



gradeup

Sahi Prep Hai Toh Life Set Hai

# ALGEBRA-4



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Algebra - 4

110 slides

Today → 60 slides

\* ~~Grade up app~~  
\* ~~Telegram group~~  
\* ~~Doubt session~~  
27<sup>th</sup> July (Algebra)

Mon  
→ Tue

Backup session (26<sup>th</sup> July) → Rem 50 slides  
Doubt Session  
Send all your doubts before 26<sup>th</sup> July  
I am on Whatsapp

## Algebra

Detailed Approach

Value Putting

Symmetry

Approx.

Adv :- Helps you in  
understanding of  
concepts

Disad :- It's true  
conserving in  
most of the cases

Adv :- It saves time in  
majority cases

Disad :- Not applicable  
always

## What is Symmetry?

→ "Same behaviour with respect to all variables"

Eg

$$a^2 + b^2 + c^2$$



$$ab + bc + ca$$



$$a^2 = b+c$$

$$b^2 = c+a$$

$$c^2 = a+b$$



## Algebra Symmetric Expression



provided it doesn't  
violate the  
given condition





**Q1.** If  $\frac{4x-3}{x} + \frac{4y-3}{y} + \frac{4z-3}{z} = 0$  then

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

- (a) 9
- (b) 3
- (c) 4
- (d) 6

**II<sup>nd</sup>**

Symmetric

$$x = y = z$$

$$\frac{4x-3}{x} = 0$$

$$x = 3/4$$

$$\frac{4 \cdot 3}{3} = 4$$

I<sup>st</sup>

Detailed App

$$\frac{4x-3}{x} + \frac{4y-3}{y} + \frac{4z-3}{z} = 0$$

$$12 = 3 \left[ \frac{1}{x} + \frac{1}{y} + \frac{1}{z} \right]$$

$$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 4$$



**Ans. (c)**

**Q2.** If  $\frac{a^2}{1} = \frac{b+c}{1}$ ,  $\frac{b^2}{1} = \frac{c+a}{1}$ ,  $\frac{c^2}{1} = \frac{a+b}{1}$ , then

$$\frac{1}{1+a} + \frac{1}{1+b} + \frac{1}{1+c}$$

- (a) 0
- ~~(b)~~ 1
- (c) 2
- (d) 3

I<sup>st</sup>

Symmetry



$$\text{let } a = b - c$$

$$a^2 = 2a$$

$$a^2 - 2a = 0$$

$$a(a-2) = 0$$

$$\frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 1$$

$$\cancel{a \neq 0} \text{ or } a = 2$$

II<sup>nd</sup>

**Detailed Approach**

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

$$a^2 + a = a + b + c$$

$$a(a+1) = a + b + c$$

$$\frac{1}{a+1} = \frac{a}{a+b+c}$$

$$\frac{a}{a+b+c} + \frac{b}{a+b+c} + \frac{c}{a+b+c}$$

$$\frac{a+b+c}{a+b+c} = 1$$

**Ans. (b)**

**Q3.** If  $a + b + c = 0$  then

$$\left( \frac{a+b}{c} + \frac{b+c}{a} + \frac{c+a}{b} \right) \left( \frac{a}{b+c} + \frac{b}{c+a} + \frac{c}{a+b} \right) \text{ is}$$

- (a) 8
- (b) 9**
- (c) -3
- (d) 0

**I** Detailed

$$\left( \frac{a}{c} + \frac{-a}{a} + \frac{-b}{b} \right) \left( \frac{a}{-a} + \frac{b}{-b} + \frac{c}{-c} \right)$$

$$(-3)(-3)$$

$$= 9$$

**II<sup>nd</sup>**

Put values

$$a=1 \quad b=1 \quad c=-2$$

$$\left( \frac{2}{-2} + \frac{-1}{1} + \frac{-1}{1} \right) \left( \frac{1}{-1} + \frac{1}{-1} + \frac{-2}{-1} \right)$$

$$(-1-1-1) \quad (-1-1-1)$$

$$= 9$$

**Ans. (b)**

**Q4.** If  $a, b, c$  are non zero,  $\underline{a} + \frac{1}{b} = 1$  &  $b + \frac{1}{c} = 1$

then (i)  $abc$  is

- (a)  $-1, 1$
- (b)  $3, -1$
- (c)  $-3, 1$
- (d)  $1, 1$

(ii)  $c + \frac{1}{a}$  is

- (a)  $3, -1$
- (b)  $1, 1$

**II<sup>nd</sup>**

Putting values

$$a=2 \quad b=-1 \quad c=\frac{1}{2}$$

$$(i) \quad 2(-1)\left(\frac{1}{2}\right) = -1 \quad \checkmark$$

$$(ii) \quad \frac{1}{2} + \frac{1}{2} = 1 \quad \checkmark$$

I Detailed App

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

$$\frac{1}{c} = 1 - b$$

$$c = \frac{1}{1-b}$$

$$(i) \quad \frac{b-1}{b} - b \cdot \frac{1}{1-b} = \frac{-1}{1-b} =$$

$$(ii) \quad \frac{1}{1-b} + \frac{b}{b-1} \\ \frac{1}{1-b} - \frac{b}{1-b} = 1$$

