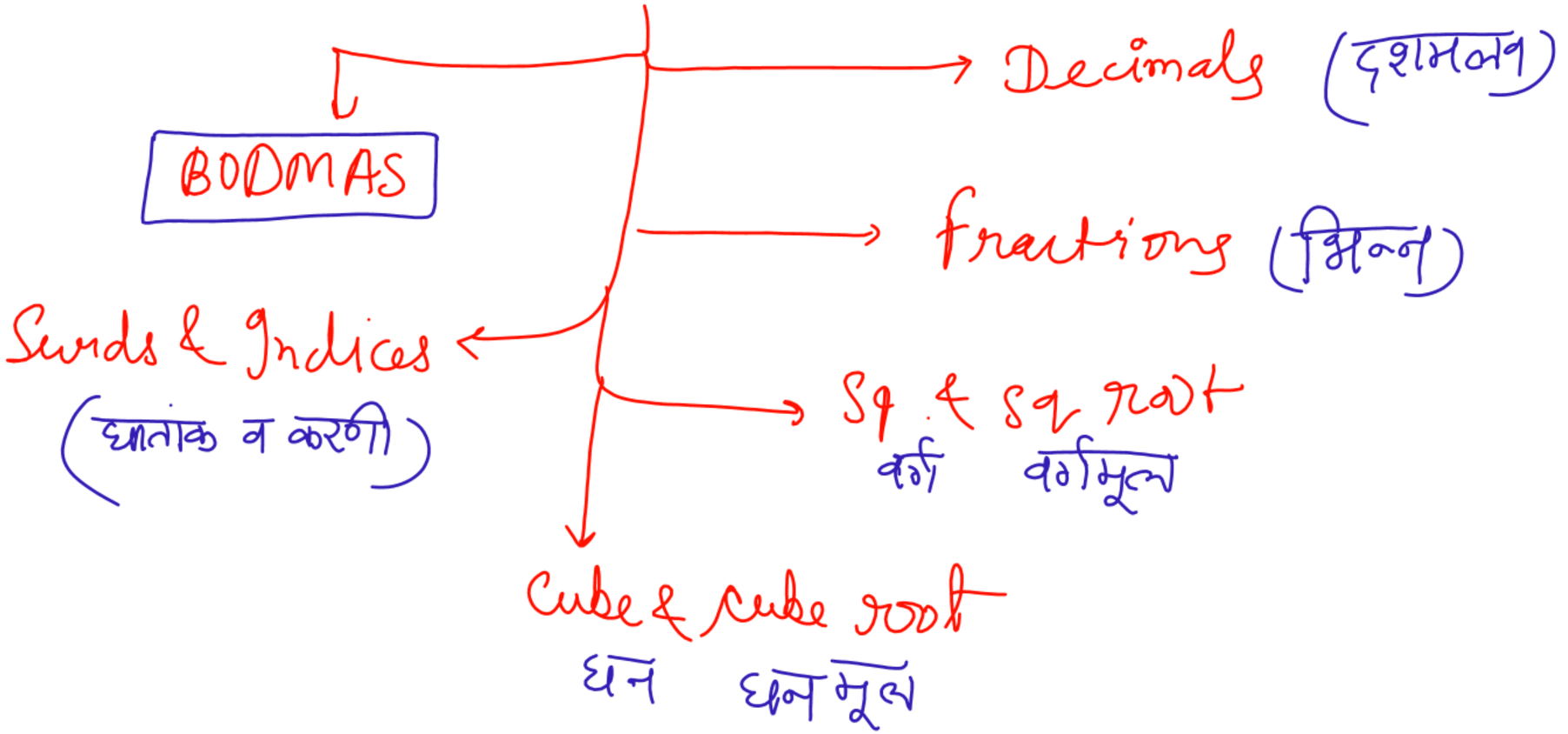
Simplification



BODMAS

- Bracket ( ) , { } , [ ]
- OF ×
- Division → ÷
- Multiplication → ×
- Add → +
- Sub. → −

