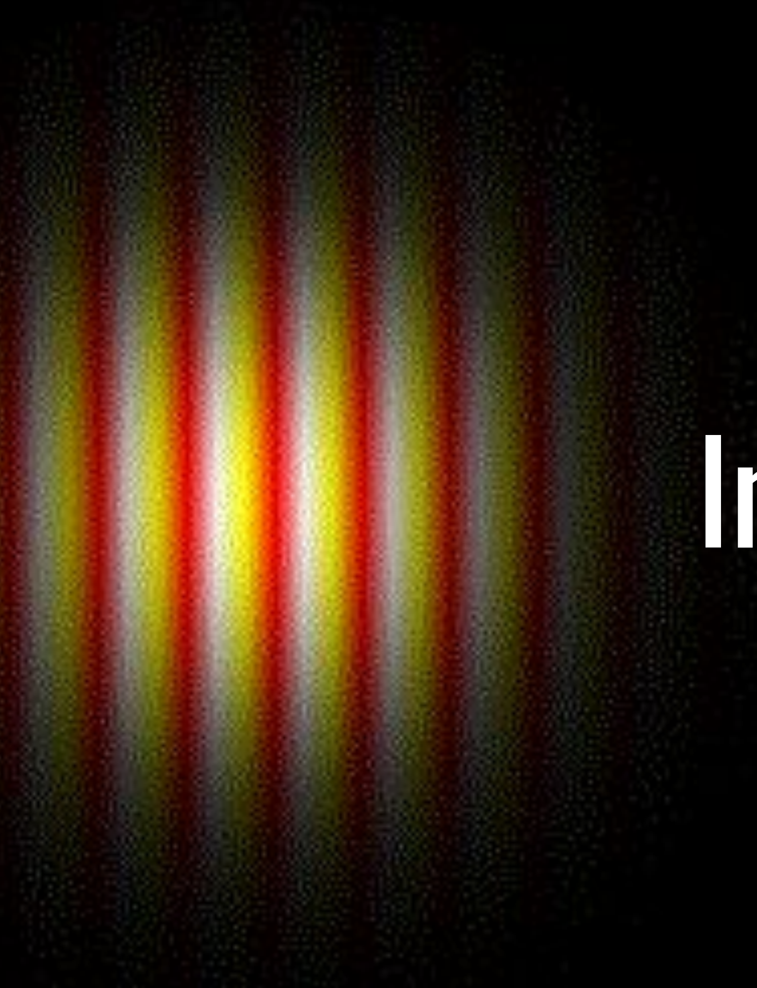


Inference Rules (Pt. III)

Storytime!

Question:

Have you ever wondered why contradictions are so frowned upon?

It's because...

You can deduce *anything* if you use a contradiction in your argumentation.

Eg,

A: RCG plays piano

B: (Anything you want)

Infer: B

1.	A & ~A	Assumption
2.	~B	As./~E
3.	A	1 &E
4.	~A	1 &E
5.	B	2–4 ~E

If someone accepts even one contradiction as true, then any sentence can validly follow.

In other words, if even one contradiction is true, then every sentence is true.

This collapses the distinction between truth and falsity.

