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Basic Mathematical Operations

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Topics

- Basic Operations of Mathematics
- Factors
- Multiples
- Divisibility Rules
- HCF-LCM
- Fractions
- Decimals
- Exponents
- Square & Cube
- Square Root, Cube Root

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Basic Operation

Addition:

The result is sum or total of some numbers. Eg: 2+5=7

Subtraction:

Subtract or deduct a number from another number. Eg: 5-3=2

Product:

When you multiply number together, the result is the product.

Quotient:

When we divide a number by another, the result is quotient.

Reminder:

After dividing a number with another we either get 0 reminder or a positive integer.

Evenly Divided:

After division if we get 0 reminder, then the number which we divide will be evenly divided.

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Factors and Factorization

Factors(উৎপাদক):

When we divide a number into, the multiplication of some other integers then those integers are the factors of that number.

Prime Factors(মৌলিক উৎপাদক):

When we divide a number into, multiplication of some prime integer then those prime integers are the prime factors of that number.

Example:

If we divide 36 into,

36= 2 x 18

= 3 x 12

= 4 x 9

= 6 x 6

Here, 2,3,4,6,9,12, and 18 are the factors of 36, and 2 and 3 are the prime factors.

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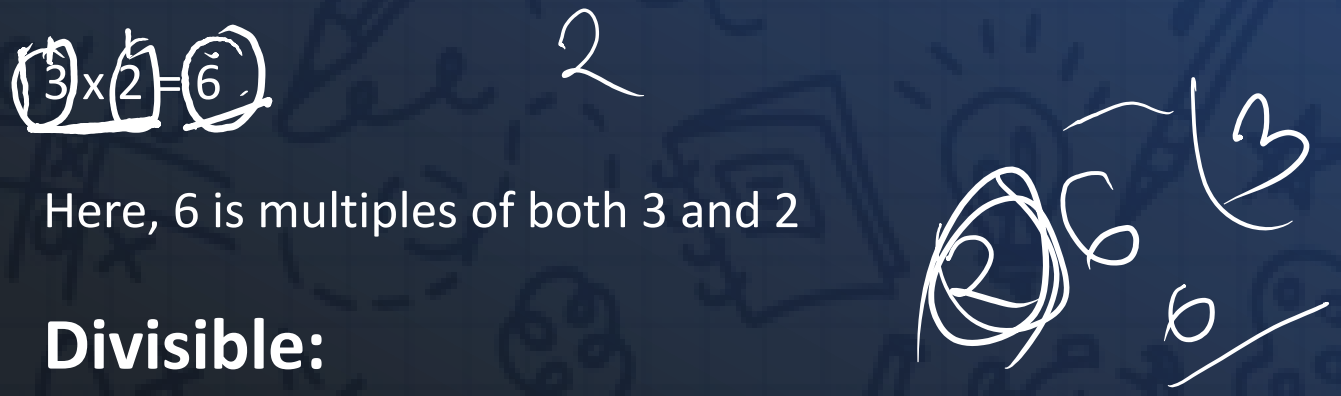
Multiples(গুণিতক)

Multiple is the exact opposite of factors. In multiplication, the product is called the multiples of those two number which was multiplied together.

Example:



Here, 6 is multiples of both 3 and 2

Divisible:

Divisible are those numbers that can divided an integer and there will be no reminder. In the previous example, 6 is divisible by both 3 and 2.

Divisors:

We can call factors a divisor cause, an integer is always divisible by its factors.

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Multiples-Divisor-Divisible

Multiple (গুণিতক) is the exact opposite of factors. In multiplication, the product is called the multiples of those two number which was multiplied together.

Example:

3 x 2 = 6

Here, 6 is multiples of both 3 and 2

Divisible(বিভাজ্য):

Divisible are those numbers that can divided an integer and there will be no reminder. In the previous example, 6 is divisible by both 3 and 2.

Divisors(ভাজক):

We can call factors a divisor cause, an integer is always divisible by its factors.

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Divisibility Rules

- A number is divisible by 2 if the unit digit of the number is divisible by 2 or if the unit digits are the even number or 0.
- A number is divisible by 3 if the sum of its digits is divisible by 3.
- A number is divisible by 4 if the number formed by the last two digits is divisible by 4.
- A number is divisible by 5 if the last digit is either 0 or 5.
- A number is divisible by 6 if it is divisible by both 2 and 3. We can also say if an even number is divisible by 3 then the number will be divisible by 6.
- If the difference between twice the unit digit of a number and other digits of that number is divisible by 7 then the whole number will be divisible by 7.
- If a number formed by the last three digits is divisible by 8 then the whole number will be divisible by 8.
- A number is divisible by 9 if the sum of its digits is divisible by 9.
- A number is divisible by 10 if the last digit is 0
- A number is divisible by 11 if the sum of its digits in the odd position from the right side and the sum of the digits in the even position from the same side are equal or their difference is 11

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123

4+2+3 = 9

9

659

426

4+2+6 = 12

6)426(71
42
6
6
0

456(4
4
16
16
0

9)123(47
36
63
63
0

1801

16-2 = 14

7

8)949(11
8
14
8
69

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HCF-LCM

HCF:

HCF refers to the Highest Common Factor. HCF is the highest common factor of two or multiple numbers that can divide those numbers evenly.

Example:

- Identify the HCF of 12,16,24

The factors of 12 are 1,2,3,4,6,12
The factors of 16 are 1,2,4,8,16
The factors of 24 are 1,2,3,4,6,12,24

∴ The highest common factor / HCF is 4

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HCF-LCM

HCF x LCM = 16 x 12

LCM:

LCM of any two is the value that is evenly divisible by the two given numbers.