Eg:- ① $6 \div 2\,(3+1)$

$6 \div 2\,(4)$

$6 \div 8$

$\frac{6}{8} = \frac{3}{4}$

$\boxed{\frac{3}{4}}$ Ans

Eg:- $6 \div 2 \times (3+1)$

$6 \div 2 \times 4$

$\frac{6}{2} \times 4$

3×4

$\boxed{12}$ Ans

Q.① $1\frac{3}{5} + 1\frac{3}{7} + 1\frac{1}{4} = ? \Rightarrow$

Q.② $6696 \div 12 + 294 = ?^2 852$

Q.③ $5\frac{1}{6} \times 4\frac{3}{8} \div 2\frac{1}{8} = ?$ $\boxed{1085/102}$

Q.④ $74844 \div ? = 54 \times 63 \Rightarrow \boxed{22}$

Q.⑤ $1148 \div 28 \times 1408 \div 32 = ? \Rightarrow \boxed{1804}$

Q.⑥ $9 - 3\frac{3}{11}$ of का $1\frac{2}{9} \div \frac{7}{9}$ का $5\frac{1}{7} = ?^8$

Solve

$9 - 3\frac{3}{11}$ of $1\frac{2}{9} \div \frac{7}{9}$ of $5\frac{1}{7} = ?$

XB
✓O
✓D
M
A
S

$9 - \frac{36}{11}^{4} \times \frac{11}{9_1} \div \frac{7}{9_1} \times \frac{36}{7}^{4}$

$9 - 4 \div 4$

$9 - \frac{4}{4}^{1}$

$\Rightarrow 9 - 1 \Rightarrow \boxed{8}$

Solve 5th

$1148 \div 28 \times 1408 \div 32$

41

~~574~~ ~~287~~

$\frac{\cancel{1148}}{\cancel{28}} \times \frac{1408}{32}$

~~44~~ ~~41~~

~~352~~ ~~176~~ ~~88~~ 44

~~704~~

$41 \times \frac{\cancel{1408}}{\cancel{32}}$

~~16~~ ~~8~~ ~~4~~ 2 1

41×44

XB
XO
-D
-M
A
S

Solve 4th

$74844 \div ? = 54 \times 63$

$\frac{74844}{x} = 54 \times 63$

~~3742~~ ~~4158~~ ~~462~~ ~~154~~ 22

$\frac{74844}{54 \times 63} = x$

$\Rightarrow x = 22$

~~27~~ ~~7~~ 1

~~3~~ 1

2nd

B
O
✓D
✓M
A
S

$6696 \div 12 + 294 = ?$

$\frac{\cancel{6696}}{\cancel{12}_{3}} \quad \cancel{3348} \quad 1674$

$\Rightarrow \frac{558}{\cancel{1674}_{\cancel{3}_{1}}} + 294$

$\Rightarrow \boxed{558 + 294} \Rightarrow \boxed{852}$

Ans

3rd

$5\frac{1}{6} \times 4\frac{3}{8} \div 2\frac{1}{8}$

$\frac{31}{6} \times \frac{35}{8} \div \frac{17}{8}$

$\frac{31}{6} \times \frac{35}{\cancel{8}} \times \frac{\cancel{8}}{17}$

$\frac{31 \times 35}{6 \times 17} \Rightarrow \frac{\square}{\square}$

Q.1) $1\frac{3}{5} + 1\frac{2}{7} + 1\frac{1}{4} = ?$

$(1+1+1) + \left(\frac{3}{5}+\frac{2}{7}+\frac{1}{4}\right) \Rightarrow 3 + \left[\frac{3}{5}+\frac{2}{7}+\frac{1}{4}\right] \Rightarrow 3 + \left[\frac{(28\times3)+(20\times2)+35}{140}\right]$

$3 + \left[\frac{\square}{140}\right]$

$3\frac{\square}{140}$

OR $\left(\frac{8}{5}+\frac{9}{7}+\frac{5}{4}\right)$

$\frac{(28\times8)+(20\times9)+(35\times5)}{140}$

$\Rightarrow \frac{224+180+175}{140} \Rightarrow \frac{579}{140}$

Some other Type Questions :-

q ① $\frac{5}{12}$ of 516 & $\frac{4}{9}$ of 495 ; find the difference b/w them.

अंतर = ?

$$\left(\frac{\cancel{516}^{\cancel{129}^{\cancel{258}^{43}}}}{\cancel{12}_{\cancel{6}_{\cancel{3}_{1}}}} \times 5\right) - \left(\frac{\cancel{495}^{55}}{\cancel{9}_{1}} \times 4\right)$$

छोटी बड़ी

□ − □ ⇒ (−ve)

$$(43 \times 5) - (55 \times 4)$$

□

Q ② किसी संख्या के $\frac{3}{4}$ तथा $\frac{4}{7}$ का अंतर 100 है तो वह संख्या = ?