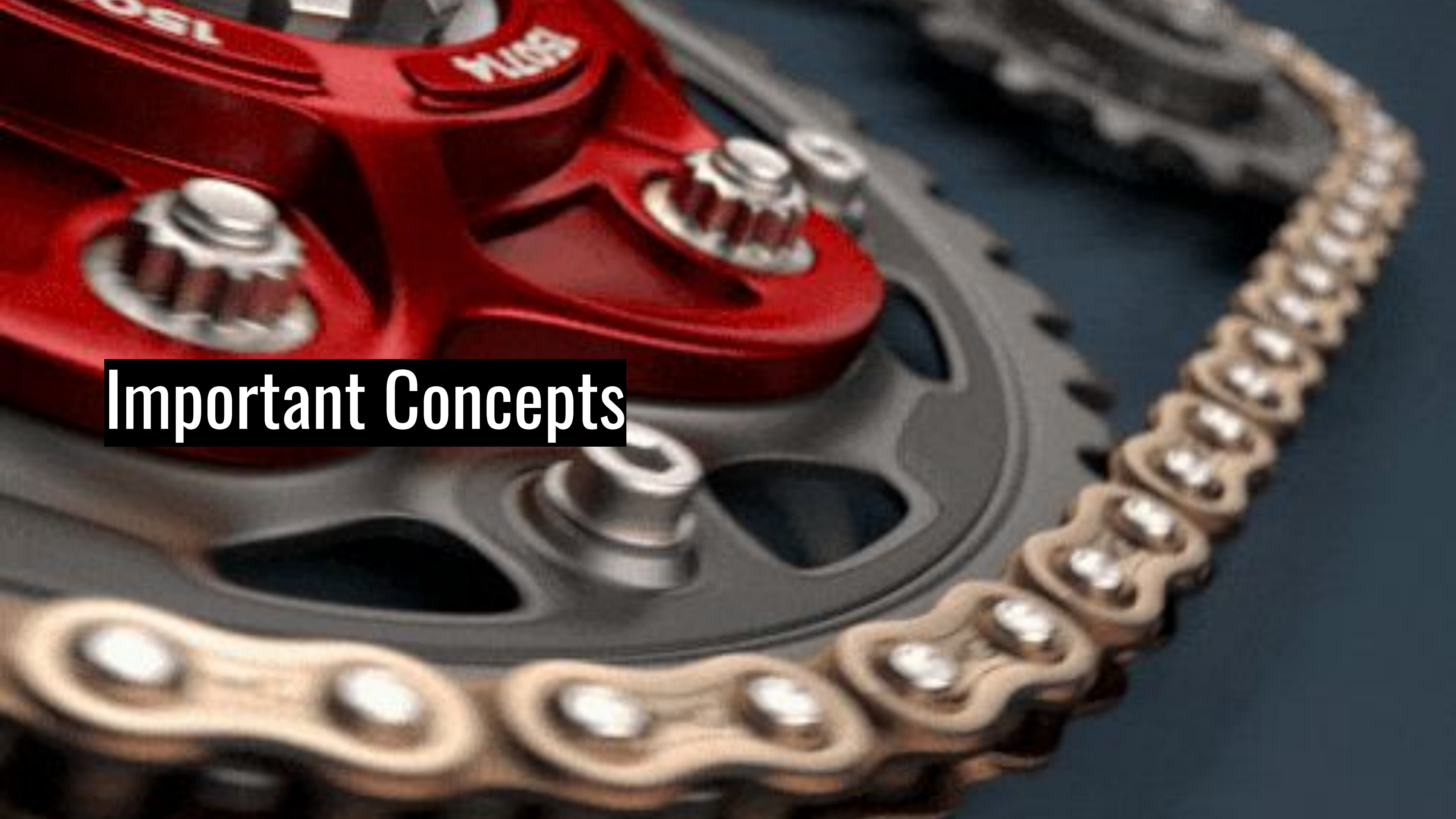
But this is absurd.

The only solution is to *stipulate* that contradictions cannot be.

This is the Law of Noncontradiction.

For analysis, see (Herrick 2013: 388-9).

Important Concepts



Fundamental Concepts

Non-subderivational Rules

- &I
- &E
- ⊃E
- ≡E
- ∨I

Subderivational Rules

- ⊃I
- ~E
- ~I
- ≡I
- ∨E

Derivability in SD

A sentence **P** of TL is derivable in SD from a set Γ of sentences of TL if and only if there is a derivation in SD in which all the primary assumptions are members of Γ and **P** occurs in the scope of only those assumptions.

Derivations

A ⊃ B

~B

Γ

~A

P

Derive: ~A

Validity in SD

An argument of TL is valid in SD if and only if the conclusion of the argument is derivable in SD from the set consisting of the premises.

An argument of TL is invalid in SD if and only if it is *not valid* in SD.

Derivations

$A \supset B$

$\sim B$ ← Γ

$\sim A$ ← P

Derive: $\sim A$

Theorem in SD

A sentence **P** of TL is a theorem in SD if and only if **P** is derivable in SD from the empty set.

Theorems

ø

$[A \supset (B \supset C)] \supset [(A \,\&\, B) \supset C]$

Inconsistency in SD

A set Γ of sentences of TL is inconsistent in SD if and only if there is a sentence **P** such that both **P** and ~**P** are derivable in SD from Γ.

A set Γ is consistent in SD if and only if it is *not inconsistent* in SD.

