Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER

CLASS – 9

MATHS

CHAPTER - 1

Number System

Part – 10

Laws of Exponents for Real Numbers & Exercise 1.5

Vikas Saini

Under CSR Support by ipca | Foundation

OVERVIEW

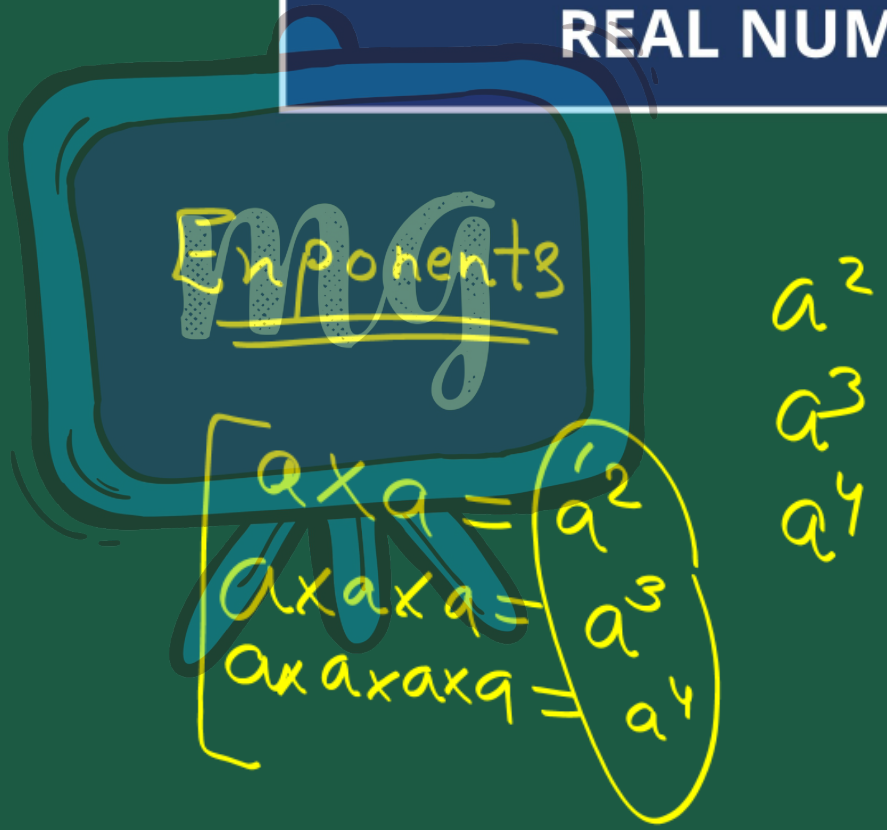
missiongyan LET'S LEARN TOGETHER

1. Number
2. Irrational Number
3. Real Number & their Decimal Expansions
4. Operations on Real Numbers
5. Laws of Exponents for Real Numbers

Under CSR Support by ipca | Foundation

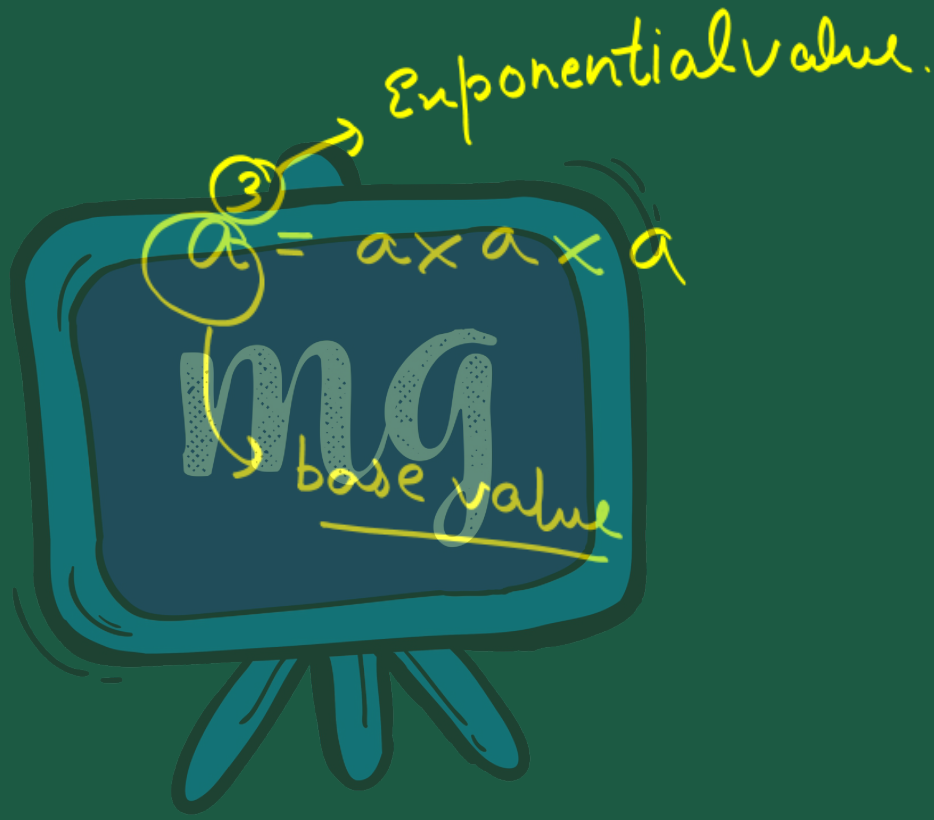
missiongyan LET'S LEARN TOGETHER

LAWS OF EXPONENTS FOR REAL NUMBERS



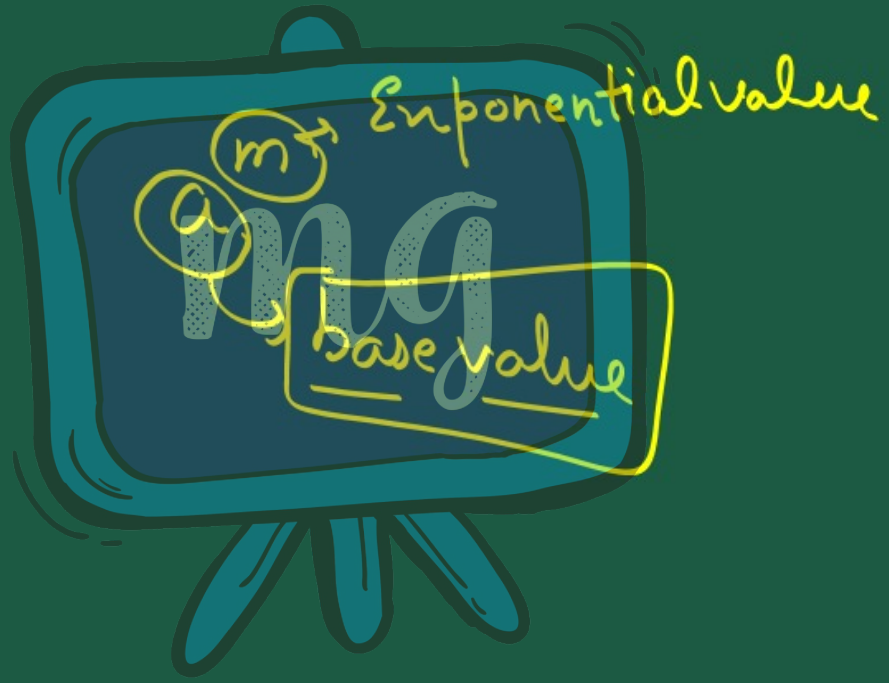
Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER



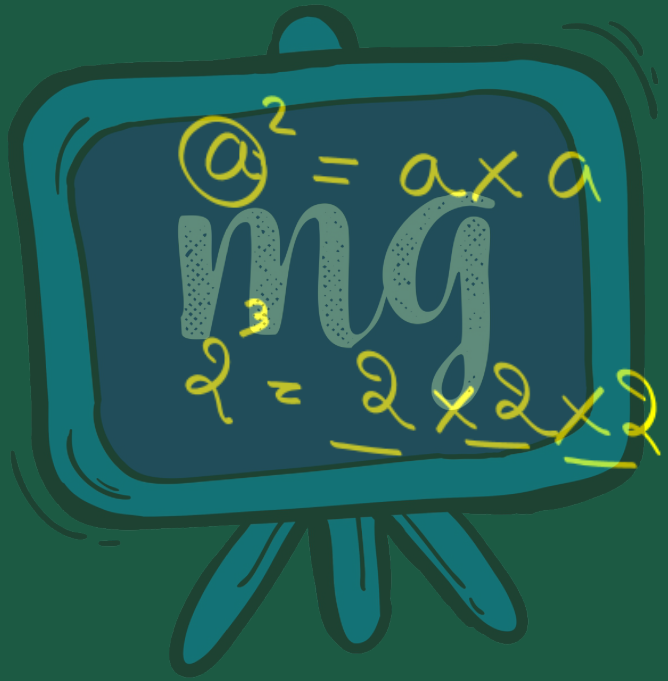
Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

