

10. If $a + b + c = 8$ and $ab + bc + ca = 5$, then $bc(b + c) + ca(c + a) + ab(a + b) + 3abc = ?$

यदि $a + b + c = 8$ और $ab + bc + ca = 5$, तो $bc(b + c) + ca(c + a) + ab(a + b) + 3abc = ?$

[A] 13

[C] 50

[B] 40

[D] 32

$= 8 \times 5$



$$(a + b + c) \cdot (ab + bc + ca) = a^2b + b^2a + b^2c + bc^2 + a^2c + ac^2 + 3abc$$

$$(a + b + c) \cdot (ab + bc + ca) - abc = a^2b + b^2a + b^2c + bc^2 + a^2c + ac^2 + 2abc$$

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

$$= (a + b)(b + c)(c + a) \checkmark$$

#

$$(a + b + c)(ab + bc + ca) - 3abc$$

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

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

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

11. If $a+b+c = 6$ and $a^2+b^2+c^2 = 38$, then what is the value of $a(b^2+c^2) + b(c^2+a^2) + c(a^2+b^2) + 3abc$?

यदि $a+b+c = 6$ और $a^2+b^2+c^2 = 38$ है, तो $a(b^2+c^2) + b(c^2+a^2) + c(a^2+b^2) + 3abc$ का मान ज्ञात कीजिए।

[A] 3

[C] 6

[B] - 3

✓ [D] - 6

$$(a+b+c)(ab+bc+ca)$$

↓
6

↓
-1

x

SelectionWay



12. If $a + b + c = 7$, $ab + bc + ca = 25$ and $abc = 13$ then $a^2b + b^2a + b^2c + c^2b + a^2c + c^2a = ?$
यदि $a + b + c = 7$, $ab + bc + ca = 25$ और $abc = 13$ तो $a^2b + b^2a + b^2c + c^2b + a^2c + c^2a = ?$

[A] 136

[C] 127

[B] 162

[D] 144


$$\begin{aligned} & 7 \times 25 - 3 \times 13 \\ &= 175 - 39 \\ &= 136 \end{aligned}$$



13. If $a + b + c = 6$ & $\frac{a(b^2+c^2)+b(c^2+a^2)+c(a^2+b^2)}{abc} = 13$, then find $\frac{1}{a} + \frac{1}{b} + \frac{1}{c}$?

यदि $a + b + c = 6$ & $\frac{a(b^2+c^2)+b(c^2+a^2)+c(a^2+b^2)}{abc} = 13$ है, तो $\frac{1}{a} + \frac{1}{b} + \frac{1}{c}$ ज्ञात कीजिये?

[A] $8/3$

[C] $19/6$

[B] 4

[D] 2

$$6(ab+bc+ca) = 16abc$$

$$\frac{ab+bc+ca}{abc} = \frac{16}{6}$$

$$\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = \frac{8}{3}$$



14. What is the simplified value of $\frac{(x+y+z)(xy+yz+zx)-xyz}{(x+y)(y+z)(z+x)}$?

$\frac{(x+y+z)(xy+yz+zx)-xyz}{(x+y)(y+z)(z+x)}$ का सरलीकृत मान क्या है?

(Mains 2021)

[A] z

[C] 1

[B] x

[D] y

SelectionWay



Important formula

$$\begin{aligned}(a + b + c)^3 &= \overbrace{a^3 + b^3 + c^3} + 3(a + b)(b + c)(c + a) \\&= a^3 + b^3 + c^3 + 3(\underline{a^2b + b^2a + b^2c + bc^2 + c^2a + ca^2 + 2abc}) \\&= a^3 + b^3 + c^3 + 3a^2(b + c) + 3b^2(c + a) + 3c^2(a + b) + 6abc\end{aligned}$$



$$(a + b + c)^3 - a^3 - b^3 - c^3 = 3(a + b)(b + c)(c + a)$$

15. If $A = \frac{(0.1)^3 + (0.2)^3 + (0.3)^3 + 3(0.005 + 0.016 + 0.027) + 0.036}{(0.1)^2 + (0.2)^2 + (0.3)^2 + 0.04 + 0.06 + 0.12}$, then the value of $60A$ is:

यदि $A = \frac{(0.1)^3 + (0.2)^3 + (0.3)^3 + 3(0.005 + 0.016 + 0.027) + 0.036}{(0.1)^2 + (0.2)^2 + (0.3)^2 + 0.04 + 0.06 + 0.12}$ है, तब $60A$ का मान है:
 $= 36$

[A] 20

[C] 36

[B] 60

[D] 30

(CHSL २००२)

$$A = \frac{(0.1 + 0.2 + 0.3)^3}{(0.1 + 0.2 + 0.3)^2}$$

$$A = 0.6$$



16. If $(x + y)^{\frac{1}{3}} + (y + z)^{\frac{1}{3}} = -(z + x)^{\frac{1}{3}}$, then $(x^3 + y^3 + z^3)$ can be expressed as:

यदि $(x + y)^{\frac{1}{3}} + (y + z)^{\frac{1}{3}} = -(z + x)^{\frac{1}{3}}$ है तो $(x^3 + y^3 + z^3)$ को इस प्रकार व्यक्त किया जा सकता है:

[A] $\frac{1}{9}xyz$

[B] $(x + y)(y + z)(z + x)$

[C] $\frac{3}{8}(x + y)(y + z)(z + x)$

[D] $3xyz$

(CHSL 2019 Pre)

$$(x+y)^{\frac{1}{3}} + (y+z)^{\frac{1}{3}} + (z+x)^{\frac{1}{3}} = 0$$

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

$$x^3 + y^3 + z^3 + 3 = \frac{27}{8}$$

$$x^3 + y^3 + z^3 = \left(\frac{27}{8} - 3 \right)$$



17.
$$\frac{1.29 \times 0.1122 \times 10.8}{0.183^3 + 0.204^3 + 0.357^3 - 0.744^3} ?$$

[A] $3\frac{1}{3}$

[C] $-6\frac{2}{3}$

[B] -3

[D] $-4\frac{4}{9}$

H.W

SelectionWay



18. Find the value of $\frac{10.7^3 - 2.4^3 - 3.5^3 - 4.8^3}{5.9 \times 8.3 \times 4.8} = ?$

$\frac{10.7^3 - 2.4^3 - 3.5^3 - 4.8^3}{5.9 \times 8.3 \times 4.8} = ?$ का मान ज्ञात कीजिए।

☒ [A] 4.5 $= \frac{3 \times 5.9 \times 8.3 \times 7.9}{5.9 \times 8.3 \times 4.8}$

[C] 1

[B] 21.97

[D] 3

(IB 20/7)

$$(a+b+c)^3 - a^3 - b^3 - c^3 = 3(a+b)(b+c)(c+a)$$



19. $372^3 - 123^3 - 124^3 - 125^3$ is divisible by ?

$372^3 - 123^3 - 124^3 - 125^3$ से विभाज्य है?

[A] 83 and 31 both

[C] 83 and 59 both

[B] 43 and 59 both

[D] 31 and 59 both

(CDS 2002)

$3 \times 247 \times 249 \times 248$

3×83

8×31



$$a^n = a \times a \times a \dots n \text{ बार}$$

$$a^{\frac{1}{n}} = \sqrt[n]{a}$$

$$a^m \times a^n = a^{m+n}$$

$$(a^m)^n = (a^n)^m = a^{m \times n}$$

$$\text{If } x^n = a$$
$$\Rightarrow x = a^{\frac{1}{n}}$$

Exponential Relation formula

$$7^a = 11^b = 77^c = k \text{ माना}$$

$$7 = k^{\frac{1}{a}}$$

$$11 = k^{\frac{1}{b}}$$

$$77 = k^{\frac{1}{c}}$$

$$(\because 7 \times 11 = 77)$$

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

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

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

$$\Rightarrow c = \frac{ab}{a+b}$$

Basic $\Rightarrow$

20. If $7^a = 11^b = 77^c$, then find value of $c = ?$

यदि $7^{\textcircled{a}} = 11^{\textcircled{b}} = 77^{\textcircled{c}}$, तो c का मान ज्ञात कीजिए ?