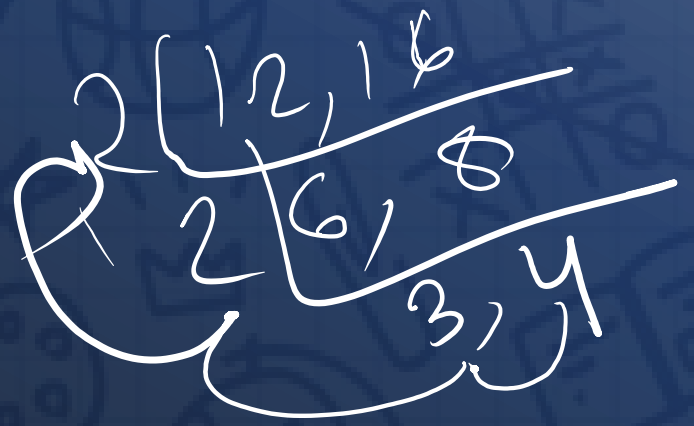
Example:

- Identify the LCM of 12,16

The Multiples of 12 are 12,24,36,48,60,.....
The factors of 16 are 16,32,48,64,80,.....

Multiple

∴ The Least Common Multiple / LCM is 48



✓ The product of HCF and LCM of any group of numbers is equal to the product of those numbers.

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Problem 1

HCF

The greatest common factor of two positive integers is A. The least common multiple of the two integers is B. If one of the integers is C, What is the other number?

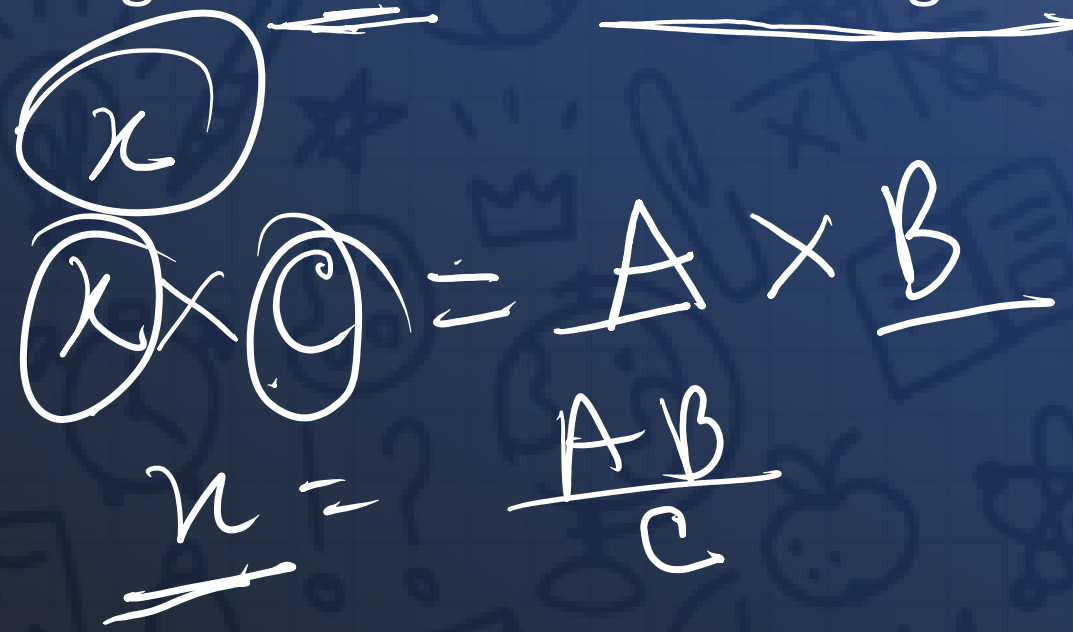
a) AB/C

b) BC/A

c) A/C + B

d) A + B/C

e) None of these



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Problem 2

When x is divided by 13, the answer is y with a reminder of 3. When x is divided by 7, the answer is z with a reminder of 3. If x,y, and z are all possible integers, what is the remainder of yz/13?

