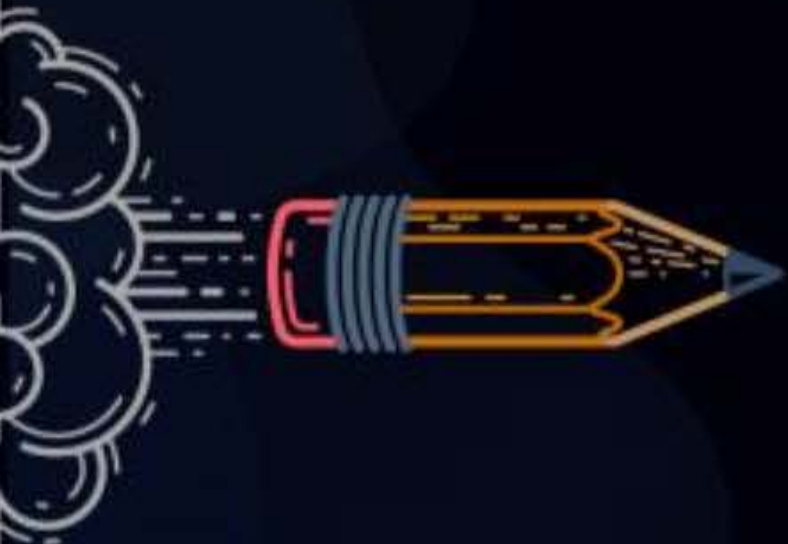


PYQ Series

CA Foundation



Lecture No.- 1

Ratio Proportion Indices and Logarithm



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TODAY'S TARGETS



Last 5 Attempt PYQs

Q.1

The salaries of A, B and C in the ratio 2 : 3 : 5. If increment of 15%, 10% and 20% are allowed respectively to their salary, then what will be the new ratio of their salaries?

[July 2021]

A

3 : 3 : 10

$$A : B : C = 2 : 3 : 5$$

$$+ 15\% \quad 10\% \quad 20\%$$

$$\text{New ratio} \rightarrow 2 + 15\% : 3 + 10\% : 5 + 20\%$$

B

10 : 11 : 20

$$\Rightarrow \frac{2 \times 15}{10} : \frac{3 \times 10}{10} : \frac{5 \times 20}{10}$$

C

23 : 33 : 60

$$\Rightarrow 23 : 33 : 60$$

D

Cannot be determined

Q.3 If $A : B = 5 : 3$, $B : C = 6 : 7$ and $C : D = 14 : 9$, then the value of $A : B : C : D$
[July 2021]

$$\underline{A:B} = 5:3 \times 2 = 10:6$$

$$\underline{B:C} = 6:7$$

$$\underline{A:B:C} = 10:6:7 \times 2 = 20:12:14$$

$$\underline{C:D} = 14:9$$

$$\Rightarrow \underline{A:B:C:D = 20:12:14:9}$$

A 20 : 14 : 12 : 9

B 20 : 9 : 12 : 14

C 20 : 9 : 14 : 12

D 20 : 12 : 14 : 9 ✓

Q.4 If $\log_4 x + \log_{16} x + \log_{64} x + \log_{256} x = 25/6$ then the value of x is
[July 2021]

A 64

B 4

C 16

D 2

$$\log_4 x + \frac{1}{2} \log_4 x + \frac{1}{3} \log_4 x + \frac{1}{4} \log_4 x = \frac{25}{6}$$

$$\Rightarrow \log_4 x + \frac{1}{2} \log_4 x + \frac{1}{3} \log_4 x + \frac{1}{4} \log_4 x = \frac{25}{6}$$

$$\Rightarrow \log_4 x \left(\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} \right) = \frac{25}{6}$$

$$\Rightarrow \log_4 x \left(\frac{12+6+4+3}{12} \right) = \frac{25}{6}$$

$$\Rightarrow \left(\log_4 x \right) \left(\frac{25}{12} \right) = \frac{25}{6}$$

$$\Rightarrow \log_4 x = 2$$

$$\Rightarrow x = 4^2 = 16$$

Q.5

If $xy + yz + zx = -1$, then the value of $\left(\frac{x+y}{1+xy} + \frac{z+y}{1+zy} + \frac{x+z}{1+zx}\right)$ is

