$a^m = b^m$

$a = b$ (m odd)

$a = \pm b$ (m even)

26. What is the value of x satisfying the equation $16 \left(\frac{a-x}{a+x}\right)^3 = \frac{a+x}{a-x}$?

x का कौन सा मान समीकरण $16 \left(\frac{a-x}{a+x}\right)^3 = \frac{a+x}{a-x}$ आपूर्ति करता है?

a) $\frac{a}{2}$　　　b) $\frac{a}{3}$　　　c) 3a　　　d) Both b and c

$\left(\frac{a+x}{a-x}\right)^4 = 16 = 2^4$

$\frac{a}{x} = 3$

$\boxed{\dfrac{a}{3} = x}$

$\frac{a+x}{a-x} = \frac{2}{1}, -\frac{2}{1}$

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

1

27. If $x^{y^z} = 1$, $y^{z^x} = 125$ and $z^{y^x} = 243$ (x, y and z are natural number), then what is the value of $9x + 10y - 18z$?

यदि $\boxed{x^{y^z} = 1}$, $y^{z^x} = 125$ और $z^{y^x} = 243$ (x, y तथा z प्राकृतिक संख्याएं है), तो $9x + 10y - 18z$ का मान क्या है?

a) 18   b) 15   c) 12   d) 5

i) $x = 1$ $(1)^{y^2} = 1$

ii) $y^z = 0$ $x^0 = 1$
Natural nos

$y^2 = 125 = 5^3$

$y = 5$, $z = 3$

$3^{5^1} = 243$

$9 + 50 - 54 = 5$

28. If $x^{y+z} = 1, y^{x+z} = 1024$ and $z^{x+y} = 729$ (x, y and z are natural number), then what is the value of $(z+1)^{y+x+1}$?

यदि $x^{y+z} = 1, y^{x+z} = 1024$ और $z^{x+y} = 729$ (x,y तथा z प्राकृतिक संख्याएं है), तो $(z+1)^{y+x+1}$? का मान क्या है?

a) 6561   b) 10000   c) 4096   d) 14641

$x = 1$

$1^{y+z} = 1$

$\boxed{y + z = 0}$ ✗

$y^{1+z} = 2^{10}$

$2^{10}, 4^5$

$y = 2$

$z = 9$

10^4

$x + x + x = 3x$

$y + y = 2y$

29. If $\left(3^{33} + 3^{33} + 3^{33}\right)\left(2^{33} + 2^{33}\right) = 6^x$, then what is the value of x?

यदि $\left(3^{33} + 3^{33} + 3^{33}\right)\left(2^{33} + 2^{33}\right) = 6^x$ हो, तो x का क्या मान है?

a) 34   b) 35   c) 33   d) 33.5

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

$3^1 \cdot 3^{33} \times 2^1 \cdot 2^{33} = 6^x$

$= 3^{34} \times 2^{34} = 6^x$

$= 6^{34} = 6^x$

30. If $\frac{1}{4} \times \frac{2}{6} \times \frac{3}{8} \times \frac{4}{10} \times \frac{5}{12} \times \cdots \times \frac{31}{64} = \frac{1}{2^x}$, then x equals to

अगर $\frac{1}{4} \times \frac{2}{6} \times \frac{3}{8} \times \frac{4}{10} \times \frac{5}{12} \times \cdots \times \frac{31}{64} = \frac{1}{2^x}$ है तो $x =$

a) 31   b) 32   c) 36   d) 37

$$\frac{1}{2^{30}} \times \frac{1}{2^6}$$

$$= \frac{1}{2^{36}} = \frac{1}{2^x}$$

5

३. If $3x - y = 3$ what is the value of $\dfrac{8^x}{2^y} = ?$

यदि $3x - y = 3$ है, $\dfrac{8^x}{2^y}$ का मान क्या है ?