Inconsistency

$A \supset \sim B$

$A \supset B$

A

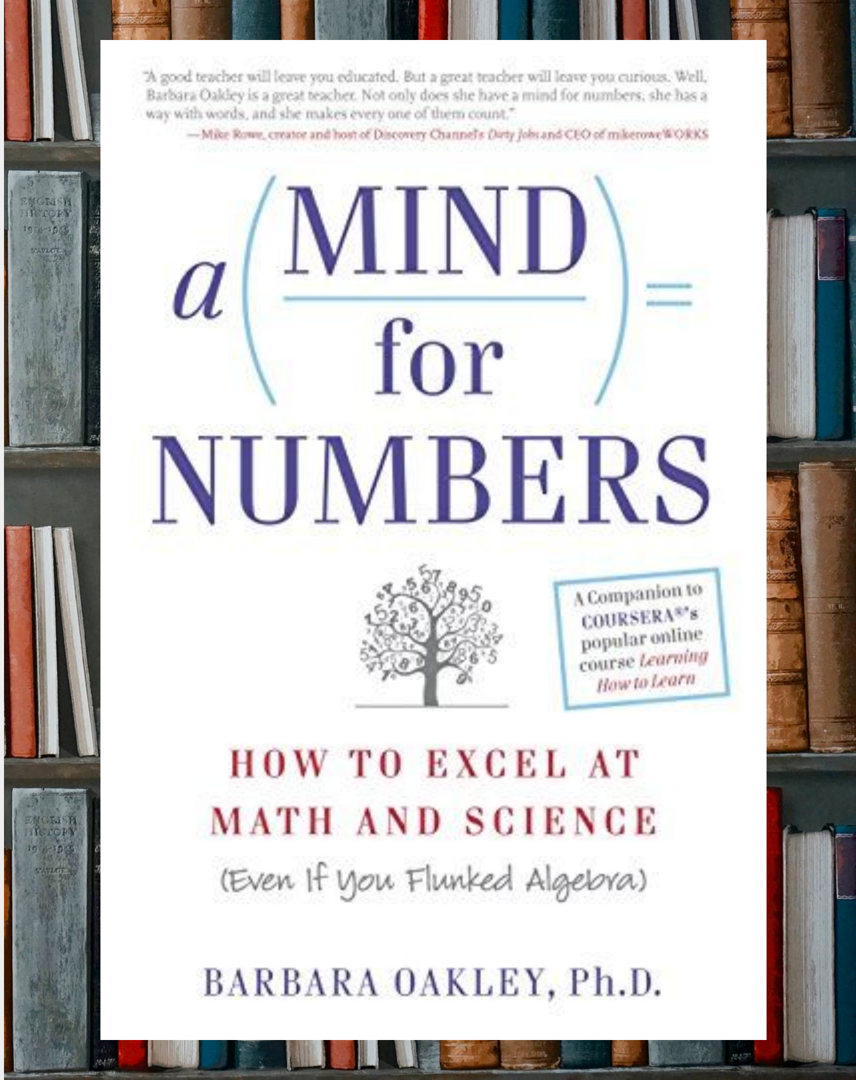
B

$\sim B$

Contradiction!

In *A Mind for Numbers*, Oakley (2014, Chapter 2) gives the following tips for working on tough math problems:

- When doing focused thinking, only do so in small intervals (at first). Set aside all distractions for, say, 25min.
- Focus not necessarily on *solving* the problem, but do work diligently to make **progress**.
- Then when your timer goes off, reward yourself.
- Try to complete 3 of these 25min intervals any given day.

