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CLASS – 9

MATHS

CHAPTER - 1

Number System

Part – 8

Operations on Real Numbers

Vikas Saini

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OVERVIEW

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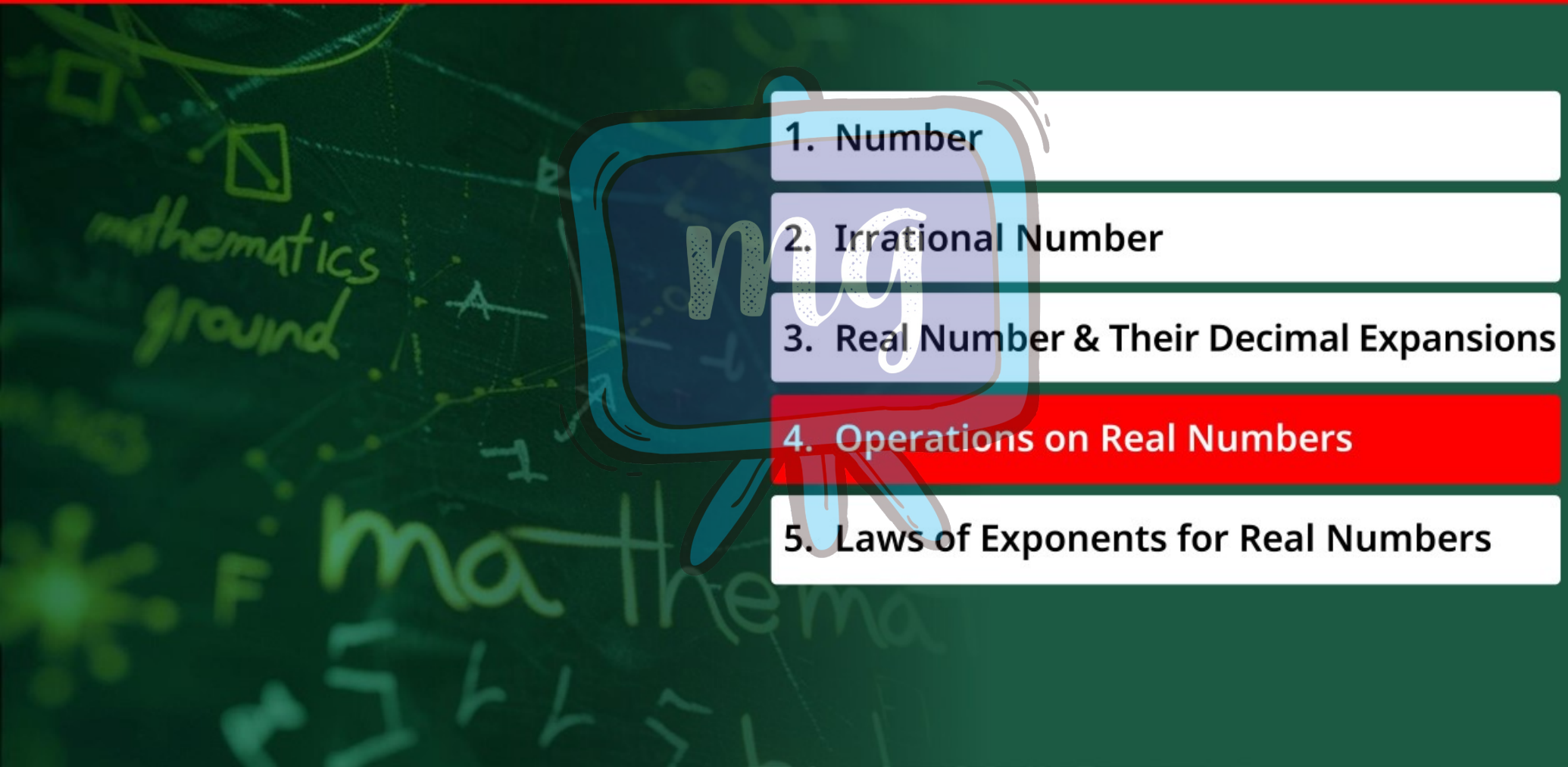