**Ans. (a)**

Just for splitting I have taken reciprocal

Q5. If  $\frac{xy}{x+y} = a$ ,  $\frac{xz}{x+z} = b$  and  $\frac{yz}{y+z} = c$

where  $a, b, c \neq 0$  then  $x$  equal to

(a)  $\frac{2abc}{ab+bc-ac}$

(b)  $\frac{2abc}{ab+ac-bc}$

(c)  $\frac{2abc}{ac+bc-ab}$

(d)  $\frac{2abc}{ab+bc+ac}$

$$\frac{x+y}{xy} = \frac{1}{a}$$

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{a}$$

$$\frac{1}{x} = \frac{1}{2} \left( \frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right) - \frac{1}{c}$$

$$\frac{1}{x} = \frac{bc+ac-ab}{2abc}$$

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{a}$$

$$\frac{1}{x} + \frac{1}{z} = \frac{1}{b}$$

$$\frac{1}{y} + \frac{1}{z} = \frac{1}{c}$$

$$2 \left( \frac{1}{x} + \frac{1}{y} + \frac{1}{z} \right) = \frac{1}{a} + \frac{1}{b} + \frac{1}{c}$$

$$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \frac{1}{2} \left( \frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right)$$

$$\frac{1}{x} + \frac{1}{c} = \frac{1}{2} \left( \frac{1}{a} + \frac{1}{b} + \frac{1}{c} \right)$$

**Ans. (c)**

**Q6.** If  $\frac{x - a^2}{b^2 + c^2} + \frac{x - b^2}{c^2 + a^2} + \frac{x - c^2}{b^2 + a^2} = 3$ , find the value of  $x$ .

- (a)  $a^2 + b^2 - c^2$  ~~p~~ (b)  $\frac{a^2 + b^2 + c^2}{2}$   
 (c)  $a^2 - b^2 - c^2$  ~~p~~ (d)  $\frac{a^2 + b^2}{2}$  ~~p~~

I

Symmetric



$$a = b = c$$

b is the sol<sup>n</sup>



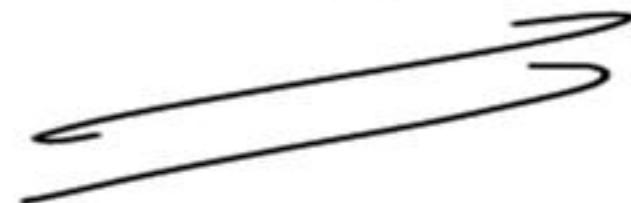
II<sup>nd</sup>

$$a = b = c$$

$$\frac{x - a^2}{2a^2} = 1$$

$$\underline{\underline{x = 3a^2}}$$

Ans (5)



Ans. (b)

Detailed Approach

III<sup>rd</sup>

$$\frac{x-a^2}{b^2+c^2} + \frac{x-b^2}{c^2+a^2} + \frac{x-c^2}{a^2+b^2} = 3$$

$$\left( \frac{x-a^2}{b^2+c^2} - 1 \right) + \left( \frac{x-b^2}{c^2+a^2} - 1 \right) + \left( \frac{x-c^2}{a^2+b^2} - 1 \right) = 0$$

$$\left( \frac{x-a^2-b^2-c^2}{b^2+c^2} \right) + \left( \frac{x-b^2-c^2-a^2}{a^2+c^2} \right) + \left( \frac{x-c^2-a^2-b^2}{a^2+b^2} \right) = 0$$

$$(x-a^2-b^2-c^2) \left[ \frac{1}{b^2+c^2} + \frac{1}{a^2+c^2} + \frac{1}{a^2+b^2} \right] = 0$$

~~$x=a^2+b^2+c^2$~~

**Q7.** If  $\frac{x-a^2}{b+c} + \frac{x-b^2}{c+a} + \frac{x-c^2}{b+a} = 4(a+b+c)$ .

Find the value of  $x$ .

