25 Questions → 1, 2 → algebra.

TOPIC : Math Class 4 (Algebra)

'x' → variables → unknown quantities → $y, z, a, b, \alpha, \beta$.

Expansion:

derive ↓

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

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

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

$\boxed{\boxed{(a+b)^2 = a^2 + 2ab + b^2.}}$

$\Rightarrow \boxed{(a+b)^2 - 2ab = a^2 + b^2}$

Equations.

$a^2 + b^2 = ?$

$(4a + 3b)^2 = (4a)^2 + 2(4a)(3b) + (3b)^2$

($4a$ = a, $3b$ = b)

$= 16a^2 + 24ab + 9b^2$

Say $x + \frac{1}{x} = n$.

$\left[x^2 + \frac{1}{x^2} = n^2 - 2.\right]$

$\left[x^3 + \frac{1}{x^3} = n^3 - 3n\right]$.

$\Rightarrow \left[x^2 + \frac{1}{x^2} = n^2 - 2.\right]$

$\frac{\quad}{x^8} = 3.$

2) $x^{16} + \frac{1}{x^{16}} = 3^2 - 2.$

$= 9 - 2 = 7.$

$(a+b)^3 = (a+b)(a+b)(a+b) = a^3 + 3a^2b + 3ab^2 + b^3$.

$\Rightarrow (a+b)^3 = a^3 + b^3 + 3a^2b + 3ab^2$.

$\Rightarrow (a+b)^3 - 3a^2b - 3ab^2 = a^3 + b^3$.

$\Rightarrow (a+b)^3 - 3ab[a+b] = a^3 + b^3$.

$\Rightarrow (a+b)\left[(a+b)^2 - 3ab\right] = a^3 + b^3$.

$\Rightarrow (a+b)\left[a^2 + 2ab + b^2 - 3ab\right] = a^3 + b^3$.

$a^3 + b^3 = ?$

$+2ab - 3ab$.

** $\Rightarrow (a+b)\left[a^2 + b^2 - ab\right] = a^3 + b^3$.

Important Algebraic Formulae

1. $(a+b)^2 = a^2 + 2ab + b^2$ $\Rightarrow$ $a^2+b^2 = (a+b)^2 - 2ab$.

2. $(a-b)^2 = a^2 - 2ab + b^2$

3. $a^2 - b^2 = (a+b)(a-b)$

$4x^2 - 9y^2 = (2x)^2 - (3y)^2$
$= (2x+3y)(2x-3y)$.

4. $a^2 + b^2 = (a+b)^2 - 2ab = (a-b)^2 + 2ab$

5. $(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$

6. $(a-b)^3 = a^3 - 3a^2b + 3ab^2 - b^3$

*7. $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

*8. $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

9. $(a+b)^2 - (a-b)^2 = 4ab$

10. $(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ac$

**11. $a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ac)$

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

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

$\Rightarrow a^3+b^3+c^3 - 3abc = 0$.

$\Rightarrow a^3+b^3+c^3 = 3abc$ **.

$(a+b+c) = 0$

1. $a + 2b = 5$, $a^2 + 4b^2 = 13$ भने अब=?

A)2 B) 7 C) 11 D)3

$ab = ?$

Remember 2

* Powers. $(a+b)^2$

$(a-b)^2$

$a + 2b = 5$.

squaring both side.

linear

↳ Equations.

$\Rightarrow (a+2b)^2 = (5)^2$

$\Rightarrow a^2 + 2(a)(2b) + (2b)^2 = 25$.

$\Rightarrow a^2 + 4ab + 4b^2 = 25$.

$\Rightarrow 4ab + 13 = 25$. $\Rightarrow 4ab = 25 - 13$.

$\Rightarrow 4ab = 12 \Rightarrow ab = \frac{12}{4} = 3$.

2.यदी $x + 1/x = 12$ भए $x^2 + 1/x^2 = ?$

A) 144 B) 146 C) 142 D)140

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

$\Rightarrow x^2 + \frac{1}{x^2} = n^2 - 2.$

$\Rightarrow x^4 + \frac{1}{x^4} = (n^2-2)^2 - 2.$

$\Rightarrow x^8 + \frac{1}{x^8} = ((n^2-2)^2-2)^2 - 2$

$\Rightarrow x^2 + \frac{1}{x^2} = 144 - 2 = 142.$

3. यदि $x + 1/x = 12$ भए $x^3 + 1/x^3 = ?$

$x + \frac{1}{x} = 12$.

$(a+b)^3 = a^3 + b^3 + 3a^2b + 3ab^2$.

Cubing both side .

$\left(x + \frac{1}{x}\right)^3 = 12^3$.

$x^3 + \frac{1}{x^3} = 1728 - 3(12)$

$= 1692$

$\Rightarrow x^3 + \frac{1}{x^3} + 3(x)^2\left(\frac{1}{x}\right) + 3(x)\left(\frac{1}{x^2}\right) = 1728$.

