



Math's by Ajay Rana Sir

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TOPIC

ALGEBRA

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1. $a + b + c = 6$
 $a^2 + b^2 + c^2 = 16$
find $ab + bc + ca = ?$



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2.

$$a + b + c = 3$$

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

$$a^2 + b^2 + c^2 = 16$$

find $abc = ?$



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3. $a^3 + b^3 = 0$
 $a + b \neq 0$
find $a + b = ?$



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4. $a^4 + b^4 = a^2b^2$ find $a^6 + b^6 = ?$



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5. $x + \frac{1}{y} = 1$ and $y + \frac{1}{z} = 1$
find $xyz = ?$



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6. If $(x + y + z)^y = a^x$
 $(x + y + z)^z = a^y$
 $(x + y + z)^x = a^z$
find $a = ?$



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7. $x(x + y + z) = 4$
 $y(x + y + z) = 16$
 $z(x + y + z) = 29$
find $x = ?$

8.

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

$$\text{find } x^{11} + \frac{1}{x^{11}} = ?$$



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9.

$$m + \frac{1}{m-2} = 4$$

$$\text{Find } (m-2)^{111} + \frac{1}{(m-2)^{111}} = ?$$



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10. (i) $m + \frac{1}{m+2} = 0$

Find $(m + 2)^{112} + \frac{1}{(m+2)^{112}} = ?$

(ii) $m^4 + m^3 + m^2 + m + 1 = ?$



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11. $x + \frac{1}{x} = -2$

(i) $x^{11} + \frac{1}{x^{11}} = ?$

(ii) $x^{112} + \frac{1}{x^{112}} = ?$



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12.

$$m + \frac{1}{m+2} = 4$$

(i) $(m+2)^{111} + \frac{1}{(m+2)^{111}} = ?$

(ii) $m^2 + m + 1 = ?$



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13.

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

Find $x^9 + \frac{1}{x^9} = ?$



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14.

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

find $x^{103} + x^{100} + x^{90} + x^{87} + x^{50} + x^{47} + 3$



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$$15. x + \frac{1}{x} = -1$$

find

$$(i) x^{23} + \frac{1}{x^{23}} = ?$$

$$(ii) x^{51} + x^{45} + x^{21} + x^{15} + x^3 + 2 = ?$$



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16. $x + \frac{1}{x} = \sqrt{3}$

find

(i) $x^{102} + \frac{1}{x^{102}} = ?$

(ii) $x^{206} + x^{200} + x^{94} + x^{100} + 3$



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17. $(x - a)(x - b) = 1$ and $a - b + 5 = 0$

find $(x - a)^3 - \frac{1}{(x - a)^3} = ?$



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18. $(x - 1)^2 + (y - 2)^2 = 0$ then $x + y = ?$



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19. $(a - 2)^2 + (b - 3)^2 + (c - 11)^2 = 0$
find $\sqrt{a + b + c} = ?$



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20. $a^2 + b^2 + c^2 = 2(a - b + c) - 3$
find $a - b + c = ?$



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21. $(x + y - z - 1)^2 + (z + x - y - 2)^2 + (z + y - x - 4)^2 = 0$
find $x + y + z = 0$



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22. $a = 297, b = 298, c = 299$
find $a^2 + b^2 + c^2 - ab - bc - ca = ?$



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23. $a^2 + b^2 + c^2 = ab + bc + ca$

Find $\frac{a+b}{b} = ?$



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24. $a^2 + b^2 + c^2 = ab + bc + ca$

Find (i) $\frac{a+b}{c} + \frac{b+c}{a} + \frac{c+a}{b} = ?$



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25.

a = 20, b = 25, c = 15

$$\frac{a^3 + b^3 + c^3 - 3abc}{a^2 + b^2 + c^2 - ab - bc - ca} = ?$$



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26.

$$a + b + c = 0$$

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



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27.

Find

$$\frac{(x^2-y^2)^3+(y^2-z^2)^3+(z^2-x^2)^3}{(x-y)^3+(y-z)^3+(z-x)^3}$$



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28.

$$x + y + z = 2S$$

find $(S - x)^3 + (S - y)^3 + 3(S - x)(S - y)z$

(A) z^3

(B) $-z^3$

(C) 0

(D) $2z^3$



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29.