1. Number
2. Irrational Number
3. Real Number & Their Decimal Expansions
4. Operations on Real Numbers
5. Laws of Exponents for Real Numbers

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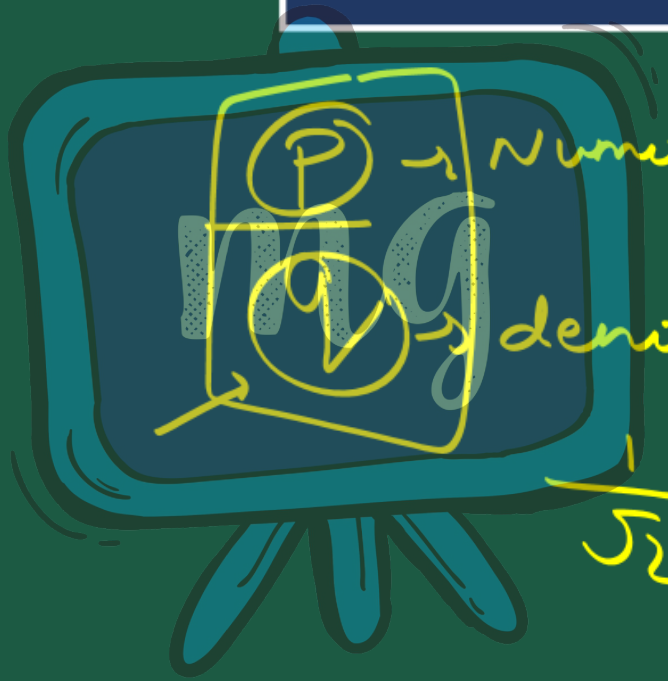
RATIONALIZATION



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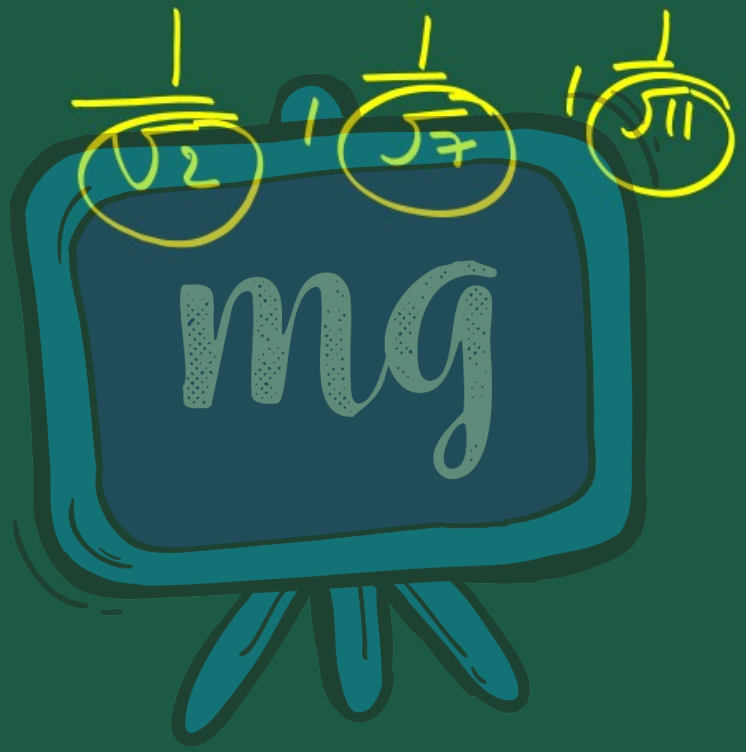