Laws of Exponents

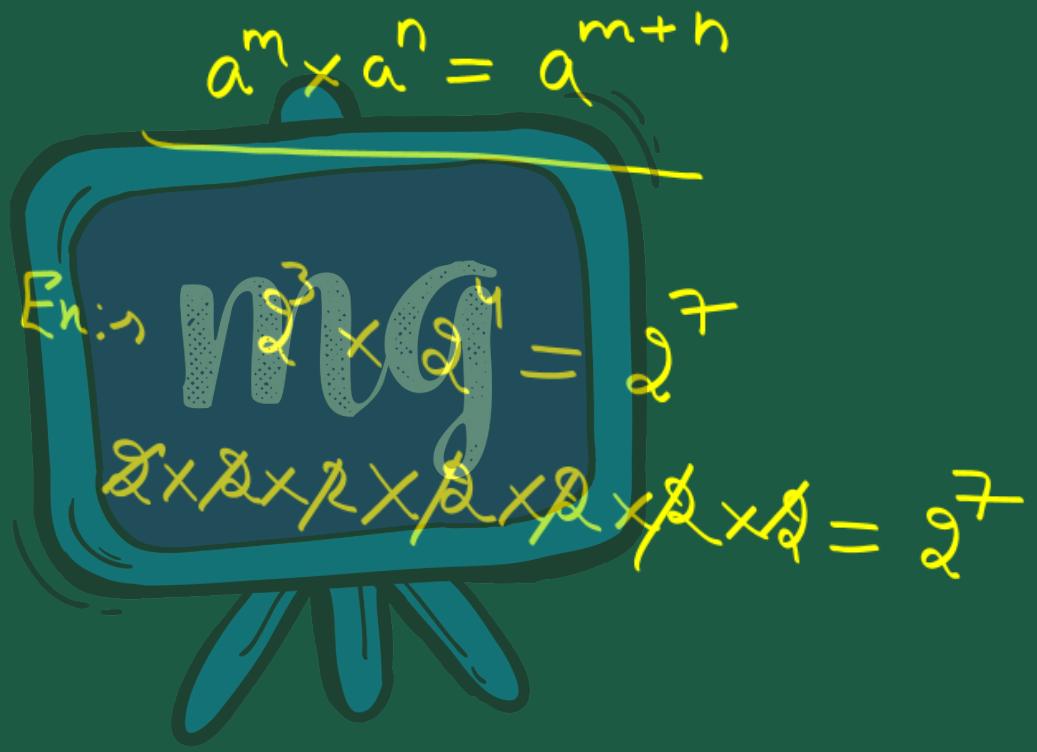


(i) $a^m \times a^n = a^{m+n}$

base value Same
but exponential value differ

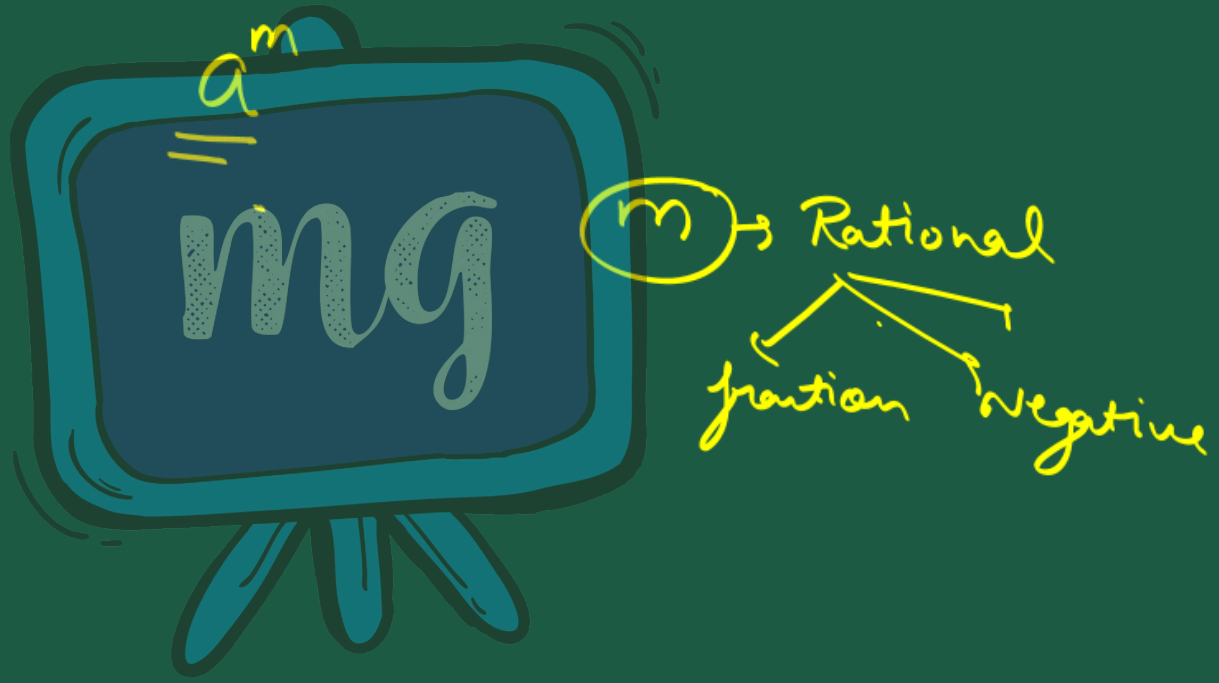
Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



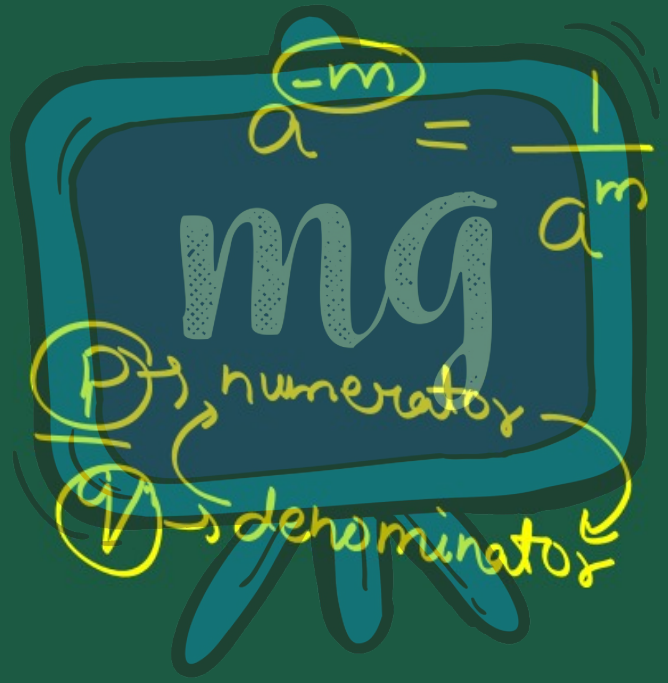
Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



