

SUMMARIZE NOTES

PROMPT

You are an assistant helping a student understand their notes. Read the provided notes and create a concise summary in plain, everyday language. Keep it accurate but easy to read, as if you were explaining it to someone new to the subject. Avoid jargon unless it is essential, and give short explanations for any terms that remain. Provide the summary in paragraph form only utilizing bullets if absolutely necessary. This should be a readable output.

NOTES 1:

Mitosis = cell division, growth, repair

Interphase → G1, S, G2 (prep stage, DNA copy happens in S)

Prophase: chromosomes visible, spindle fibers form

Metaphase: line up in middle

Anaphase: sister chromatids pull apart

Telophase: 2 nuclei form

Cytokinesis = cytoplasm splits (animal → cleavage furrow, plant → cell plate)

Meiosis → sex cells (gametes), 2 divisions

Crossing over? = genetic variety

End = 4 non-identical cells, 23 chrom in humans

Confused: meiosis vs mitosis similarities???

SUMMARY 1:

Your notes are about how cells divide, both for regular body growth and for making sex cells. Mitosis is the process cells use to grow and repair. Before dividing, the cell goes through interphase, where it prepares by growing (G1), copying its DNA (S), and checking everything (G2). In mitosis itself, the chromosomes become visible in prophase and spindle fibers form to help move them. In metaphase, the chromosomes line up in the middle, then in anaphase, the copies (called sister chromatids) are pulled apart. By telophase, two new nuclei form, and finally, cytokinesis splits the cell into two. In animals, this happens with a pinching called a cleavage furrow, while plants build a new wall, called a cell plate.

Meiosis is different because it makes sex cells, or gametes. It happens in two rounds of division instead of one, and includes crossing over, where pieces of DNA are swapped to increase genetic variety. The end result is four unique cells, each with half the usual number of chromosomes—23 in humans. Both mitosis and meiosis start with DNA copying and go through

similar phases, but mitosis creates identical cells for growth and repair, while meiosis makes unique cells for reproduction.

NOTES 2:

Causes: taxation without rep. (Stamp Act, Tea Act), Boston Tea Party

Colonists angry → 1st Continental Congress

1776 = Declaration of Independence (Jefferson wrote? or Adams?? double check)

Key battles: Lexington & Concord (first shots), Saratoga (turning point), Yorktown (end, Cornwallis surrender)

Allies: France helped after Saratoga

Aftermath: Treaty of Paris 1783

Remember: Articles of Confederation = weak gov., no taxes

?? Bill of Rights came right after?? maybe check timing

SUMMARY 2:

These notes outline the main causes and events of the American Revolution. The colonists became frustrated with Britain's taxes, like the Stamp Act and Tea Act, which led to protests such as the Boston Tea Party. Their anger pushed them to form the First Continental Congress. In 1776, the colonies declared independence through the Declaration of Independence, written mostly by Thomas Jefferson.

The fighting began at Lexington and Concord, often called the "shot heard 'round the world." The Battle of Saratoga became the turning point, convincing France to join as an ally. The war ended at Yorktown when British General Cornwallis surrendered. Afterward, the Treaty of Paris in 1783 officially recognized American independence.

The new nation first tried governing under the Articles of Confederation, which created a weak central government that couldn't collect taxes. The Bill of Rights did not come immediately—it was added later, after the U.S. Constitution was written and ratified, to guarantee individual freedoms.

NOTES 3:

Derivative = slope of tangent line

$f'(x) = \text{limit as } h \rightarrow 0 \text{ of } [f(x+h)-f(x)]/h$

Power rule: $d/dx [x^n] = n \cdot x^{(n-1)}$

Examples:

$f(x)=x^2 \rightarrow f'(x)=2x$

$$f(x)=3x^3 \rightarrow 9x^2$$

Product rule: $(fg)' = f'g + fg'$

Quotient rule: $(f/g)' = (f'g - fg')/g^2$

Chain rule = derivative of outside * inside

$$\text{ex: } y=(3x+1)^5 \rightarrow 5(3x+1)^4 * 3 = 15(3x+1)^4$$

Not sure: when to use chain vs product?? practice

SUMMARY 3:

Your notes are about the basics of derivatives, which tell us the slope of a curve at any point (the slope of the tangent line). The formal definition uses a limit: $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$. In practice, though, we usually use rules.