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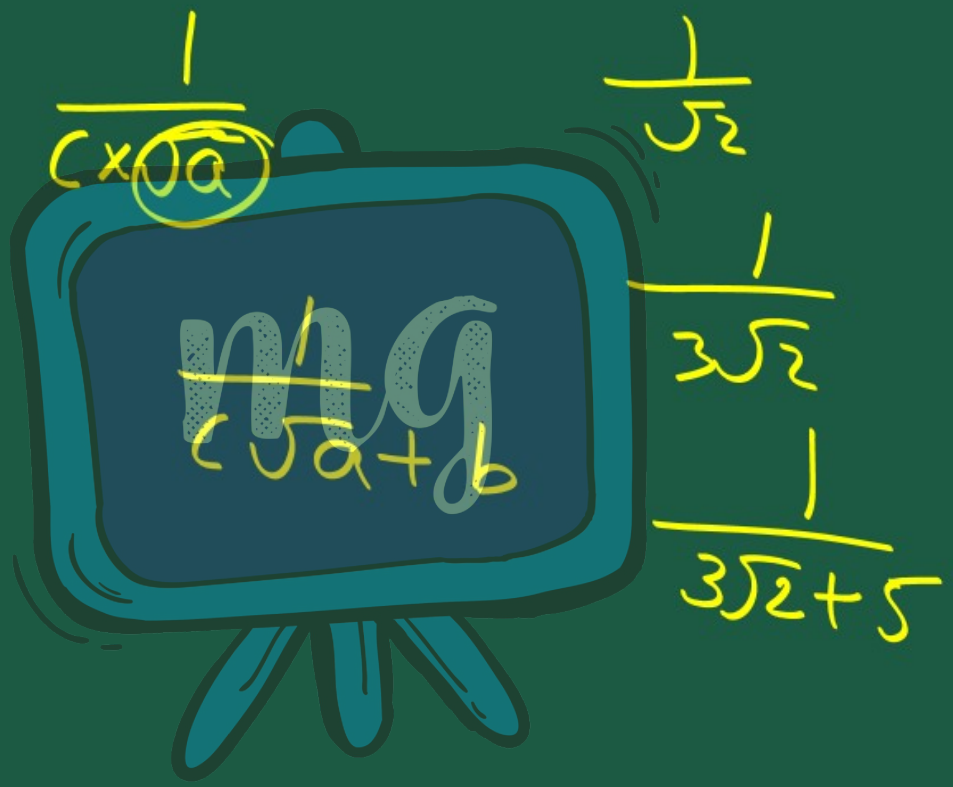

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$$\frac{1}{\sqrt{a}} = \frac{1}{\sqrt{a}} \times \frac{\sqrt{a}}{\sqrt{a}}$$

$$\frac{2}{2} \quad \frac{x}{x} \quad \frac{77}{77}$$

$$\frac{1}{\sqrt{a}} = \frac{1}{\sqrt{a}} \times 1$$

$$2 \times 1 = 2$$

$$99 \times 1 = 2$$

$$= \frac{1}{\sqrt{a}} \times \frac{\sqrt{a}}{\sqrt{a}}$$

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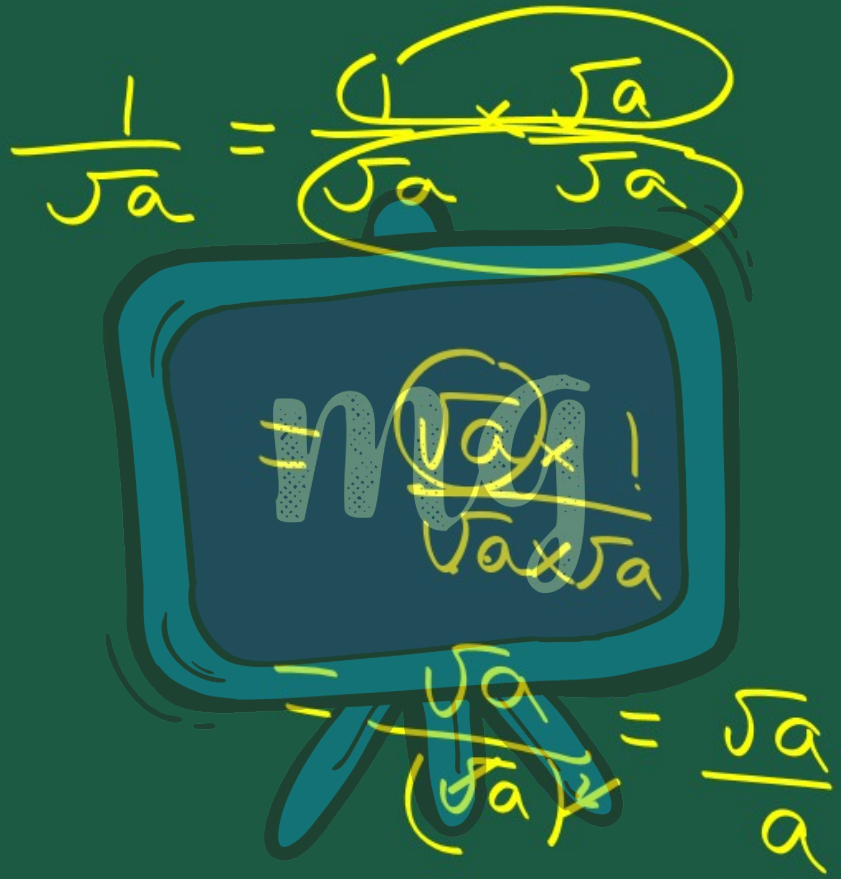