a) 0

b) 3

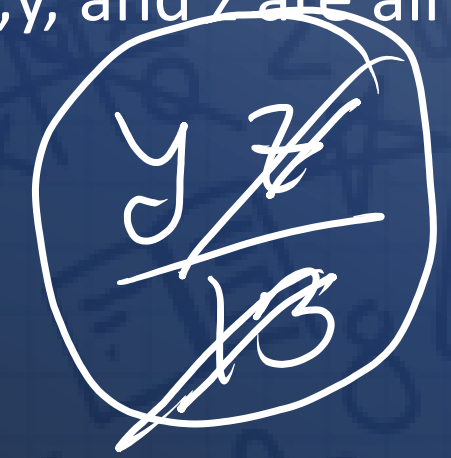
c) 4

d) 7

e) None of these

$x = 13y + 3$

$x = 7z + 3$



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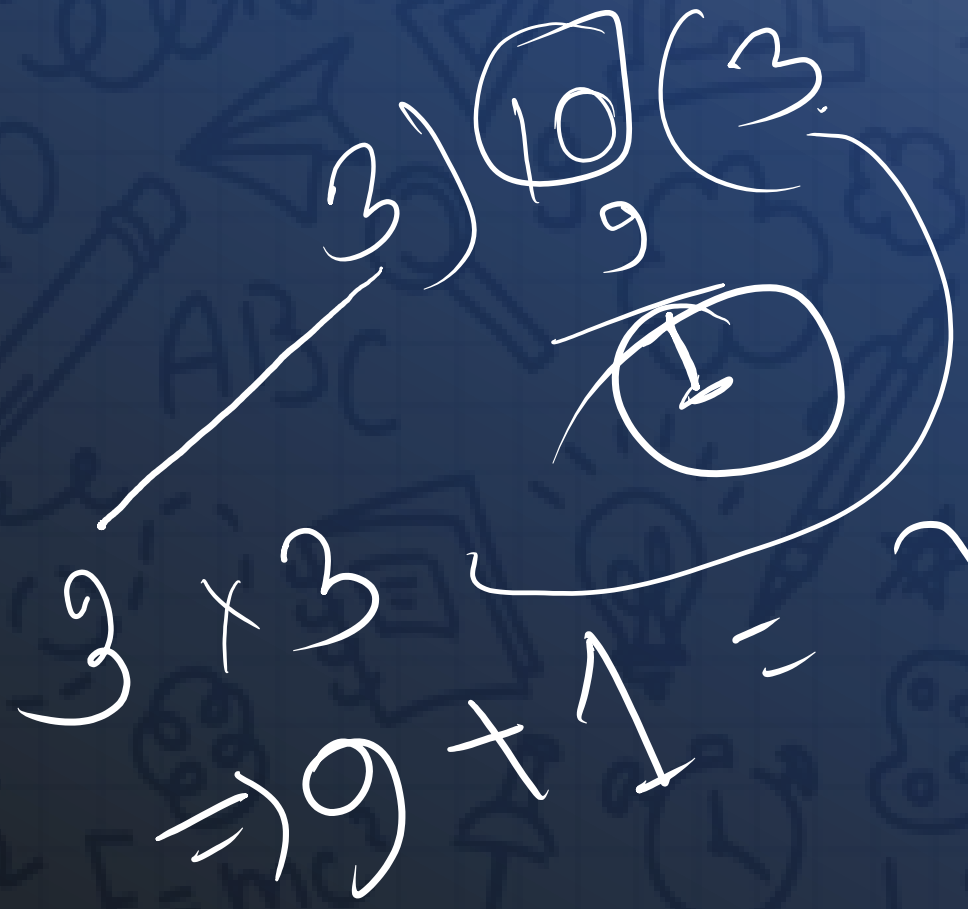

$13y + 3 = 7z + 3$

$\Rightarrow 13y = 7z$

$\Rightarrow y = \frac{7z}{13}$

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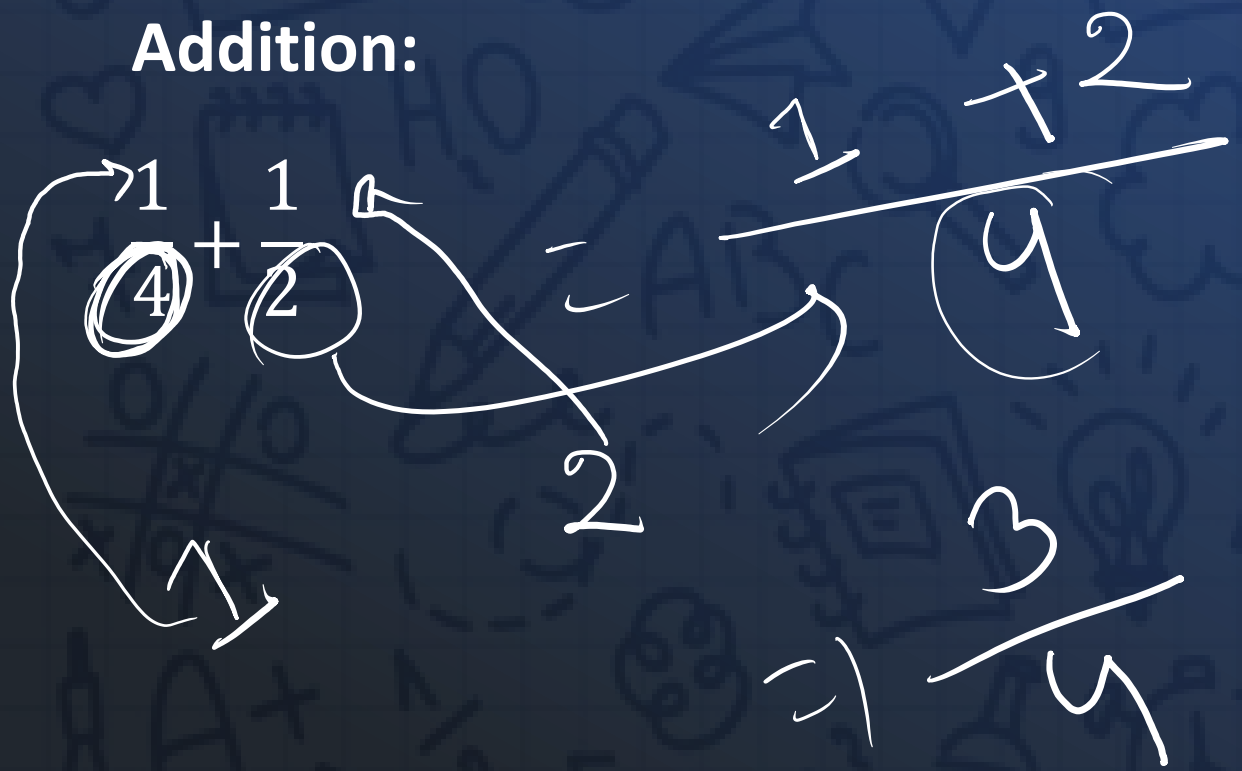
Fractions & Decimals