(a)  $(a+b+c)^2$

(b)  $a^2 + b^2 + c^2$

(c)  $ab + bc + ca$

(d)  $a^2 + b^2 + c^2 - ab - bc - ca$



I

Symmetric



let  $a = b = c$

$$\beta \left( \frac{x-a^2}{2a} \right) = 4 \cancel{\beta} a$$

$$x-a^2 = 8a^2$$

$$x = 9a^2$$

1<sup>st</sup>

Detailed App

(Homework)

**Ans. (a)**

# LAW OF RATIO

∴

$$\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = k$$

→ (i)

$$\frac{a+c+e}{b+d+f} = k$$

→ (ii)

$$\frac{a+c-e}{b+d-f} = k$$

$a = b k, \quad c = d k, \quad e = f k$

$$\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = k$$

$$\frac{a+c+e}{b+d+f} = k$$



**Q1.** If  $\frac{x}{xa+yb+zc} = \frac{y}{ya+zb+xc} = \frac{z}{za+xb+yc} = K$   
 and  $x+y+z \neq 0$  then each ratio is

(a)  $\frac{1}{a-b-c}$

(b)  $\frac{1}{a+b-c}$

(c)  $\frac{1}{a-b+c}$

(d)  $\cancel{\frac{1}{a+b+c}}$

$$\frac{x + y + z}{x(a+b+c) + y(a+b+c) + z(a+b+c)} = K$$

$$\frac{x(a+b+c) + y(a+b+c) + z(a+b+c)}{(a+b+c)(x+y+z)} = K$$

$$\frac{x+y+z}{(a+b+c)(x+y+z)} = K$$

$$\frac{1}{a+b+c} = K$$

$$K = \frac{1}{a+b+c}$$

**Ans. (d)**

**Q2.**

$$\frac{x}{(2x+y+z)} = \frac{y}{(x+2y+z)} = \frac{z}{(x+y+2z)} = a$$

and  $x+y+z \neq 0$  then the value of  $a$  is

(a)  $\frac{1}{3}$

~~(b)~~  $\frac{1}{4}$

(c)  $\frac{1}{2}$

(d)  $\frac{1}{8}$

$$\frac{x+y+z}{4(x+y+z)}$$

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

**Ans. (b)**

# CONCEPT OF PUTTING VALUES



**Q1.** If  $a + b + c = 0$ , then the value of  $\frac{a^2 + b^2 + \cancel{c^2}}{a^2 - bc} =$

- (a) 0
- (b) 1
- (c) 2
- (d) 3

I Putting Values

$$a=1, b=-1, c=0$$

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

II  
Detailed Method

$$b+c = -a$$

$$b^2 + c^2 + 2bc = a^2$$

$$\frac{b^2 + c^2 + 2bc + b^2 + c^2}{b^2 + c^2 + bc}$$

$$\frac{2(b^2 + c^2 + bc)}{b^2 + c^2 + bc} = 2$$

**Ans. (c)**

**Q2.** If  $a + b + c = 0$  then the value of  $\frac{a^2 + b^2 + c^2}{ab + bc + ca}$

is

- (a) 2
- (b) -2
- (c) 0
- (d) 4

I

$$a=1 \quad b=-1 \quad c=0$$

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

II<sup>nd</sup>

detailed

$$(a+b+c)^2 = a^2 + b^2 + c^2 + 2(ab+bc+ca)$$

$$a^2 + b^2 + c^2 = -2(ab+bc+ca)$$

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

**Ans. (b)**

**Q3.** If  $x + y + z = 0$  then  $\frac{xyz}{(x+y)(y+z)(z+x)} = ?$

- (a) -1                          (b) 1  
(c)  $xy + yz + zx$             (d) None

$$x = -y \quad z = 0$$

✗

$$\frac{xyz}{(-z)(-x)(-y)} = \underline{\underline{1}}$$

**Ans. (a)**

**Q4.** If  $a + b + c = 0$

$$\text{then } (a + b - c)^2 + (\underline{b + c} - a)^2 + (c + \underline{a} - b)^2 = ?$$



$$(-c-c)^2 + (-a-a)^2 + (-b-b)^2$$

$$4c^2 + 4a^2 + 4b^2$$

$$4(a^2 + b^2 + c^2)$$

**Ans. (c)**

**Q5.** If  $x + y + z = 0$ , what is the value of  $\frac{(3y^2 + x^2 + z^2)}{2y^2 - xz}$

- (a) 2      (b) 1  
 (c)  $\frac{3}{2}$       (d)  $\frac{5}{3}$

21<sup>nd</sup>

Debuted

(Hw)

