ALGEBRA

SHEET 04

Class notes by Aditya Ranjan

(Miscellaneous)

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

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

123 = a 77 = b

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

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

1. Find the value of

$$\frac{(123+77)^2+(123-77)^2}{(123)^2+(77)^2}$$

(a) 0 (b) 1

(c) 2 (d) 4

$$\frac{(a+b)^2-(a-b)^2}{ab}$$

$$= \frac{4ab}{ab}$$

2. Find the value of

$$\frac{(\overset{a}{148}+\overset{b}{69})^2-(148-69)^2}{148\times 69}$$

(a) 2 (b) 4

(c) 1 (d) 0

Rationalisation

* $\frac{1}{\sqrt{3}+\sqrt{2}} = \sqrt{3}-\sqrt{2}$

* $\frac{1}{\sqrt{7}+\sqrt{6}} = \frac{\sqrt{7}-\sqrt{6}}{1}$

* $\frac{1}{\sqrt{5}+\sqrt{3}} = \frac{\sqrt{5}-\sqrt{3}}{2}$

$\frac{1}{\sqrt{2}+1} = \sqrt{2}-1$

3. $\frac{1}{\sqrt{2}+1} + \frac{1}{\sqrt{3}+\sqrt{2}} + \ldots\ldots\ldots\ldots + \frac{1}{\sqrt{49}+\sqrt{48}}$

(a) 6 (b) 8

(c) 7 (d) 0

$= \sqrt{2}-1+\sqrt{3}-\sqrt{2} + - \text{——} + \sqrt{49}-\sqrt{48}$

$= -1+\sqrt{49}$

$= -1+7 = 6$

Pythagoras Theorem $a^2+b^2=c^2$

Triplet →

3, 4, 5

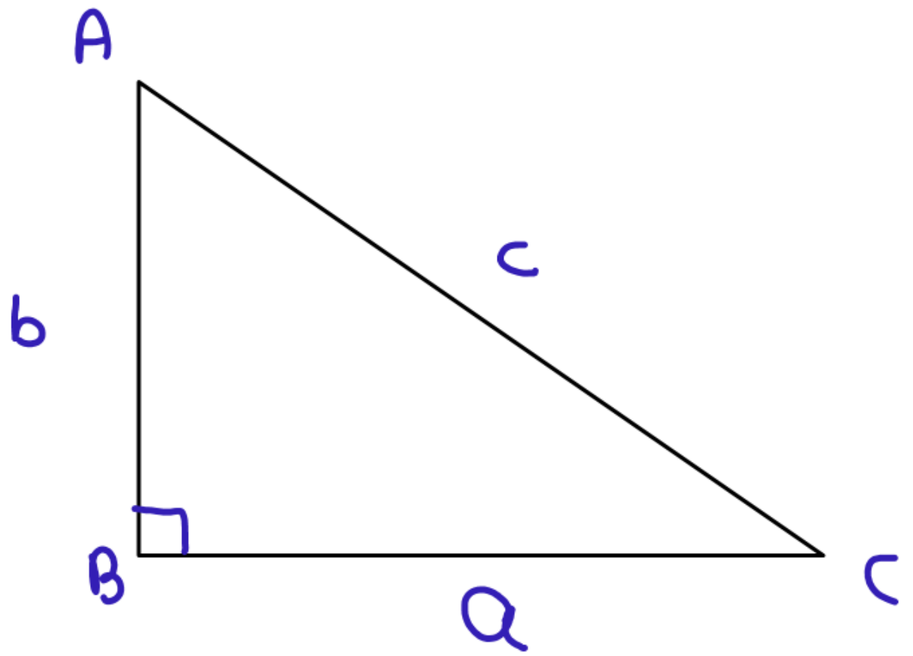
6, 8, 10

9, 12, 15

5, 12, 13

7, 24, 25

9, 40, 41



$5^{(2)} + 12^2 = 13^2$

$\sqrt[3]{x} = 2$

$\Rightarrow x = 8$

4. If $5^{\sqrt[3]{x}} + 12^{\sqrt[3]{x}} = 13^{\sqrt[3]{x}}$, then the value of x is :

SSC CHSL 5 July 2019 (Afternoon)