Addition:



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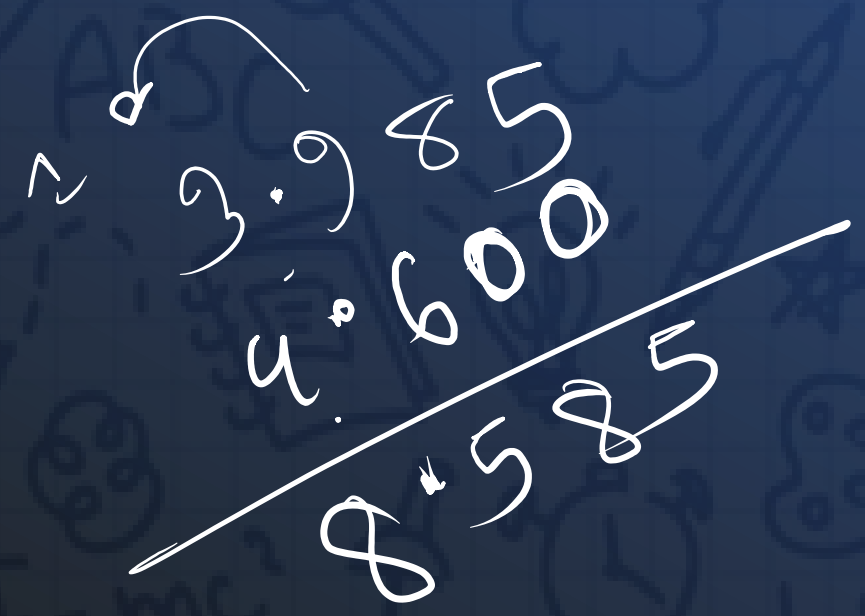
Fractions & Decimals

Addition:

$3.985 + 4.6 =$



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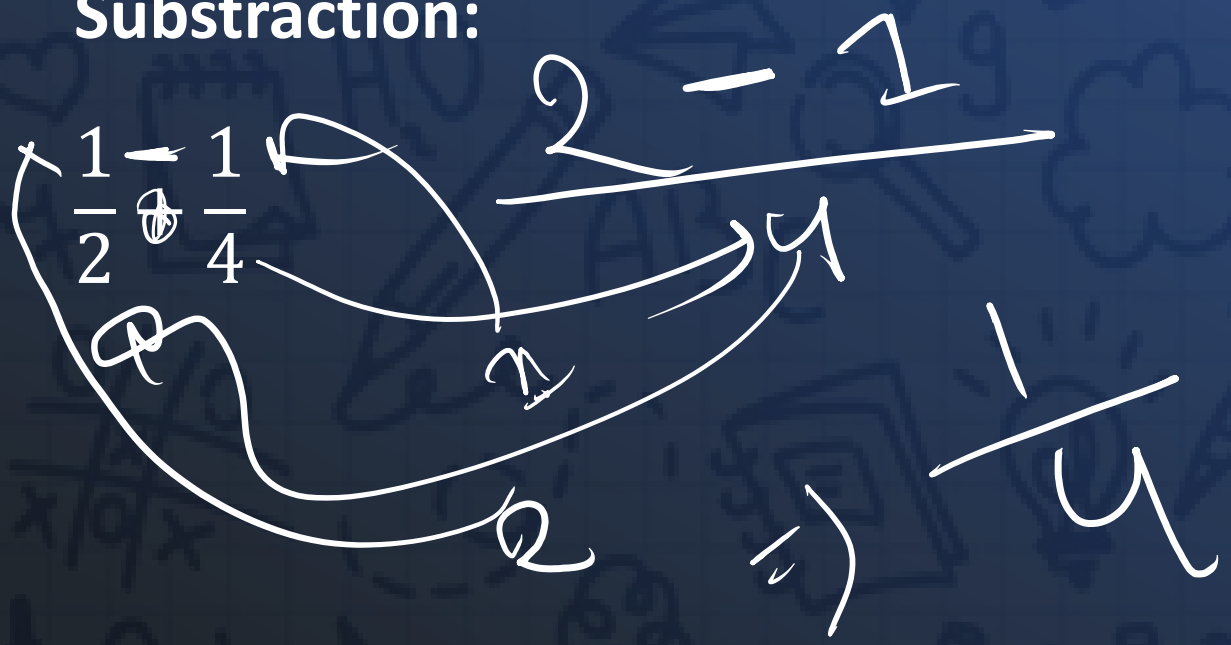
Fractions & Decimals

Substraction:



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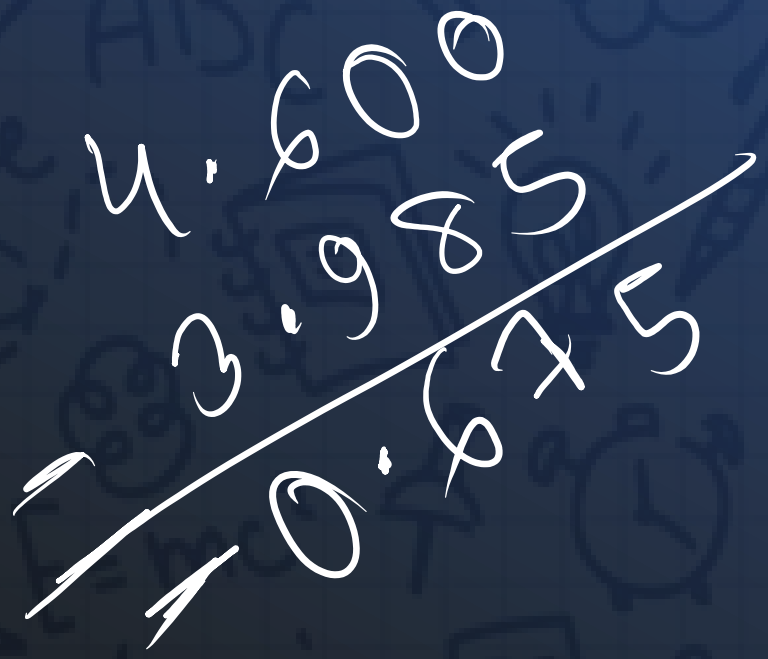
Substraction:

$3.985 - 4.6 =$



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Fractions & Decimals

Multiplication:

$$\frac{1}{2} \times \frac{1}{4}$$

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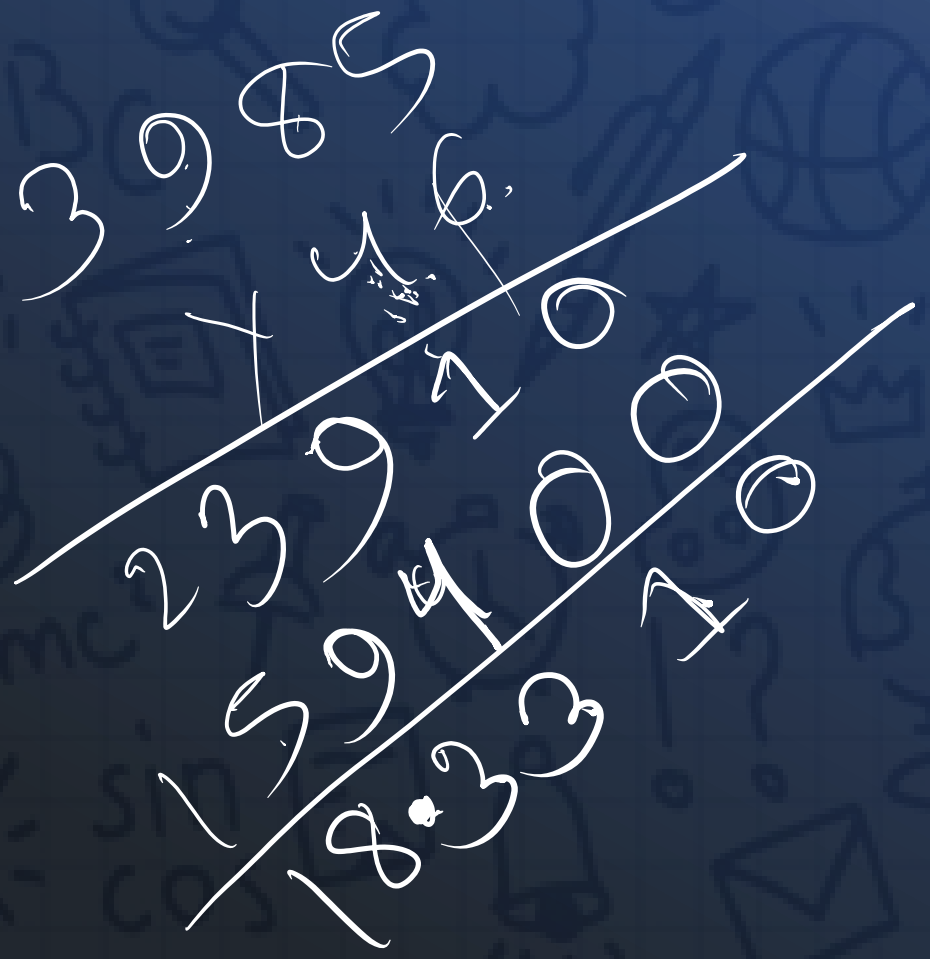
Fractions & Decimals

Multiplication:

$3.985 \times 4.6 =$



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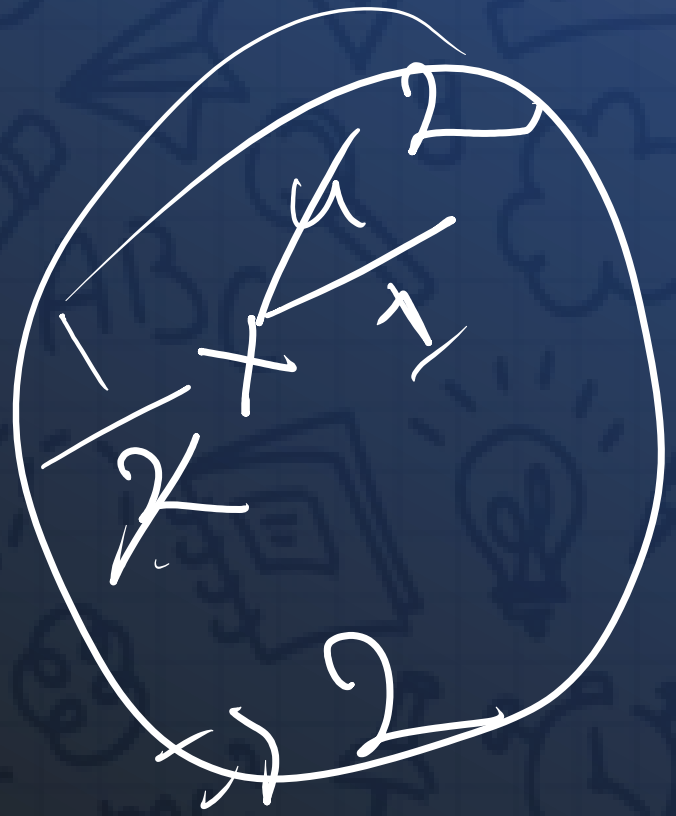
Fractions & Decimals