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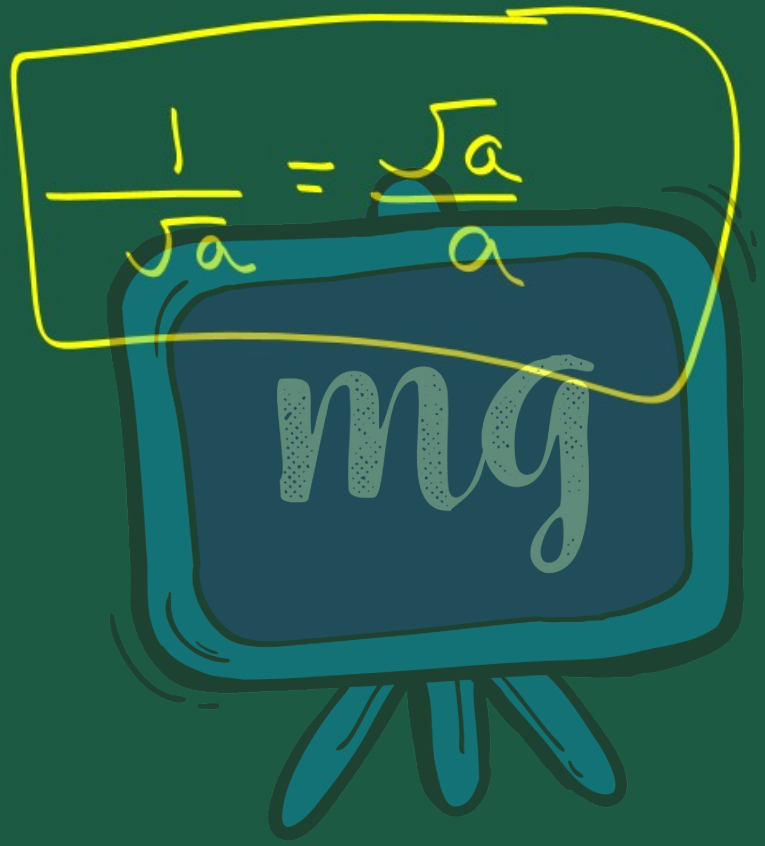

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$$\frac{1}{c\sqrt{a}} = \frac{1}{c\sqrt{a}} \times \frac{\sqrt{a}}{\sqrt{a}}$$