The power rule says if you're differentiating x raised to a power, bring the power down in front and subtract one from it. For example, x^2 becomes $2x$, and $3x^3$ becomes $9x^2$. When multiplying functions, you use the product rule: take the derivative of the first times the second, plus the first times the derivative of the second. For division, you use the quotient rule: derivative of the top times the bottom minus the top times the derivative of the bottom, all divided by the bottom squared.

The chain rule comes in when you have a function inside another function. You take the derivative of the outside function and then multiply by the derivative of the inside. For instance, with $(3x+1)^5$, the outside is something to the 5th power, so you bring down the 5 and reduce the power to 4, then multiply by the derivative of the inside $(3x+1)$, which is 3. That gives $15(3x+1)^4$.

A good way to remember when to use chain vs product is:

- Use **chain rule** when it's one function wrapped inside another (like parentheses or something raised to a power).
- Use **product rule** when it's two separate functions multiplied together (like x^2 times $\sin(x)$).

STRUCTURE NOTES

PROMPT

You are an assistant transforming raw student notes into a clear and organized format. Rewrite the provided notes into one of the following styles as determined by the Note Style selected first:

Outline Method

- Information is organized hierarchically, with main topics, subtopics, and supporting details.
- Useful for quickly jotting down and later reviewing linear material, such as lecture notes or textbook readings.
- Highlights key points and relationships between ideas.

Cornell Method

- Note page is divided into three sections: notes, cues, and summary.
- Encourages active engagement and review, making it easy to condense and self-assess knowledge.
- Highly structured and efficient for lecture-based material.

Mapping (Mind Mapping)

- Main topic is centered, with branches for subtopics and details.
- Visual learners benefit from seeing connections and the big picture.
- Useful for brainstorming, complex concepts, or organizing non-linear information.

Charting Method

- Information is organized in tables and columns according to categories or properties.
- Effective for comparing concepts, summarizing data, or organizing information with multiple variables.

Sentence Method

- Records information as individual sentences—each new topic gets a separate line.
- Works well if the lecture is fast-paced or lacks structure, but may require revisiting and reorganizing later for clarity.

Boxing Method

- Places each topic or subtopic inside a labeled box on the page.
- Provides a summary of each area at a glance and is helpful for revision or visual organization.

General Note-Taking Tips

- Keep notes brief and selective; focus on keywords and main points.
- Use headings, lists, color coding, and your own words to reinforce understanding.
- Review and reorganize notes soon after creation to boost retention.

Keep all content accurate, note incomplete thoughts for the user to request to fill later (but do not mention them here), and maintain consistent formatting and styling in your output (this includes margins, formatting, columns, etc...) If content is unclear, note it with a question mark so the student knows to clarify.

NOTES 1:

Mitosis = cell division, growth, repair

Interphase → G1, S, G2 (prep stage, DNA copy happens in S)

Prophase: chromosomes visible, spindle fibers form

Metaphase: line up in middle

Anaphase: sister chromatids pull apart

Telophase: 2 nuclei form

Cytokinesis = cytoplasm splits (animal → cleavage furrow, plant → cell plate)

Meiosis → sex cells (gametes), 2 divisions

Crossing over? = genetic variety

End = 4 non-identical cells, 23 chrom in humans

Confused: meiosis vs mitosis similarities???

