Strange Stuff Part 1

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All Odd Numbers > 1 are Prime.

Prime Number

A natural number greater than 1 that has no positive divisors other than 1 and itself.

For Further Reading

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A natural number greater than 1 that has no positive divisors other than 1 and itself.

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Mathematician

- 3 is an odd number, 3 is a prime number.
- 5 is an odd number, 5 is a prime number.
- 7 is an odd number, 7 is a prime number.

- By induction, all the odd integers are prime.

All Odd Numbers > 1 are Prime.

Engineer

- 3 is an odd number, 3 is a prime number.
- 5 is an odd number, 5 is a prime number.
- 7 is an odd number, 7 is a prime number.
- 9 is an odd number, 9 is not a prime number.
- 11 is an odd number, 11 is a prime number.
- 13 is an odd number, 13 is a prime number.
- 15 is an odd number, 15 is not a prime number.
- 17 is an odd number, 17 is a prime number.
- 19 is an odd number, 19 is a prime number.

- Except for the experimental errors, the data clearly indicates that all the odd integers are prime.

All Odd Numbers > 1 are Prime.

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- 3 is an odd number, 3 is a prime number.
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All Odd Numbers > 1 are Prime.

Particle Physicist

- 3 is an odd number, 3 is prime.
- 5 is an odd number, 5 is prime.
- 7 is an odd number, 7 is prime.
- 9 is an odd number, 9 is $\cdots$ uh, $\frac{9}{3}$ is prime.
- 11 is an odd number, 11 is prime.
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- 15 is an odd number, 15 is ... uh, $\frac{15}{3}$ is prime

[1] divide by a single prime when needed.

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When Rescaling is Properly applied[1] :

- All the odd integers are prime.

[1] divide by a single prime when needed.

Knowledge versus Understanding

Acquire information versus Integrate information

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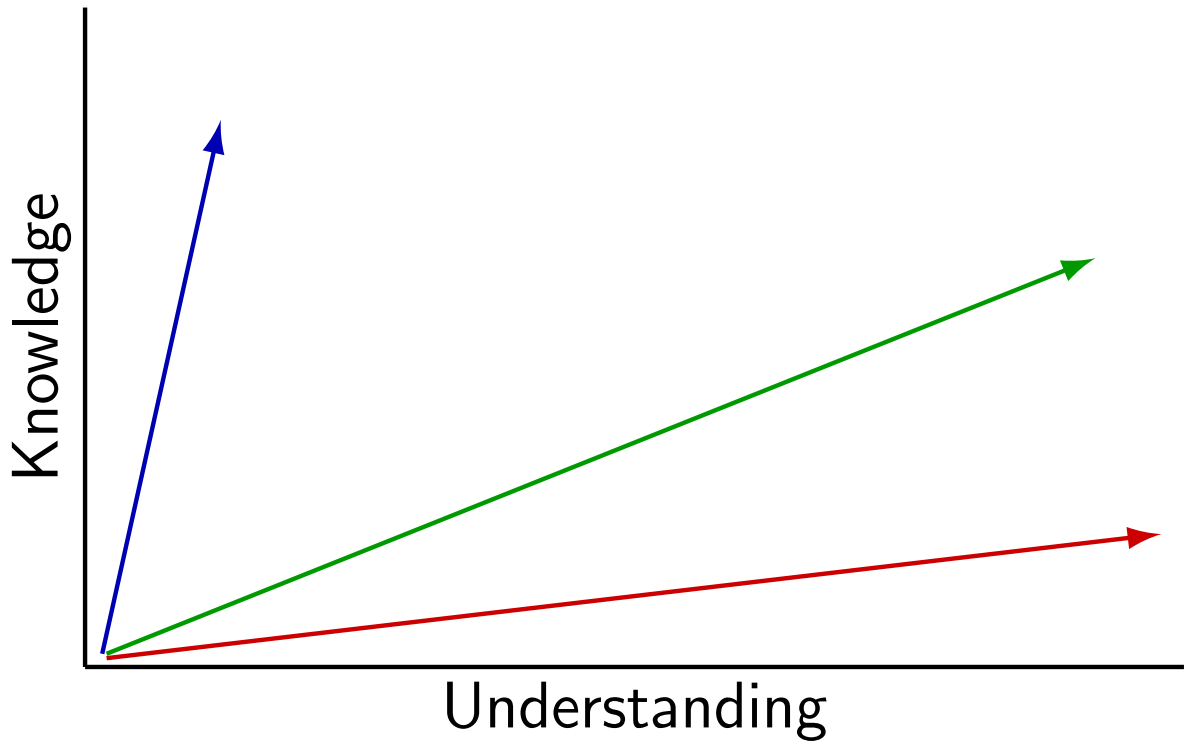

