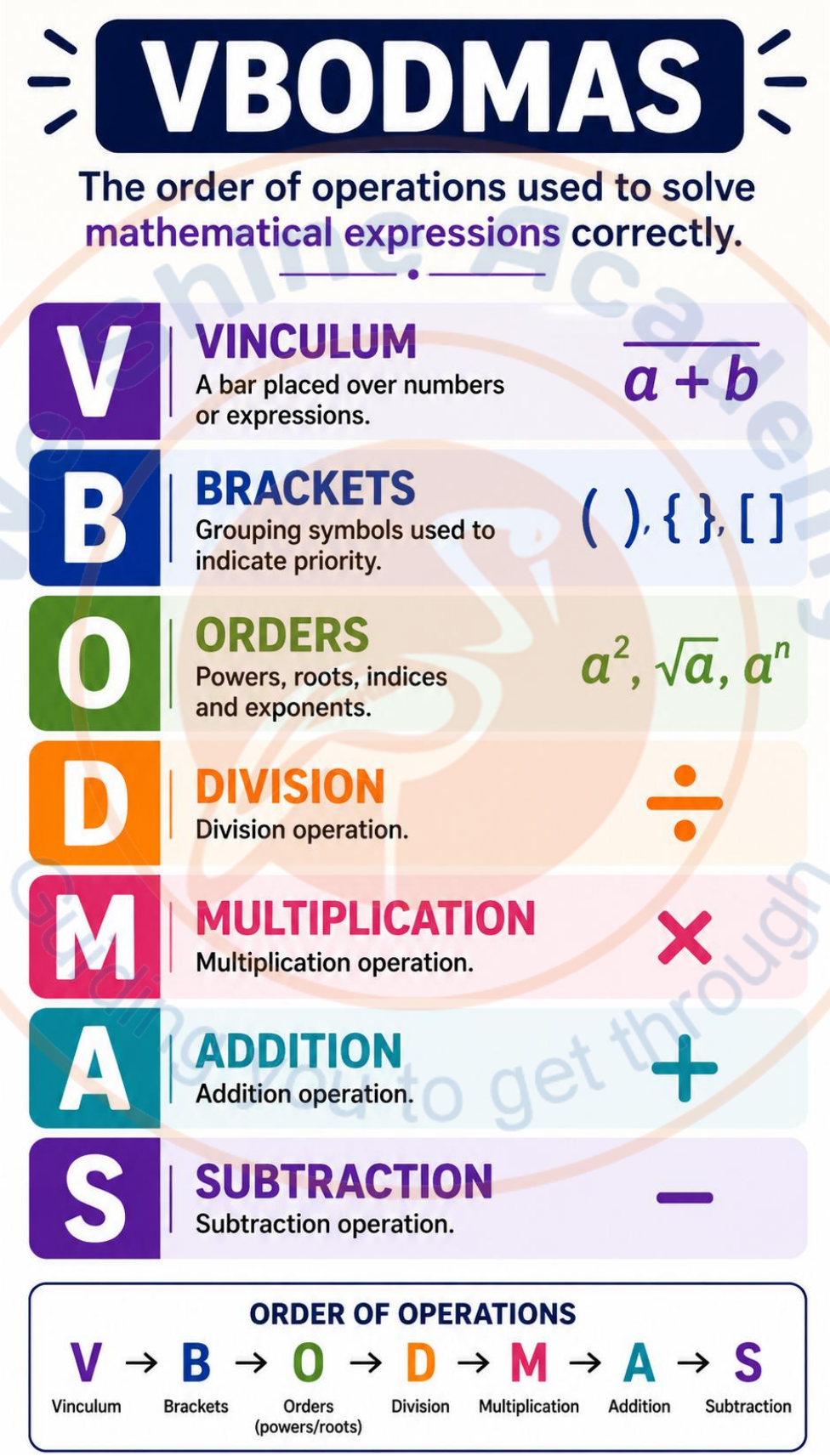
SIMPLIFICATION



1. What is the result of $3\frac{1}{4} \div 0.5$?

$3\frac{1}{4} \div 0.5$ இன் மதிப்பு யாது?

