Chemistry: Le Chatelier's principle

Chem 101, week 9 (fictional class)

Fictional example · affine.pro/blog/cornell-notes-example

What does a system at equilibrium do when it is disturbed?	It shifts to partly offset the change, then settles at a new equilibrium.
Add more reactant: which way?	Toward products. Removing product also pushes it toward products.
Raise the pressure (gases): which way?	Toward the side with fewer moles of gas. $N_2 + 3H_2 \rightleftharpoons 2NH_3$ goes from 4 moles to 2, so more NH_3 forms.
Raise the temperature: which way?	Toward the endothermic direction. Making ammonia is exothermic, so heating lowers the NH_3 yield.
Does a catalyst shift equilibrium?	No. It speeds up both directions equally, so equilibrium arrives faster at the same position.

Summary

An equilibrium pushes back against any change. Concentration, pressure, and temperature move its position; a catalyst only changes how fast it gets there.

US History: Causes of the Great Depression

US History, unit 7 (fictional class)

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What set off the crisis in 1929?	The October 1929 stock market crash. Black Tuesday was October 29. Many investors had bought stock on margin, with borrowed money.
Why did bank failures make it worse?	Thousands of banks failed from 1930 to 1933. Deposits were not insured yet, so savings vanished and lending dried up.
How did trade policy hurt?	The Smoot-Hawley Tariff (1930) raised US tariffs. Other countries retaliated, and world trade fell.
What happened on the Great Plains?	Drought and dust storms (the Dust Bowl) ruined farms and pushed many families to move west.
How bad did unemployment get?	About 25% of the labor force was out of work by 1933.

Summary

The 1929 crash started the slump, but bank failures, shrinking trade, and the farm crisis turned it into a depression. The causes reinforced each other.

Algebra: The quadratic formula

Algebra 1, unit 8 (fictional class)

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When do I use the quadratic formula?	For any equation in the form $ax^2 + bx + c = 0$ ($a \neq 0$), especially when it does not factor easily.
What is the formula?	$x = (-b \pm \sqrt{(b^2 - 4ac)}) / 2a$
What does the discriminant tell me?	$b^2 - 4ac > 0$: two real roots. Equal to 0: one real root. Less than 0: no real roots.
Worked example: $x^2 - 5x + 6 = 0$	$a = 1$, $b = -5$, $c = 6$. Discriminant = 25 − 24 = 1. $x = (5 \pm 1) / 2$, so $x = 3$ or $x = 2$.
How do I check the answer?	Substitute back: $9 - 15 + 6 = 0$ and $4 - 10 + 6 = 0$. Both roots work.

Summary

Write the equation in standard form, find the discriminant to see how many real roots to expect, then apply the formula and check by substitution.

Literature: Macbeth, Act 1

English 10 (fictional class)

Fictional example · affine.pro/blog/cornell-notes-example

What do the witches predict?	Macbeth will be Thane of Cawdor and then king. Banquo will father kings but not be one (1.3).
How does the first prophecy come true?	Right after the witches vanish, Ross brings news that Duncan has named Macbeth Thane of Cawdor (1.3).
What is Macbeth's first reaction?	In an aside he admits to "horrible imaginings": he already pictures murder, and it frightens him (1.3).
How does Lady Macbeth see her husband?	She fears he is "too full o' th' milk of human kindness" to take the crown (1.5).
Theme to track	Ambition against conscience. The prophecy tempts; Macbeth's choices decide.

Summary

Act 1 plants ambition: one prophecy comes true at once, which makes the rest feel possible. Macbeth hesitates and Lady Macbeth pushes. Track whether fate or choice drives the murders.

Spanish: Preterite vs. imperfect

Spanish 2 (fictional class)

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When do I use the preterite?	Finished actions with a clear start or end: Ayer comí a las ocho. (Yesterday I ate at eight.)
When do I use the imperfect?	Ongoing, habitual, or background actions: De niño, jugaba al fútbol. (As a kid, I used to play soccer.)
Which tense for time, age, and description?	Imperfect: Eran las tres. Tenía diez años. (It was three. I was ten.)
Both tenses in one sentence?	The imperfect sets the scene and the preterite interrupts: Leía cuando sonó el teléfono. (I was reading when the phone rang.)
Trigger words	Preterite: ayer, una vez, de repente. Imperfect: siempre, todos los días, mientras.

Summary

Preterite is a finished event on the timeline. Imperfect is the background or the habit. When one action interrupts another, the interrupted action takes the imperfect.

Psychology lecture: The forgetting curve

Psych 100, lecture 6 (fictional class)

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Who first measured forgetting?	Hermann Ebbinghaus, in his 1885 book on memory (Über das Gedächtnis). He was his own and only subject.
What did he memorize, and why?	Lists of nonsense syllables, to limit help from words he already knew.
How did he measure memory?	Savings: how much less time it took to relearn a list than to learn it the first time.
What shape is the curve?	Forgetting is fastest soon after learning, then slows down.
What slows forgetting?	Relearning after spaced intervals. Each relearning took less time than the one before.
Limitation	One subject and meaningless material. A 2015 replication found a similar curve.

Summary

Memory drops fastest in the first hours and days after learning, so the first review matters most. The original method was narrow, but the curve's shape has been replicated.

Statistics course: Mean vs. median

Intro to statistics, module 2 (fictional online course) — Fictional example · affine.pro/blog/cornell-notes-example

Mean or median for skewed data?	Median. One extreme value pulls the mean but barely moves the median. (video 03:10)
Worked example	Data: 2, 3, 3, 4, 18. Mean = 30 / 5 = 6. Median = 3.
Why is the mean higher here?	The outlier 18 drags it up. Four of the five values sit below the mean.
When is the mean the better choice?	Roughly symmetric data without outliers, or when you need the total (mean × count). (video 07:45)
Real-world use	Household income is usually reported as a median, because a few very high incomes would inflate the mean.

Summary

Check the shape of the data first. With skew or outliers, report the median. With symmetric data, the mean works and keeps its link to the total.

Work meeting: Website launch check-in

Marketing team, weekly sync (fictional company)

Fictional example · affine.pro/blog/cornell-notes-example

What did we decide?	Launch moves from Oct 14 to Oct 21 to finish accessibility fixes.
Who owns what?	Priya fixes contrast and alt text by Oct 16. Marco updates the launch email by Oct 17.
What is still blocked?	Legal review of the pricing page. Dana follows up on Thursday.
Which numbers matter?	12 open accessibility issues, 3 of them critical.
What do we check next week?	Critical issues at zero and legal sign-off received.

Summary

Launch moved one week to Oct 21 for accessibility fixes. Priya and Marco own the fixes and the email; Dana unblocks legal. Next sync confirms zero critical issues and legal sign-off.