Let → $\left(x \times \frac{3}{4}\right) - \left(x \times \frac{4}{7}\right) = 100$

$\frac{3x}{4} - \frac{4x}{7} = 100$

$\frac{21x - 16x}{28} = 100$

$\frac{5x}{28} = 100$

$5x = 100 \times 28$

$x = \frac{\overset{20}{\cancel{100}} \times 28}{\cancel{5}_{1}}$

$x = 20 \times 28$

$x = \boxed{560}$

Q③ $9\frac{1}{9}$ में से $3\frac{2}{3}$ घटाने पर प्राप्त अंतर को 450 से गुणा करने पर क्या प्राप्त होगा ?

When we subtract $3\frac{2}{3}$ from $9\frac{1}{9}$ then multiply their diff^{nc} by 450 then what will you get ?

$$\left(9\frac{1}{9} - 3\frac{2}{3}\right) \times 450$$

$$\left(\frac{82}{9} - \frac{11}{3}\right) \times 450$$

$$\frac{82-33}{9} \times 450$$

$$\frac{49}{9} \times 450$$

Some Algebric Based :-

Q.① If $\frac{a}{b} = \frac{6}{7}$ then find $\frac{a+2b}{a-3b} = ?$

Q.② If $\frac{a}{3} = \frac{b}{4} = \frac{c}{7}$ then find $\frac{a+b+c}{c} = ?$

Q.③ यदि $\frac{x}{5} = \frac{y}{8}$ हो तो $\frac{x+5}{y+8} = ?$

Q.④ If $a = 11$, $b = 9$, find $\frac{a^2+b^2+ab}{(a^3-b^3)} = ?$

$\Rightarrow \frac{a^2+b^2+ab}{(a-b)[a^2+ab+b^2]}$

$\frac{1}{a-b} = \frac{1}{-9}$

$\Rightarrow \frac{1}{2}$

Q.⑤ If $a+b+c = 0$

Then find $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab} = ?$

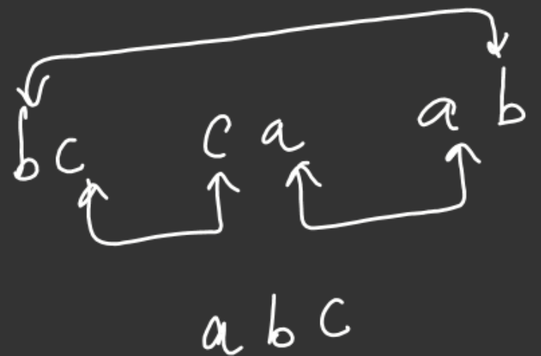
Solve

$$a+b+c=0$$

$$a^3+b^3+c^3=3abc$$

$$\Rightarrow \frac{a^2}{bc}+\frac{b^2}{ca}+\frac{c^2}{ab}=?$$

$$\Rightarrow \frac{(a^2\times a)+(b^2\times b)+c^2\times c}{abc}$$



$$\Rightarrow \frac{a^3+b^3+c^3}{abc} \Rightarrow \frac{3abc}{abc} \Rightarrow \boxed{3}$$ Ans

Given

$a = 11$
$b = 9$

$$\frac{a^2+ab+b^2}{a^3-b^3} = ?$$

$\because \quad a^3-b^3 = (a-b)(a^2+ab+b^2)$

when we put

$$\Rightarrow \frac{a^2+ab+b^2}{(a-b)(a^2+ab+b^2)} \Rightarrow \frac{1}{a-b} \Rightarrow \frac{1}{11-9}$$

$$\Rightarrow \boxed{\frac{1}{2}} \text{ Ans}$$

Solve ③

If $\frac{x}{5} = \frac{y}{8}$; $\frac{x+5}{y+8} = ?$

$\frac{x}{5} = \frac{y}{8} = K$

$\frac{x}{5} = K \Rightarrow \boxed{x = 5K}$

$\frac{y}{8} = K \Rightarrow \boxed{y = 8K}$

$\frac{5K+5}{8K+8} \Rightarrow \frac{5\cancel{(K+1)}}{8\cancel{(K+1)}} \Rightarrow \boxed{\frac{5}{8}}$ Ans

$$\frac{a}{3} = \frac{b}{4} = \frac{c}{7} \; ; \quad \frac{a+b+c}{c} = ?$$

$\Rightarrow \frac{a}{3} = \frac{b}{4} = \frac{c}{7} = k$ (let)