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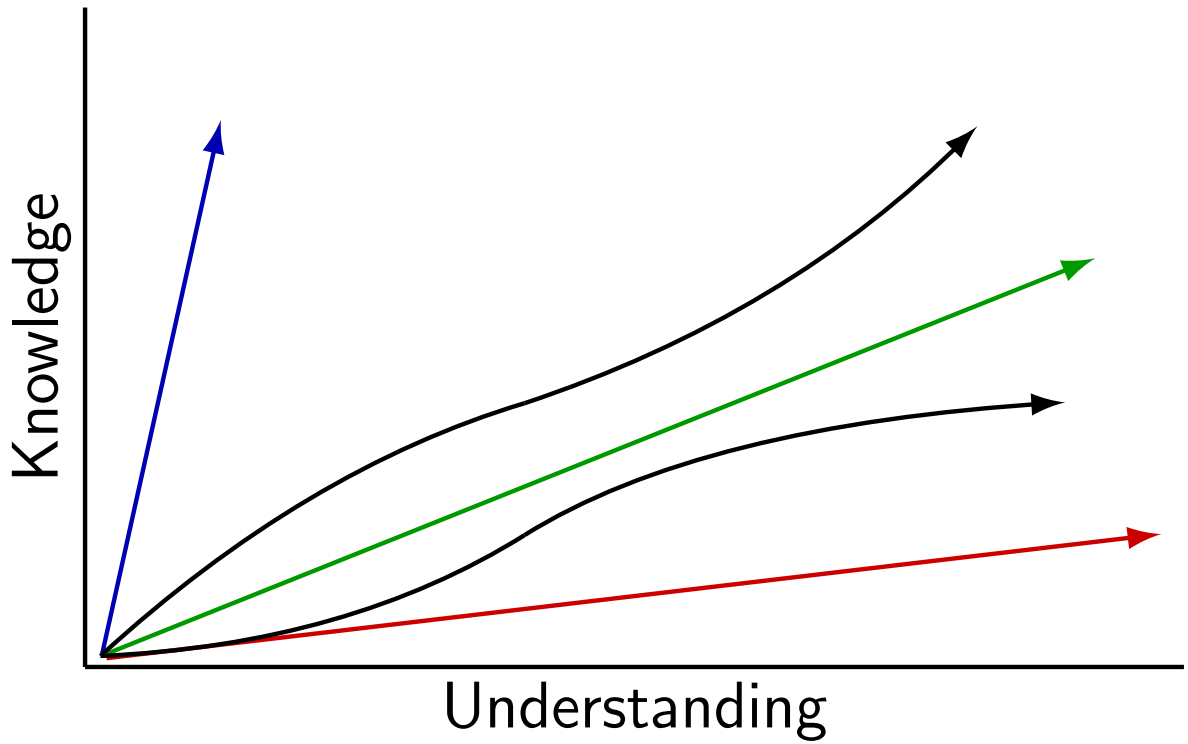

A Metamathematical Interlude

1

A Metamathematical Interlude

$$1 + 2$$

A Metamathematical Interlude

$$1 + 2 + 3$$

A Metamathematical Interlude

$$1 + 2 + 3 + 4$$

A Metamathematical Interlude

$$1 + 2 + 3 + 4 + 5$$

A Metamathematical Interlude

$$1 + 2 + 3 + 4 + 5 + 6$$

A Metamathematical Interlude

$$1 + 2 + 3 + 4 + 5 + 6 + \cdots =$$

A Metamathematical Interlude

$$1 + 2 + 3 + 4 + 5 + 6 + \cdots = -\frac{1}{12} \tag{1}$$

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This result is not surprising $\cdots$

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Correction,

A Metamathematical Interlude

$$1 + 2 + 3 + 4 + 5 + 6 + \cdots = -\frac{1}{12} \tag{1}$$

This result is not surprising $\cdots$

Correction, this result is not **inherently** surprising.

