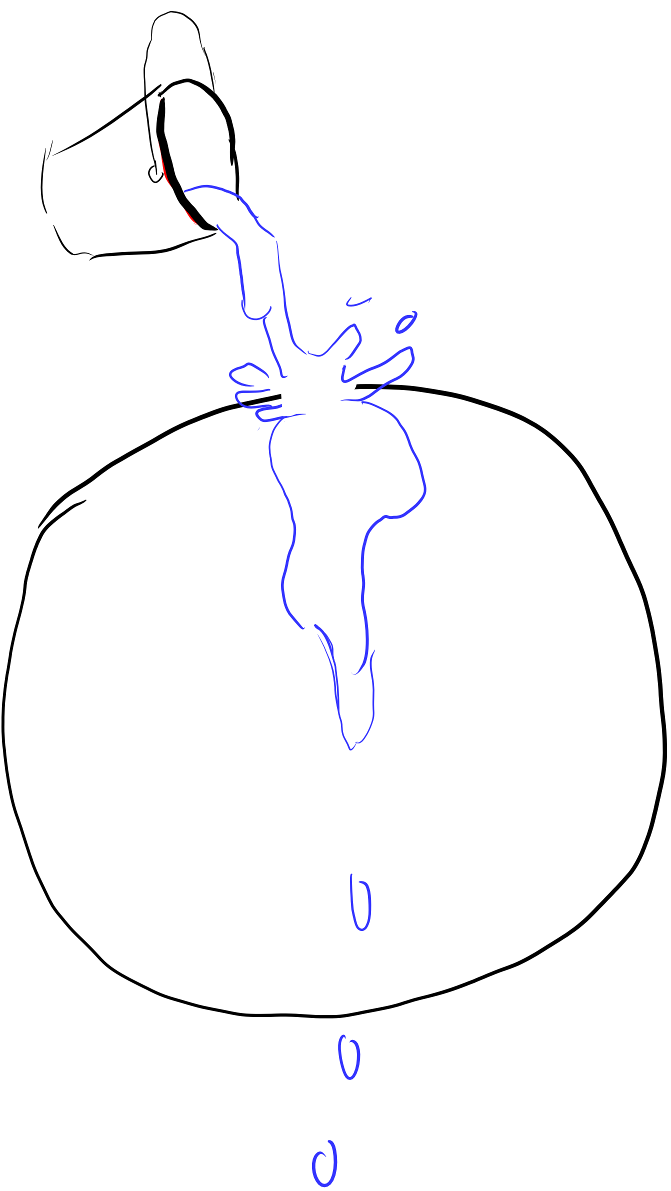


Proof

assume world is round

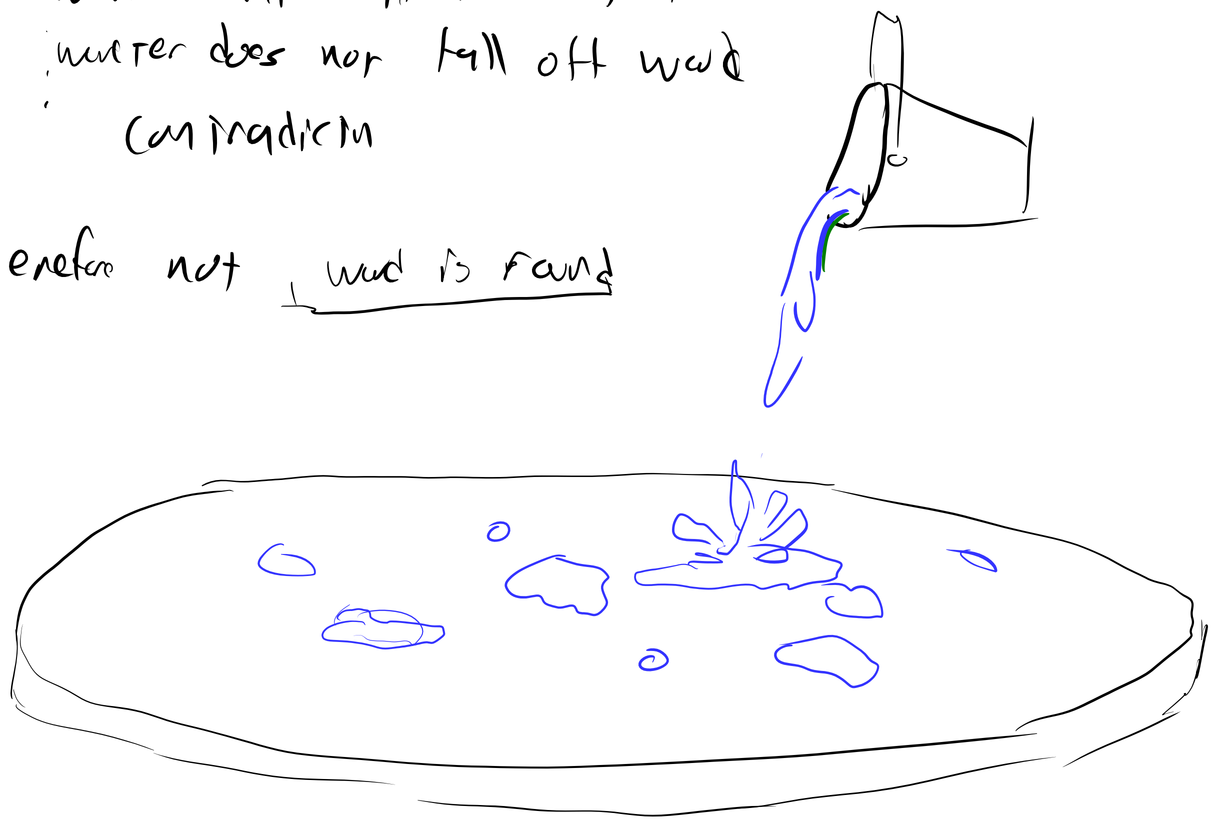
∴ water falls off round thing

∵ water does not fall off world

∴ contradiction

Therefore not world is round

small ball + big balls
how same water behave



$|x|$

$|x|$

$|x|$

$\{ \quad | \quad \}$

$x | y$

mean

x divides y

x is a factor of y

Factor = divisors

Primality

Fund. Thm of Arith

$z = GCD(x, y)$

$c = LCM(a, b)$

$a | c \qquad c \bmod a = 0$

$b | c \qquad a \% d == 0$

$\boxed{\nexists d < c . \ a|d \land b|d}$

$60 = 2 \cdot 2 \cdot 3 \cdot 5$

$8 = 2 \cdot 2 \cdot 2$

$lcm(60, 8) = 2 \cdot 2 \cdot 2 \cdot 3 \cdot 5$

$= 120$

$\boxed{x = 0 \mod z}$

$x \bmod z = 0 \qquad y \bmod z = 0$

%

$2 = 4 \mod 2$

$7 = 10 \mod 3$

$\boxed{\nexists w > z . \ w|x \land w|y}$

$60 = 2 \cdot 2 \cdot 3 \cdot 5$

$8 = 2 \cdot 2 \cdot 2$

$gcd(60, 8) = 2 \cdot 2 = 4$

$gcd(2^3 \cdot 3^2 \cdot 7^4 \cdot 11 \cdot 13^2, \ 3^5 \cdot 7^2 \cdot 11 \cdot 13 \cdot 17)$

$= 3^2 \cdot 7^2 \cdot 11 \cdot 13$

$GCD(x, y) = 1 \quad \boxed{\equiv} \quad x$ and y are coprime

relatively prime

$$\mathbb{Q}$$

$$\frac{-33}{-11} = 3$$

$$\forall x \in \mathbb{Q} \;.\; \exists d \in \mathbb{N}^+, n \in \mathbb{Z} \;.\; x = \frac{n}{d} \wedge \gcd(n,d) = 1$$

if you assume   you can derive

$$\boxed{\neg A} \vdash \boxed{\bot}$$

if this is true