Under CSR Support by
ipca | Foundation

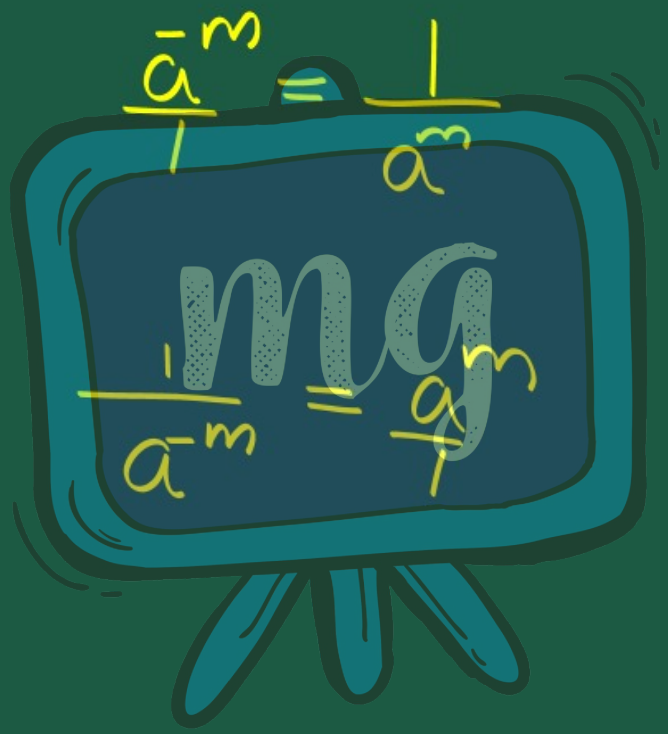
missiongyan
LET'S LEARN TOGETHER



$\frac{a^{-m}}{1}$

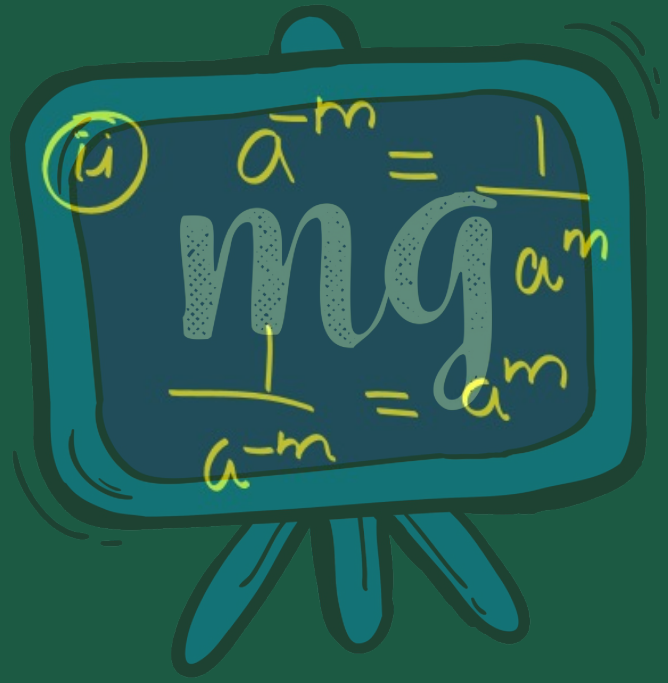
Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



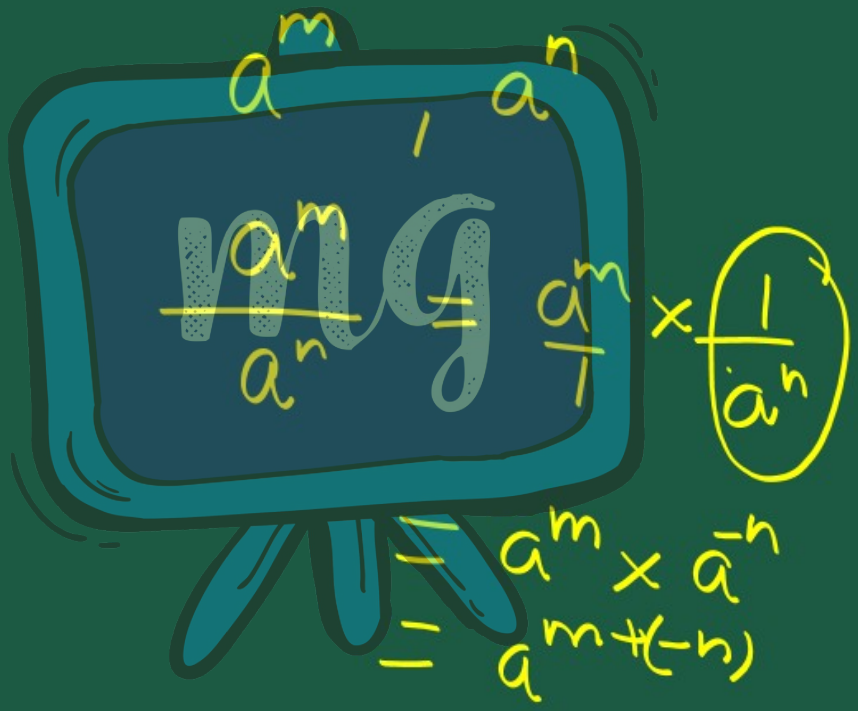
Under CSR Support by ipca | Foundation

missiongyan® LET'S LEARN TOGETHER



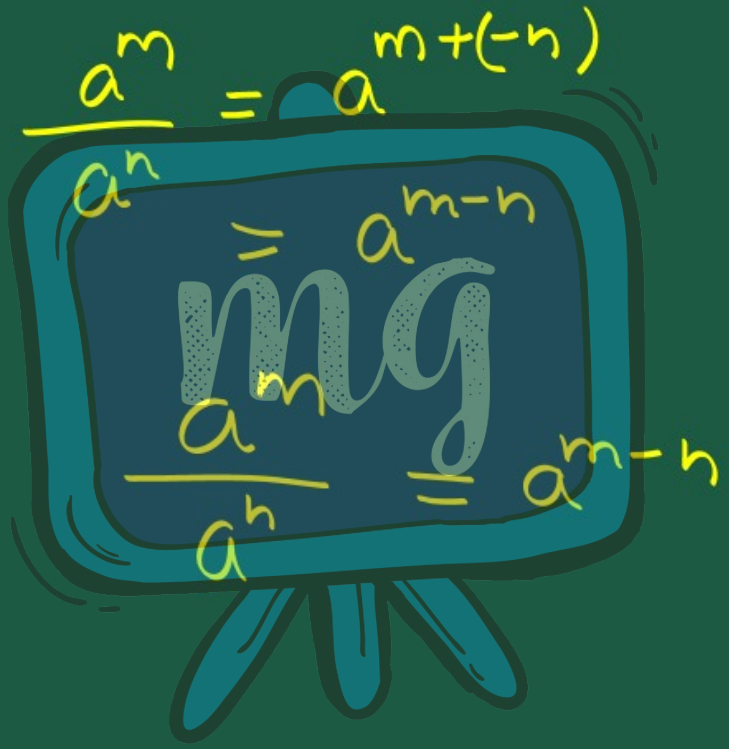
Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



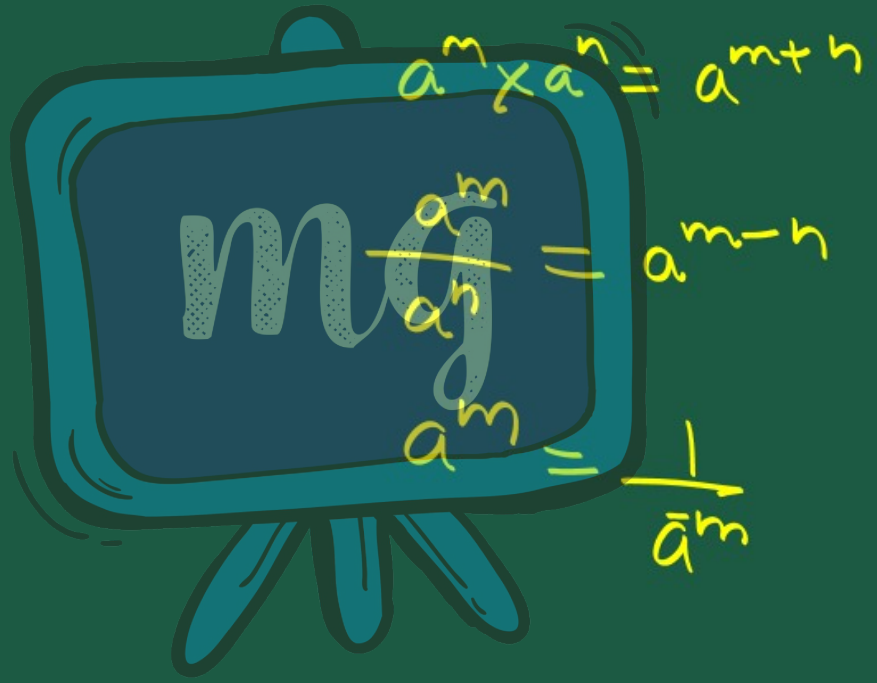
Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



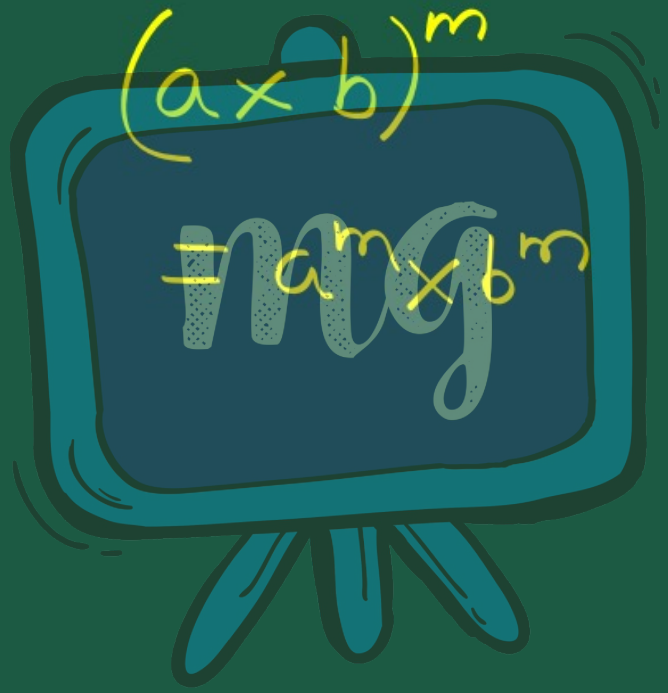
Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