Sum of an Infinite Number of Numbers

$$\varphi = \frac{9}{10} + \frac{9}{100} + \frac{9}{1000} + \frac{9}{10000} + \frac{9}{100000} + \cdots$$

$$\varphi = 0.999999999999999\cdots$$

$$\varphi = 1.000000000000000\cdots$$

- - - - - - - - - Zeno's Paradox - - - - - - - - -

$$(0.9\ \text{m} + 0.09\ \text{m} + 0.09\ \text{m} + \cdots) \,/\, (0.9\ \text{s} + 0.09\ \text{s} + 0.09\ \text{s} + \cdots) = 1.0\ \text{m} \,/\, 1.0\ \text{s}$$

Series Representations of Irrational Numbers

$$\pi = \frac{4}{1} - \frac{4}{3} + \frac{4}{5} - \frac{4}{7} + \frac{4}{9} - \frac{4}{11} + \cdots = 4\sum_{n=0}^{\infty} \frac{(-1)^n}{2n+1}$$

$$e = \frac{1}{1} + \frac{1}{1} + \frac{1}{2} + \frac{1}{6} + \frac{1}{24} + \frac{1}{120} + \frac{1}{720} + \cdots = \sum_{n=0}^{\infty} \frac{1}{n!}$$

Why isn't Equation(1) inherently surprising ?

$$9 + 90 + 900 + 9,000 + 90,000 + 900,000 + \cdots = -1 \tag{2}$$

Is Equation(2) a true statement? Asked another way, what is the result if one is added to the left and right sides of the following equation.

$$\cdots 999999999999999999999999.0 = x \tag{3}$$

Why isn't Equation(1) inherently surprising ?

$$9 + 90 + 900 + 9,000 + 90,000 + 900,000 + \cdots = -1 \tag{2}$$

Is Equation(2) a true statement? Asked another way, what is the result if one is added to the left and right sides of the following equation.

$$\cdots 999999999999999999999999.0 = x \tag{3}$$

$$\cdots 000000000000000000000000.0 = x + 1 \tag{4}$$

Euler–Riemann zeta function

$$\zeta(z) = 1^{-z} + 2^{-z} + 3^{-z} + 4^{-z} + \cdots$$

$$\zeta(-1) = -\frac{1}{12}$$

$$1 + 2 + 3 + 4 + 5 + 6 + \cdots = -\frac{1}{12}$$

A Demonstration of Equation(2)'s truth.

Start with:

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Multiply Equation(5) by ten:

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Multiply Equation(5) by ten:

$$90 + 900 + 9,000 + 90,000 + 900,000 + 9,000,000 + \cdots = 10x \tag{6}$$

Observe that Equation(5) is 9 + Equation(6)

$$x = 9 + 10x \implies x = -1 \tag{7}$$

Standard Example, $x < +1$

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$$1 - 1 + 1 - 1 + \cdots = \frac{1}{2}$$

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$$1 + 5 + 25 + 125 + 625 \cdots = -\frac{1}{4}$$