$\Rightarrow \frac{a}{3} = k \Rightarrow \boxed{a = 3k}$

$\Rightarrow \frac{b}{4} \Rightarrow k \Rightarrow \boxed{b = 4k}$

$\Rightarrow \frac{c}{7} \Rightarrow k \Rightarrow \boxed{c = 7k}$

$$\frac{3k+4k+7k}{7k} = \frac{\overset{2}{\cancel{14k}}}{\cancel{7k}_{1}} \Rightarrow \boxed{2}$$ Ans

If $\frac{a}{b} = \frac{6}{7}$; $\frac{a+2b}{a-3b} = ?$

$\Rightarrow$ $a \longrightarrow 6$
$b \longrightarrow 7$

$\Rightarrow$ $\frac{a+2b}{a-3b}$

$\Rightarrow$ $\frac{6+2\times7}{6-3\times7}$

$\Rightarrow$ $\frac{6+14}{6-21} \Rightarrow \frac{20}{-15} \Rightarrow -\frac{20}{15} \Rightarrow \boxed{-\frac{4}{3}}$ OR

$\frac{4}{-3} \Rightarrow -\frac{4}{3}$

Some formulae :-

① $(a+b)^2 = a^2 + b^2 + 2ab$

② $(a-b)^2 = a^2 + b^2 - 2ab$

③ $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$

④ $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$

⑤ $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

⑥ $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

Some word Problem :-

Q.(1) किसी संख्या के तीन - चौथाई का $\frac{2}{5}$ यदि 174 हो तो वह संख्या = ?

If a no. of 3/4 of 2/5 is 174 then find that No.?

$$\Rightarrow x \times \frac{3}{\cancel{4}_{2}} \times \frac{\cancel{2}^{1}}{5} = 174$$

$$\Rightarrow x \times \frac{3}{2} \times \frac{1}{5} = 174$$

$$\Rightarrow x \times \frac{3}{10} = 174$$

$$\frac{3x}{10} = 174$$

$$\Rightarrow 3x = 174 \times 10$$

$$\Rightarrow x = \frac{\overset{58}{\cancel{174}} \times 10}{\cancel{3}\,1} \Rightarrow \frac{58 \times 10}{1}$$

$$\Rightarrow \boxed{x = 580}$$ Ans

Q. ② एक संख्या के $\frac{2}{3}$ का $\frac{3}{4}$ यदि 782 हो तो इस संख्या के $\frac{1}{4}$ का $\frac{1}{3}$ = ?

If a no of $\frac{2}{3}$ of $\frac{3}{4}$ is 782 then find $\frac{1}{4}$ of $\frac{1}{3}$ of that no. ?

$$\Rightarrow x \times \frac{\cancel{2}^{1}}{\cancel{3}} \times \frac{\cancel{3}}{\cancel{4}_{2}} = 782$$

$$\Rightarrow \frac{x}{2} = 782$$

$$\Rightarrow x = {}^{1}782 \times 2$$

$$\boxed{x = 1564}$$

$$\Rightarrow \cancel{782}\ 391 \times \cancel{1564} \times \frac{1}{\cancel{4}} \times \frac{1}{3}$$

$$\cancel{2}\ 1$$

$$\Rightarrow \frac{391}{3} \Rightarrow \square \text{ decimal}$$

Q.③ एक किसान के पास कुछ मुर्गियाँ तथा बकरियाँ हैं। यदि इन सबके कुल सिर 240 तथा कुल पैर 640 हों तो मुर्गियों की संख्या ?

If a farmer has some hens & some goats. If their total no of heads are 240 & their legs are 640 then find the total no of hens ?

{ मुर्गियाँ → Hens → x
बकरियाँ → goats → y }

No. of Head → $x + y = 240$ ① $\times 2$

No. of Legs → $2x + 4y = 640$ ②

$2x + 2y = 240 \times 2 \Rightarrow 480$

$2x + 4y = 640 \quad - 640$

$+2y = +160$

$\Rightarrow y = \frac{160}{2} \Rightarrow (80)$

$x + y = 240$

$x + 80 = 240$

$x = 240 - 80$

160

माना → x y

सिर → $1x + 1y = 240$ ×2 —— (1)