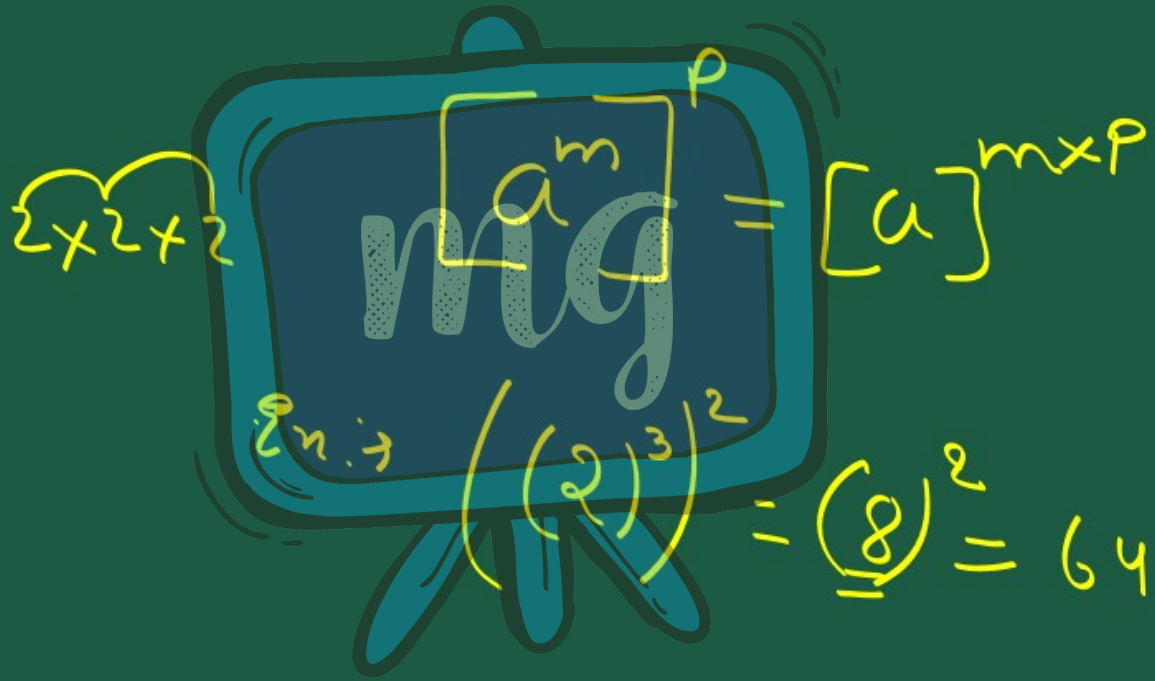
Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



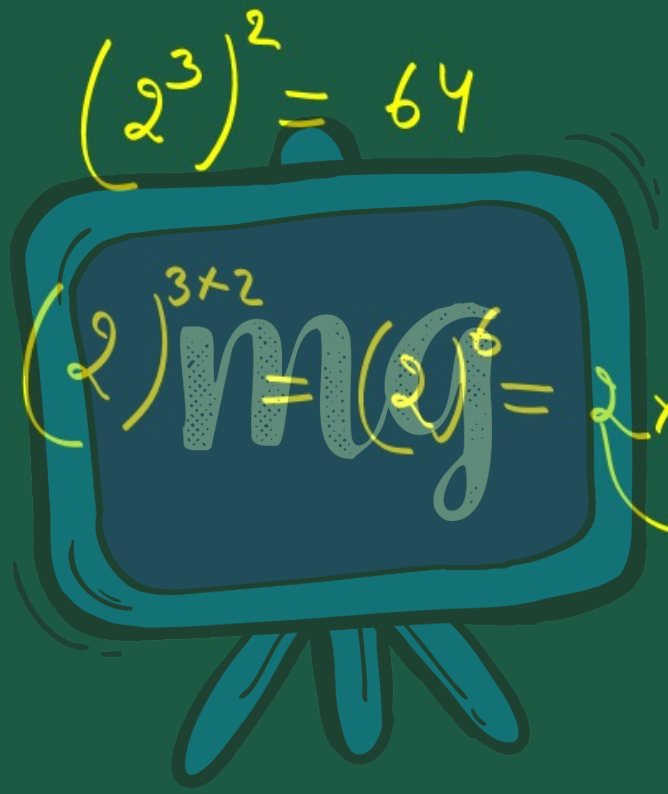
Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