$$I \quad x=1 \quad y=-1 \quad z=0$$

$$\begin{array}{r} 3 + 1 + 0 \\ \hline 2 - 0 \end{array}$$

**Ans. (a)**

**Q6.** If  $x + y = 2a$ , then the value of  $\frac{a}{x-a} + \frac{a}{y-a}$  is

- (a) 2  
 (c) 1

- (b) 0  
 (d) -1

I<sup>nd</sup>

$$a \left[ \frac{1}{x-a} + \frac{1}{y-a} \right]$$

$$a \left[ \frac{y-a+x-a}{(x-a)(y-a)} \right]$$

$$a \left[ \frac{x+y-2a}{(x-a)(y-a)} \right]$$

$$a \cdot 0 = \underline{\underline{0}}$$

I Putting values

$$\text{let } x=3 \ y=1 \ a=2$$

$$\frac{2}{1} + \frac{2}{-1}$$

$$2-2 = \underline{\underline{0}}$$

Ans. (b)

$$x+y = 2a$$

III

$$x = 2a-y$$

$$x+y = 2a$$

$$x+y = a+q$$

$$x-a = q-y$$

---

IV

$$\frac{a}{x-a} + \frac{q}{y-q}$$

$$\frac{q}{x-a} - \frac{q}{x-a} = 0$$

$$\frac{a}{x-a} + \frac{q}{y-q}$$

$$\frac{a}{2a-y-q} + \frac{q}{y-q}$$

$$\frac{a}{a-y} + \frac{q}{y-q}$$

$$\cancel{\frac{q}{q}} - \cancel{\frac{y}{a-y}} = 0$$

**Q7.** If  $x = \frac{a}{b} + \frac{b}{a}$ ,  $y = \frac{b}{c} + \frac{c}{b}$ ,  $z = \frac{c}{a} + \frac{a}{c}$ ,

then what is the value of  $xyz - x^2 - y^2 - z^2 = ?$

- (a) -4
- (b) -2
- (c) -1
- (d) -6

I Putting values

$$a = b = c$$

$$x = 2 \quad y = 2 \quad z = 2$$

$$2 \cdot 2 \cdot 2 - 2^2 - 2^2 - 2^2$$

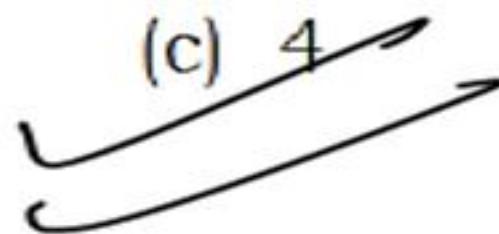
$$8 - 12$$

$$= -4$$

**Ans. (a)**

Q8. If  $x = \sqrt{\frac{\sqrt{5} + 1}{\sqrt{5} - 1}}$ , then  $5x^2 - 5x - 1$  is

- (a) 0
- (b) 3
- (c) 4
- (d) 5



$$x = \sqrt{\frac{\sqrt{5}+1}{\sqrt{5}-1} \times \frac{\sqrt{5}+1}{\sqrt{5}+1}}$$

$$x = \sqrt{\frac{(\sqrt{5}+1)^2}{4}} \Rightarrow \frac{\sqrt{5}+1}{2}$$

$$5 \left[ \frac{\sqrt{5}+1}{2} \right]^2 - 5 \left[ \frac{\sqrt{5}+1}{2} \right] - 1$$

$$5 \left[ \frac{6+2\sqrt{5}}{4} \right] - 5 \left[ \frac{\sqrt{5}+1}{2} \right] - 1$$

$$\frac{15}{2} + \cancel{\frac{5\sqrt{5}}{2}} - \cancel{\frac{5\sqrt{5}}{2}} - \frac{5}{2} - 1 \quad \text{---} \quad 4$$

Ans. (c)

$$x = \sqrt{\frac{\sqrt{5}+1}{\sqrt{5}-1}}$$

$$\underline{5x^2 - 5x - 1}$$

- A) 0    B) 3    C) 4    D) 5

For Approx

$$\sqrt{5} = \underline{\underline{2.23}}$$

$$\begin{aligned}x &= \sqrt{\frac{\sqrt{2.23}}{\sqrt{2.23}}} \\&= \sqrt{2.23} \approx \boxed{1.49}\end{aligned}$$

$$5 \cdot \frac{8}{3} - 5 \times 1.49 - 1$$

$$13.33 - 8.25 - 1 = \underline{\underline{4.08}}$$

~~V.A.b~~

**Q9.** If  $47.2506 = 4A + \frac{7}{B} + 2C + \frac{5}{D} + 6E$  then the

value of  $\underline{5A} + \underline{3B} + 6C + D + 3E$  is

- (a) 53.6003
- (b) 53.603
- ~~(c) 153.6003~~
- (d) 213.0003

$$50 + 3 + 0.6 + 100 + 0.0003$$

$$\underline{\underline{153.6003}}$$

$$4 \times \underline{10} + 7 \times \underline{1} + \frac{2}{10} + \frac{5}{100} + \frac{0}{1000} + \frac{6}{10000} = \underline{4A} + \frac{7}{B} + 2C + \frac{5}{D} + 6E$$