[July 2021]

A

xyz

B

$\frac{-1+y}{yz}$

C

$\frac{1}{xyz}$

D

$\frac{1}{x+y+z}$

$$-(xy + yz + zx) = -(-1) = 1 \Rightarrow -xy - yz - zx = 1 \quad \text{--- (1)}$$

$$-xy = yz + zx$$

$$-(1+xy) = yz + zx$$

$$1+xy = -(yz+zx) = -z(y+x)$$

$$-1-yz = xy+zx$$

$$\Rightarrow 1+yz = -x(y+z)$$

$$\begin{aligned} -1-zx &= -xy-yz \\ 1+zx &= -y(x+z) \end{aligned}$$

$$\Rightarrow \frac{\cancel{x+y}}{\cancel{-z(y+x)}} + \frac{\cancel{z+y}}{\cancel{-x(y+z)}} + \frac{\cancel{x+z}}{\cancel{-y(x+z)}}$$

$$\Rightarrow -\frac{1}{z} - \frac{1}{x} - \frac{1}{y}$$

$$\Rightarrow \frac{-xy-yz-xz}{xyz} \Rightarrow \frac{1}{xyz} \quad (\text{using (1)})$$

Q.6

A bag has 105 coins containing some 50 paise, and 25 paise coins. The ratio of the number of these coins is 4:3. The total value (in ₹) in the bag is

[Dec 2021]

A

43.25

B

41.25

C

39.25

D

35.25

50p 25p
4 : 3

Let 50p $\rightarrow$ ₹0.5 = $4x$

25p $\rightarrow$ ₹0.25 = $3x$

Value = $0.5 \times 4x + 0.25 \times 3x$

$\Rightarrow 0.5 \times 4 \times 15 + 0.25 \times 3 \times 15$

$= \underline{30} + \underline{11.25} = \underline{41.25}$

$$4x + 3x = 105$$

$$7x = 105$$

$$\Rightarrow x = \frac{105}{7} = 15$$

Q.7

If $\log_{10} 3 = x$ and $\log_{10} 4 = y$, then the value of $\log_{10} 120$ can be expressed as

[Dec 2021]

A

$x - y + 1$

B

$x + y + 1$

C

$x + y - 1$

D

$2x + y - 1$

$$\log_{10} 120 = \log_{10} 3 \times 4 \times 10$$

$$= \log_{10} 3 + \log_{10} 4 + \log_{10} 10$$

$$= \underline{x + y + 1}$$

$$\underline{(\log_a a = 1)}$$

Q.8 Find the value of $\log(x^6)$ if $\log(x) + 2 \log(x^2) + 3 \log(x^3) = 14$.

[Dec 2021]

$$\log(x^6) = 6 \log x$$

$$\log x + \underline{2 \times 2} \log x + \underline{3 \times 3} \log x = 14$$

$$14 \log x = 14$$

$$\log x = 1$$

$$\Rightarrow \underline{6 \log x = 6 \times 1 = 6}$$

A 3

B 4

C 5

D 6

Q.9 Incomes of R and S are in the ratio 7: 9 and their expenditures are in the ratio 4: 5. Their total expenditure is equal to income of R. What is the ratio of their savings?