Under CSR Support by
ipca | Foundation

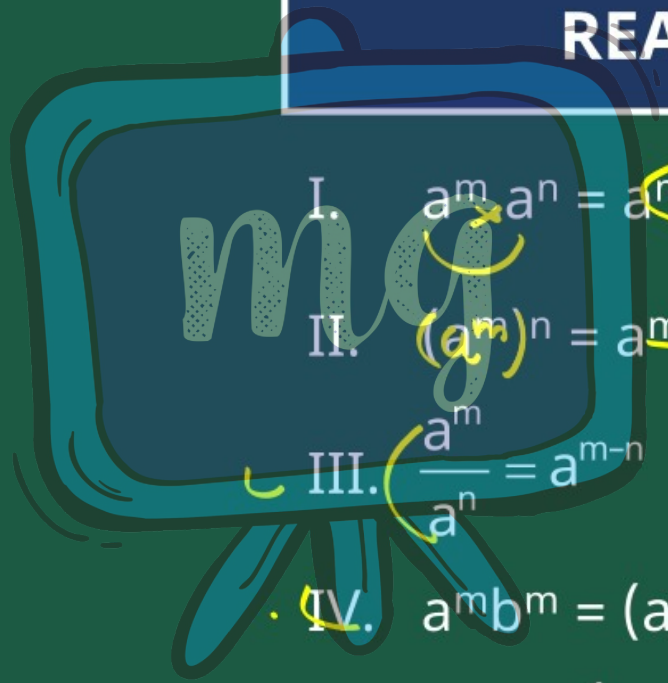
missiongyan
LET'S LEARN TOGETHER



Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

LAWS OF EXPONENTS FOR REAL NUMBERS



I. $a^m \cdot a^n = a^{m+n}$

II. $(a^m)^n = a^{mn}$

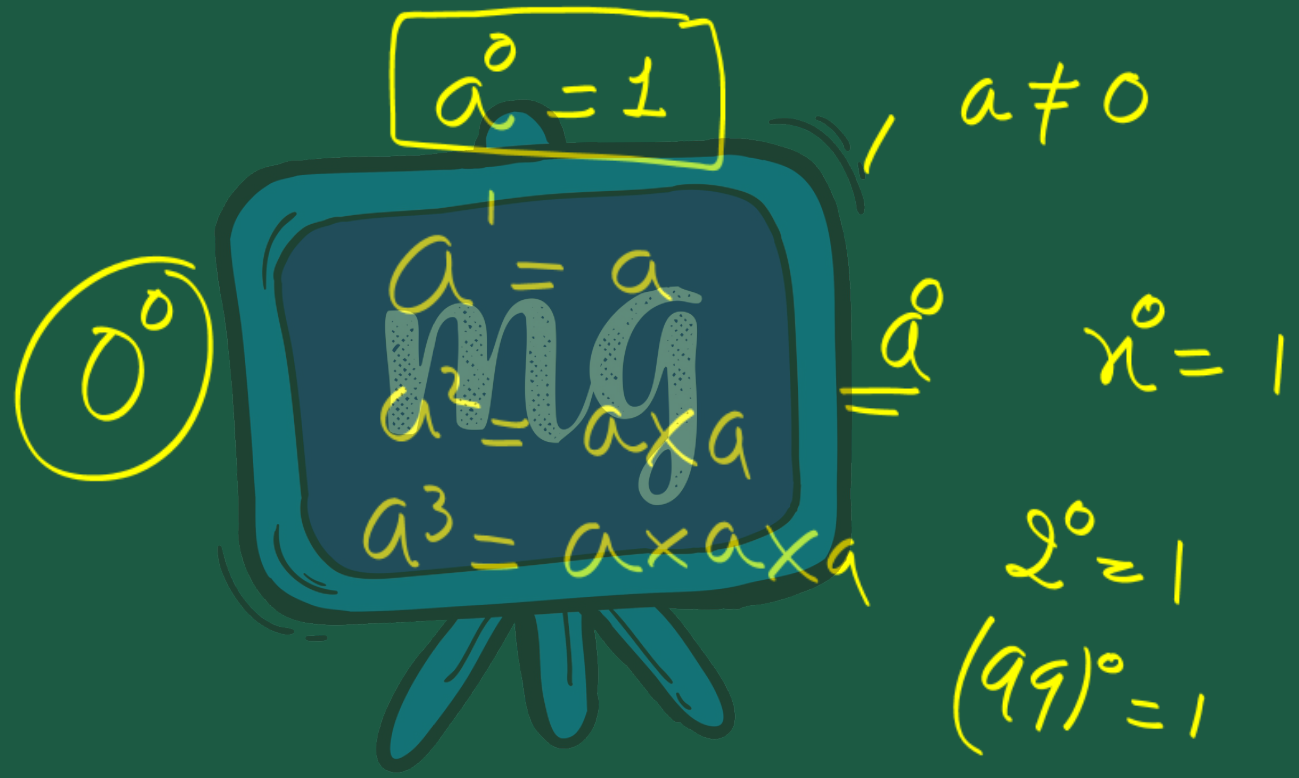
III. $\frac{a^m}{a^n} = a^{m-n}$

IV. $a^m b^m = (ab)^m$

V. $a^{-m} = \frac{1}{a^m}$

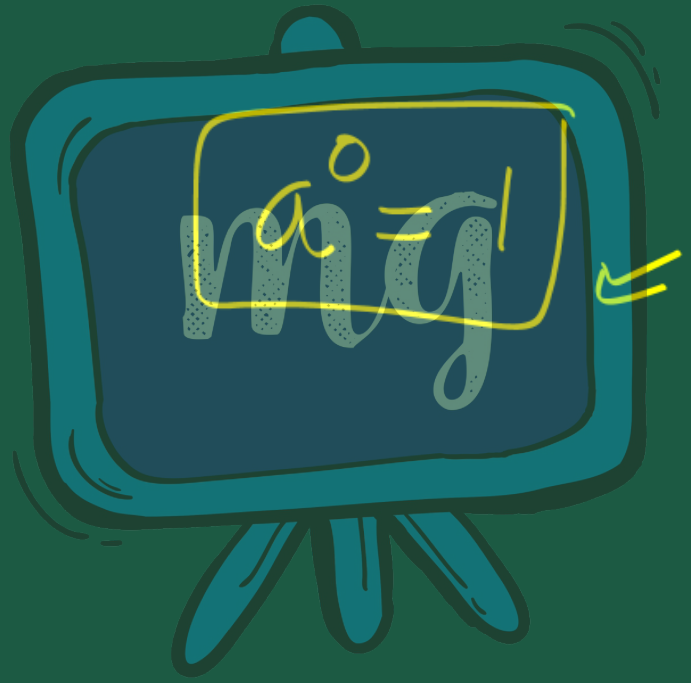
Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



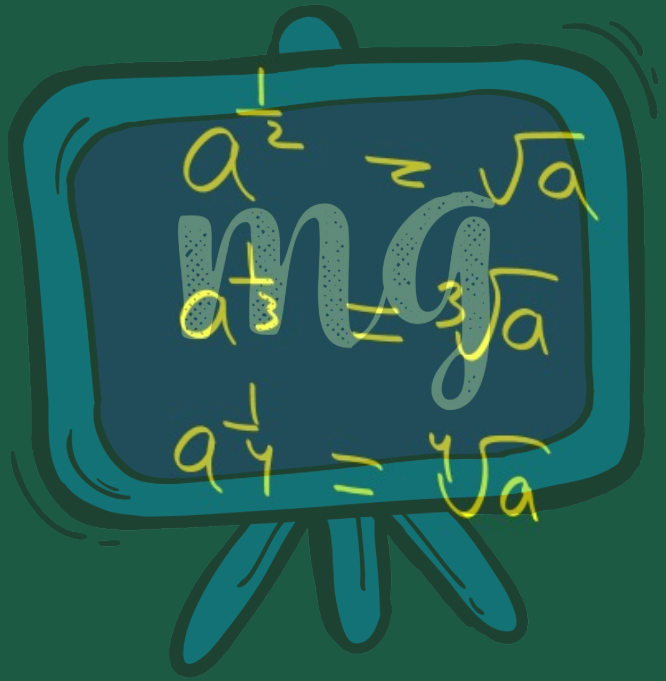
Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



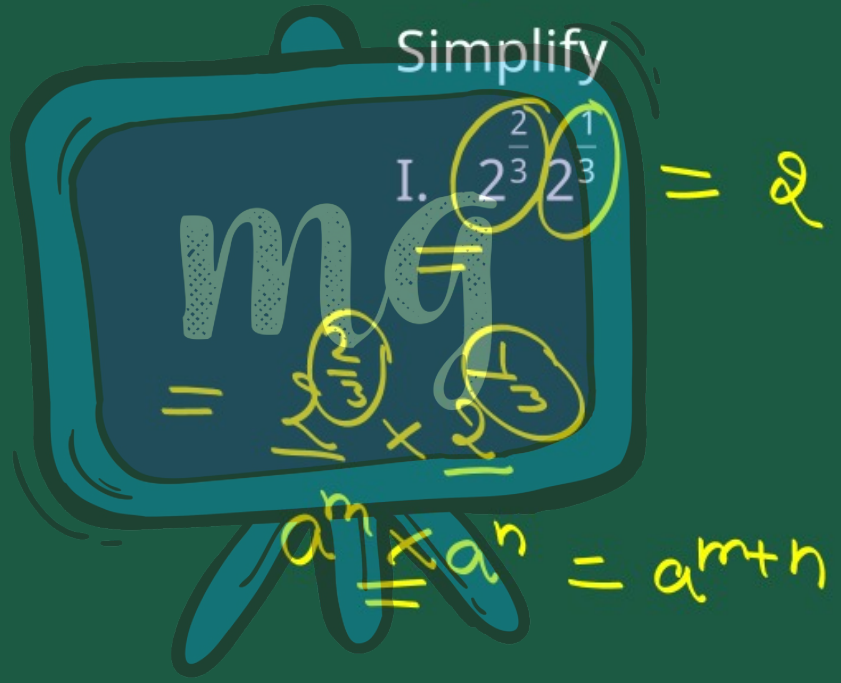
Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

Example 20 :