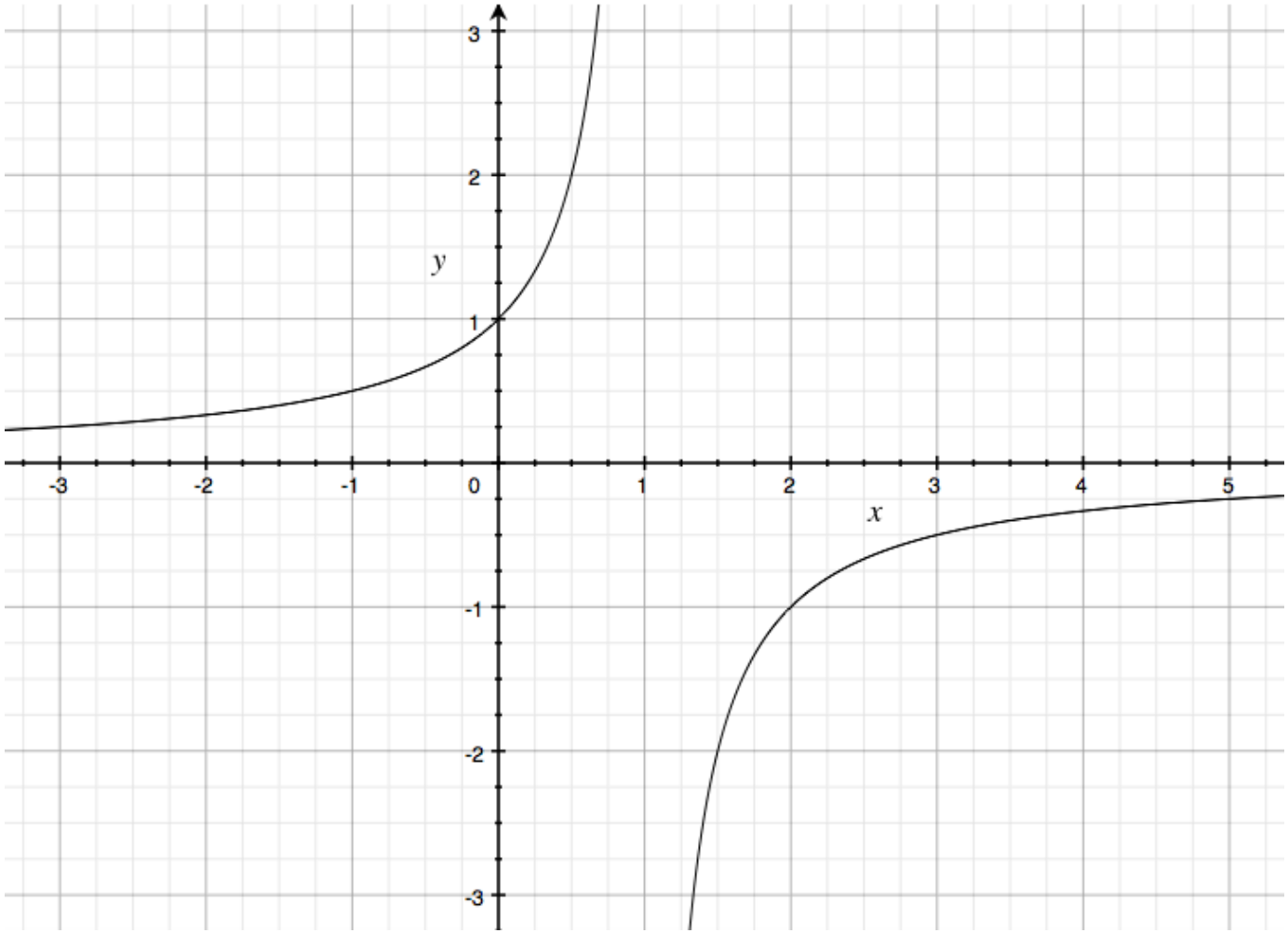

Figure 1 : $y = \frac{1}{1-x}$ versus x

Experiment versus Theory

Knowing {Insert Concept} versus Understanding {Insert Concept}[2].

[2] https://www.youtube.com/watch?v=NM-zWTU7X-k and Flat Earth

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Compare the orbits of (♆), (♂), (♃), and (♀) to the orbit of (☿).

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The Absurdity of Detecting Gravitational Waves

https://www.youtube.com/watch?v=iphcyNWFD10

A Nice Opportunity

You have $400 you may bet on the outcome (Heads or Tails) of flipping quarters at my gambling establishment.

