CLASSWORK 13, January 26, 2025

Pigeonhole principle states that if ***n*** items are put **into** **m pigeonholes** with ***n > m***, then at least one pigeonhole must contain more than one item.

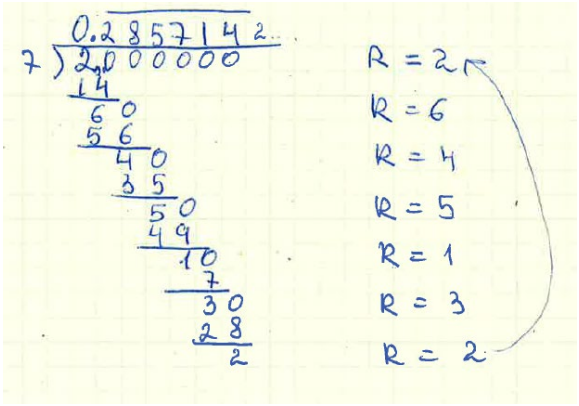
1. **Rational number is** a real number that can be written as a simple/irregular fraction, i.e as a proportion $\frac{a}{b}$.
2. Theorem: any rational number is a finite or repeating decimal. The way we proved is using **Pigeonhole principle**.

Decimal fractions: $\frac{2}{7}$

Find simple fractions for$0.\overline{3}$, $0.\overline{71}$,

$0.\overline{3} = x$, **multiply by 10.**

$3.\overline{3} = 10x \rightarrow 3 + 0.\overline{3} = 10x \rightarrow 3 + x = 10x$



Power Properties: $a^n = a \cdot a \cdot \cdots \cdot a\ (ntimes)$

$(a \cdot b)^n = a^n \cdot b^n$

$a^m \cdot a^n = a^{m+n}$;

$a^m \div a^n = a^{m-n}$

$a^0 = 1$

$a^{-n} = \frac{1}{a^n}$

Scientific Notation: $5.12 \times 10^6 = 5.12 \times 1000000 = 5120000$

$1.2 \times 10^4 \times 3 \times 10^8 = 1.2 \times 3 \times 10^4 \times 10^8 = 3.6 \times 10^{12}$

$1L = 1dm^3$, $1mL = 1cm^3$. Units of volume

HOMEWORK 13,
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1. Simplify the following and show the answer in the exponent form

a) $\frac{3^7 \cdot 2^7}{2^3 \cdot 2^4} =$ b) $\frac{6^5 \cdot 2^4}{3^5 \cdot 2^2} =$ c) $\frac{7^9 \cdot 2^5}{7^2 \cdot 2^4} =$

d) $\frac{11^4}{11^2 \cdot 5^2 \cdot 5^3} =$ e) $7^4 \cdot 11^2 \cdot 11^{-5} \cdot 7^2 =$ f) $\frac{3^{-5} \cdot 2^7}{3^{-3} \cdot 2^4} =$

g) $\frac{42^2}{6^2} =$ h) $\frac{3^5 \cdot 3^{-5}}{3^9} =$ i) $\frac{x^2 \cdot y^2 \cdot x^{-3}}{x^2} =$

2. Find a simple fraction form for the following repeating decimals:

a) $0.\overline{6}$ b) $0.\overline{7}$ c) $0.\overline{8}$

3. Let $a = 2 \cdot 10^8$, $b = 10^5$, compute $a^2 \cdot b$, $\frac{a}{b}$, $a^2 \div b^3$.

$$1L = \_?\_\, cm^3 = \_?\_\, mm^3 \_?\_ = m^3 \_?\_ = km^3$$

4. It is known that $2^{10} = 1024$, which is very close to 10^3. Using this, can you **estimate** what is the value of 2^{20}? 2^{32}?

5. Using pencil, ruler, and **quadrille** paper construct a rectangle ABCD with sides 3cm and 4 cm. Measure the diagonal AC. How much did you get?

6. Using pencil, ruler, and quadrille paper construct isosceles triangle ABC with the base 5 cm and the height 4 cm. Using protractor measure all angles in your triangle: $\angle A, \angle B, \angle C$.

7. Using compass construct a circle with radius 5 cm. Using ruler draw diameter AB. Put any point K on the circle and construct the triangle ABK. Using protractor measure $\angle K$.