[A] $\frac{ab}{a+b}$

[C] $\frac{ab}{a-b}$

[B] $\frac{a+b}{ab}$

[D] $\frac{a+b}{a-b}$

$7^{\textcircled{1}} \times 11^{\textcircled{1}} = 77^{\textcircled{1}}$

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

direct



21. If $2x = 3y = 18 - z$, then which option is correct?

यदि $2^x = 3^y = 18^{-z}$ है, तो कौन सा विकल्प सही है?

~~[A]~~ $\frac{1}{x} + \frac{2}{y} + \frac{1}{z} = 0$

[C] $\frac{1}{x} + \frac{2}{y} - \frac{1}{z} = 0$

[B] $\frac{2}{x} + \frac{1}{y} + \frac{1}{z} = 0$

[D] $\frac{1}{x} - \frac{2}{y} + \frac{1}{z} = 0$

$\overset{(1)}{2}x \overset{(2)}{3} = 18 \overset{(1)}{-z}$

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



22. If $169^a = 403^{-2b} = 961^c$, then find $\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)^{2021}$?

यदि $169^a = 403^{-2b} = 961^c$ है, तो $\left(\frac{1}{a} + \frac{1}{b} + \frac{1}{c}\right)^{2021}$ ज्ञात कीजिये?

[A] 0

[C] 2

[B] 1

[D] -1

$= 0^{2021}$

$$13^{2a} = 403^{-2b} = 31^{2c}$$

$$\Rightarrow 13^a = 403^{-b} = 31^c$$

$$13^1 \times 31^1 = 403^1$$

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



23. If a, b, c are non-zero numbers and then $6b\left(\frac{1}{c} - \frac{1}{a}\right)$ is equal to?

यदि a, b, c गैर-शून्यक संख्याये हैं और $14^a = 36^b = 84^c$ हैं, तो $6b\left(\frac{1}{c} - \frac{1}{a}\right)$ बराबर है?

[A] 6

[C] 4

[B] 3

[D] 1.5

$$= 6b \times \frac{1}{2b}$$

$$14 \times 6 = 84$$

$$14^1 \times 36^{\frac{1}{2}} = 84^1$$

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

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



24. If $ax = by = cz$ and $b^3 = a^2c^4$, then what is $\frac{1}{x} + \frac{2}{z}$ equal to?

यदि $a^x = b^y = c^z$ और $b^3 = a^2c^4$ है, तो $\frac{1}{x} + \frac{2}{z}$ किसके बराबर है?

[A] $\frac{1.5}{y}$

[C] $\frac{2.5}{y}$

[B] $-\frac{1.5}{y}$

[D] $\frac{3}{y}$

$\frac{3}{2x} = \frac{2}{2x} + \frac{4}{2z}$

SelectionWay



25. If $(5.55)^x = (0.555)^y = 1000$, then the value of $\frac{1}{x} - \frac{1}{y}$ is

यदि $(5.55)^x = (0.555)^y = 1000$, फिर $\frac{1}{x} - \frac{1}{y}$ का मान है

[A] 3

[C] $1/3$

[B] 1

[D] $2/3$

$$5.55^x = .555^y = 10$$

$$\frac{1}{x} - \frac{1}{y} = \frac{1}{3}$$

$$\frac{5.55^1}{.555^1} = 10^1$$



26. If $(0.77)^x = (0.0077)^y = 1000$, then what is the value of $\frac{x-y+xy}{3(y-x)+xy}$?

यदि $(0.77)^x = (0.0077)^y = 1000$ है, तो $\frac{x-y+xy}{3(y-x)+xy}$ ज्ञात कीजिए ?