A 23: 36

B 28: 41

C 31: 43

D 35: 46

[Dec 2021]

$$\text{Inc} - \text{Exp} = \text{Savings}$$

	Inc	Exp	Savin
R	$7x$	$4y$	$7x - 4y$
S	$9x$	$5y$	$9x - 5y$

Given

$$4y + 5y = 7x$$

$$9y = 7x$$

$$y = \frac{7x}{9}$$

$$\text{Savings Ratio} = \frac{7x - 4y}{9x - 5y} = \frac{7x - 4\left(\frac{7x}{9}\right)}{9x - 5\left(\frac{7x}{9}\right)} = \frac{63x - 28x}{81x - 35x} = \frac{35x}{46x}$$

$$\text{Savings Ratio} = \underline{35: 46}$$

Q.10

The value of $\frac{6^{n+4} + 3^{n+3} \times 2^{n+3}}{5 \times 6^n + 6^n}$ is :

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

$$6^{n+4} = 6^{n+3+1} = 6^{n+3} \cdot 6$$

[Dec 2021]

A

232

$$= \frac{6^{n+4} + (3 \times 2)^{n+3}}{6^n (5+1)}$$

B

242

$$\Rightarrow \frac{6^{n+3} \cdot 6 + 6^{n+3}}{6^n (6)} \Rightarrow \frac{6^{n+3} (6+1)}{6^{n+1}}$$

C

252

$$\Rightarrow 6^{n+3-n-1} (7)$$

D

262

$$\Rightarrow 6^2 (7) = \underline{252}$$

Q.11 In a department, the number of males and females are in the ratio 3: 2. If two males and 5 females join department, then the ratio becomes 1: 1, initially the number of female in the department is

[Dec 2021]

A 9

B 6

C 3

D 8

$$\begin{array}{c} M \\ 3x \\ +2 \end{array} : \begin{array}{c} F \\ 2x \\ +5 \end{array} = 1:1$$

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

$$\Rightarrow 3x+2 = 2x+5$$

$$\Rightarrow 3x - 2x = 5 - 2$$

$$\Rightarrow \underline{x = 3}$$

$$\text{Female} = 2x = 2 \times 3 = 6$$

Q.12

If $\left(\frac{3a}{2b}\right)^{2x-4} = \left(\frac{2b}{3a}\right)^{2x-4}$, for some a and b , then the value of x is

$\Rightarrow 1$

$$p^0 = 1 = q^0$$

$$a^0 = 1 = b^0$$

[Dec 2021]

*
CCW

A 8

B 6

C 4

D 2

$$2x - 4 = 0$$

$$x = \frac{4}{2} = 2$$

Q.13

The value of $\left(1 - \sqrt[3]{0.027} \left(\frac{5}{6}\right) \left(\frac{1}{2}\right)^2\right)$ is :

[Dec 2021]

A

11/16

B

13/16

C

15/16

D

1

$$0.027 = 0.3 \times 0.3 \times 0.3 = (0.3)^3$$

$$= \left(1 - (0.027)^{\frac{1}{3}} \left(\frac{5}{6} \times \frac{1}{4}\right)\right)$$

$$= 1 - ((0.3)^3)^{\frac{1}{3}} \left(\frac{5}{24}\right)$$

$$\Rightarrow 1 - \frac{1 \times 5}{8 \times 24} \Rightarrow 1 - \frac{1}{16} = \frac{15}{16}$$

Q.14

Find the value of z from $(\sqrt{9})^{-8} \times (\sqrt{3})^{-5} = 3^z$

[June 2022]

A

$$\frac{2}{21}$$

B

$$\frac{-21}{2}$$

C

$$\frac{21}{2}$$

D

$$\frac{-2}{21}$$

$$((3^{\frac{1}{2}})^{-8}) \times (3^{\frac{1}{2}})^{-5} = 3^z$$

$$\Rightarrow 3^{-8} \times 3^{-\frac{5}{2}} = 3^z$$

$$\Rightarrow 3^{-8-\frac{5}{2}} = 3^z$$

$$\Rightarrow z = -8 - \frac{5}{2} = \frac{-16-5}{2} = \frac{-21}{2}$$

Q.15 Find the value of $\frac{3t^{-1}}{t^{\frac{-1}{3}}}$

[June 2022]