(a) 2 (b) 8

(c) 1 (d) 4

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

$$\sqrt[3]{x} = x^{\frac{1}{3}}$$

$$\sqrt[4]{x} = x^{\frac{1}{4}}$$

5. If $6^{\sqrt[4]{x}} + 8^{\sqrt[4]{x}} = 10^{\sqrt[4]{x}}$, then the value of x is :

$6^2 + 8^2 = 10^2$

SSC CHSL 8 July 2019 (Afternoon)

(a) 2 (b) 16

(c) 4 (d) 8

$\sqrt[4]{x} = 2$

$x^{\frac{1}{4}} = 2$

$\Rightarrow (x^{\frac{1}{4}})^4 = (2)^4$

$\Rightarrow x = 16$

* $\sqrt{7+2\sqrt{6}} = \sqrt{6}+1$

* $\sqrt{8+4\sqrt{3}} = \sqrt{8+2\sqrt{2\times2\times3}} = \sqrt{8+2\sqrt{12}} = \sqrt{6}+\sqrt{2}$

$2\sqrt{3} = \sqrt{2\times2\times3} = \sqrt{12}$

* $\sqrt{4+2\sqrt{3}} = \sqrt{3}+1$

$\sqrt{9} = \sqrt{3\times3} = (3^2)^{\frac{1}{2}} = 3$

* $\sqrt{2+\sqrt{3}} = \sqrt{\frac{4+2\sqrt{3}}{2}} = \frac{\sqrt{3}+1}{\sqrt{2}}$

$\sqrt{86-2\times30\sqrt{2}}$

$= \sqrt{86-2\sqrt{30\times30\times2}}$

$= \sqrt{86-2\sqrt{1800}}$

$= \sqrt{50}-\sqrt{36}$

$= 5\sqrt{2}-6$

$-b = 5$

$b = -5$

$a = -6$

$\sqrt{36+25} = \sqrt{61}$

6. If $\sqrt{86-60\sqrt{2}} = a-b\sqrt{2}$, then what will be the value of $\sqrt{a^2+b^2}$, correct to one decimal place?

CGL Tier-II (11 September 2019)

(a) 8.4 (b) 8.2

(c) 7.8 (d) 7.2

7. If $x = \sqrt{1+\frac{\sqrt{3}}{2}} - \sqrt{1-\frac{\sqrt{3}}{2}}$, then the value of $\frac{\sqrt{2}-x}{\sqrt{2}+x}$ will be closest to :

CGL Tier-II (11 September 2019)

(a) 0.17 (b) 0.12
(c) 1.4 (d) 1.2

$$x = \sqrt{1+\frac{\sqrt{3}}{2}} - \sqrt{1-\frac{\sqrt{3}}{2}}$$

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

$$= \sqrt{\frac{4+2\sqrt{3}}{4}} - \sqrt{\frac{4-2\sqrt{3}}{4}}$$

$$= \frac{(\sqrt{3}+1)}{2} - \frac{(\sqrt{3}-1)}{2}$$

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

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

$$\frac{\sqrt{2}-1}{\sqrt{2}+1} = (\sqrt{2}-1)^2$$

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

$$= 3-2\sqrt{2}$$

$$= 3-2\times1.41$$

$$= 3-2.82$$

$$= 0.18$$

$$\frac{1}{\sqrt{2}+1} = \sqrt{2}-1$$

$\sqrt{2} = 1.414$

$\sqrt{3} = 1.732$

$\sqrt{7}-\sqrt{3}+\sqrt{5}+\sqrt{3}=\sqrt{a}+\sqrt{b}$

$\sqrt{7}+\sqrt{5}=\sqrt{a}+\sqrt{b}$

$=\sqrt{7\times5}=\sqrt{35}$

8. If $\sqrt{10-2\sqrt{21}}+\sqrt{8+2\sqrt{15}}=\sqrt{a}+\sqrt{b}$, where a and b are positive integers, then the value of $\sqrt{ab}$ is closest to :

CGL Tier-II (12 September 2019)

(a) 4.6 (b) 5.9

(c) 6.8 (d) 7.2

put a=0

put b=0

9. $ab(a-b)+bc(b-c)+ca(c-a)$ **is equal to :**

CGL Tier-II (13 September 2019)

(a) $(a+b)(b-c)(c-a)$ $-a(c(c-a)$

(b) $(a-b)(b+c)(c-a)$

(c) $(a-b)(b-c)(c-a)$

(d) $(b-a)(b-c)(c-a)$ $a((c-a)$

$a=1 \quad b=2 \quad c=3$

9. $ab(a-b)+bc(b-c)+ca(c-a)$ is equal to :