a) 2   ~~b) 8~~   c) 16   d) Data Insufficient

$$\frac{2^{3x}}{2^y} = 2^{3x-y} = 2^3 = 8$$

32. If $a = 0.4039$ then $\sqrt{4a^2 - 4a + 1} + 5a = ?$

अगर $a = 0.4039$ है तो $\sqrt{4a^2 - 4a + 1} + 5a$ का मान:

a) 2.2117   b) 2.4039

c) 2.8078   d) 1.8273

$\sqrt{16} = 4$

$\sqrt{(1-2a)^2}$ $\sqrt{(2a-1)^2} + 5a$

$1-2a = +ve$

$\times\ 2a-1 = -ve$

$1-2a+5a = 1+3a$

$= 1 + 1.2117$

7

$(a-b)^2 = (b-a)^2$

33. $\sqrt{(1-\sqrt{3})^2} + \sqrt{(\sqrt{3}-2)^2} = ?$

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

$\sqrt{3} = 1.732$

$\sqrt{3} - 1 + 2 - \sqrt{3}$

$= 1$

34. If $2 < x < 3$ then $\sqrt{(2-x)^2} + \sqrt{(x-3)^2} =$?

अगर $2 < x < 3$ है तो $\sqrt{(2-x)^2} + \sqrt{(x-3)^2} =$?

a) 1 b) -1 c) $2x-5$ d) $5-2x$
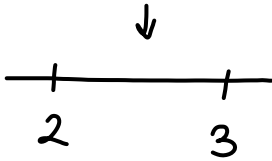
$x-2 + 3-x = 1$

a) 7   b) 9   c) 5   ~~d) 6~~

$$5^{15} - 5^{14}$$

$$5^{14}(5-1)$$

$$3^{x-1}(3-1) = \cancel{486} \overset{243}{=} 3^5$$

$$x - 1 = 5$$

$$\Rightarrow x = 6$$
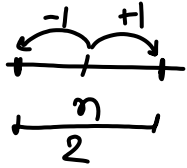
36. If $2^{n-1} + 2^{n+1} = 320$, then the value of n is

अगर $2^{n-1} + 2^{n+1} = 320$ है तो n का मान:

a) 6 b) 8 c) 5 d) 7

$$2^{n-1}(1+4) = 320 = 2^6$$

$$\frac{64}{}$$

$$n = 7$$

37. If $5^a + 2^{b+1} = 189$ & $5^{a+1} + 2^{b-2} = 633$, then find $a + b$.

यदि $5^a + 2^{b+1} = 189$ और $5^{a+1} + 2^{b-2} = 633$ है, तो $a + b$ ज्ञात करो |

a) 8   b) 7   c) 10   d) 9

$$5^{a+1} = 5^a \times 5^1$$
$$= 5 \cdot 5^a$$

$$2^{b+2} = 4 \cdot 2^b$$
$$= 2^b \times 2^2$$

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

$$2^{b-2} = \frac{2^b}{2^2}$$

$$2^b \times 2^{-2}$$

$$5^a + 2 \cdot 2^b = 189$$
$$\underset{12}{5} \quad \underset{64}{} $$
$$x + 2y = 189$$
$$5x + \frac{y}{4} = 633$$

$$5 \cdot 5^a + \frac{1}{4} 2^b = 633$$

$$5^3 = 5^a = x$$
$$2^5 = 2^b = y$$
$$5 = b$$
$$3 = a$$

$$\frac{39}{4} y = \frac{945}{-633}$$
$$\frac{312}{248}$$
$$y = 32$$

12

38. If $(x + y + z)^y = a^x, (x + y + z)^z = a^y (x + y + z)^x = a^z$ then,

यदि $(x + y + z)^y = \underline{a^x}, (x + y + z)^z = \underline{a^y} (x + y + z)^x = \underline{a^z}$ है, तो

a) Only $(x + y + z) = a$ b) $x = y = z = 2a$

c) $x = y = z = \dfrac{a}{3}$ d) $x = y = z = a$

$$(x + y + z)^{x+y+z} = a^{x+y+z}$$

$$\Rightarrow x + y + z = a$$

$x + y + z = a$ $a = x + y + z$

$a^y = a^x$ $a^z = a^y$

$\Rightarrow y = x$ $\Rightarrow z = y$

$x = y = z$

13

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

यदि $x = y^a$, $y = z^b$ और $z = x^c$ है,तो abc का मान है:

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

$x = y^a$

$z = \left(y^a\right)^c = y^{ac}$

$z^1 = \left(z^b\right)^{ac} = z^{abc}$

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४०. If $a^x = b$, $b^y = c$ and $xyz = 1$, then what is the value of c^z?