$$A = 10$$

$$D = 100$$

$$B = 1$$

$$E = \frac{1}{10000} = -0.0001$$

$$C = \frac{1}{10} \Rightarrow 0.1$$

**Ans. (c)**

**Q10.** If  $x^{x\sqrt{x}} = (x\sqrt{x})^x$ , then  $x$  equals

(a)  $\frac{4}{9}$

(b)  $\frac{2}{3}$

(c)  $\frac{9}{4}$

(d)  $\frac{3}{2}$

**Ans. (c)**

**Q11.** If  $x = \frac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}}$  and  $xy = 1$  then  $\frac{x^2 + xy + y^2}{x^2 - xy + y^2}$  is

(a)  $\frac{63}{61}$

(b)  $\frac{67}{65}$

(c)  $\frac{65}{63}$

(d)  $\frac{69}{67}$

**Ans. (a)**

**Q12.** If  $x=1 + \sqrt{2} + \sqrt{3}$  then  $(2x^4 - 8x^3 - 5x^2 + 26x - 28)$  is

- (a)  $2\sqrt{2}$
- (b)  $3\sqrt{3}$
- (c)  $5\sqrt{5}$
- (d)  $6\sqrt{6}$

**Ans. (d)**

**Q13.** If  $x = 16$ , then  $x^4 - 17x^3 + 17x^2 - 17x + 17$  is

- (a) 0
- (b) 1
- (c) 4
- (d) 3

**Ans. (b)**

**Q14.** If  $x = 11$  then  $x^4 - 13x^3 + 12x^2 - 14x + 10 = ?$

- (a) -1350
- (b) -1354
- (c) 0
- (d) 1

**Ans. (b)**

**Q15.** If  $x = 3 + 2\sqrt{2}$ , then  $\frac{x^6 + x^4 + x^2 + 1}{x^3}$  is equal to-

- (a) 216
- (b) 192
- (c) 198
- (d) 204

**Ans. (d)**

**Q16.** If  $x^2 + x = 5$  then  $(x+3)^3 + \frac{1}{(x+3)^3}$  is

- (a) 140
- (b) 110
- (c) 130
- (d) 120

**Ans. (b)**

**Q17.** If  $x = 2 + 2^{\frac{2}{3}} - 2^{\frac{1}{3}}$  then find  $x^3 - 6x^2 + 18x + 3$

- (a) 22
- (b) 24
- (c) 25
- (d) 0

**Ans. (c)**

**Q18.** If  $\frac{a}{1-2a} + \frac{b}{1-2b} + \frac{c}{1-2c} = 1$  find  $\frac{1}{1-2a} + \frac{1}{1-2b} + \frac{1}{1-2c} = ?$

- (a) 5
- (b) 56
- (c) 30
- (d) 60

**Ans. (a)**

**Q19.** If  $\frac{a}{2-3a} + \frac{b}{2-3b} + \frac{c}{2-3c} = 2$  find  $\frac{1}{2-3a} + \frac{1}{2-3b} + \frac{1}{2-3c} = ?$

- (a) 3.5
- (b) 4.5
- (c) 2.4
- (d) None

**Ans. (b)**

**Q20.** If  $\frac{a}{3+2a} + \frac{b}{3+2b} + \frac{c}{3+2c} = 6$  find  $\frac{1}{3+2a} + \frac{1}{3+2b} + \frac{2}{3+2c} = ?$

**Ans. (c)**

**Q21.** If  $\frac{a^2 - bc}{a^2 + bc} + \frac{b^2 - ca}{b^2 + ca} + \frac{c^2 - ab}{c^2 + ab} = 1$  then the

value of  $\frac{a^2}{a^2 + bc} + \frac{b^2}{b^2 + ca} + \frac{c^2}{c^2 + ab}$  is

- (a) 0
- (b) 1
- (c) -1
- (d) 2

**Ans. (d)**

**Q22.** If  $a + b + c = 4\sqrt{3}$  and  $a^2 + b^2 + c^2 = 16$  then

$a : b : c = ?$

- (a)  $1 : 1 : 1$
- (b)  $1 : \sqrt{2} : \sqrt{3}$
- (c)  $1 : 2 : 3$
- (d) None