The Setup

I. Each of four quarters are flipped ten times.
II. You are shown a video revealing the first eight flips for each quarter.
III. You predict and specify the final two results for each quarter.
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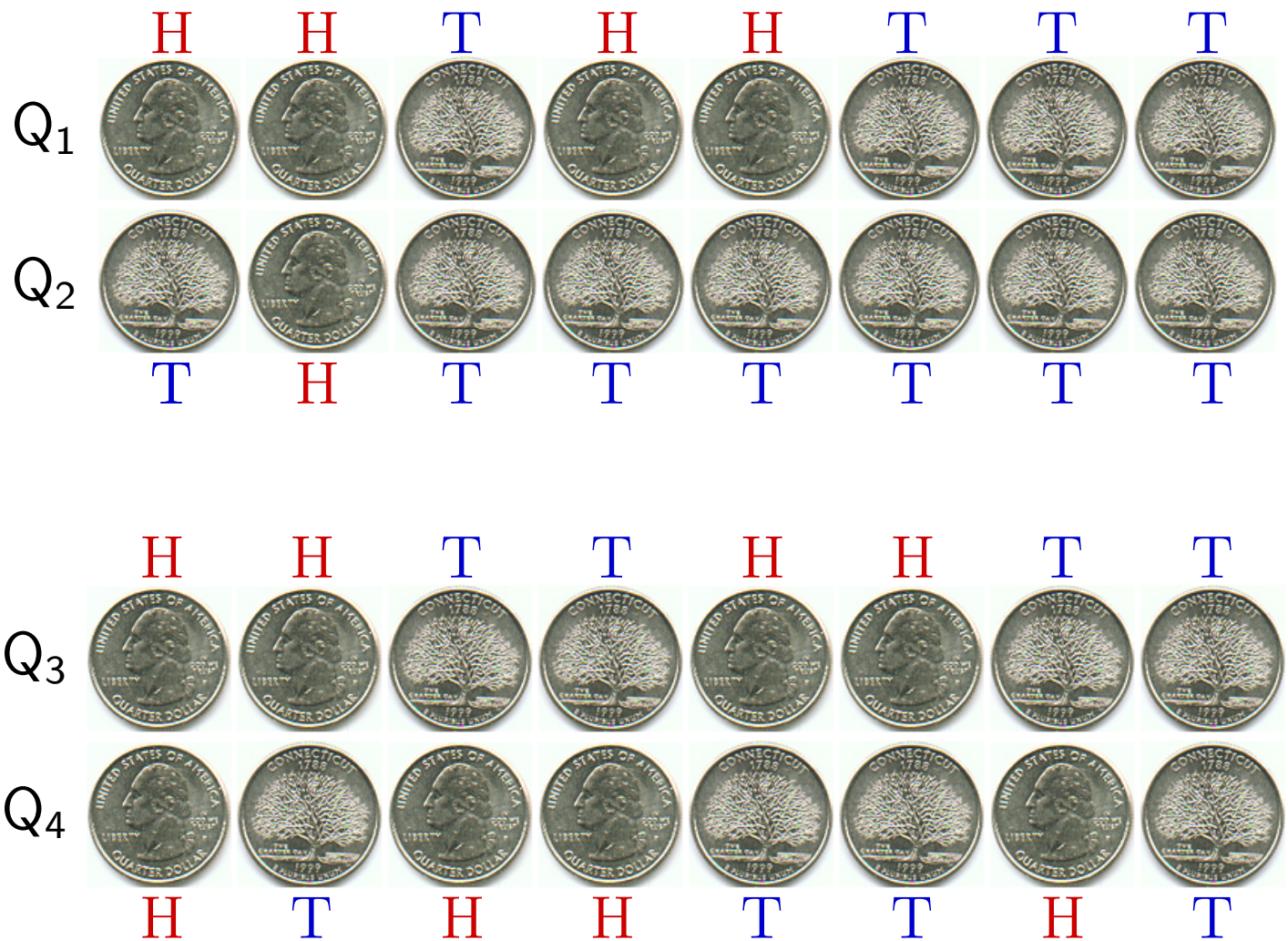
How do you allocate your $400?


H H T H H T T T
Q1
Q2
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Q4
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Never Give a Sucker an Even Break

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Put your $400 in a safe place then walk away.

21st Century understanding requires Quantum Mechanics

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Figure 2 : Red Flag Warning

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Looking to the past for "truth" is futile. Ancient Wisdom $\cdots$ Isn't ?

Perception versus Reality

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Over thousands of millennia our progenitors evolved what can be best described as a "classical" perception of their internal as well as their external environment.
Envision: Blue Skies, Rainbows, and Unicorns.

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Reality:

Everything emerges from quantum mechanical processes.
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Socrates-Plato-Aristotle : The Authority for "Philosophers".