$\therefore$ $\boxed{A}$ you've proven A

Thm. $\frac{1}{2} \notin \mathbb{Z}$

Proof.

assume $\frac{1}{2} \in \mathbb{Z}$. That means $\exists x \in \mathbb{Z}.\ \frac{1}{2} = x$.

thus, $\underbrace{1 = 2x}$

By fund thm of Arith, 1 and $2x$ must have same prime factors.

But 1 has no prime factors and $2x$ has at least one (2).

That is a contradictions

Because assuming $\frac{1}{2} \in \mathbb{Z}$ led to a contradiction, it must be that $\frac{1}{2} \in \mathbb{Z}$ $\square$

$x = \underbrace{2^k \cdot w}$

$x^2 = 2^{\boxed{2k}} \cdot w^2$

$$\sqrt{2} \notin \mathbb{Q}$$

$x = 14$
$y = 10$

then $\boxed{\nexists q \in \mathbb{Q} .\ q^2 = 2}$

$14^2 = (2 \cdot 7)^2 = 2^{\boxed{2}} 7^2 = 196$

$10^2 = (2 \cdot 5)^2 = 2^{\boxed{2}} 5^2 = 100$

$8^2 = (2 \cdot 2 \cdot 2)^2 = 2^{\boxed{6}}$

Pf assume $\boxed{\exists q \in \mathbb{Q} .\ q^2 = 2}$

that means $\exists x \in \mathbb{Z}, y \in \mathbb{Z}^+ .\ \frac{x}{y} = q$ and $\gcd(x,y) = 1$

which mean $\frac{x^2}{y^2} = 2$

$60 = 2^{\boxed{2}} \cdot 3^1 \cdot 5^1$

$x^2 = 2y^2$

multiplicity of factor 7 in 60 is 0

FTOA: x^2 and $2y^2$ have same prime factors

$2^{\text{even}} \cdot w$

multiplicity of factor 2 in $\boxed{x^2}$ is even

MUT of fac 3 is 1
2 is 2

multiplicity of factor 2 in $\boxed{2y^2}$ is odd

$\perp$

$2 \cdot 2^{\text{even}} \cdot w$ $\quad 2^{\text{odd}} \cdot w$

Because assumption led to $\perp$, then is true ∎