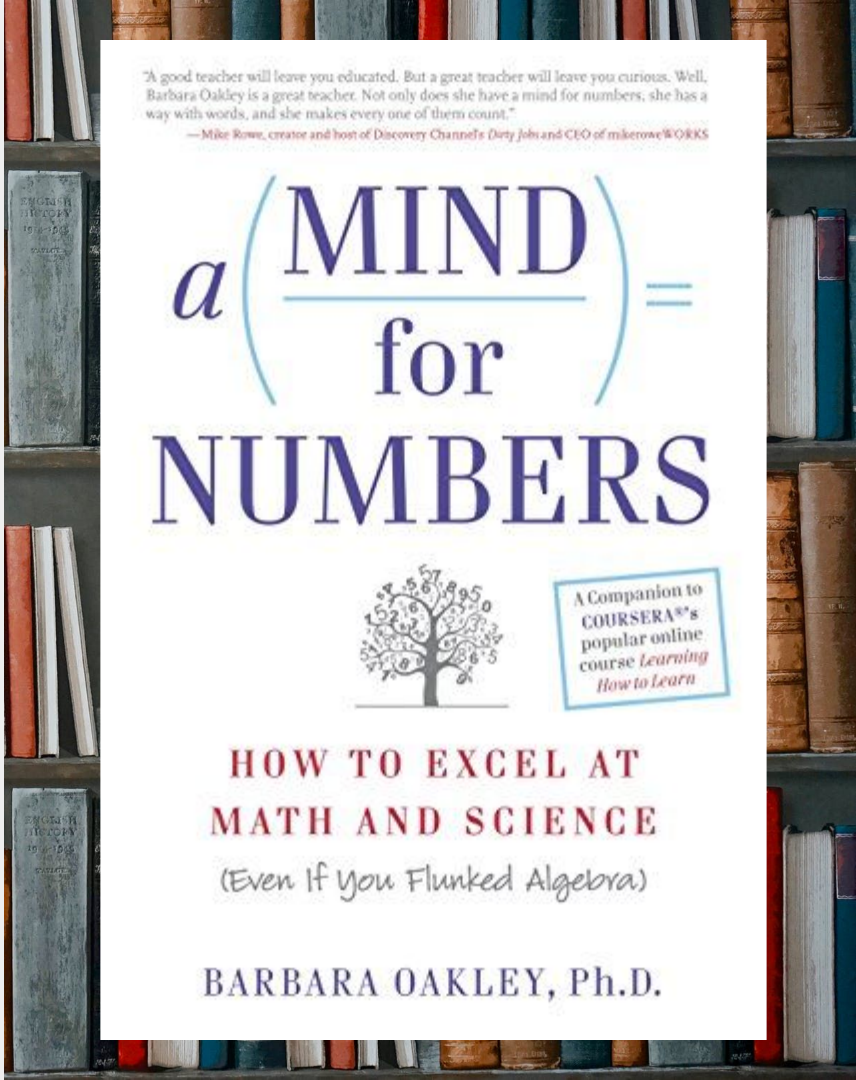


In chapter 3, Oakley emphasizes that **breaks are essential**.

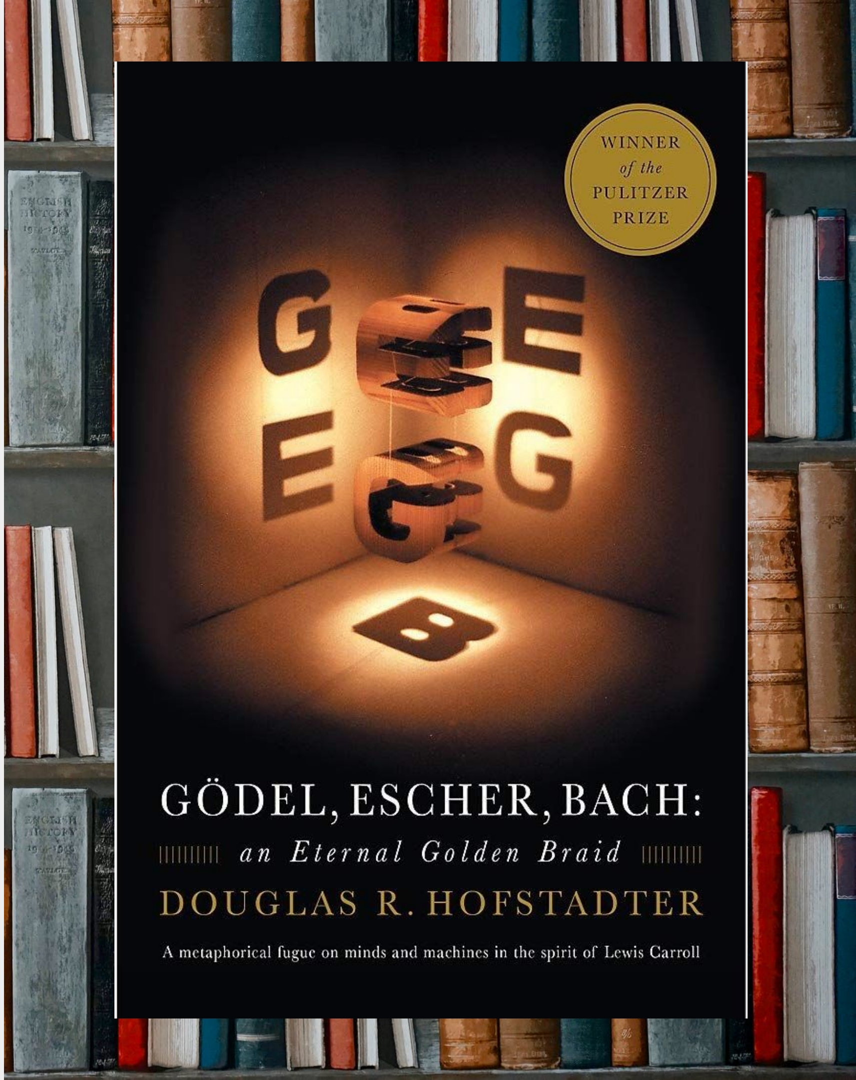
Surf the web, take a walk, workout, switch to a different subject. Your mind will naturally keep working on the problem in the background.

But(!) have a paper and pen handy. Solutions may come at any time.

And don't stay away from a problem for longer than a day. You might lose your progress, just like in physical fitness.



Hofstadter (1999, ch. 12, originally published in 1979) reminds us that chunking is precisely what chess grandmasters do, which explains why they are able to memorize hundreds of games.




DO STUFF

This!