Division:

$$\frac{1}{2} \div \frac{1}{4}$$



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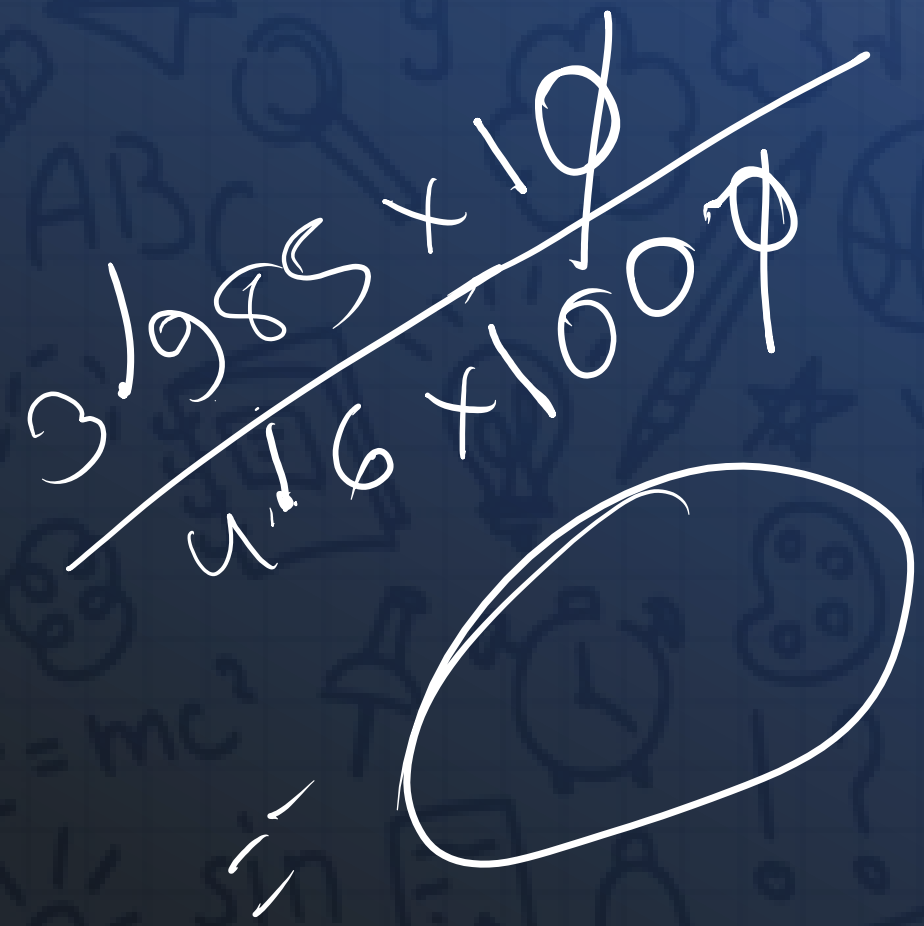
Fractions & Decimals

Division:

$3.985 \div 4.6 =$



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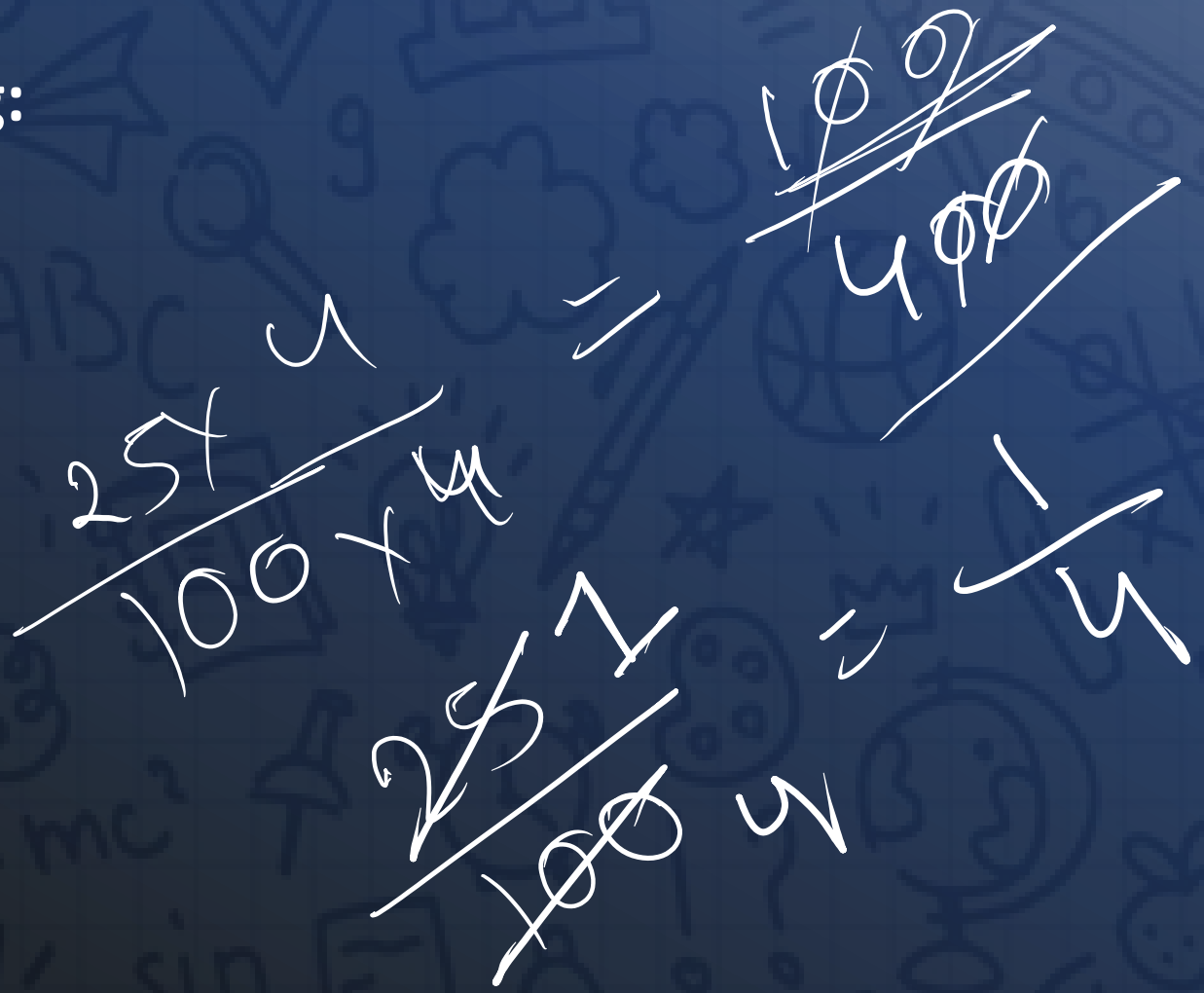
Fractions & Decimals

Rising & Reducing:

$$\frac{25}{100}$$



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Comparison of Fraction

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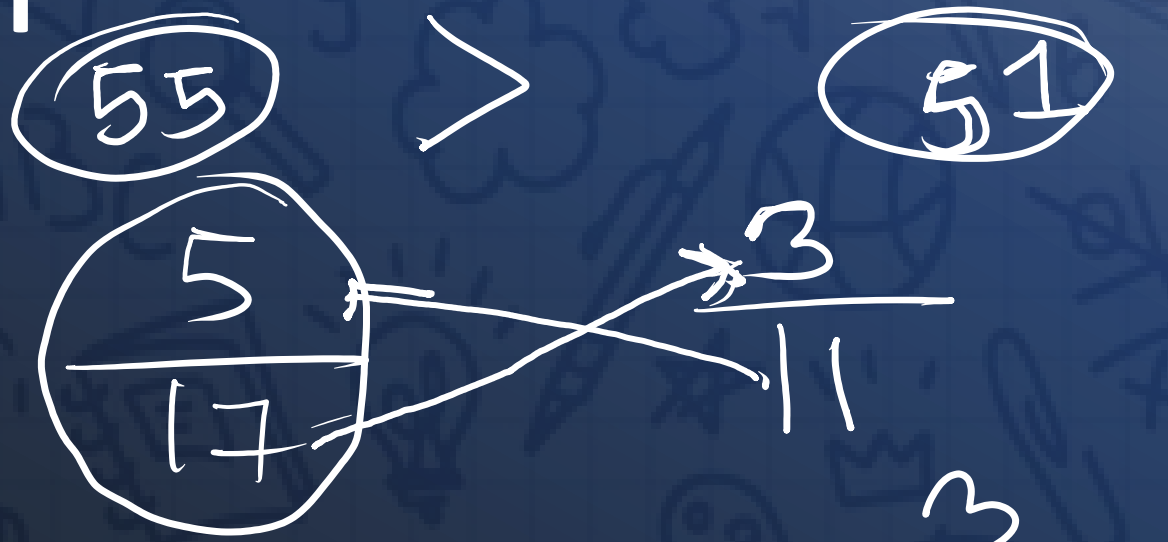
For 2 fraction