$$= \frac{\sqrt{a} \times 1}{c \times \sqrt{a} \times \sqrt{a}}$$

$$= \frac{\sqrt{a}}{ca}$$

$$\therefore \frac{1}{c\sqrt{a}} = \frac{\sqrt{a}}{ca}$$

$$= \frac{\sqrt{a}}{c \times (\sqrt{a})^2}$$

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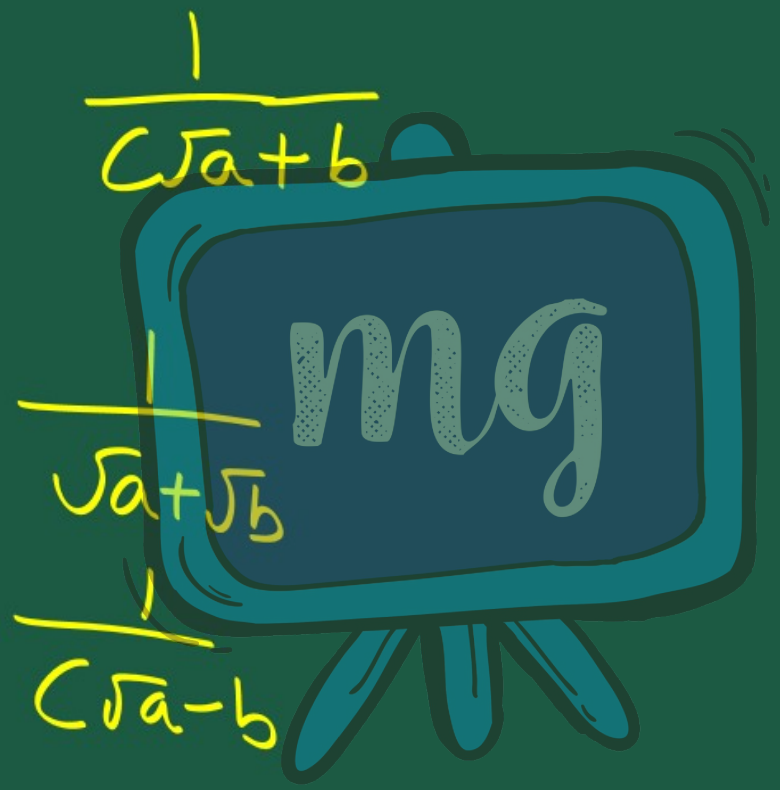

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$$\frac{1}{\sqrt{a}+b} = \frac{1}{\sqrt{a}+b} \times \frac{(\sqrt{a}-b)}{\sqrt{a}-b}$$

$$= \frac{1}{\sqrt{a}+b} \times \frac{\sqrt{a}-b}{\sqrt{a}-b}$$

$$= \frac{\sqrt{a}-b}{(\sqrt{a}+b)(\sqrt{a}-b)}$$

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$$= \frac{c\sqrt{a} - b}{(c\sqrt{a})^2 - (b)^2}$$

$$= \frac{c\sqrt{a} - b}{c^2(\sqrt{a})^2 - b^2}$$

$$\frac{1}{c\sqrt{a} + b} = \frac{c\sqrt{a} - b}{c^2 a - b^2}$$

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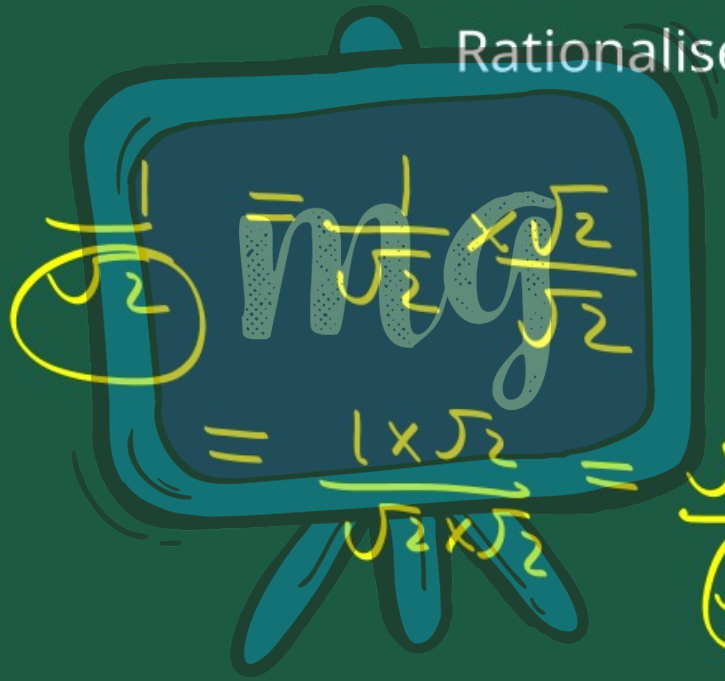
Example 16 :

Rationalise the denominator of $\frac{1}{\sqrt{2}}$.