$\Rightarrow x^3 + \frac{1}{x^3} + 3\left(x + \frac{1}{x}\right) = 1728$.

$\Rightarrow x^3 + \frac{1}{x^3} + 3(12) = 1728$.

4. $\sqrt{x} + 1/\sqrt{x} = 5$ then $x^2 + 1/x^2 = ?$

A)529 B) 527 C) 520 D) 500

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

$\sqrt{x} + \frac{1}{\sqrt{x}} = 5$. → Squaring both sides.

$\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2 = (5)^2$

$\Rightarrow (\sqrt{x})^2 + \left(\frac{1}{\sqrt{x}}\right)^2 + 2(\sqrt{x})\left(\frac{1}{\sqrt{x}}\right) = 25$.

$\Rightarrow x + \frac{1}{x} + 2 = 25$.

$x + \frac{1}{x} = 25 - 2$.

$x + \frac{1}{x} = 23$.

$x^2 + \frac{1}{x^2} = (23)^2 - 2$.

$= 529 - 2$

$= 527$.

5. यदि $x\sqrt{x} + 1/x\sqrt{x} = 9$, भने $x^3 + 1/x^3 = ?$

A) 81 B) 83 C) 79 D) none

$\sqrt{x} = (x)^{1/2}$.

x^1

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

$x\sqrt{x} + \frac{1}{x\sqrt{x}} = 9.$

$(a^b)^c = a^{bc}$.

$(x^{3/2})^2 + \left(\frac{1}{x^{3/2}}\right)^2 + 2\left(x^{3/2}\right)\left(\frac{1}{x^{3/2}}\right) = (9)^2$

$\Rightarrow x^{3/2} + \frac{1}{x^{3/2}} = 9.$

$\Rightarrow x^{\frac{3\times 2}{2}} + \frac{1}{x^3} + 2 = 81$

Squaring both side.

$\left(x^{3/2} + \frac{1}{x^{3/2}}\right)^2 = 9.$

$\Rightarrow x^3 + \frac{1}{x^3} = 81 - 2$

$= 79.$

6. यदि a+b = 9 ,ab =20 भने $a^3 + b^3$ =?

A) 180 B) 182 C) 189 D) 192

$a^3+b^3 = ?$ $(a+b)^3$ $(a+b)^2$.

$a+b = 9.$

cubing

$\Rightarrow (a+b)^3 = (9)^3.$

$\Rightarrow a^3 + b^3 + 3a^2b + 3ab^2 = 729.$

$\Rightarrow a^3+b^3 + 3ab(a+b) = 729.$

$\Rightarrow a^3+b^3 + 3(20)(9) = 729.$

$a^3+b^3 = 729 - 3(20)(9)$

$= 729 - 540.$

$= 189.$

$a^3+b^3 = (a+b)^3[a^2 - ab + b^2).$

7. यदि $a+b=20$, $ab=84$ भने $a^2+b^2=?$

$(a+b)^2$
$(a+b)^3$.

$(a+b)^2 = 400$

$\Rightarrow a^2+b^2+2ab = 400$

$\Rightarrow a^2+b^2+2(84) = 400$

$\Rightarrow a^2+b^2+168 = 400$

$\Rightarrow a^2+b^2 = 400-168$.

$= 232$.

8. यदि $a - b = 10$, $ab = 231$ भने $a^2 + b^2 = ?$

$(a-b)^2 = 100$

$\Rightarrow a^2+b^2 - 2ab = 100$

$\Rightarrow a^2+b^2 - 2(231) = 100$

$\Rightarrow a^2+b^2 - 462 = 100$

$\Rightarrow a^2+b^2 = 562$.

9. यदी $x+y+z=13$, $x^2+y^2+z^2=69$ भने $xy+yz+zx=?$

$(x+y+z)^2 = (13)^2$

$\Rightarrow x^2+y^2+z^2+2xy+2xz+2yz = 169$

$\Rightarrow 69 + 2xy+2xz+2yz = 169$

$\Rightarrow 2xy+2xz+2yz = 169-69$

$\Rightarrow 2(xy+xz+yz) = 100$

$xy+xz+yz = \frac{100}{2}$

$= 50$

10. यदि $3x - 1/3x = 9$, भने $9x^2 + 1/9x^2 = ?$

$n^2 - 2$.

$$\left(\frac{3x}{} - \frac{1}{3x}\right)^2 = 9^2 .$$

$$\Rightarrow (3x)^2 + \left(\frac{1}{3x}\right)^2 - 2(3x)\left(\frac{1}{3x}\right) = 81$$

$$\Rightarrow 9x^2 + \frac{1}{9x^2} - 2 = 81$$

$$\Rightarrow 9x^2 + \frac{1}{9x^2} = 81 + 2$$

$$= 83 .$$

$n - \frac{1}{n} = n .$

$\hookrightarrow$

$n^2 + \frac{1}{n^2} = n^2 + 2 .$

$n^2 - 2 .$ $\quad n + \frac{1}{n} = n$, $n - \frac{1}{n} = n .$

$\hookrightarrow$ $\quad \hookrightarrow$

$n^2 + \frac{1}{n^2}$ $\quad n^2 + \frac{1}{n^2}$

11. यदि a= 5 ,b =7 अनि c = -12 भए $a^3 + b^3 + c^3$ =?