**Ans. (a)**

**Q23.** If  $a + b + c = 6$ ,  $a^2 + b^2 + c^2 = 14$ . Find the value of  $a : b : c = ??$

**Ans.**

**Q24.** If  $\sqrt{3x^2 - 12x + 19} + \sqrt{3x^2 - 12x - 11} = 6$  then

$$\sqrt{3x^2 - 12x + 19} - \sqrt{3x^2 - 12x - 11} = ?$$

- (a) 4
- (b) 3
- (c) 0
- (d) 5

**Ans. (d)**

**Q25.** If  $x(x + y + z) = 28$ ,  $y(x + y + z) = 70$ ,  $z(x + y + z) = 98$

then the value of  $3(x + y + z)$  is:

- (a)  $\pm 28$
- (b)  $\pm 24$
- (c)  $\pm 42$
- (d)  $\pm 36$

**Ans. (c)**



**Q26.** If  $2^x = 8^y = 32^z$  and  $x + y + z = 20$ . Find the value of  $y$ .

**Ans.**

**Q27.** If  $2^x = 3^y = 6^{-z}$  then  $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$  is equal to

- (a) 0
- (b) 1
- (c)  $\frac{3}{2}$
- (d)  $-\frac{1}{2}$

**Ans. (a)**

**Q28.** The value of  $\frac{1}{1+p+q^{-1}} + \frac{1}{1+q+r^{-1}} + \frac{1}{1+r+p^{-1}}$  given that  $pqr = 1$  is-

- (a) 1
- (b) 0
- (c)  $p+q+r$
- (d) None of these

**Ans. (a)**

**Q29.** If  $x^2 + 2 = 2x$  then  $x^4 - x^3 + x^2 + 5 = ?$

- (a) 1
- (b) 2
- (c) 3
- (d) 4

**Ans. (c)**

**Q30.** If  $x^3 + y^3 + z^3 = 3(1 + xyz)$ ,  $P = y + z - x$ ,  
 $Q = z + x - y$ ,  $R = x + y - z$  then what is the value of  $P^3 + Q^3 + R^3 - 3PQR = ?$

**Ans. (c)**

**Q31.** If  $u_n = \frac{1}{n} - \frac{1}{n+1}$  then the value of  $u_1 + u_2 + u_3 + u_4 + u_5$  is-

- (a)  $\frac{1}{2}$
- (b)  $\frac{1}{3}$
- (c)  $\frac{2}{5}$
- (d)  $\frac{5}{6}$

**Ans. (d)**

**Q32.** If  $x = \sqrt[3]{a + \sqrt{a^2 + b^3}} + \sqrt[3]{a - \sqrt{a^2 + b^3}}$  then

$x^3 + 3bx$  is equal to –

- (a) 0
- (b)  $a$
- (c)  $2a$
- (d) 1

**Ans. (c)**

**Q33.** If  $x_1x_2x_3 = 4(4 + x_1 + x_2 + x_3)$  then what is the

value of  $\frac{1}{(2+x_1)} + \frac{1}{(2+x_2)} + \frac{1}{(2+x_3)}$

- (a) 1
- (b)  $\frac{1}{2}$
- (c) 2
- (d)  $\frac{1}{3}$

**Ans. (b)**

**Q34.** Let  $x = \frac{\sqrt{13} + \sqrt{11}}{\sqrt{13} - \sqrt{11}}$  and  $y = \frac{1}{x}$ , then the value

of  $3x^2 - 5xy + 3y^2$  is-

**Ans. (a)**

**Q35.** If  $a^2 + b^2 + 9 - 6b + (a + b - 4)^2 = 2ab - 6a$ , then find  $ab = ??$

- (a)  $7/4$
- (b)  $-7/4$
- (c)  $7/2$
- (d)  $12$

**Ans. (a)**

**Q36.** If  $a + b = 48 - ab$ ,  $b + c = 99 - bc$  and  $c + a = 3 - ca$  where  $a$ ,  $b$  and  $c$  are positive numbers then find  $7c - 15a + b = ?$

**Ans. (b)**

**Q37.** If  $2 \cdot 9^x = 841^y = 1000$ , find  $\frac{xy}{x - 2y} = ?$

- (a)  $1/2$
- (b)  $2$
- (c)  $1/3$
- (d)  $-1/4$

**Ans. (b)**

**Q38.** If  $a^4 + b^4 - 18 a^2b^2 = 24$  and  $a^2 - b^2 - 4ab = 6$ , find  $ab = ?$

- (a)  $-\frac{1}{2}$
- (b)  $-\frac{1}{4}$
- (c)  $\frac{1}{2}$
- (d)  $\frac{1}{4}$