यदि $a^x = b$, $b^y = c$ और $xyz = 1$ है, तो $\boxed{c^z}$ का मान क्या होगा ?

a) a   b) b   c) ab   d) $\frac{a}{b}$

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

$$\Rightarrow a^{xy} = c^z$$

४१. If $a^x = b^y = c^z$ and $abc = 1$, then the value of $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$ will be equal to

यदि $a^x = b^y = c^z$ और $abc = 1$ है, तो $\frac{1}{x} + \frac{1}{y} + \frac{1}{z}$ का मान बराबर है :

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

$$a^x = k \implies a = k^{\frac{1}{x}}$$
$$b = k^{\frac{1}{y}}$$
$$c = k^{\frac{1}{z}}$$

$$a \times b \times c = k^{\frac{1}{x}} \times k^{\frac{1}{y}} \times k^{\frac{1}{z}}$$

$$\implies abc = k^{\frac{1}{x} + \frac{1}{y} + \frac{1}{z}}$$

$$k^0 = 1$$

$\left(a^{\frac{1}{m}}\right)^m = (k)^m$

$a = k^m$

If $a^{\frac{1}{m}} = b^{\frac{1}{n}} = c^{\frac{1}{p}}$ and $abc = 1$, then $(m + n + p)$ is equal to

यदि $a^{\frac{1}{m}} = b^{\frac{1}{n}} = c^{\frac{1}{p}} = k$ और $abc = 1$ है, तो $(m + n + p)$ बराबर है:

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

$\left.\begin{array}{l} a = k^m \\ b = k^n \\ c = k^p \end{array}\right\}$ $k = 1 = abc = k^{m+n+p}$

17

43. If $2^x = 3^y = 6^{-z}$ then $\left(\dfrac{1}{x} + \dfrac{1}{y} + \dfrac{1}{z}\right)$ is

अगर $2^x = 3^y = 6^{-z}$ है तो $\left(\dfrac{1}{x} + \dfrac{1}{y} + \dfrac{1}{z}\right)$=?

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

$= k$

$x \begin{bmatrix} 2 = k^{\frac{1}{x}} \\ 3 = k^{\frac{1}{y}} \end{bmatrix}$

$y = 6 = k^{-\frac{1}{z}}$

$2 \times 3 = 6$

$k^{\frac{1}{x}} \times k^{\frac{1}{y}} = k^{-\frac{1}{z}}$

$\Rightarrow k^{\frac{1}{x} + \frac{1}{y}} = k^{-\frac{1}{z}}$

$\Rightarrow \dfrac{1}{x} + \dfrac{1}{y} = -\dfrac{1}{z}$

18

44. If $4^x = 6^{-y} = 9^z$ then $\left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z}\right)$ is

$= k$

अगर $4^x = 6^{-y} = 9^z$ है तो $\left(\frac{1}{x} + \frac{1}{y} + \frac{1}{z}\right) = ?$

a) 0   b) $-\frac{1}{x}$ c) $-\frac{1}{y}$ d) $-\frac{1}{z}$

$4 = k^{\frac{1}{x}}$

$6 = k^{-\frac{1}{y}}$

$9 = k^{\frac{1}{z}}$

$9 \times 4 = 6^2$

$k^{\frac{1}{z}} \times k^{\frac{1}{x}} = k^{-\frac{2}{y}}$

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

$\quad + \frac{1}{y}$

19

45. If $2^x = 3^y = 12^z = k$ then $\left(\frac{1}{z} - \frac{1}{y}\right)$ is

अगर $2^x = 3^y = 12^z$ है तो $\left(\frac{1}{z} - \frac{1}{y}\right) = ?$

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

$2 = k^{\frac{1}{x}}$

$3 = k^{\frac{1}{y}}$

$12 = k^{\frac{1}{z}}$

$2^2 \times 3 = 12$

$k^{\frac{2}{x}} \times k^{\frac{1}{y}} = k^{\frac{1}{z}}$

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

20

46. $(0.111\ldots)^x = (324)^y = (8)^z$, find the relation between x, y, z .