CGL Tier-II (13 September 2019)

$2(-1)+6(-1)+3(2)$

$=-2$

(a) $(a+b)(b-c)(c-a)$ $\quad 3 \quad (-1) \quad (2)$ $= -6$

(b) $(a-b)(b+c)(c-a)$ $\quad (-1) \quad 5 \quad 2$ $= -10$

(c) $(a-b)(b-c)(c-a)$ $\quad -1 \quad -1 \quad 2$ $= 2$

(d) $(b-a)(b-c)(c-a)$ $\quad 1 \quad -1 \quad 2$ $= -2$

$x = (3^3)^{\frac{1}{6}} - \sqrt{\frac{27}{4}}$

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

$x^2 = \frac{3}{4}$

10. **Let $x = \sqrt[6]{27} - \sqrt{6\frac{3}{4}}$ and $y = \frac{\sqrt{45} + \sqrt{605} + \sqrt{245}}{\sqrt{80} + \sqrt{125}}$, then the value of $x^2 + y^2$ is :**

CGL Tier-II (13 September 2019)

(a) $\frac{223}{36}$ **(b)** $\frac{221}{36}$

(c) $\frac{221}{9}$ **(d)** $\frac{227}{9}$

$y = \frac{3\sqrt{5} + 11\sqrt{5} + 7\sqrt{5}}{4\sqrt{5} + 5\sqrt{5}}$

$= \frac{21\sqrt{5}}{3\sqrt{5}}$

$\Rightarrow y = \frac{7}{3}$

$y^2 = \frac{49}{9}$

$\frac{3}{4} + \frac{49}{9} = \frac{27 + 196}{36} = \frac{223}{36}$

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

$$91 = 13 \times 7$$

(a) $a^2+b^2+ab = 13$

$a^2+b^2-ab = 7$

$2a^2+2b^2 = 20$

$2(a^2+b^2) = 20$

$\Rightarrow a^2+b^2 = \frac{20}{2}$

(a) $a^2+b^2 = \frac{20}{2} = 10$

(b) $ab = \frac{6}{2} = 3$

(c) $\frac{1}{a^2}+\frac{1}{b^2}$

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

$= \frac{10}{9}$

0. $a^4+b^4+a^2b^2 = 90$

$a^2+b^2+ab = 18$

$a^2+b^2-ab = 5$

(i) $a^2+b^2 = \frac{23}{2}$

(ii) $ab = \frac{13}{2}$

$\frac{y^2+x^2}{(xy)^2}$

$= \frac{5}{2^2} = \frac{5}{4}$

11. If $x^4 + x^2y^2 + y^4 = 21$ and $x^2 + xy + y^2 = 7$, $x^2 - xy + y^2 = 3$

then the value of $\left(\frac{1}{x^2} + \frac{1}{y^2}\right)$ is :

SSC CGL 3 March 2020 (Afternoon)

(a) $\frac{5}{2}$ **(b) $\frac{7}{4}$**

(c) $\frac{5}{4}$ **(d) $\frac{7}{3}$**

12. If $x^4 + x^2y^2 + y^4 = 273$ and $x^2 - xy + y^2 = 13$, then the value of xy is : $x^2 + xy + y^2 = 21$

SSC CGL 5 March 2020 (Afternoon)

(a) 4 (b) 8

(c) 10 (d) 6

$(16a^4+36a^2b^2+81b^4) = 91$

$(4a^2-6ab+9b^2) = 13$

$4a^2+6ab+9b^2 = 7$

$-12ab = 6$

$ab = \frac{6}{-12} = \left(-\frac{1}{2}\right)$

13. If $16a^4 + 36a^2b^2 + 81b^4 = 91$ and $4a^2 + 9b^2 - 6ab = 13$, then what is the value of $3ab$?

SSC CGL 4 March 2020 (Morning)

(a) -3

(b) $\frac{3}{2}$

(c) 5

(d) $-\frac{3}{2}$

$3^a = 3^{3b} = 3^{4c}$

$\frac{a}{12} = \frac{3b}{12} = \frac{4c}{12}$

$\frac{a}{12} = \frac{b}{4} = \frac{c}{3}$

$a = 12x$, $b = 4x$, $c = 3x$

$144x^3 = 144$

$x = 1$

14. If $3^a = 27^b = 81^c$ and $abc = 144$, then the value of $12\left(\frac{1}{a} + \frac{1}{2b} + \frac{1}{5c}\right)$ is :