EXAMPLE:

Outline Method Example

Mitosis (cell division for growth & repair)

- Interphase
 - G1: cell growth
 - S: DNA replication
 - G2: preparation for division
- Prophase: chromosomes visible, spindle fibers form

- Metaphase: chromosomes line up at the cell's equator
- Anaphase: sister chromatids pulled apart
- Telophase: two nuclei form
- Cytokinesis: cytoplasm splits
 - Animal cells: cleavage furrow
 - Plant cells: cell plate

Meiosis (formation of sex cells/gametes)

- Purpose: produce genetic variety
- Process: two divisions
- Crossing over: exchange of DNA between homologous chromosomes
- End result: 4 non-identical cells (haploid)
 - In humans: 23 chromosomes per gamete

Comparison (Mitosis vs. Meiosis)

- Similarities: both involve cell division, phases (prophase, metaphase, anaphase, telophase)
- Differences:
 - Mitosis → 2 identical cells
 - Meiosis → 4 unique gametes

NOTES 2:

Causes: taxation without rep. (Stamp Act, Tea Act), Boston Tea Party

Colonists angry → 1st Continental Congress

1776 = Declaration of Independence (Jefferson wrote? or Adams?? double check)

Key battles: Lexington & Concord (first shots), Saratoga (turning point), Yorktown (end, Cornwallis surrender)

Allies: France helped after Saratoga

Aftermath: Treaty of Paris 1783

Remember: Articles of Confederation = weak gov., no taxes

?? Bill of Rights came right after?? maybe check timing

EXAMPLE:

Notes

- **Causes**

- Taxation without representation
 - Stamp Act
 - Tea Act
- Boston Tea Party

- **Colonists' Response**

- Anger → First Continental Congress

- **Declaration of Independence**

- Written in 1776
- Author = Jefferson? or Adams?? (double check)

- **Key Battles**

- Lexington & Concord → first shots
- Saratoga → turning point
- Yorktown → Cornwallis surrender, end of war

- **Allies**
 - France joined after Saratoga
- **Aftermath**
 - Treaty of Paris, 1783
- **Government**
 - Articles of Confederation = weak (no taxes)
- **Bill of Rights**
 - Came right after?? check timing

Cues

- Causes of Revolution?
- First major colonial response?
- When + who wrote Declaration?
- Which battle = turning point?
- Which battle ended the war?
- Which foreign ally helped?
- What treaty ended the war?
- Why were Articles of Confederation weak?
- Bill of Rights timing?

Summary

The American Revolution was driven by taxation without representation and colonial protests like the Boston Tea Party. Colonists organized through the First Continental Congress and later declared independence in 1776. Key battles included Lexington & Concord (start), Saratoga (turning point), and Yorktown (final victory). France's support after Saratoga was crucial. The

war officially ended with the Treaty of Paris in 1783. The Articles of Confederation created a weak government, especially due to lack of taxation power. The timing of the Bill of Rights still needs clarification.

NOTES 3:

Derivative = slope of tangent line

$$f'(x) = \text{limit as } h \rightarrow 0 \text{ of } [f(x+h)-f(x)]/h$$

$$\text{Power rule: } d/dx [x^n] = n \cdot x^{(n-1)}$$

Examples:

$$f(x)=x^2 \rightarrow f'(x)=2x$$

$$f(x)=3x^3 \rightarrow 9x^2$$

$$\text{Product rule: } (fg)' = f'g + fg'$$

$$\text{Quotient rule: } (f/g)' = (f'g - fg')/g^2$$

Chain rule = derivative of outside * inside

$$\text{ex: } y=(3x+1)^5 \rightarrow 5(3x+1)^4 * 3 = 15(3x+1)^4$$

Not sure: when to use chain vs product?? practice

EXAMPLE 3:

Mind Map: Derivatives

Derivative

- Slope of tangent line

- Definition: $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$

Rules

- **Power Rule**

- $\frac{d}{dx} [x^n] = n \cdot x^{n-1}$

- Examples:

- $f(x) = x^2 \rightarrow f'(x) = 2x$

- $f(x) = 3x^3 \rightarrow f'(x) = 9x^2$

- **Product Rule**

- $(fg)' = f'g + fg'$

- **Quotient Rule**

- $(f/g)' = (f'g - fg')/g^2$

- **Chain Rule**

- Derivative = (derivative of outside) \times (derivative of inside)

- Example: $y = (3x+1)^5$
 $\rightarrow 5(3x+1)^4 \times 3 = 15(3x+1)^4$

Practice Question/Unclear

- When to use chain rule vs product rule??