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

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



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30.

$$\frac{1}{x+1} + \frac{2}{y+2} + \frac{1009}{z+1009} = 1$$

Find $\frac{x}{x+1} + \frac{y}{y+2} + \frac{z}{z+1009} = ?$



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31.

$$\frac{a}{x-a} + \frac{b}{y-b} + \frac{c}{z-c} = ?$$

Find $\frac{x}{x-a} + \frac{y}{y-b} + \frac{z}{z-c} = ?$



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32. $a^2 = b + c, b^2 = c + a, c^2 = a + b$

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



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33.

$$\frac{7x-3}{x} + \frac{7y-3}{y} + \frac{7z-3}{z} = 0$$

then $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = ?$



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**34. $a^x = b$; $b^y = c$ and $xyz = 1$
find $c^z = ?$**



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35. $(3.7)^x = (0.037)^y = 10000$

find $\frac{1}{x} - \frac{1}{y} = ?$



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36.

$$2^x = 3^y = 6^{-z}$$

find $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = ?$



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37. $ax + by = 6$
 $bx - ay = 2$
 $x^2 + y^2 = 4$
find $a^2 + b^2 = ?$



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**38. $a^4 + b^4 + a^2b^2 = 21$
 $a^2 + b^2 + ab = 7$
 find $ab = ?$**



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39.

$$a^4 + b^4 + a^2b^2 = 8$$

$$a^2 + b^2 + ab = 4$$

find $ab = ?$



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40. $x = a + \frac{1}{a}$; $y = a - \frac{1}{a}$; $x = 16$
find $x^4 + y^4 - 2x^2y^2$



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41.

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

$$\text{find } x^5 + \frac{1}{x^5} = ?$$



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42.

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

$$\text{find } x^5 + \frac{1}{x^5} = ?$$



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43. $xy(x + y) = 1$
find $\frac{1}{x^3y^3} - x^3 - y^3 = ?$



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44. $a = x + y; b = x - y; c = x + 2y$
find $a^2 + b^2 + c^2 - ab - bc - ca = ?$



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45. $a^x = bc; b^y = ac; c^z = ab$
find $\frac{1}{x+1} + \frac{1}{1+y} + \frac{1}{1+z} = 1$



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46.

b = 36

$$\frac{a-b}{\sqrt{a}-\sqrt{b}} + \frac{a+b}{\sqrt{a}+\sqrt{b}} = ?$$



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47.

$$pq + qr + rp = 0$$

find $\frac{1}{p^2 - qr} + \frac{1}{q^2 - rq} + \frac{1}{r^2 - pq} = ?$



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48.

$$pq + qr + rp = 0$$

$$\frac{p^2}{p^2 - qr} + \frac{q^2}{q^2 - rq} + \frac{r^2}{r^2 - pq} = ?$$



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49. $a + b + c = 12, \frac{1}{a} + \frac{1}{b} + \frac{1}{c} = ?$

find $\frac{a}{b} + \frac{b}{a} + \frac{b}{c} + \frac{c}{b} + \frac{a}{c} + \frac{c}{a} = ?$



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50.

$$x = \frac{4ab}{a+b}$$

Find $\frac{x+2a}{x-2a} + \frac{x+2b}{x-2b} = ?$



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51. $x = 11$
find $x^5 - 12x^4 + 12x^3 - 12x^2 + 12x - 1$



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52.

$$5a + \frac{1}{3a} = 5$$

$$\text{find } 9a^2 + \frac{1}{25a^2} = ?$$



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53. $x^a \cdot x^b \cdot x^c = 1$
find $a^3 + b^3 + c^3 = ?$



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54.

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

Find $\frac{x^3 + \frac{1}{x}}{x^2 - x + 1} = ?$



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55.

$$x = \sqrt{3} + \sqrt{2}$$

$$\text{find } x^2 + \frac{1}{x^2} = ?$$



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56.

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

$$\frac{2x}{3x^2 - 5x + 3} = ?$$



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57. $x = 7 + 4\sqrt{3}$
find $\sqrt{x} + \frac{1}{\sqrt{x}} = ?$



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58.

$$a + b + c = 6$$

$$a^2 + b^2 + c^2 = 14$$

$$a^3 + b^3 + c^3 = 36$$

find $abc = ?$



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59. $\sqrt[5]{2x - 7} = 3$ find $x = ?$



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60. $2^{32} - (2 + 1) (2^2 + 1) (2^4 + 1) (2^8 + 1) (2^{16} + 1) = ?$



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