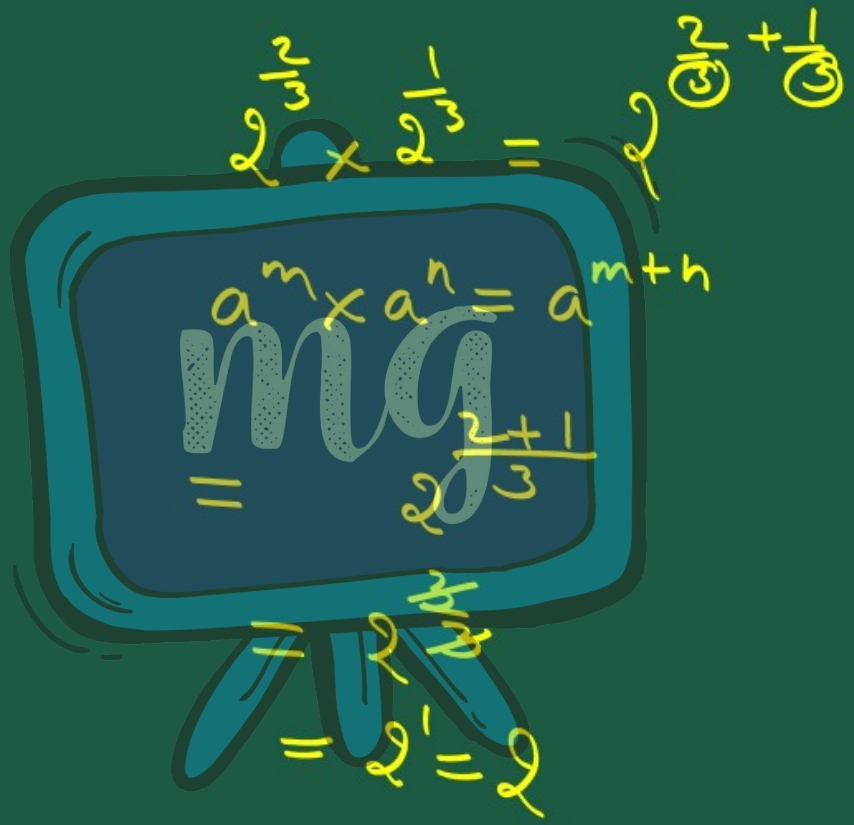
Simplify

I. $2^{\frac{2}{3}} 2^{\frac{1}{3}}$



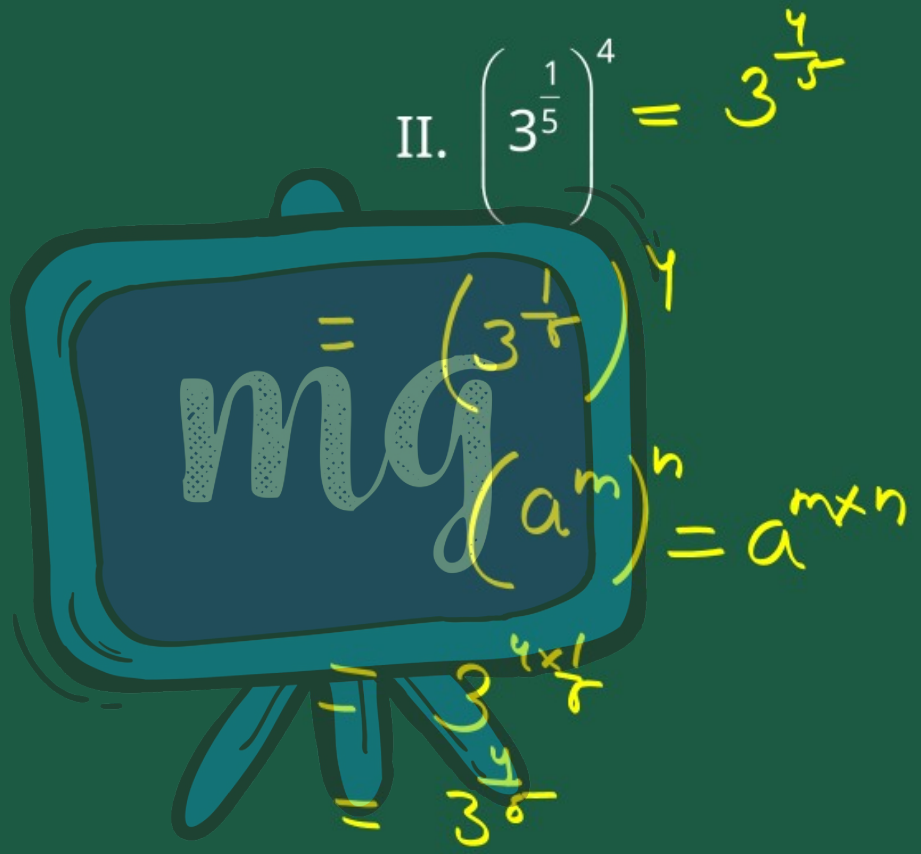
Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



