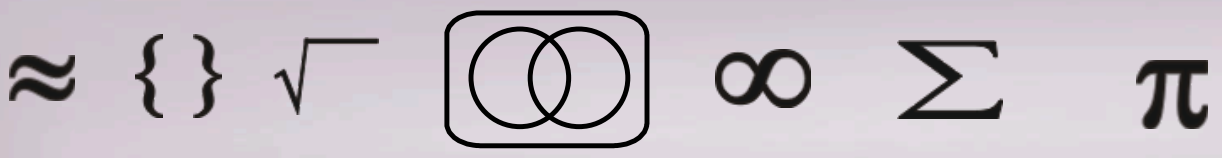


5.2 billion

Math 1030 #6b

1 cm = 50 mi

Putting Numbers in Perspective

Scaling

4.5×10^{12}

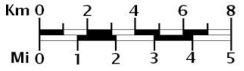
$3 \times 10_{8}$

Perspective Through Scaling

Scale may be expressed

Verbally - 1 cm = 1 mi

Graphically - Marked miniruler on a map.



As a ratio - The model of the home was 1:64

We use scales in

Maps, Design, Timelines, Time-lapsed photography

EX 1: According to modern science, Earth is about 4.5 billion years old. Written human history extends back 10,000 years. Suppose you represent the entire history of the Earth by 12 hours on a clock, with the birth of Earth at midnight.

a) How much time on the clock represents a billion years?

$$\frac{12 \text{ hrs on clock}}{4.5} \rightarrow \frac{4.5 \text{ billion yrs}}{4.5}$$

$$\sim 2.667 \text{ hrs on clock} \rightarrow 1 \text{ billion yrs}$$

b) At what time on the clock does written human history begin?

$$10000 \text{ yrs} = \frac{1}{100{,}000}(1{,}000{,}000{,}000) \text{ yrs}$$

$$\left(10^4 = \frac{10^9}{10^5}\right)$$

$$\Rightarrow \frac{1}{100{,}000}(2.667) = 2.667 \times 10^{-5}$$

$$= 0.00002667 \text{ hrs}$$

$$= 0.00002667 \text{ hrs} \left(\frac{3600 \text{ sec}}{1 \text{ hr}}\right)$$

$$\simeq 0.096 \text{ sec}$$

EX 2: There are approximately 2.2 million marriages per year in the United States. Express this quantity in marriages per hour.

$$\frac{2.2\times10^6 \text{ marriages}}{\text{yr}}\left(\frac{1\text{ yr}}{365\text{ days}}\right)\left(\frac{1\text{ day}}{24\text{ hr}}\right)$$

$$= \frac{2.2\times10^6}{365(24)}\ \frac{\text{marriages}}{\text{hr}} \simeq 250 \text{ marriages/hr}$$

EX 3: In 2007, Proctor and Gamble spent $5.2 billion on advertising. Express this quantity in terms of the height in kilometers of a stack of $1.00 bills. Assume 10 bills per millimeter.

$$\$5.2\times10^9\left(\frac{1\text{ mm}}{\$10}\right)\left(\frac{1\text{ km}}{10^6\text{ mm}}\right) = \frac{5.2\times10^9}{10^7}\text{ km}$$

$$= 520\text{ km}$$

EX 4: The debt ceiling is $14.294 trillion. How big is that number?

$$\$14.294\times10^{12} = \$14{,}294{,}000{,}000{,}000$$