Timidity is a virtue ... until it is Not ⁉

About 100 years ago we were timid as we tried to understand the storm clouds on the horizon. Several examples $\cdots$

wavicle : an entity having :
$\{$properties characteristic of (waves) $\cup$ (particles)$\}$.

We are supposed to be timid until we must be bold.

> *I myself have never met an interpretation of quantum mechanics I didn't dislike.*[3]

[3] THE ITHACA INTERPRETATION OF QUANTUM MECHANICS
by N. David Mermin, 17 September 1996

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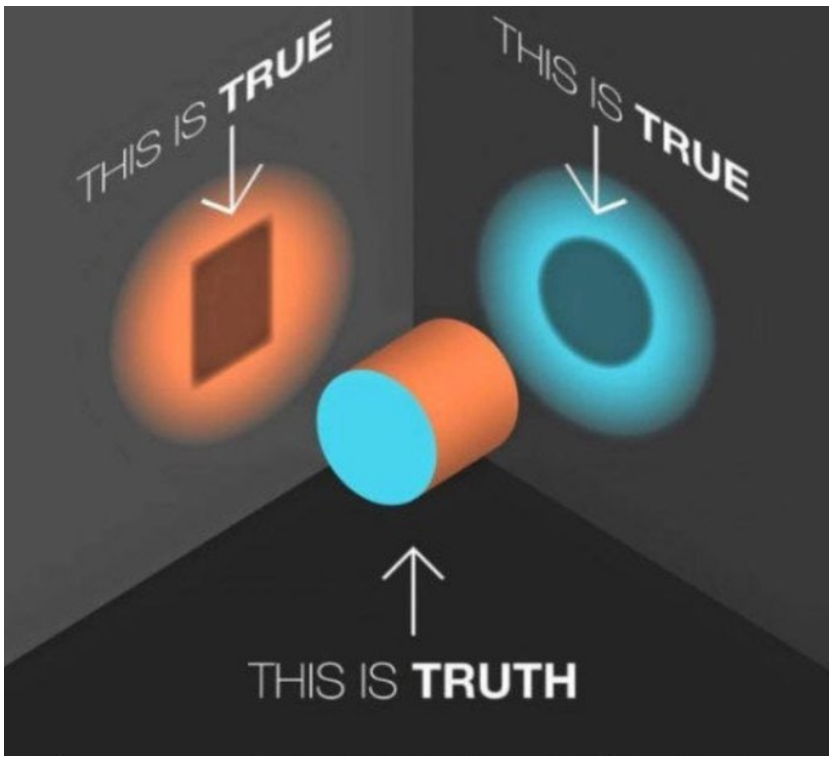
Too Many Think



When is a Particle not a Particle ?