पैर → $2x + 4y = 640$

$2x + 2y = 480$

$2x + 4y = 640$

$-2y = -160$

$2y = 160$

$y = \frac{160}{2} = \boxed{80}$ → Goat

$1x + 1y = 240$

$x + 80 = 240$

$x = 240 - 80 \Rightarrow \boxed{160}$ → Hens

Q. ④ पाँच क्रमागत संख्याओं का योग 270 है उनमें से दूसरी तथा पाँचवी संख्याओं का योग ?

If Sum of five consecutive no's are 270. Then find the Sum of second & fift no. ?

$$\underset{1^{st}}{(x)} + \underset{2^{nd}}{(x+1)} + \underset{3^{rd}}{(x+2)} + \underset{4^{th}}{(x+3)} + \underset{5^{th}}{(x+4)} = 270$$

$$5x + 10 = 270$$

$$5x = 270 - 10$$

$$5x = 260$$

$$\boxed{x = 52}$$

$2^{nd} \rightarrow x+1 = 52+1 = 53$

$5^{th} \rightarrow x+4 = 52+4 = 56$

$$\text{Sum} = \begin{array}{r} 53 \\ +\,56 \\ \hline \boxed{109} \end{array}$$ Ans

⑮ किसी संख्या में से 600 के 75% का दो-तिहाई घटाने पर 320 प्राप्त होता है, वह संख्या = ?

If we subtract the 2/3rd of 75% of 600 from a no. then we'll get 320 then find that no. ?

$$x - \left(\frac{\overset{2}{\cancel{600}}}{1} \times \frac{75}{\cancel{100}} \times \frac{2}{\cancel{3}}\right) = 320$$

$$x - (150 \times 2) = 320$$

$$x - 300 = 320 \Rightarrow x = 320 + 300 \Rightarrow \boxed{620}$$

SURDS & Indices
(करणी) (घातांक)

Laws of Indices :-

① $a^m \times a^n = a^{m+n}$ ⟶ $5^3 \times 5^4 \Rightarrow 5^{3+4} \Rightarrow 5^7 \Rightarrow 5\times5\times\cdots$

② $a^m \div a^n = a^{m-n}$ ⟶ $6^3 \div 6^{15} \Rightarrow 6^{3-15} \Rightarrow 6^{-12} \Rightarrow \Rightarrow \frac{1}{6^{12}}$

③ $(a^m)^n = a^{mn}$ ⟶

④ $(ab)^n = a^n \times b^n$ ⟶

⑤ $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$ ⟶ $\frac{6^3}{5^3} = \left(\frac{6}{5}\right)^3$

⑥ $a^0 = 1$ ⟶ x^0

⑦ $a^{-m} = \frac{1}{a^m}$ ⟶

Laws of Surds :-

① $(\sqrt[n]{a})^n = (a^{1/n})^n \Rightarrow a$ ($a^{\frac{1}{n}\times n}$, a^1)

② $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$

③ $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$

④ $(\sqrt[n]{a})^m = \sqrt[n]{a^m} = a^{m\times\frac{1}{n}} \Rightarrow a^{\frac{m}{n}}$ ⋆

⑤ $\sqrt[m]{\sqrt[n]{a}} = \sqrt[mn]{a}$

Eg:- $\sqrt{3}$ ($3^{1/2}$) ⇒ द्वितीय घात की करणी

Eg:- $\sqrt[4]{5}$ ($5^{1/4}$) ⇒ घात 4, करणी

Surds → 4

laws 5 :-

$\sqrt[m]{\sqrt[n]{a}} \Rightarrow \sqrt[m]{a^{1/n}}$

$\Rightarrow (a^{1/n})^{1/m}$

$\Rightarrow a^{\frac{1}{n}\times\frac{1}{m}}$

$\Rightarrow a^{\frac{1}{mn}} \Rightarrow \sqrt[mn]{a}$

If Bases are differ & powers are same :-

अगर आधार अलग और घातें समान हो :-

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

$$a^n \div b^n = \left(\frac{a}{b}\right)^n$$

Q. ① $(3^5)^2 = ?$ $\Rightarrow (a^m)^n \Rightarrow a^{m \times n} \Rightarrow (3^5)^2 \Rightarrow 3^{5\times 2} \Rightarrow \boxed{3^{10}}$

Q. ② $\left((-2)^{-2}\right)^{-2} = ?$ $(-2)^{-2\times -2} \Rightarrow (-2)^{+4} \Rightarrow (-2)^4$

Q. ③ $\boxed{\sqrt[5]{3125}} = ?$ $\sqrt[5]{5^5} \Rightarrow (5^5)^{1/5} \Rightarrow 5^{5\times \frac{1}{5}} \Rightarrow \boxed{5}$