$a^3+b^3+c^3 - 3abc = (a+b+c)(a^2+b^2+c^2 - ab - bc - ac)$.

$a^3+b^3+c^3 = 3abc$ % $a+b+c = 0$.

$a^3+b^3+c^3 = 3(5)(7)(-12)$

$a^3+b^3+c^3 = -1260$.

12. यदि $a=3, b=5, c=2$ भने $a^3+b^3+c^3=?$

$a^3+b^3+c^3-3abc = (a+b+c)(a^2+b^2+c^2-ac-ab-bc)$.

$\Rightarrow a^3+b^3+c^3-3(3)(5)(2) = (3+5+2)(3^2+5^2+2^2-3\times2-5\times3-5\times2)$.

$\Rightarrow a^3+b^3+c^3-90 = (10)[9+25+4-6-15-10]$.

$\Rightarrow a^3+b^3+c^3-90 = 10[38-31]$.

$\Rightarrow a^3+b^3+c^3 = 70+90$

$= 160$

13. If the difference between two number is 11 and the product of two number is 210 find the numbers / यदि दुई संख्या बीचको भिन्नता 11 र दुई संख्याको गुणनफल 210 हो भने संख्याहरू पत्ता लगाउनुहोस् 21, 10.

21 10
$x - y = 11$

21×10
$xy = 210$

21×10.

3 | 210
1 | 70
2 | 35
7 | 5
5 | 1

10 ∞ - 21.

14. यदि $3x+4y=25$, अनि $xy=12$, $27x^3 + 64y^3 =$

$(3x+4y)^3 = (25)^3$.

$\Rightarrow (3x)^3 + (4y)^3 + 3(3x)^2(4y) + 3(3x)(4y)^2 = (25)^3$.

$\Rightarrow 27x^3 + 64y^3 + 3(3x)(4y)[3x+4y] = 25^3$.

$\Rightarrow 27x^3 + 64y^3 + 36xy[3x+4y] = 25^3$.

$\Rightarrow 27x^3 + 64y^3 + 36(12)(25) = 25^3$.

$\Rightarrow 27x^3 + 64y^3 = (25)^3 - (36)(12)(25)$

$= 15625 - 10800$.

$= 4825$.

$a^3 + b^3 =$

64×25.

$= 36 \times 12^3 \times \frac{100}{4}$

6250 — 108×100

6250 — 10800.

3125

15625

$36 \times 12^3 \times 100$ — 15625, 10800

51 4825

15625
10800
4825

**15. $\dfrac{8.73\times8.73\times8.73+4.27\times4.27\times4.27}{8.73\times8.73-8.73\times4.27+4.27\times4.27}=?$

(A) 13 (B) 11 (C) 13 · 27 (D) 12

$a^3+b^3=(a+b)(a^2-ab+b^2)$.

$$\frac{(\overset{a}{8.73})^3+(\overset{b}{4.27})^3}{(\overset{a}{8.73})^2-(\overset{a}{8.73})(\overset{b}{4.27})+(\overset{b}{4.27})^2}=\frac{a^3+b^3}{a^2-ab+b^2}=a+b.$$

$= 8.73+4.27$.

$= 13.00$

* $16.8a^3 - (pb)^3 = (2a - 3b)(4a^2 + 6ab + 9b^2)$ then p = 3 .

$(2a)^3 - (pb)^3 = (2a - 3b)(4a^2 + 6ab + 9b^2)$.

$a^3 - b^3$
$a^3 + b^3$.

$p = 3$.

$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$.

17. मूल्यांकन (value):

$$\frac{(2.39)^2-(1.61)^2}{2.39-1.61}$$

(A) 4 (B) 8 (C) 6 (D) 2

$a = 2.39$, $b = 1.61$

$= 2.39 + 1.61 = 4$.

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

2) $\frac{a^2-b^2}{a-b} = a+b$.

18. दुई संख्याको योगफल (sum) 27 हो भने गुणफल (product) 182 हुनेछ। सानो (smaller) संख्या कति हो?

(A) 16 (B) 12 (C) 14 (D) ~~13~~

2, 3 → Revision

Very important.

$14 + 13 = 27$ ... (I)

Confirm

14×13

$xy = 182$.

2 | 182

13 | 91

7

14×13.

H.C.F / L.C.M → Number system.