$\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\frac{\sqrt{2}}{(\sqrt{2})^2} = \frac{\sqrt{2}}{2}$

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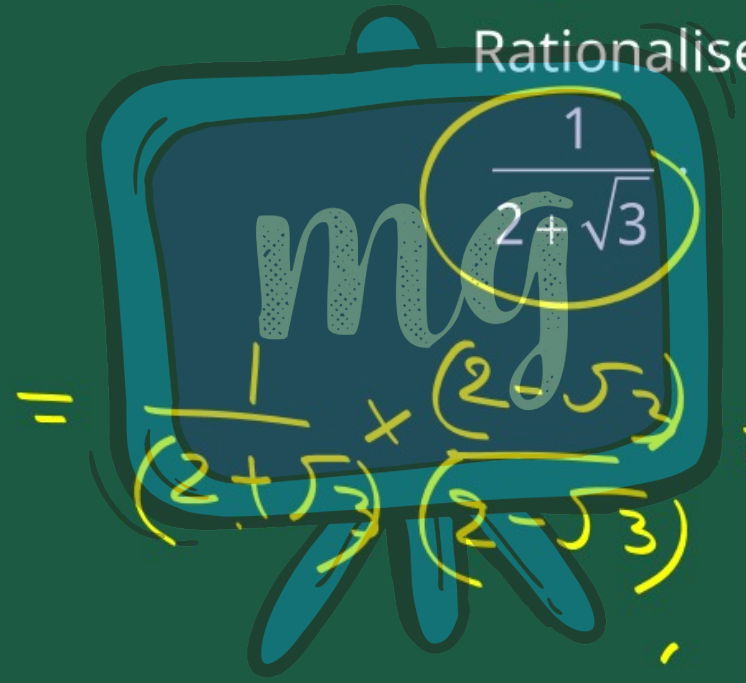
Example 17 :

Rationalise the denominator of $\frac{1}{2+\sqrt{3}}$



$$= \frac{1}{(2+\sqrt{3})} \times \frac{(2-\sqrt{3})}{(2-\sqrt{3})} = \frac{2-\sqrt{3}}{(2+\sqrt{3})(2-\sqrt{3})}$$

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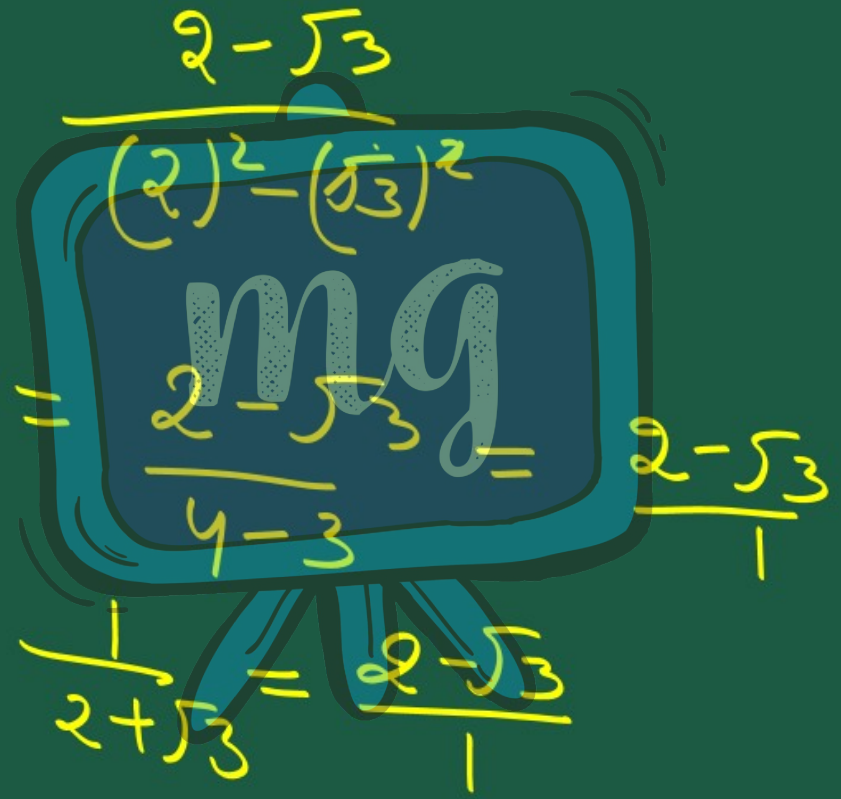