Under CSR Support by ipca | Foundation

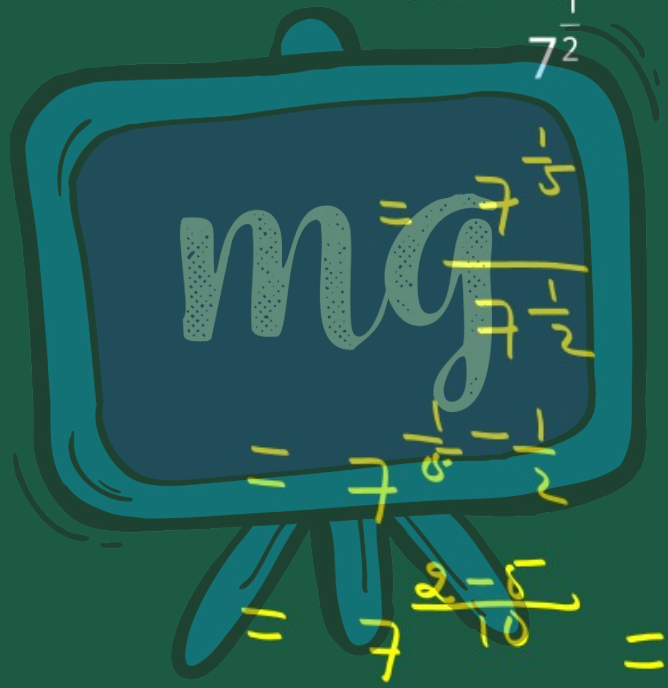
missiongyan LET'S LEARN TOGETHER



Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

III. $\dfrac{7^{\frac{1}{5}}}{7^{\frac{1}{2}}} = \dfrac{1}{7^{\frac{3}{10}}}$

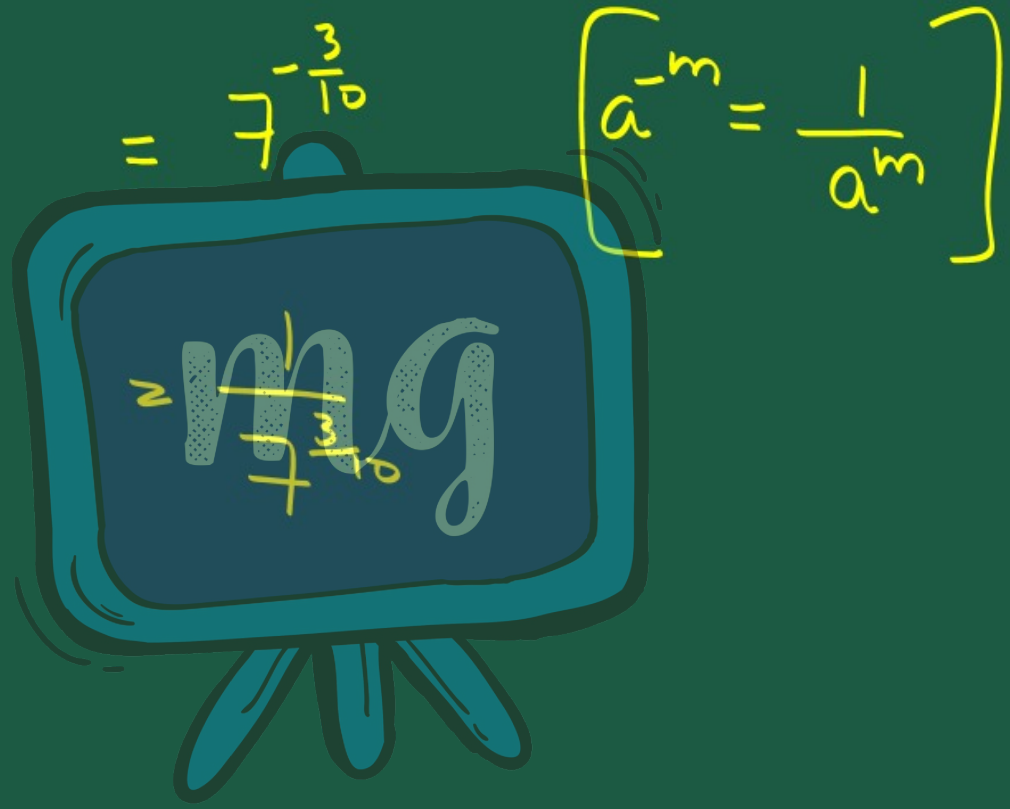


$\dfrac{a^m}{a^n} = a^{m-n}$

$= 7^{\frac{2-5}{10}} = 7^{\frac{-3}{10}}$

Under CSR Support by
ipca | Foundation

missiongyan
LET'S LEARN TOGETHER



Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

IV. $13^{\frac{1}{5}}.17^{\frac{1}{5}} = (221)^{\frac{1}{5}}$

$= (13)^{\frac{1}{5}} \times (17)^{\frac{1}{5}}$

$a^m \times b^m = (a \times b)^m$

$= (13 \times 17)^{\frac{1}{5}}$

$= (221)^{\frac{1}{5}}$

Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER



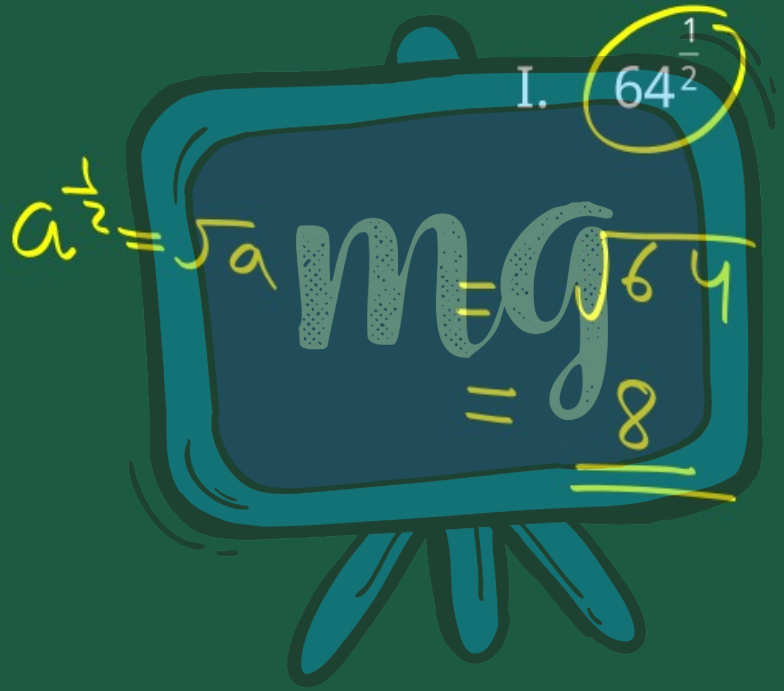
EXERCISE 1.5

Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

1. Find :

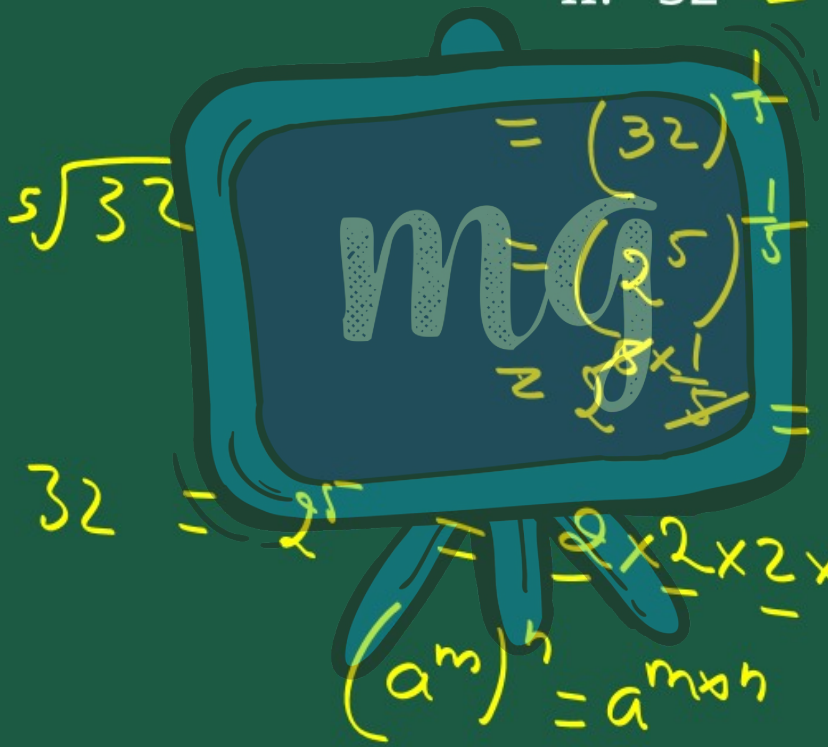
I. $64^{\frac{1}{2}}$

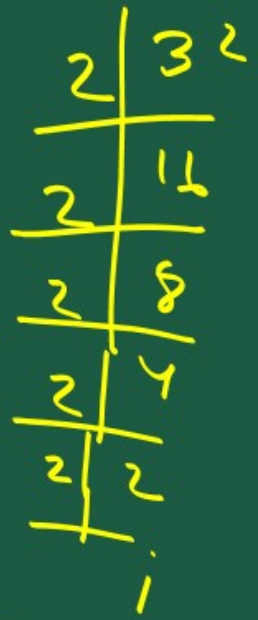


Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

II. $32^{\frac{1}{5}} = 2$





Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

III. $125^{\frac{1}{3}} = 5$

5	125
5	25
5	5
	1

$= (125)^{\frac{1}{3}}$

$= (5^3)^{\frac{1}{3}}$

$= 5^{3 \times \frac{1}{3}} = 5$

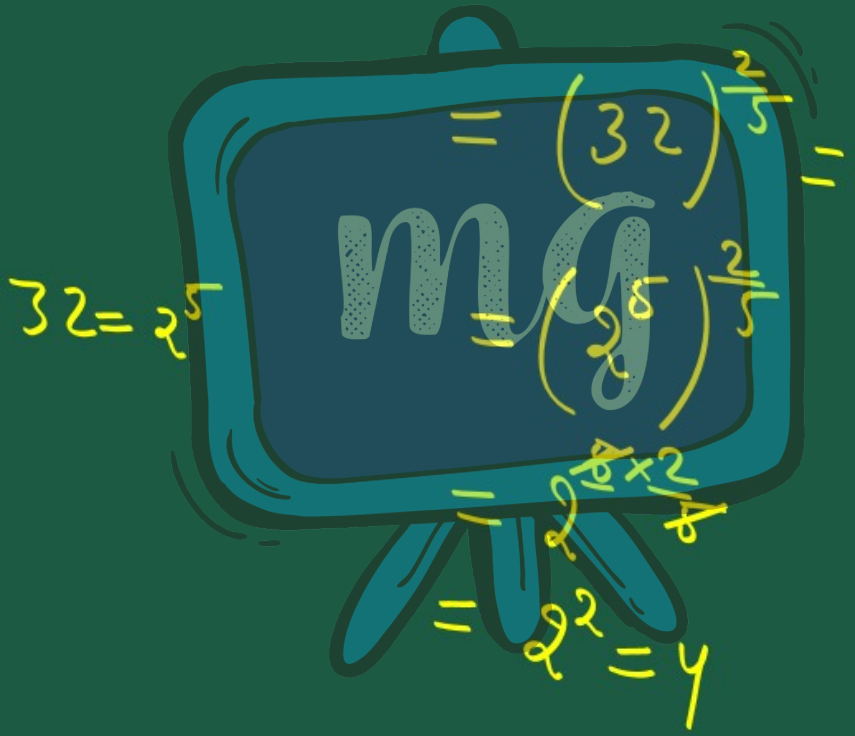
$125 = 5^3 = 5 \times 5 \times 5$

$[a^m]^n = a^{mn}$

Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

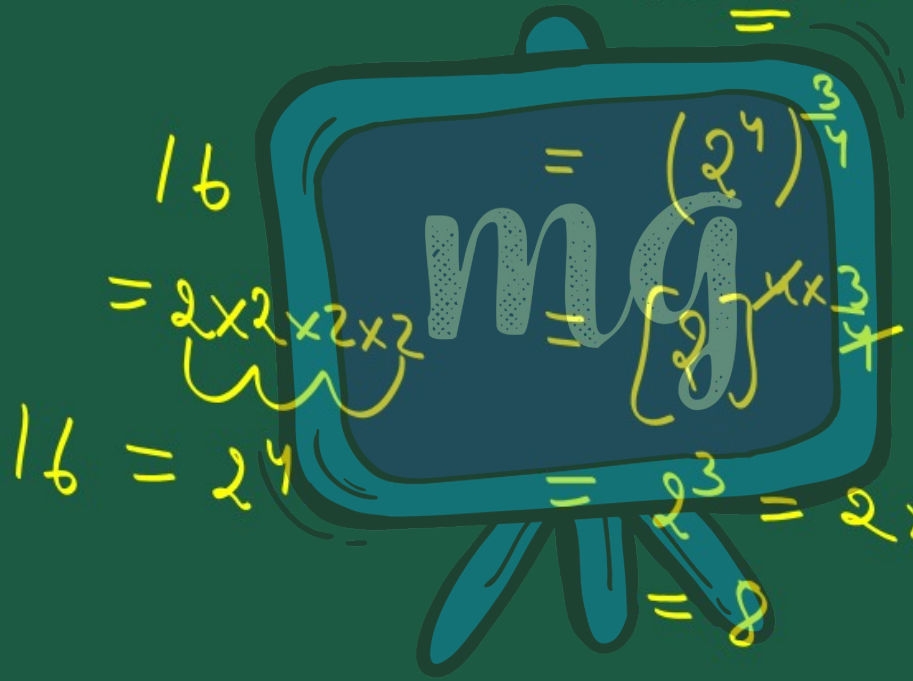
II. $32^{\frac{2}{5}} = 4$



Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

III. $16^{\frac{3}{4}} = 8$



$16 = (2^4)^{\frac{3}{4}}$

$= 2 \times 2 \times 2 \times 2$

$= [2]^{4 \times \frac{3}{4}}$

$16 = 2^4$

$= 2^3 = 2 \times 2 \times 2$

$= 8$

$[a^m]^n = a^{m \times n}$

Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

IV. $125^{-\frac{1}{3}} = \frac{1}{5}$

$= (125)^{\frac{-1}{3}}$

$= \frac{1}{(125)^{\frac{1}{3}}}$

$125 = 5^3$

$= \left(5^3\right)^{\frac{1}{3}} = \frac{1}{(5)^{3\times\frac{1}{3}}} = \frac{1}{5}$