(a) 3.25 (b) 6.5 (c) 2.75 (d) 6.25

(அ) 3.25 (ஆ) 6.5 (இ) 2.75 (ஈ) 6.25

2. Find the value of $11 - \{(3 \div 4)$ of $8 - \overline{4 - 8}\}$

11 – {(3 ÷ 4) இன் 8 – $\overline{4 - 8}$} இன் மதிப்பு காண்க

(a) 2 (b) 3 (c) 1 (d) −1

(அ) 2 (ஆ) 3 (இ) 1 (ஈ) −1

3. Simplify: $(\frac{8}{5} \div \frac{14}{5}) \times (\frac{10}{7} \div \frac{4}{3})$

உள்ளடக்கமாக்கு: $(\frac{8}{5} \div \frac{14}{5}) \times (\frac{10}{7} \div \frac{4}{3})$

(a) $\frac{120}{196}$ (b) $\frac{180}{196}$ (c) $\frac{196}{180}$ (d) $\frac{150}{360}$

(அ) $\frac{120}{196}$ (ஆ) $\frac{180}{196}$ (இ) $\frac{196}{180}$ (ஈ) $\frac{150}{360}$

4. Simplify: $(3.5 + \frac{3}{8}) - (\frac{9}{5} \times 1.25)$

உள்ளடக்கமாக்கு: $(3.5 + \frac{3}{8}) - (\frac{9}{5} \times 1.25)$

(a) 3.4418 (b) 1.625 (c) 4.5526 (d) 7.5526

(அ) 3.4418 (ஆ) 1.625 (இ) 4.5526 (ஈ) 7.5526

5. Simplify: $[(\frac{4}{3}) + (\frac{4}{5} \div \frac{2}{7})] \div [(\frac{3}{2}) - (\frac{7}{12} \times \frac{3}{4})]$

உள்ளடக்கமாக்கு: $[(\frac{4}{3}) + (\frac{4}{5} \div \frac{2}{7})] \div [(\frac{3}{2}) - (\frac{7}{12} \times \frac{3}{4})]$

(a) $\frac{992}{255}$ (b) $\frac{892}{255}$ (c) $\frac{982}{255}$ (d) $\frac{929}{255}$

(அ) $\frac{992}{255}$ (ஆ) $\frac{892}{255}$ (இ) $\frac{982}{255}$ (ஈ) $\frac{929}{255}$

6. Find the value of the following expression:

$$\frac{[\frac{5}{8} - \{\frac{3}{8} - (\frac{5}{8} - \frac{3}{8})\}] \text{ of } 8.8 - 1.2}{4\frac{1}{6} \div 2.5 \times 2 \div \frac{1}{6} \text{ of } 60 + (\frac{3}{4} - \frac{3}{8})}$$

கீழ்காணும் விவரம் கண்டுபிடி:

$$\frac{[\frac{5}{8} - \{\frac{3}{8} - (\frac{5}{8} - \frac{3}{8})\}] \text{ இன் } 8.8 - 1.2}{4\frac{1}{6} \div 2.5 \times 2 \div \frac{1}{6} \text{ இன் } 60 + (\frac{3}{4} - \frac{3}{8})}$$

(a) $5\frac{22}{43}$ (b) $3\frac{23}{67}$ (c) $4\frac{44}{85}$ (d) $4\frac{4}{5}$

(அ) $5\frac{22}{43}$ (ஆ) $3\frac{23}{67}$ (இ) $4\frac{44}{85}$ (ஈ) $4\frac{4}{5}$

7. Solve the following:

$$\frac{24 \div \frac{3}{8} \text{ of } (8 + 2 \times \overline{7-3}) + [\frac{2}{11} \div \frac{4}{55} - \{\frac{5}{8} + \frac{6}{16}\}]}{32 \div \overline{15-7} + 75 \div (6 + 15 \div 3 + 4)}$$

தீர்வு காண்:

$$\frac{24 \div \frac{3}{8} \text{ இன் } (8 + 2 \times \overline{7-3}) + [\frac{2}{11} \div \frac{4}{55} - \{\frac{5}{8} + \frac{6}{16}\}]}{32 \div \overline{15-7} + 75 \div (6 + 15 \div 3 + 4)}$$

(a) $\frac{23}{27}$ (b) $\frac{9}{2}$ (c) $\frac{11}{18}$ (d) $\frac{15}{19}$

(அ) $\frac{23}{27}$ (ஆ) $\frac{9}{2}$ (இ) $\frac{11}{18}$ (ஈ) $\frac{15}{19}$

8. Simplify the following expression:

$$9\frac{1}{5} \div \{(16\frac{1}{5} \div \overline{12\frac{2}{3} - 9\frac{2}{3}}) + 17\frac{1}{2} \text{ of } 3\frac{1}{21}\}$$