$(0.111\ldots)^x = (324)^y = (8)^z$ है, x, y, z के बीच सम्बन्ध ज्ञात करो ।

a) $\dfrac{1}{x} + \dfrac{1}{2y} = \dfrac{1}{3z}$ b) $\dfrac{1}{2x} + \dfrac{1}{y} + \dfrac{1}{z}$

c) $\dfrac{1}{3x} + \dfrac{1}{2y} = \dfrac{1}{3z}$ d) None of these

$\cdot \bar{1} = \dfrac{1}{9}$

$$\left(\dfrac{1}{9}\right)^x = 324^y = 8^z = K$$

$$\left(\dfrac{1}{9}\right)^x = 18^{2y} = 2^{3z} = K$$

$\dfrac{1}{9} = K^{\frac{1}{x}}$

$18 = K^{\frac{1}{2y}}$

$2 = K^{\frac{1}{3z}}$

$\dfrac{1}{9} \times 18 = 2$

$\Rightarrow K^{\frac{1}{x}} \times K^{\frac{1}{2y}} = K^{\frac{1}{3z}}$

$\dfrac{1}{x} + \dfrac{1}{2y} = \dfrac{1}{3z}$

21

47. If $p^a = q^b = r^c$ and $\frac{p}{q} = \frac{q}{r}$, then $\left(\frac{1}{a} + \frac{1}{c}\right) b = ?$

यदि $p^a = q^b = r^c$ और $\frac{p}{q} = \frac{q}{r}$ है, तो $\left(\frac{1}{a} + \frac{1}{c}\right) b$ होगा :

a) 1   b) $\frac{1}{2}$ c) $\frac{3}{4}$ d) 2

$= k$

$pr = q^2$

$P = k^{\frac{1}{a}}$

$q = k^{\frac{1}{b}}$

$r = k^{\frac{1}{c}}$

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

22

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

$y = k^{\frac{1}{2b}}$

$z = k^{\frac{1}{2c}}$

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

$\Rightarrow \dfrac{2}{a} = \dfrac{b+c}{bc}$

$\Rightarrow 2bc = ab + ac$

४८. If $x^{2a} = y^{2b} = z^{2c} \neq 0$ and $x^2 = yz$, then the value of $\dfrac{ab+bc+ca}{bc}$ is:

यदि $x^{2a} = y^{2b} = z^{2c} \neq 0$ और $x^2 = yz$, तो $\dfrac{ab+bc+ca}{bc}$ का मान है:

a) 3   b) $3ac$

c) $3bc$ d) $3ab$

$\dfrac{3bc}{bc}$

$$3.7 = \frac{(10000)^{\frac{1}{x}}}{.037 = (10000)^{\frac{1}{y}}}$$

$$100 = (10000)^{\frac{1}{x} - \frac{1}{y}}$$

$$\Rightarrow 10^2 = 10^{4\left(\frac{1}{x} - \frac{1}{y}\right)}$$

$$\frac{1}{2} = \frac{2}{4} = \frac{1}{x} - \frac{1}{y}$$

49. If $\underline{(3.7)^x} = (0.037)^y = \underline{10000}$, then what is the value of $\frac{1}{x} - \frac{1}{y}$?

यदि $(3.7)^x = (0.037)^y = 10000$ है, तो $\frac{1}{x} - \frac{1}{y}$ का मान क्या होगा ?