Gap Check with Socratic Questioning

PROMPT:

You are an assistant acting like a thoughtful teacher. Review the provided notes for gaps, misconceptions, or missing key ideas. Then:

1. Give brief feedback on what is already correct and useful.
2. Point out any missing or unclear areas.
3. Use Socratic-style questions to guide the student toward filling those gaps themselves. (Example: "You mentioned X, but what about Y? How does it connect?")

Do not directly provide the missing answers—prompt the student with questions that lead them to add the missing information to their notes.

NOTES 1:

Mitosis = cell division, growth, repair

Interphase → G1, S, G2 (prep stage, DNA copy happens in S)

Prophase: chromosomes visible, spindle fibers form

Metaphase: line up in middle

Anaphase: sister chromatids pull apart

Telophase: 2 nuclei form

Cytokinesis = cytoplasm splits (animal → cleavage furrow, plant → cell plate)

Meiosis → sex cells (gametes), 2 divisions

Crossing over? = genetic variety

End = 4 non-identical cells, 23 chrom in humans

Confused: meiosis vs mitosis similarities???

EXAMPLE:

1. What's already correct and useful

- You clearly listed the **phases of mitosis** (prophase, metaphase, anaphase, telophase, cytokinesis) with accurate descriptions.
- You included **interphase** and broke down G1, S, and G2—good detail that many students skip.
- You correctly identified **meiosis as two divisions** producing **4 non-identical cells**, with crossing over providing genetic variety.

- The distinction between **mitosis for growth/repair** and **meiosis for gametes** is solid.
-

2. What's missing or unclear

- Your notes don't mention what happens to **chromosome number** in mitosis vs. meiosis.
 - You wrote "crossing over? = genetic variety," but didn't pin down **when** crossing over happens.
 - The differences between meiosis I and meiosis II are missing.
 - You flagged confusion about **similarities between mitosis and meiosis** but didn't explore it further.
 - Cytokinesis was noted, but only for mitosis—does it also happen after meiosis?
-

3. Socratic-style guiding questions

Let's probe your own understanding so you can add to your notes:

- You wrote that mitosis makes identical cells, and meiosis makes gametes. What happens to the **chromosome number** in each process? How might that difference connect to their purposes?
 - You noted "crossing over = genetic variety." In which stage of meiosis does crossing over occur, and why is it important that it happens there rather than later?
 - How are **meiosis I and meiosis II** different in terms of what separates (homologous pairs vs. sister chromatids)?
 - You mentioned being confused about similarities. Both processes share some steps—so in what ways are **prophase, metaphase, anaphase, and telophase** alike across mitosis and meiosis?
 - You described cytokinesis for mitosis. What happens at the end of meiosis—do the cells still need to split their cytoplasm? If so, how many times?
-

NOTES 2:

Causes: taxation without rep. (Stamp Act, Tea Act), Boston Tea Party Colonists angry → 1st Continental Congress 1776 = Declaration of Independence (Jefferson wrote? or Adams?? double check) Key battles: Lexington & Concord (first shots), Saratoga (turning point), Yorktown (end, Cornwallis surrender) Allies: France helped after Saratoga Aftermath: Treaty of Paris 1783 Remember: Articles of Confederation = weak gov., no taxes ?? Bill of Rights came right after?? maybe check timing

EXAMPLE 2:

1. What's already correct and useful

- You nailed the **major causes**: taxation without representation, Stamp Act, Tea Act, Boston Tea Party.
 - You included the **First Continental Congress** and the **Declaration of Independence (1776)**.
 - The **key battles** are right on target: Lexington & Concord (start), Saratoga (turning point), Yorktown (end).
 - Noting **France as an ally after Saratoga** is excellent.
 - Treaty of Paris 1783 ending the war is correct.
 - You remembered the **Articles of Confederation** as a weak government system, unable to tax.
-

2. What's missing or unclear

- You're unsure about **who wrote the Declaration of Independence** (Jefferson vs. Adams).
- You noted the **Bill of Rights timing** but aren't sure if it came "right after" the Revolution.
- The **connection between Articles of Confederation and the later Constitution** isn't developed.
- Other allies beyond France (like Spain and the Dutch) aren't mentioned.

- Social impacts (slavery, women, Native Americans) are missing if this is for a broader history class.
-

3. Socratic-style guiding questions

Let's help you fill those gaps by thinking through them:

- You wrote “Jefferson wrote? or Adams??” When the Continental Congress drafted the Declaration, who was chosen to actually write the first draft? Why do you think that person was picked instead of someone like Adams?
 - You asked if the **Bill of Rights came right after**. What government document came immediately after the Revolution—was it the Constitution or the Articles of Confederation? Then, when was the Bill of Rights added in relation to the Constitution?
 - You wrote that the **Articles of Confederation were weak**. What specific problems (besides taxation) did this cause? How might those problems have pushed leaders to write a new Constitution?
 - You listed France as an ally. Who else gave support (even if smaller) to the American cause, and why might they have wanted to weaken Britain?
 - Thinking beyond politics—how did the Revolution affect different groups in society (enslaved people, women, Native Americans)? Were they included in the “freedom” the colonists were fighting for?
-

NOTES 3:

Derivative = slope of tangent line

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$\text{Power rule: } \frac{d}{dx} [x^n] = n \cdot x^{(n-1)}$$

Examples:

$$f(x) = x^2 \rightarrow f'(x) = 2x$$

$$f(x) = 3x^3 \rightarrow 9x^2$$

Product rule: $(fg)' = f'g + fg'$

Quotient rule: $(f/g)' = (f'g - fg')/g^2$

Chain rule = derivative of outside * inside

ex: $y = (3x+1)^5 \rightarrow 5(3x+1)^4 * 3 = 15(3x+1)^4$

Not sure: when to use chain vs product?? Practice

EXAMPLE 3:

1. What's already correct and useful

- You captured the **core definition of the derivative** as the slope of a tangent line and wrote the limit definition correctly.
 - The **power rule** is correct, and your examples are accurate.
 - The **product, quotient, and chain rules** are correctly stated and applied.
 - Your worked example for the chain rule is spot on.
-

2. What's missing or unclear

- You didn't explicitly note that the **power rule is a shortcut derived from the limit definition**—could help to connect the rules back to the foundation.
- You left yourself a question: “when to use chain vs. product?” That's an important point—this is where many students get mixed up.
- You haven't included examples where more than one rule might apply at the same time (like combining product and chain).

- No mention yet of **derivatives of constants, sums, or basic trig/exponential functions**—which often come right after these core rules.

3. Socratic-style guiding questions

To help you clarify and expand your notes, consider:

- You wrote both the **product rule** and the **chain rule**. What's the key difference between multiplying two separate functions (product) versus having one function inside another (chain)? Can you think of an example that forces you to choose?
- If you have something like $y = (x^2 + 1)(3x - 4)$, would you use chain or product? Why?
- If you have $y = \sin(5x)$, would you use chain or product? How can you tell?
- You listed the power rule—how does it connect back to the original limit definition? Why do you think the shortcut works for all powers?
- Can you think of a situation where you'd have to use **both** product and chain rules together? What would that look like?