Q. ④ $\left(\sqrt[n]{a}\right)^n = ?$ $\left(a^{\frac{1}{n}}\right)^n \Rightarrow a^{\frac{1}{n}\times n} \Rightarrow \boxed{a}$

Q. ⑤ $2^3 \times 2^2 = ?$ $2^{3+2} \Rightarrow \boxed{2^5}$

Q. ⑥ $2^{-2} = ?$ $a^{-m} \Rightarrow \frac{1}{a^m} \Rightarrow 2^{-2} \Rightarrow \boxed{\frac{1}{2^2}} \Rightarrow \boxed{\frac{1}{4}} \Rightarrow \boxed{4^{-1}}$

5	3125
5	625
5	125
5	25
5	5
5	

Q.2. $\left(\frac{3}{5}\right)^{3} \left(\frac{3}{5}\right)^{-6} = \left(\frac{3}{5}\right)^{2x-1}$ find the value of x ?

$$3 - 6 = 2x - 1$$

$$-3 = 2x - 1$$

$$-3 + 1 = 2x$$

$$-2 = 2x$$

thus $x = -1$

Note:- powers will be equal → only when → Bases will be equal

If Bases are not equal → Then firstly → Make them equal → After that → Both the side of powers will be equal

Q. ① $(27)^{2x-1} = (243)^{3}$ find x ?

$\Downarrow$

$(3^3)^{2x-1} = (3^5)^{3}$

$3^{3(2x-1)} = 3^{5\times3}$

$3(2x-1) = 5\times3$

$6x - 3 = 15$

$6x = 15 + 3$

$6x = 18$

$x = \frac{18}{6} \Rightarrow \boxed{3}$ Ans

3	243
3	81
3	27
3	9
3	3
	1

Q. ② $\left(\frac{3}{5}\right)^{x}\left(\frac{5}{3}\right)^{2x} = \frac{125}{27}$ $\rightarrow 5$ $\rightarrow 3$ find x ?

$$\left(\frac{5}{3}\right)^{-x}\left(\frac{5}{3}\right)^{2x} = \frac{125}{27}$$

$$\left(\frac{5}{3}\right)^{-x}\left(\frac{5}{3}\right)^{2x} = \frac{5^3}{3^3}$$

$$\left(\frac{5}{3}\right)^{-x}\left(\frac{5}{3}\right)^{2x} = \left(\frac{5}{3}\right)^{3}$$

$$-x+2x = 3$$

$$\boxed{x = 3}$$

Q. ③ $2^{x-1} + 2^{x+1} = 1280$ find x ?

$(2^x \cdot 2^{-1}) + (2^x \cdot 2^1) = 1280$

$2^x[2^{-1} + 2^1] = 1280$

$2^x\left[\frac{1}{2} + \frac{2}{1}\right] = 1280$

$2^x\left[\frac{1+4}{2}\right] = 1280$

$2^x\left[\frac{5}{2}\right] = 1280$

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

$2^x = \frac{1280}{\frac{5}{2}}$

$2^x = \frac{1280}{1} \times \frac{2}{5}$ 1

$2^x = 256 \times 2$

$2^x = 512 \Rightarrow 2^x = 8^3$

$\Rightarrow 2^x = (2^3)^3$

$x^x = x^9$

$x = 9$

Q. (4) If $\frac{p}{56} = \frac{\sqrt{784} \times \sqrt{49}}{4p^2}$ find p ?

$$\frac{p}{56} = \frac{28 \times 7}{4p^2}$$

$$\frac{p}{56} = \frac{(7 \times 7)}{p^2}$$

$$p \times p^2 = (7 \times 7) \times 56$$

$$p^3 = (7 \times 7) \times (7 \times 8)$$

$$p^3 = 7^3 \times 2^3$$

$$p = 7 \times 2 \Rightarrow \boxed{14}$$

2	512
2	256
2	128
2	64
2	32
2	16
2	8
	4

2	4
2	2
	1

Some other type :-

Q①.

$$x = \sqrt{20 + \sqrt{20 + \sqrt{20 + \ldots\ldots \infty}}} = ?$$

Q. ② . $\sqrt{72+\sqrt{72+\sqrt{72+\ldots\ldots\infty}}}$?