$\frac{5}{17}$ $\frac{3}{11}$



$$\frac{5}{17} > \frac{3}{11}$$

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For 3 or more fraction

$\frac{5}{16}$ $\frac{3}{14}$ $\frac{8}{19}$ $\frac{13}{24}$

$\frac{5}{16}$ 11

$\frac{3}{14}$ 11

$\frac{13}{24} > \frac{8}{19} > \frac{5}{16} > \frac{3}{14}$

$\frac{8}{19}$ 11

$\frac{13}{24}$ 11

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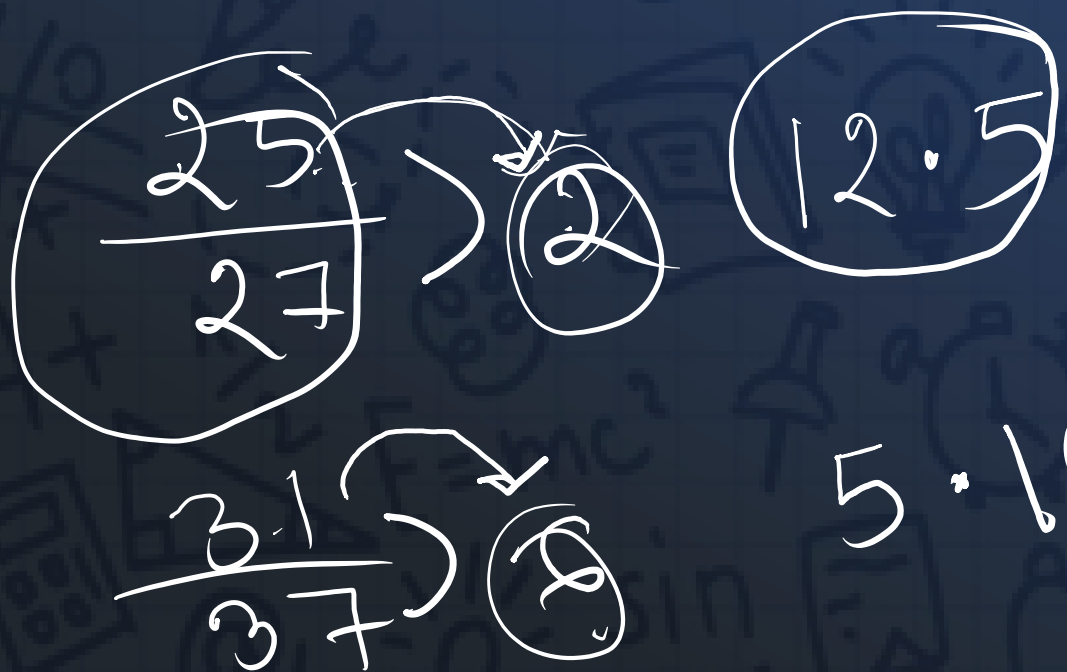
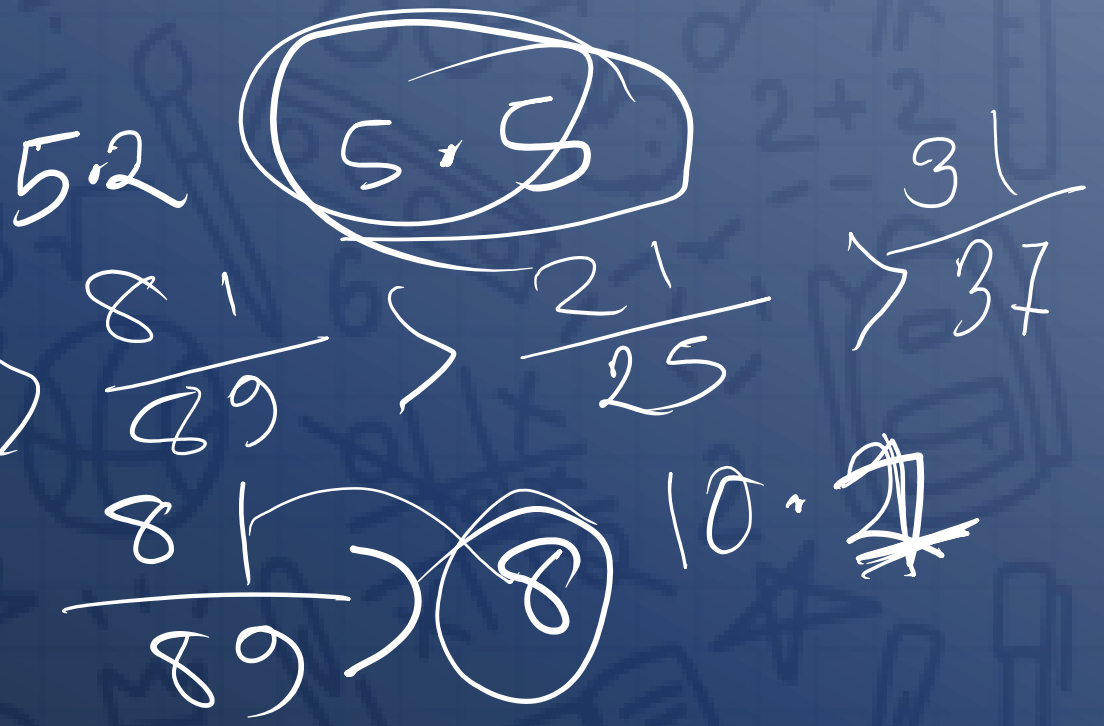
For 3 or more fraction

$\frac{25}{27}$ $\frac{31}{37}$ $\frac{81}{89}$ $\frac{21}{25}$





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Exponents

Exponents or power provide a shortcut notation for repeated multiplication of a number by itself.

Example:

$4^{3} = 4 \times 4 \times 4$

- When the exponent is 2 we call it square.
- When the exponent is 3 we call it cube.

Some Rules of Exponents:

- $x^a \times x^b = x^{a+b}$
- $x^a / x^b = x^{a-b}$
- $(x^a)^b = x^{ab}$
- $(xy)^a = x^a \times y^a$
- $\left(\frac{x}{y}\right)^a = x^a / y^a$
- $x^{-a} = \frac{1}{x^a}$
- $x^0 = 1$
- $x^1 = x$

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Root

Root is opposite of exponents.

Example:

$4^3 = 4 \times 4 \times 4 = 64$

$\sqrt[3]{64} = 4$

- We can't identify the square root of a negative number.
- Square of a negative number is always positive.

Some Rules of Root:

- $\sqrt{(a \times b)} = \sqrt{a} \times \sqrt{b}$
- $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$
- $\sqrt[n]{a} = a^{\frac{1}{n}}$