**Ans. (b)**

**Q39.** If  $x^2 - 4x + 1 = 0$ , find  $x^9 + x^7 - 194x^5 - 194x^3 = ?$

- (a) - 2
- (b) - 4
- (c) 0
- (d) 1

**Ans. (b)**

**Q40.** If  $\frac{8x + y^3 - 27x - y^3}{5y - x} = Ax^2 + Bxy + Cy^2$

then find the value of  $(A + B + C) = ?$

- (a) 26
- (b) 19
- (c) 16
- (d) 13

**Ans. (c)**

# HOMEWORK

**Q1.** If  $x^2 + y^2 + z^2 = xy + yz + zx$  then the value of

$$\frac{3x^4 + 7y^4 + 5z^4}{5x^2y^2 + 7y^2z^2 + 3z^2x^2} \text{ is}$$

- |       |        |
|-------|--------|
| (a) 2 | (b) 1  |
| (c) 0 | (d) -1 |

**Ans. (b)**

**Q2.** If  $a + b + c + d = 4$  then  $\frac{1}{(1-a)(1-b)(1-c)} + \frac{1}{(1-b)(1-c)(1-d)} + \frac{1}{(1-c)(1-d)(1-a)} + \frac{1}{(1-d)(1-a)(1-b)}$  is

**Ans. (a)**

**Q3.** If  $(a^2 + b^2)^3 = (a^3 + b^3)^2$  then  $\frac{a}{b} + \frac{b}{a}$  is

(a)  $\frac{1}{3}$

(b)  $\frac{2}{3}$

(c)  $\frac{-1}{3}$

(d)  $\frac{-2}{3}$

**Ans. (b)**

**Q4.** If  $\frac{b-c}{a} + \frac{a+c}{b} + \frac{a-b}{c} = 1$  and  $a - b + c \neq 0$   
then

(a)  $\frac{1}{c} = \frac{1}{a} + \frac{1}{b}$

(b)  $\frac{1}{a} = \frac{1}{b} + \frac{1}{c}$

(c)  $\frac{1}{b} = \frac{1}{a} - \frac{1}{c}$

(d)  $\frac{1}{b} = \frac{1}{a} + \frac{1}{c}$

**Ans. (c, b)**

**Q5.** If  $\frac{x + a^2 + 2c^2}{b+c} + \frac{x + b^2 + 2a^2}{c+a} + \frac{x + c^2 + 2b^2}{a+b} = 0$ , find  $x$

- (a)  $a^2 + b^2 + c^2$
- (b)  $-(a^2 + b^2 + c^2)$
- (c)  $a^2 + 2b^2 + c^2$
- (d)  $-(a^2 + 2b^2 + c^2)$

**Ans. (b)**

**Q6.** If  $a^x = (x + y + z)^y$ ,  $a^y = (x + y + z)^z$  and  $a^z = (x + y + z)^x$ ,  
then  $x + y + z = ?$  ( $a \neq 0$ )

- (a) 0
- (b) 1
- (c)  $a^3$
- (d)  $a$

**Ans. (d)**

**Q7.** If  $a = \frac{x}{x+y}$ ,  $b = \frac{y}{x-y}$  find  $\frac{ab}{a+b}$

(a)  $\frac{xy}{x^2 + y^2}$

(b)  $\frac{x^2 + y^2}{xy}$

(c)  $\frac{x}{x+y}$

(d)  $\left(\frac{y}{x+y}\right)^2$

**Ans. (a)**

**Q8.** If  $\frac{x+1}{x-1} = \frac{a}{b}$  and  $\frac{1-y}{1+y} = \frac{b}{a}$  then the value of  $\frac{x-y}{1+xy}$  is

(a)  $\frac{2ab}{a^2 - b^2}$

(b)  $\frac{a^2 - b^2}{2ab}$

(c)  $\frac{a^2 + b^2}{2ab}$

(d)  $\frac{a^2 - b^2}{ab}$

**Ans. (a)**

**Q9.** If  $x = \sqrt{a} + \frac{1}{\sqrt{a}}$ ,  $y = \sqrt{a} - \frac{1}{\sqrt{a}}$ , ( $a > 0$ ) then the

value of  $(x^4 + y^4 - 2x^2y^2)$  is

- (a) 16
- (b) 20
- (c) 10
- (d) 5

**Ans. (a)**

**Q10.** The value of  $\frac{1}{a^2 + ax + x^2} - \frac{1}{a^2 - ax + x^2} + \frac{2ax}{a^4 + a^2x^2 + x^4}$  is

- (a) 2
- (b) 1
- (c) -1
- (d) 0

**Ans. (d)**

**Q11.** If  $a^2 + a + 1 = 0$  then the value of  $a^5 + a^4 + 1$  is :

- (a)  $a^2$
- (b) 1
- (c) 0
- (d)  $a + 1$

**Ans. (c)**

**Q12.** If  $x = 16$ , then  $x^4 - 17x^3 + 17x^2 - 17x + 17$  is

- (a) 0
- (b) 1
- (c) 4
- (d) 3

**Ans. (b)**

**Q13.** If  $(x+2)(x-1) = 1$ , find  $(x+2)^3 - \frac{1}{(x+2)^3} = ?$

- (a) 18
- (b) 27
- (c) 25
- (d) 36

**Ans. (d)**

**Q14.** If  $\frac{x + \sqrt{x^2 - 1}}{x - \sqrt{x^2 - 1}} + \frac{x - \sqrt{x^2 - 1}}{x + \sqrt{x^2 - 1}} = 34$ . Find  $x$ .