[A] $\frac{1}{9}$
[C] $\frac{5}{2}$

[B] $\frac{1}{3}$
[D] $\frac{2}{3}$

H.W



27. If $\sqrt[x]{75} = \sqrt[y]{45} = \sqrt[z]{15}$, then which of the following statement is true?

यदि $\sqrt[x]{75} = \sqrt[y]{45} = \sqrt[z]{15}$ है, तो निम्नलिखित में से कौन सा कथन सत्य है?

[A] $x + y = 2z$

[C] $x - y = 3z$

[B] $x + y = 3z$

[D] $2x + 3y = 4z$

$75^{\frac{1}{x}} = 45^{\frac{1}{y}} = 15^{\frac{1}{z}}$

$75^{\textcircled{1}} \times 45^{\textcircled{1}} = 15^{\textcircled{3}}$

$x + y = 3z$



$$\underline{1 + A + B + AB} = (1 + A)(1 + B) \checkmark$$

$$(ax + by)^2 + (ay - bx)^2 = (a^2 + b^2)(x^2 + y^2) \checkmark$$

28. If $x + y + xy = 208$, where x and y are positive integer, find $(x + y)$?

यदि $x + y + xy = 208$, जहां x और y सकारात्मक पूर्णांक हैं, तो $(x + y)$ का मान क्या है?

[A] 28

[B] 30

[C] 29

[D] 27

$$1 + x + y + xy = 208 + 1$$

$$(1+x)(1+y) = 209$$

$$\begin{array}{r} \cancel{1} \times \cancel{209} \\ 11 \times 19 \end{array}$$

$$x = 10, y = 18$$



29. If $x + y + xy = 0$; $y + z + yz = 3$; $z + x + zx = 8$ then find $12xyz = ?$

यदि $x + y + xy = 0$; $y + z + yz = 3$; $z + x + zx = 8$ तो $12xyz$ का मान क्या है?

[A] -8

[B] -5

[C] -10

[D] -15

$$12 \times \frac{1}{2} \times -\frac{1}{3} \times 5 = -10$$

$$(1+x)(1+y)=1$$

$$(1+y)(1+z)=4$$

$$(1+z)(1+x)=9$$

$$(1+x)(1+y)(1+z)=6$$

$$1+z=6 \Rightarrow z=5$$

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

$$1+y=\frac{6}{9} \Rightarrow y=-\frac{1}{3}$$



30. Find $x^2 + y^2$, if x and y are positive integers such that $xy + x + y = 71$ and $x^2y + xy^2 = 880$.

$x^2 + y^2$, ज्ञात कीजिए, यदि x और y धनात्मक पूर्णांक हैं जैसे कि $xy + x + y = 71$ और $x^2y + xy^2 = 880$.

[A] 146

[C] 142

[B] 113

[D] 181

$$(1+x)(1+y) = 72$$

$\rightarrow 12 \times 6$

$$xy(x+y) = 880$$

$11 \times 5 \times 16 = 880 \checkmark$

$$x = 11$$
$$y = 5$$

$\rightarrow 121 + 25$



31. If $a^2+b^2 = 25$, $x^2+y^2 = 17$ and $ax+by = 8$, then $ay-bx = ?$

यदि $a^2+b^2 = 25$, $x^2+y^2 = 17$ और $ax+by = 8$ है, तो $ay-bx$ ज्ञात कीजिए?

(CHSL 2020)

[A] 20

[C] 18

[B] 17

[D] 19

$$8^2 + ?^2 = 25 \times 17$$

$$?^2 = 425 - 64$$

$$?^2 = 361$$

$$? = 19$$