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

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

24

50. x, y and z all are positive numbers. If $3^x > 9^y$ and $2^y > 4^z$, then which of the following is true?

x, y तथा z सभी धनात्मक संख्याएं हैं। यदि $3^x > 9^y$ तथा $2^y > 4^z$ है, तो निम्न में से कोनसा सत्य है?

a) $x > y > z$

b) $x > z > y$

c) $z > y > x$

d) $y > x > z$

$$2^y > 2^{2z}$$
$$\Rightarrow y > 2z$$
$$\Rightarrow y > z$$

$$3^x > 9^y$$
$$3^x > 3^{2y}$$
$$\Rightarrow x > 2y$$
$$\Rightarrow x > y$$

(i) $a > 1$ $a^{big} > a^{small}$

$$5^3 > 5^2$$

(ii)

$$\left(\frac{1}{2}\right)^2 = \frac{1}{4}$$ $a^{big} < a^{small}$

$0 < a < 1$
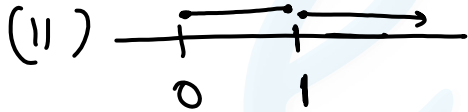
$$\left(\frac{1}{2}\right)^3 = \frac{1}{8}$$ $\left(\frac{1}{2}\right)^5 < \left(\frac{1}{2}\right)^3$

$\frac{1}{2}, \frac{1}{3}, \frac{2}{5}$
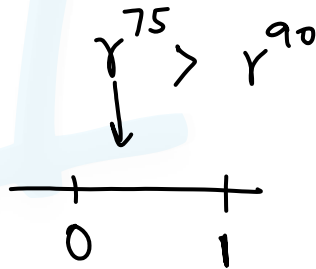
$$\left(\frac{1}{2}\right)^4 = \frac{1}{16}$$

51. r is a non-zero number such that $r^{75} > r^{90}$. This is possible only when

r एक गैर-शून्य संख्या है ऐसे कि $r^{75} > r^{90}$ है। यह तभी संभव है जब :

a) $-1 < r < 0$ b) $0 < r < 1$

c) $1 < r$ d) $-1 < r < 1$

$$r^{75} > r^{90}$$

52 . If $p^x = r^y$ and $r^W = p^z$, then which one of the following is correct ?

यदि $p^x = r^y$ और $r^W = p^z$ है, तो निम्नलिखित में से कौन सा ठीक है?

a) $xw = yz$ b) $xz = yw$

c) $x + y = w + z$ d) $x - y = w - z$

$$P = k^{\frac{1}{x}}$$

$$r = k^{\frac{1}{y}}$$

$$k^{\frac{w}{y}} = k^{\frac{z}{x}}$$

$$\frac{w}{y} = \frac{z}{x}$$

$$\Rightarrow wx = yz$$

53. If $2b = a + c$ and $y^2 = xz$, then what is $x^{b-c}y^{c-a}z^{a-b}$ equal to?

यदि $2b = a + c$ और $y^2 = xz$ हैं तो $x^{b-c}y^{c-a}z^{a-b}$ किसके बराबर है ?

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

$b - c = a - b$

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

$2b = a + c$

$2^2 = 4 \times 1$

$x^{a-b} \cdot y^{c-a} z^{a-b}$

$= (xz)^{a-b} \cdot y^{c-a}$

$= y^{2a-2b} \cdot y^{c-a}$

$= y^{a-2b+c} = y^{a+c-2b}$

$= y^0 = 1$

54. If $x > 0$, $x^2 = 2^{64}$ and $x^x = 2^y$ then what is the value of y ?

यदि $x > 0$, $x^2 = 2^{64}$ और $x^x = 2^y$ है, तो y का मान क्या है ?

a) 2^{32}　　　b) 2^{11}　　　　c) 2　　　　　d) 2^{37}

$$x = 2^{\frac{64 \times 1}{2}}$$

$$\Rightarrow x = 2^{32}$$

$$\left(2^m\right)^n = 2^{mn}$$

$$2^5 \quad \left(2^{32}\right)^{2^{32}} = 2^y$$

$$\Rightarrow 2^{32 \times 2^{32}} = 2^y$$

$$\Rightarrow 2^{\left(2^{37}\right)} = 2^y$$

$$\Rightarrow 2^{37} = y$$