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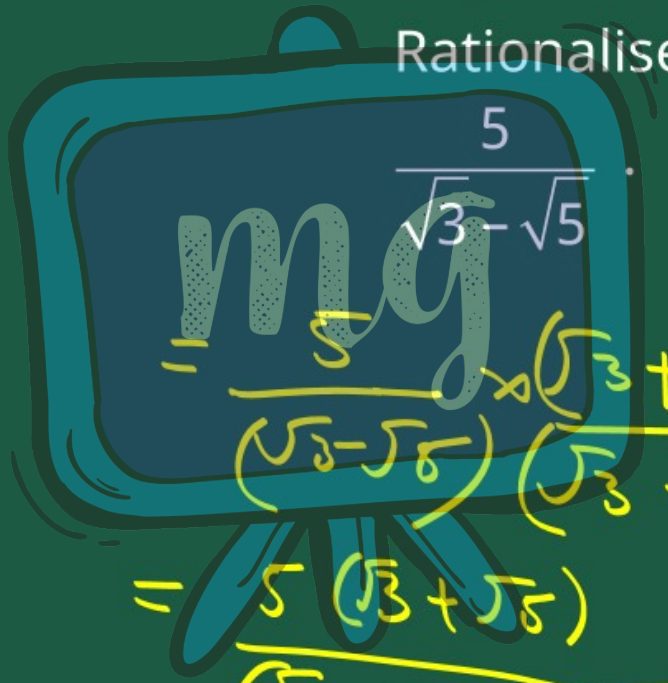
Example 18 :

Rationalise the denominator of $\frac{5}{\sqrt{3}-\sqrt{5}}$.



$$= \frac{5}{(\sqrt{3}-\sqrt{5})} \times \frac{(\sqrt{3}+\sqrt{5})}{(\sqrt{3}+\sqrt{5})}$$

$$= \frac{5(\sqrt{3}+\sqrt{5})}{(\sqrt{3}-\sqrt{5})\times(\sqrt{3}+\sqrt{5})}$$

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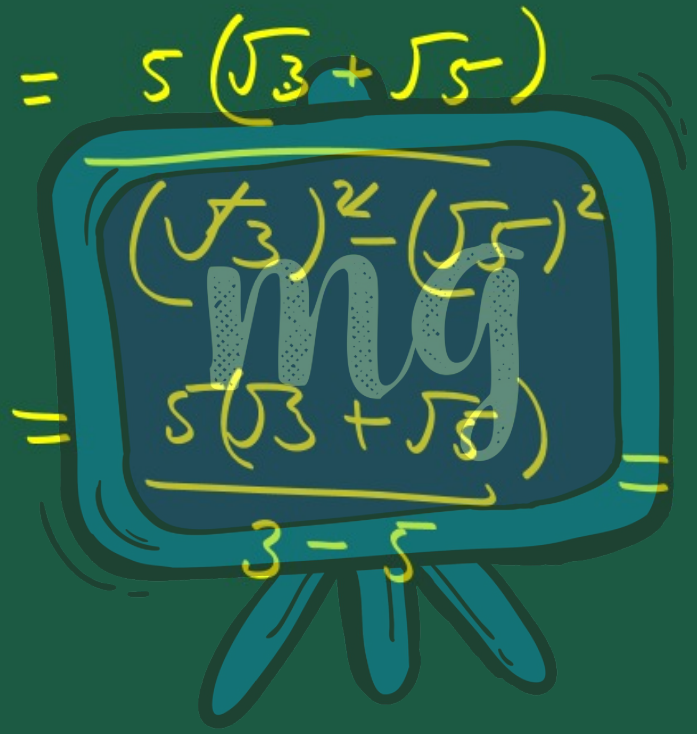

$$= \frac{5(\sqrt{3}+\sqrt{5})}{(\sqrt{3})^2-(\sqrt{5})^2}$$

$$= \frac{5(\sqrt{3}+\sqrt{5})}{3-5}$$

$$= \frac{5(\sqrt{3}+\sqrt{5})}{-2}$$

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

Example 19 :

Rationalise the denominator of $\frac{1}{7+3\sqrt{2}}$.