கீழ்காணும் விவரம் உள்ளடக்கமாக்கு:

$$9\frac{1}{5} \div \{(16\frac{1}{5} \div \overline{12\frac{2}{3} - 9\frac{2}{3}}) + 17\frac{1}{2} \text{ இன் } 3\frac{1}{21}\}$$

(a) $\frac{139}{881}$ (b) $\frac{137}{881}$ (c) $\frac{140}{881}$ (d) $\frac{138}{881}$

(அ) $\frac{139}{881}$ (ஆ) $\frac{137}{881}$ (இ) $\frac{140}{881}$ (ஈ) $\frac{138}{881}$

9. Evaluate the continued fraction:

$$x = 3 + \cfrac{1}{8 + \cfrac{1}{6 + \cfrac{1}{2}}}$$

தொடர் பின்னடையின் மதிப்பு காண்:

$$x = 3 + \cfrac{1}{8 + \cfrac{1}{6 + \cfrac{1}{2}}}$$

(a) $\frac{331}{106}$ (b) $\frac{131}{106}$ (c) $\frac{321}{106}$ (d) $\frac{231}{106}$

(அ) $\frac{331}{106}$ (ஆ) $\frac{131}{106}$ (இ) $\frac{321}{106}$ (ஈ) $\frac{231}{106}$

SURDS & LAW OF SURDS

WHAT IS SURDS?

- A **surd** is an expression that involves a root (√) and cannot be simplified to a rational number.
- In other words, a surd is a number that is **irrational** and is expressed in radical form.

EXAMPLES OF SURDS

$\sqrt{2}$, $\sqrt{3}$, $\sqrt{5}$, $\sqrt{7}$, $\sqrt{10}$ ...

$\sqrt{4} = 2$ is **NOT** a surd, because it simplifies to a rational number.

LAWS OF SURDS

1 Product Law

$$\sqrt[n]{a} \times \sqrt[n]{b} = \sqrt[n]{ab}$$

Example: $\sqrt{3} \times \sqrt{5} = \sqrt{15}$

2 Quotient Law

$$\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}} \quad (b > 0)$$

Example: $\frac{\sqrt{18}}{\sqrt{2}} = \frac{\sqrt[n]{18}}{\sqrt[n]{2}} = \sqrt[n]{9} = 3$

3 Power Law

$$\left(\sqrt[m]{a}\right)^n = \sqrt[n]{a^n}$$

(n is any integer)

Example: $(\sqrt{5})^2 = \sqrt{5^2} = 5$

4 Addition Law

$$c\sqrt{a} + d\sqrt{a} = (c+d)\sqrt{a}$$

Example: $2\sqrt{3} + 5\sqrt{3} = (2+5)\sqrt{3} = 7\sqrt{3}$

★ **Note:** Surds can be added or subtracted only if they are like surds (same surd part).

5 Subtraction Law

$$c\sqrt{a} - d\sqrt{a} = (c-d)\sqrt{a}$$

Example: $6\sqrt{2} - 3\sqrt{2} = (6-3)\sqrt{2} = 3\sqrt{2}$

IMPORTANT NOTES

✓ $\sqrt[n]{a \times b} = \sqrt[n]{a} \times \sqrt[n]{b}$

✓ $\sqrt[n]{a \div b} = \sqrt[n]{a} \div \sqrt[n]{b}$

BUT!!

✗ $\sqrt[n]{a+b} \neq \sqrt[n]{a} + \sqrt[n]{b}$

✗ $\sqrt[n]{a-b} \neq \sqrt[n]{a} - \sqrt[n]{b}$

! Surds cannot be added or subtracted unless they are like surds.

INDICES AND LAW OF INDICES

WHAT IS INDICES?

Indices (or exponents) show how many times a number (the base) is multiplied by itself.

a^n ← Index/Exponent/Power

Base

Example:

$2^3 = 2 \times 2 \times 2 = 8$

(2 is the base, 3 is the index)

LAW OF INDICES

Let a and b be non-zero real numbers and m, n be integers.