- (a) -1
- (b) -2
- (c)  $\pm 3$
- (d) -4

**Ans. (c)**

**Q15.** If  $\tan\theta + \cot\theta = 5$ , then  $\tan^5\theta + \cot^5\theta = ?$

- (a) 2527
- (b) 2730
- (c) 2525
- (d) 2540

**Ans. (c)**

**Q16.** If  $\frac{x}{a^2 - x} + \frac{y}{b^2 - y} + \frac{z}{c^2 - z} = 2$  find  $\frac{a^2}{a^2 - x} + \frac{b^2}{b^2 - y} + \frac{c^2}{c^2 - z} = ?$

- (a) 1
- (b) 5
- (c) 15
- (d) 8

**Ans. (b)**

**Q17.** If  $\frac{4\sqrt{3} + 5\sqrt{2}}{\sqrt{48} + \sqrt{18}} = a + b\sqrt{6}$ , then the values of  $a$  and  $b$  are

- (a)  $\frac{9}{15}, \frac{-4}{15}$
- (b)  $\frac{3}{11}, \frac{4}{33}$
- (c)  $\frac{9}{10}, \frac{2}{5}$
- (d)  $\frac{3}{5}, \frac{4}{15}$

**Ans. (d)**

**Q18.** If  $\sqrt{\frac{x-a}{x-b}} + \frac{a}{x} = \sqrt{\frac{x-b}{x-a}} + \frac{b}{x}$ ,  $b \neq a$  then value of  $x$  is.

(a)  $\frac{b}{a+b}$

(b)  $\frac{ab}{a+b}$

(c) 1

(d)  $\frac{a}{a+b}$

**Ans. (b)**

**Q19.** If  $ax + by = 4$ ,  $bx - ay = 3$ ,  $x^2 + y^2 = 5$  find  $a^2 + b^2 = ?$

- (a) 15
- (b) 5
- (c) 35
- (d) None

**Ans. (b)**

**Q20.** If  $a^4 + a^2 b^2 + b^4 = 10$ ,  $a^2 + ab + b^2 = 5$  find  $ab = ?$

- (a) 4.5
- (b) 1.5
- (c) 3.5
- (d) 2.5

**Ans. (b)**

**Q21.** If  $x^3 + \frac{3}{x} = 4(a^3 + b^3)$  and  $3x + \frac{1}{x^3} = 4(a^3 - b^3)$

then  $a^2 - b^2 = ?$

- (a) 4
- (b) 0
- (c) 1
- (d) 2

**Ans. (c)**

**Q22.** If  $\frac{p}{(b-c)(b+c-2a)} = \frac{q}{(c-a)(c+a-2b)} = \frac{r}{(a-b)(a+b-2c)}$

Find p + q + r

- (a) 0
- (b) 1
- (c) -1
- (d) 2

**Ans. (a)**

**Q23.** If  $3a^2 = b^2 \neq 0$  then the value of

$$\frac{(a+b)^3 - (a-b)^3}{(a+b)^2 + (a-b)^2} \text{ is--}$$

(a)  $\frac{3b}{2}$

(b)  $b$

(c)  $\frac{b}{2}$

(d)  $\frac{2b}{3}$

**Ans. (a)**

**Q24.** If  $x > 1$  and  $x + \frac{1}{x} = 2\frac{1}{12}$ , then the value of  $x^4 - \frac{1}{x^4}$  is -

- (a)  $\frac{58975}{20736}$
- (b)  $\frac{59825}{20736}$
- (c)  $\frac{57985}{20736}$
- (d)  $\frac{57895}{20736}$

**Ans. (a)**

**Q25.** Find the value of  $1 + (2+1)(2^2+1)(2^4+1)(2^8+1)(2^{16}+1)(2^{32}+1)$

- (a)  $2^{32}$
- (b)  $2^{33}$
- (c)  $2^{64}$
- (d)  $2^{65}$

**Ans. (c)**

**Q26.** If  $x^2 - 16x + 59 = 0$ , then  $x - 6^2 + \frac{1}{x - 6^2} = ?$

- (a) 14
- (b) 16
- (c) 18
- (d) 20

**Ans. (c)**



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