusions:

Hypothesis - Hypothesis

Research - DNA facts ~~~~, mutations, What are genes, DNA, genetic disorders.

Concepts - Gene therapy, epigenetics, ataxia telangiectasia, Cystic fibrosis, hemophilia, sickle cell disease.

Conclusion: ~~~~~

Applications + Extensions ~~~~

Title: cut out from colored paper.

☆ add special frames from colored paper.

~~Model - Pipecleaners? Wires?~~