$= \frac{1}{(7+3\sqrt{2})} \times \frac{(7-3\sqrt{2})}{(7-3\sqrt{2})}$

$= \frac{7-3\sqrt{2}}{(7)^2-(3\sqrt{2})^2} = \frac{7-3\sqrt{2}}{49-3^2\times(\sqrt{2})^2}$

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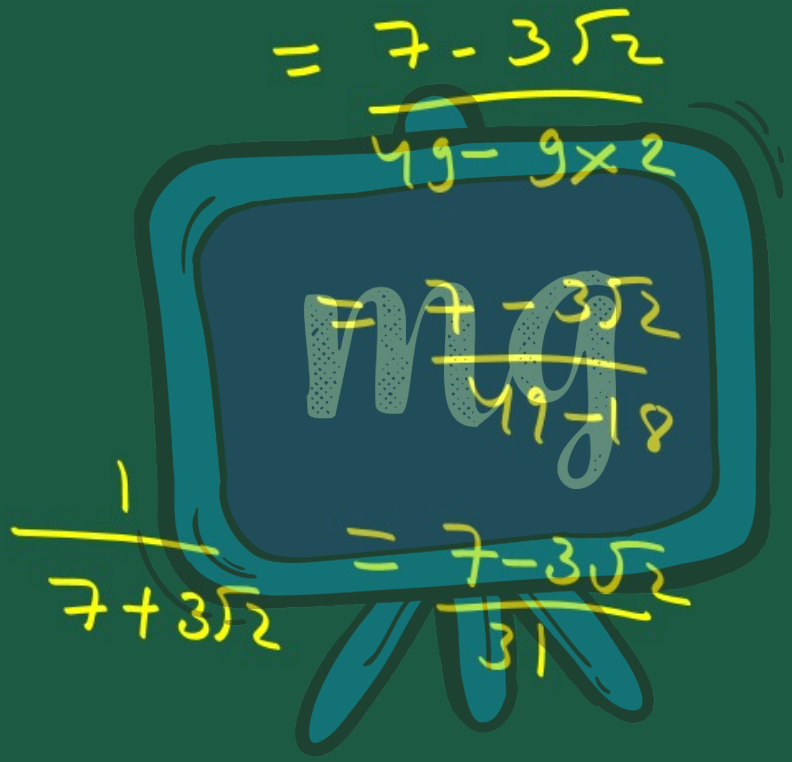

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LEARNING OUTCOMES

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Rationalization

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ASSESSMENT

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1 Rationalise the Denominator of $\frac{1}{6-\sqrt{3}}$ we get .....

A $\frac{6-\sqrt{3}}{3}$

B $\frac{6-\sqrt{3}}{33}$

C $\frac{6+\sqrt{3}}{3}$

D $\frac{6+\sqrt{3}}{33}$

$= \frac{1}{(6-\sqrt{3})} \times \frac{(6+\sqrt{3})}{(6+\sqrt{3})}$

$= \frac{6+\sqrt{3}}{(6)^2-(\sqrt{3})^2}$

$= \frac{6+\sqrt{3}}{36-3}$

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ASSESSMENT

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2 Rationalise the Denominator of $\frac{1}{\sqrt{7}}$ we get .....

A $\frac{\sqrt{7}}{7}$

B $\frac{2}{7}$

C $\frac{1}{7}$

D $\sqrt{7}$

$\frac{1}{\sqrt{7}} \times \frac{\sqrt{7}}{\sqrt{7}}$

$= \frac{\sqrt{7}}{(\sqrt{7})^2}$

$= \frac{\sqrt{7}}{7}$