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

Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

3. Simplify :

I. $2^{\frac{2}{3}} \cdot 2^{\frac{1}{5}} = 2^{\frac{7}{5}}$

$a^m \times a^n = a^{m+n}$

$= 2^{\frac{2}{3}+\frac{1}{5}}$

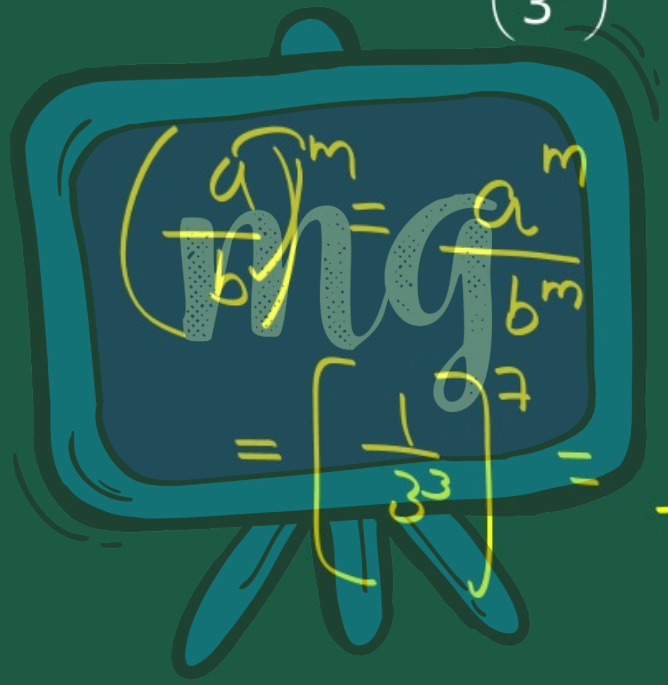
$= 2^{\frac{10+3}{15}}$

$= 2^{\frac{13}{15}}$

Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

II. $\left(\frac{1}{3^3}\right)^7 = \frac{1}{3^{21}}$



1^{99}

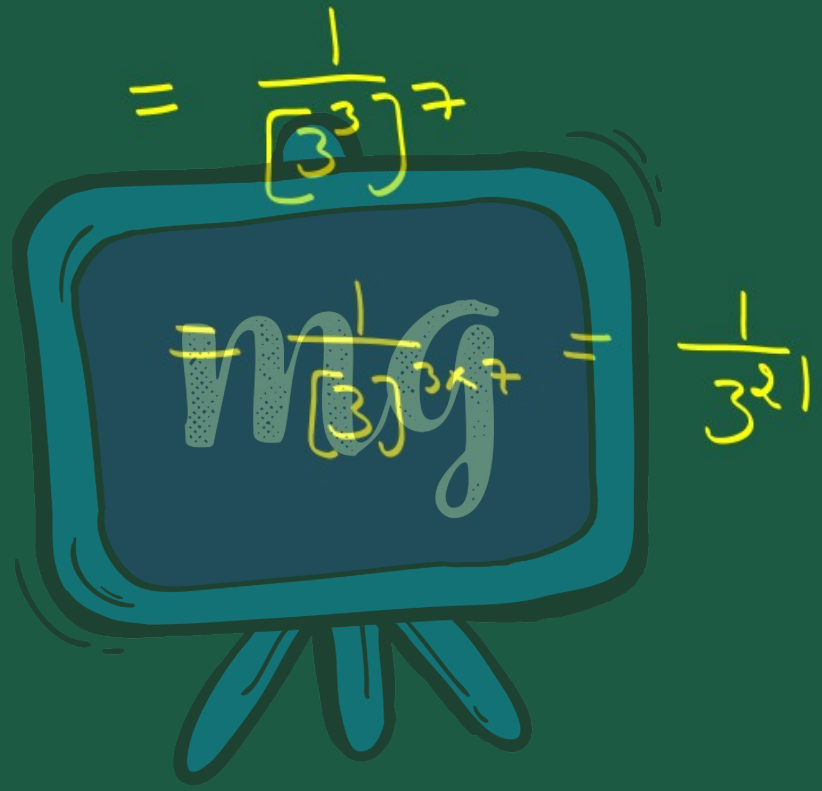
1^0

$1^1 = 1$

$\frac{1^7}{[3^3]^7} = \frac{1}{[3^3]^7}$

Under CSR Support by
ipca | Foundation

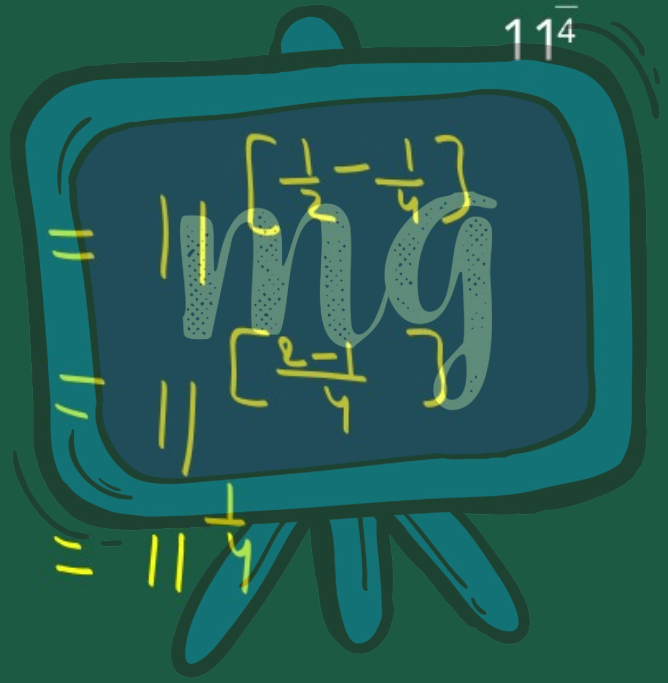
missiongyan
LET'S LEARN TOGETHER



Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

III. $\dfrac{11^{\frac{1}{2}}}{11^{\frac{1}{4}}} = 11^{\frac{1}{4}}$



$= 11^{\left[\frac{1}{2}-\frac{1}{4}\right]}$

$= 11^{\left[\frac{2-1}{4}\right]}$

$= 11^{\frac{1}{4}}$

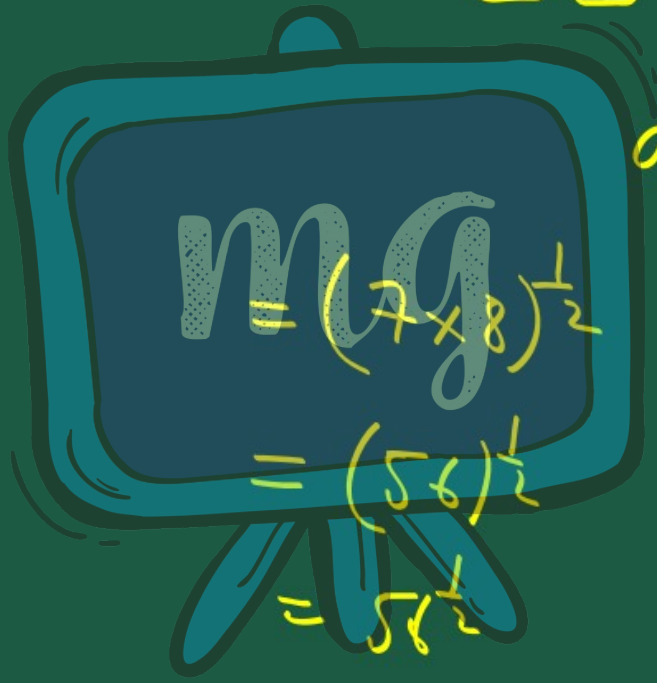
$\dfrac{a^m}{a^n} = a^{m-n}$

Under CSR Support by ipca | Foundation

missiongyan LET'S LEARN TOGETHER

IV. $7^{\frac{1}{2}} \cdot 8^{\frac{1}{2}} = 56^{\frac{1}{2}}$

$a^m \times b^m = (ab)^m$



Under CSR Support by ipca | Foundation

LEARNING OUTCOME

missiongyan



The Laws of Exponents