MISSION SSC 2024

MATHS

TOPIC BOOSTER

ALGEBRA
(PART 3)

LIVE 05:00 PM

Mission Selection – SSC 2024

ALGEBRAIC IDENTITIES

1. $(a + b)^2 = a^2 + 2ab + b^2 = (-a - b)^2$
2. $(a - b)^2 = a^2 - 2ab + b^2$
3. $(a - b)(a + b) = a^2 - b^2$
4. $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$
5. $(a + b - c)^2 = a^2 + b^2 + c^2 + 2ab - 2bc - 2ca$
6. $(a - b + c)^2 = a^2 + b^2 + c^2 - 2ab - 2bc + 2ca$
7. $(-a + b + c)^2 = a^2 + b^2 + c^2 - 2ab + 2bc - 2ca$
8. $(a - b - c)^2 = a^2 + b^2 + c^2 - 2ab + 2bc - 2ca$
9. $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$
10. $(a - b)^3 = a^3 - b^3 - 3ab(a - b)$
11. $a^3 + b^3 = (a + b)^3 - 3ab(a + b)$
    $= (a + b)(a^2 - ab + b^2)$
12. $a^3 - b^3 = (a - b)^3 + 3ab(a - b)$
    $= (a - b)(a^2 + ab + b^2)$
13. $a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$

if $a + b + c = 0$ then $a^3 + b^3 + c^3 = 3abc$

Q1.If $x + \frac{1}{x} = 5$ then find the value of $.x^2 - \frac{1}{x^2}$

a. $5\sqrt{21}$
b. 5
c. $-5\sqrt{21}$
d. 7

Q2.If $x^4 + \frac{1}{x^4} = 194$ then find the value of $x^3 - \frac{1}{x^3}$.

a. $30\sqrt{3}$

b. $30\sqrt{2}$

c. 14

d. 25

Q3. $\left(x+\frac{1}{x}\right)\left(x-\frac{1}{x}\right)\left(x^2+\frac{1}{x^2}-1\right)\left(x^2+\frac{1}{x^2}+1\right)$

a. $x^6+\frac{1}{x^6}$

b. $x^8+\frac{1}{x^8}$

c. $x^8-\frac{1}{x^8}$

d. $x^6-\frac{1}{x^6}$

Q4.If a= $\sqrt{7+2\sqrt{12}}$ and b= $\sqrt{7-2\sqrt{12}}$, then (a^3+b^3) is equal to

a. 40
b. 44
c. 48
d. not

Q5.If $x=\sqrt[3]{2+\sqrt{3}}$, then the value of $x3+\frac{1}{x3}$ is

a. 8
b. 9
c. 2
d. 4

Q6.If $a^3+ b^3+ c^3- 3abc=0$ and $a + b +c\neq 0$ find relation

a. $a=b=c$

b. $a + b=c$

c. $a + c=b$

d. $a=b+c$

Q7.If a=25, b=15 and c= -10, $a^3+b^3+ c^3-3abc/(a-b)^2 +(b-c)^2 +(c-a)^2$

a. 15

b. 10

c. 1

d. 0

Q8.If a=997, b=998 and c=999, $a^3+b^3+c^3-3abc$ =?

a. 0

b. 8982

c. 1

d. 4491

Q9.If $\frac{a}{b+c}+\frac{b}{c+a}+\frac{c}{a+b}=1$, then find value of $\frac{a^2}{b+c}+\frac{b^2}{c+a}+\frac{c^2}{a+b}$

a. **0**

b. -1

c. **2**

d. **2**

Q10. $x + \frac{1}{x} = 1$ then find the value of $x^{17} + \frac{1}{x^{17}}$

a. 1
b. -1
c. 0
d. *not*

Q11. If $x+\frac{1}{x}=\sqrt{3}$ then find $x^{506}+x^{500}+x^{384}+x^{190}+x^{184}+x^{18}+x^{12}$

a. 3

b. **1**

c. 84

d. *not*

Q12.If $x^{1/3}+y^{1/3}=z^{1/3}$

Find the value $(x+y-z)^3+27xyz$

a.1

b.0

c. 2

d. -1

Q13.If $x=5+2\sqrt{6}$ and $x\ y=1$, then find the value of $\frac{x^3+3xy+y^3}{x^2-2xy+y^2}$

a. $\frac{209}{93}$

b. $\frac{973}{97}$

c. $\frac{205}{37}$

d. not

Q14. If x + y + z = 19, $x^2 + y^2 + z^2 = 133$ and $xz = y^2$, then the difference between z and x is

(a)10

(b)12

(c)9

(d)5

Q15.If $x^4 + x^{-4} = 194$, x > 0, then the value of $(x - 2)^2$

(a)1

(b)2

(c) 6

(d) 3

Q16.If $x = 2 - \sqrt{3}$ then the value of $x^3 - x^{-3}$ is

(a)$-30\sqrt{3}$ (b)$30\sqrt{2}$

(c)$30\sqrt{3}$

(d)$-30\sqrt{2}$

$Q17.\ (x+y)^{\frac{1}{3}}+(y+z)^{\frac{1}{3}}=-(z+x)^{\frac{1}{3}}$, then $x^3+y^3+z^3$ can be expressed as:

(a) $\frac{1}{8}xyz$

(b) $\frac{3}{8}(x+y)(y+z)(z+x)$

(c) $(x+y)(y+z)(z+x)$

(d) $3xyz$

Q18.If x is real, and $x^4 - 5x^2 - 1 = 0$, then the value of $\left(x^6 - 3x^2 + \frac{3}{x^2} - \frac{1}{x^6} + 1\right)$ is:

(a)110

(b)116

(c)126

(d)96

Q19.If $8(x+y)\text{ ^3} - (x-y)\text{ ^3} = (x+3y)(Ax\text{^ }2 + Cy\text{ ^2} + Bxy)$, then the value of $(A-B-C)$ is

(a)-6

(b)14

(c)-2

(d)10

Q20.If $8(a+b)^3+(a-b)^3=(3a+b)(Aa^2+Cb^2+Bab)$,then the value of $(A+B-C)$ is:

(a)10

(b)4

(c)2

(d)11

Q21.If $x = (\sqrt{5}-\sqrt{3} / \sqrt{5}+\sqrt{3})$ and y is the reciprocal of x, then what is the value of $(x^3 + y^3)$?

(a)504

(b)476

(c)488

(d)472

Q21.If $(3x-1)^3+(4x-3)^3+(2x+1)^3=3(3x-1)(4x-3)(2x+1)$ and $x \neq 1/3$, then x =?

(a)$1/2$

(b)$1/4$

(c)2

(d)1

Q22.If x^2 – 3x -1 =0, then the value of (x^2+8x-1){x^3+x^(-1) } ^(-1) is:

(a) 3/8

(b) 1

(c) 0

(d) 3

Q23.If $X^{2a} = Y^{2b} = Z^{2c} \neq 0$ and $x^2 = yz$, then the value of $(ab + bc + ca)/bc$ is:

(a)3ac

(b)3ab

(c)3

(d)3bc

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Q24.If $x - y = 4$ and $x\,\hat{}\,3 - y\,\hat{}\,3 = 316$, then the value of $x\,\hat{}\,4 + y\,\hat{}\,4$ is:

(a)2248

(b)2482

(c)2428

(d)2284

Q25.If x=16,find the value of $x^4-17x^3+17x^2-17x+17$

a. 0

b. -1

c. 2

d. 1

If $\frac{a}{1-a} + \frac{b}{1-b} + \frac{c}{1-c} = 1$, then find value of $\frac{1}{1-a} + \frac{1}{1-b} + \frac{1}{1-c}$

a. 0

b. -1

c. 4

d. 2

if $x=\frac{\sqrt{3}+1}{\sqrt{3}-1}$

And xy=1 then find the value of $(\frac{x-y}{x+y})^2$

a. 3/7

b. 3/4

c. 0

d. 1

$4^{2x-y} = 4^{x+y} = \sqrt{64}$ find the value of x

a. 1
b. 0
c. 2
d. not

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

a. 13/6
b. 6/13
c. 13
d. not

if a + b+ c =0 then the value of the $a^2 + b^2 + c^2 / c^2 - ab$

a. 2
b. 1
c. a+b+c
d. not

If a + b+ c =0 then the value of the

$a^2/bc + b^2/ca + c^2/ab$

a. 3

b. 1

c. 2

d. not

$a + b + c = 0, (a^3 + b^3 + c^3)^2 = ?$

(1) $3a^2 b^2 c^2$

(2) $9abc$

(3) $27abc$

(4) $9a^2 b^2 c^2$

If $x = \sqrt{3} + \sqrt{4} + \sqrt{5}$ then

$x^4 - 8x^3 + 8x^2 + 32x = ?$

A- 36

B- 39

C-40

D- 54

If $(a^{28} + 1) / a^{14} = 23$

then $(a^{42} + 1) / a^{21} = ?$

A-110

B- 29

C- 52

D- 59

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If $\{(a^2 + b^2 + c^2) / (a^2 – b^2 – c^2)\} + \{(b^2 + c^2 + a^2) / b^2 – c^2–a^2)\} + \{(c^2 + a^2 +b^2) / (c^2 – a^2 –b^2)\} = ?$

A- 0
B- 1
C-3
D-1

If $x = 1 / x = \sqrt{5}$ than $\sqrt{x}(\sqrt{x} - 1) = ?$

A- $\frac{\sqrt{5}}{2}$

B- $\frac{\sqrt{5}}{4}$

C – 1

D $-\frac{10}{\sqrt{5}}$

If $x = (1 / \sqrt{5} - 2)$ then

$x^4 + 16x^2 - 8x^3 = ?$

A- -1

B - $\sqrt{5}$

C- $2\sqrt{5}$

D- $\sqrt{5} + 2$

If $x = (1 / \sqrt{5} - 2)$ then

$2x^3 - 5x^2 - 14x - 3 = ?$

A - 0

B -1

C -5

D - 3

If $x + (1 / x) = = 1$ then

$x^{50} + x^{51} + x^{52} + x^{53} + x^{54} + x^{55} = ?$

A – 3
B – 6
C – 2
D - 0

If $x + (1 / x) = 0$ then $x^{12} + x^{14} + x^{16} + x^{18} = ?$

A- 0
B – 1
C – 2
D - 4