A $\frac{3}{2}t^{\frac{2}{3}}$ ✓

B $\frac{3}{3}t^{\frac{2}{3}}$

C $\frac{3}{1}t^{\frac{2}{3}}$

D $\frac{3}{t^2}$

$$= \frac{3t^{-1}}{t^{\frac{-1}{3}}} = 3t^{-1+\frac{1}{3}} = 3t^{\frac{-3+1}{3}} = 3t^{\frac{-2}{3}} = \frac{3}{t^{\frac{2}{3}}}$$

Q.16 If $\log_a \sqrt{3} = \frac{1}{6}$, find the value of a

[June 2022]

A 9

B 81

C 27

D 3

$$\begin{aligned} \left(a^{\frac{1}{6}}\right)^6 &= (\sqrt{3})^6 \\ \Rightarrow a &= (3^{\frac{1}{2}})^6 = 3^{\frac{1}{2} \times 6} = \underline{3^3 = 27} \end{aligned}$$

Q.17

$$\log \frac{p^2}{qr} + \log \frac{q^2}{pr} + \log \frac{r^2}{pq} = \underline{\hspace{2cm}}$$

[June 2022]

A

pqr

B

 $\frac{1}{pqr}$

C

1

D

0

$$\log \left(\frac{p^2}{qr} \times \frac{q^2}{pr} \times \frac{r^2}{pq} \right)$$

$$= \log(1) = 0$$

Q.18

If $\log_{10} 2 = y$ and $\log_{10} 3 = x$, then the value of $\log_{10} 15$ is:

[Dec 2022]

A

$x - y + 1$

B

$x + y + 1$

C

$x - y - 1$

D

$y - x + 1$

$$\log_{10} \frac{30}{2} = \log_{10} 30 - \log_{10} 2$$

$$= \log_{10} 3 \times 10 - \log_{10} 2$$

$$\Rightarrow \log_{10} 3 + \log_{10} 10 - \log_{10} 2 \quad (\log_a a = 1)$$

$$\Rightarrow \underline{x + 1 - y}$$

Q.19

$\log_3 4 \cdot \log_4 5 \log_5 6 \cdot \log_6 7 \cdot \log_7 8 \cdot \log_8 9$ equal to :

[Dec 2022]

A 3

B 2

C 1

D 0

$$= \frac{\log 4}{\log 3} \times \frac{\log 5}{\log 4} \times \frac{\log 6}{\log 5} \times \frac{\log 7}{\log 6} \times \frac{\log 8}{\log 7} \times \frac{\log 9}{\log 8} = \frac{\log 9}{\log 3}$$

$$\Rightarrow \frac{\log 3^2}{\log 3} \Rightarrow 2 \frac{\log 3}{\log 3} = 2$$

Q.20

By simplifying $(2a^3 b^4)^6 / (4a^3 b)^2 \times (a^2 b^2)$, the answer will be

[Dec 2022]

A

$4a^2b^3$

B

$4a^6b$

C

$4a^{10}b^{10}$

D

$4a^{10}b^{20}$

$$\Rightarrow \frac{2^6 a^{3 \times 6} b^{4 \times 6}}{(4^2 a^{3 \times 2} b^2) (a^2 b^2)}$$

$$\Rightarrow \frac{64 a^{18} b^{24}}{16 a^6 a^2 b^2 b^2}$$

$$\Rightarrow 4 (a^{18-6-2} b^{24-2-2})$$

$$\Rightarrow 4 (a^{10} b^{20})$$

Q.21

A group of 400 soldiers posted at border area had a provision for 31 days. After 28 days 280 from this group were called back. Find the number of days for which the remaining rations will be sufficient?