1	Product of Powers (Same Base)	$a^m \times a^n = a^{m+n}$	Example: $2^3 \times 2^4 = 2^{3+4} = 2^7$
2	Quotient of Powers (Same Base)	$\frac{a^m}{a^n} = a^{m-n}$ $(a \neq 0)$	Example: $2^5 \div 2^2 = 2^{5-2} = 2^3$
3	Power of a Power	$(a^m)^n = a^{mn}$	Example: $(3^2)^4 = 3^{2\times4} = 3^8$
4	Power of a Product	$(ab)^n = a^n b^n$	Example: $(2 \times 3)^4 = 2^4 \times 3^4$
5	Power of a Quotient	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$ $(b \neq 0)$	Example: $\left(\frac{2}{3}\right)^3 = \frac{2^3}{3^3}$
6	Zero Index	$a^0 = 1$ $(a \neq 0)$	Example: $5^0 = 1$
7	Negative Index	$a^{-n} = \frac{1}{a^n}$ $(a \neq 0)$	Example: $2^{-3} = \frac{1}{2^3} = \frac{1}{8}$

10. Find the value of $47^{-8} \div 47^{3} \times 47^{-19}$

$47^{-8} \div 47^{3} \times 47^{-19}$ இன் மதிப்பு கண்டுபிடி

(a) 47^{-30} (b) 47^{-24} (c) 47^{-27} (d) 47^{-37}

(அ) 47^{-30} (ஆ) 47^{-24} (இ) 47^{-27} (ஈ) 47^{-37}

11. $\frac{\sqrt[3]{1331}}{\sqrt[4]{10000}} \times \frac{5}{33} \times 30 = ?$

$\frac{\sqrt[3]{1331}}{\sqrt[4]{10000}} \times \frac{5}{33} \times 30 = ?$

(a) 6 (b) 13 (c) 9 (d) 5

(அ) 6 (ஆ) 13 (இ) 9 (ஈ) 5

12. The simplified value of

$\frac{31^{10} \times 2^{15} \times 84^{6}}{31^{9} \times 2^{14} \times 84^{5}}$ is:

உள்ளடக்கமாச்சி மதிப்பு:

$$\frac{31^{10} \times 2^{15} \times 84^{6}}{31^{9} \times 2^{14} \times 84^{5}}$$

(a) 5208 (b) 5209 (c) 5217 (d) 5213

(அ) 5208 (ஆ) 5209 (இ) 5217 (ஈ) 5213

13. Given that $137^{0.42} = x$, $137^{0.62} = y$ and $x^z = y^2$, then the value of z is close to:

$137^{0.42} = x$, $137^{0.62} = y$ மற்றும் $x^z = y^2$ ஆக இருந்தால், z இன் மதிப்பு எதற்கு அண்மையானது?

(a) 2.95 (b) 4.37 (c) 4.66 (d) 2.8

(அ) 2.95 (ஆ) 4.37 (இ) 4.66 (ஈ) 2.8

14. The value of $[k^{ab-c} \times k^{bc-a} \times k^{ca-b}] \times (x^0 - 1)$ is:

$[k^{ab-c} \times k^{bc-a} \times k^{ca-b}] \times (x^0 - 1)$ இன் மதிப்பு:

(a) a+b+c (b) abc (c) 0 (d) 1

(அ) a+b+c (ஆ) abc (இ) 0 (ஈ) 1

$\left(\frac{k^{ab}}{k^c} \times \frac{k^{bc}}{k^a} \times \frac{k^{ca}}{k^b}\right) \times (x^0 - 1)$

$\frac{k^m}{k^n} = k^{m-n}$

$a^0 = 1$

$1 - 1$

0

15. The mixed surd form of $\sqrt{1350}$ is?

$\sqrt{1350}$ இன் கலப்பு கரணி வடிவம் யாது?

(a) $12\sqrt{6}$ (b) $15\sqrt{6}$ (c) $13\sqrt{6}$ (d) $14\sqrt{6}$

(அ) $12\sqrt{6}$ (ஆ) $15\sqrt{6}$ (இ) $13\sqrt{6}$ (ஈ) $14\sqrt{6}$

5 | 1350
5 | 270
2 | 54
3 | 27
3 | 9
3

$\sqrt{1350} = \sqrt{5^2 \times 2 \times 3^3}$

$= 5 \times 3\sqrt{2 \times 3}$

$= 15\sqrt{6}$