{Things that are particles.} versus {Not Things that are particles.}

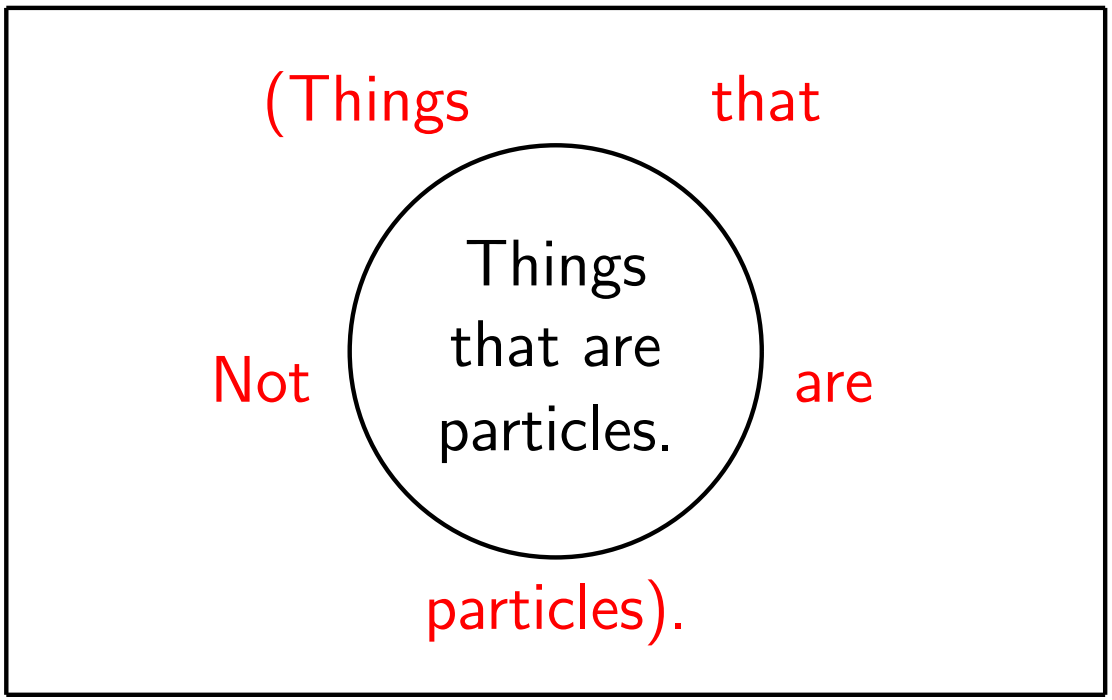


Figure 3 : $P \cap \neg P = \emptyset$: $P \cup \neg P =$ All Things

When is a Wave not a Wave?

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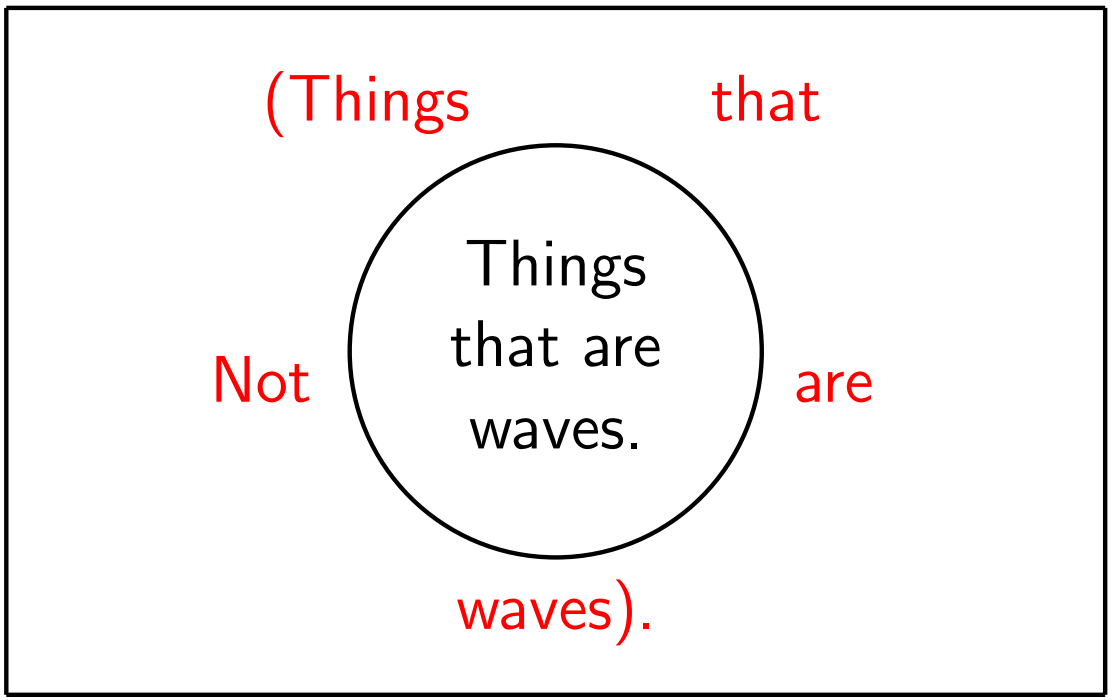

Figure 4 : $W \cap \neg W = \emptyset$: $W \cup \neg W =$ All Things

Is thingness a thing?

electron : an entity having :

$$\{\text{properties characteristic of } (\text{particles} \cap \neg \text{ particles})\}$$
$$\cap$$
$$\{\text{properties characteristic of } (\text{waves} \cap \neg \text{ waves})\}.$$

photon : an entity having :

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These "properties" are **Emergent Properties**.