[Dec 2022]

A

3

B

6

C

8

D

10



$$\begin{array}{r} \text{Total ration} \rightarrow 31 \text{ days } \boxed{400} \\ 31 \times 400 = 12400 \\ - 28 \times 400 = 11200 \\ \hline 1200 \end{array}$$

$$\text{After 28 day} \rightarrow 3 \text{ days } 400$$

$$= 3 \times 400 = \boxed{1200}$$

$$\begin{array}{r} \text{Total} = 400 \\ - 280 \\ \hline \text{Remain} = 120 \end{array}$$

$$\text{Ratio} = \frac{120}{12} = 10 \text{ days}$$

Q.22 A sum of money is to be distributed among A, B, C, D in the proportion of 5 : 2 : 4 : 3. If C gets Rs. 1,000 more than D, what is B's share?

[Dec 2022]

A 2,000

B 1500

C 2500

D 1000

$$A's = 5x$$

$$B's = 2x$$

$$C's = 4x$$

$$D's = 3x$$

$$\rightarrow 2 \times 1000 = \underline{2000}$$

$$4x = 3x + 1000$$

$$\Rightarrow \underline{x = 1000}$$

Q.23

If $x = y^a$, $y = z^b$, $z = x^c$, then the value of abc is

[June 2023]

$$z = (y^a)^c$$

$$\Rightarrow z = y^{ac}$$

$$\Rightarrow z = (z^b)^{ac}$$

$$\Rightarrow z^1 = z^{abc}$$

$$\Rightarrow \boxed{1 = abc}$$

A

1 ✓

B

2

C

3

D

4

Q.24

If $\sqrt[3]{a} + \sqrt[3]{b} + \sqrt[3]{c} = 0$ then find the value of $\left(\frac{a+b+c}{3}\right)^3$.

[June 2023]

$a^{\frac{1}{3}} + b^{\frac{1}{3}} + c^{\frac{1}{3}} = 0$

$a^3 + b^3 + c^3 - 3abc = 0$ if $a + b + c = 0$ *

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

or $p^3 + q^3 + r^3 = 3pqr$

if $p + q + r = 0$

Let $p = a^{\frac{1}{3}}, q = b^{\frac{1}{3}}, r = c^{\frac{1}{3}}$

$a^{\frac{1}{3}} + b^{\frac{1}{3}} + c^{\frac{1}{3}} = 0 \Rightarrow (a^{\frac{1}{3}})^3 + (b^{\frac{1}{3}})^3 + (c^{\frac{1}{3}})^3 = 3(a^{\frac{1}{3}} \cdot b^{\frac{1}{3}} \cdot c^{\frac{1}{3}})$

$\Rightarrow a + b + c = 3(abc)^{\frac{1}{3}}$

Put this in given

$\Rightarrow \frac{(3(abc)^{\frac{1}{3}})^3}{3} \Rightarrow (abc)^{\frac{1}{3} \times 3} \Rightarrow abc$

A

abc

B

9abc

C

1/abc

D

1/9abc

Q.25The value of $[\log_{10}(5\log_{10} \underline{100})]^2$ is

[June 2023]

$$= [\log_{10} 5 \log_{10} 10^2]^2$$

$$= [\log_{10} (5 \times 2 \times \log_{10} 10)]^2$$

$$\Rightarrow [\log_{10} (10 \times 1)]^2 = [\log_{10} 10]^2 = 1^2 = \underline{1}$$

A

1

B

2

C

10

D

25

Q.26

Given that $\log_{10} x = m + n - 1$ and $\log_{10} y = m - n$, the value of $\log_{10} \left(\frac{100x}{y^2} \right)$ expressed in terms of m and n is

[June 2023]

A

$1 - m + 3n$

B

$m - 1 + 3n$

C

$m + 3n + 1$

D

$m^2 - n^2$

$$\log_{10}(100) + \log x - \log y^2$$

$$\Rightarrow \frac{2 \log_{10} 10}{4} + \log x - 2 \log y$$

$$\Rightarrow 2(1) + m + n - 1 - 2(m - n)$$

$$\Rightarrow 2 + m + n - 1 - 2m + 2n$$

$$\Rightarrow \underline{1 - m + 3n}$$

Thank You !