SSC CGL 6 March 2020 (Morning)

(a) $\frac{17}{120}$

(b) $\frac{18}{10}$

(c) $\frac{18}{120}$

(d) $\frac{33}{10}$

$12\left(\frac{1}{12} + \frac{1}{8} + \frac{1}{15}\right)$

$= 12\left(\frac{10+15+8}{120}\right) = \frac{33}{10}$

Put values of $\sqrt{2}, \sqrt{3}, \sqrt{6}$

15. The value of $5\sqrt{3}+7\sqrt{2}-\sqrt{6}-\dfrac{23}{\sqrt{2}+\sqrt{3}+\sqrt{6}}$ is :

CHSL 14/10/2020 (Afternoon)

(a) 0
(b) 16
(c) 12
(d) 10

16. If $\frac{8+2\sqrt{3}}{3\sqrt{3}+5} = a\sqrt{3} - b$, then the value of $a + b$ is equal to :

CGL 2019 Tier-II (18/11/2020)

(a) 18 (b) 15
(c) 16 (d) 24

$$(8+2\sqrt{3}) \times \frac{(3\sqrt{3}-5)}{2}$$

$$= \frac{24\sqrt{3} - 40 + 18 - 10\sqrt{3}}{2}$$

$$= \frac{14\sqrt{3} - 22}{2}$$

$$\Rightarrow 7\sqrt{3} - 11 = a\sqrt{3} - b$$

$a = 7$

$b = 11$

$2 = x + \cfrac{1}{1+\cfrac{2}{11}}$

$\Rightarrow 2 = x + \cfrac{11}{13}$

$\Rightarrow 2 - \cfrac{11}{13} = x$

$\Rightarrow \cfrac{15}{13} = x$

17. If $2 = x + \cfrac{1}{1+\cfrac{1}{5+\cfrac{1}{2}}}$, then the value of x is equal to :

CGL 2019 Tier-II (18/11/2020)

(a) $\cfrac{14}{13}$ (b) 1

(c) $\cfrac{15}{13}$ (d) $\cfrac{13}{15}$

18. If $2^{x+y-2z} = 8^{8z-5-y}$; $5^{4y-6z} = 25^{y+z}$; $3^{4x-3z} = 9^{x+z}$ then the value of $2x + 3y + 5z$ is :

CHSL 13/10/2020 (Morning)

(a) 56 (b) 44 (c) 32 (d) 28

$x+y-2z = 24z-15-3y$

$\Rightarrow x+4y-26z = -15$ — (i)

$4y-6z = 2y+2z$

$\Rightarrow 2y = 8z$

$y = 4z$

$4x-3z = 2x+2z$

$\Rightarrow 2x = 5z$

$2 \cdot 5z + 16z - 26z = -15$

$\Rightarrow -17 \cdot 5z = -15z$

$z = 2$

$2^{(x+y-2z)} = 2^{24z-15-3y}$

$3^{4x-3z} = 3^{2x+2z}$

$5^{4y-6z} = 5^{2y+2z}$

$5z + 12z + 5z$

$= 22z$

$= 44$

$$13 = 10 \times 1 + 1 \times 3$$

$$453 = 100 \times 4 + 10 \times 5 + 3 \times 1$$

$$0.5 = 5 \times \frac{1}{10}$$

$$23.7 = 2 \times 10 + 3 \times 1 + 7 \times \frac{1}{10}$$

$A = 10 \quad B = 1$

$C = \frac{1}{10} \quad D = 100$

$E = \frac{1}{10000}$

19. If $47.2506 = 4A + \frac{7}{B} + 2C + \frac{5}{D} + 6E$ then the value of 5A + 3B + 6C + D + 3E is

(a) 53.6003 (b) 53.603

(c) 153.6003 (d) 213.0003

$5A + 3B + 6C + D + 3E$

$= 50 + 3 + \frac{6}{10} + 100 + \frac{3}{10000}$

$= 153 + \frac{6}{10} + \frac{3}{10000}$

$= 153 + 0.6 + 0.0003$

$= 153.6003$

$47.2506 = 10 \times 4 + 1 \times 7 + 2 \times \frac{1}{10} + 5 \times \frac{1}{100} + 0 \times \frac{1}{1000} + 6 \times \frac{1}{10000}$

$A \times 4 + \frac{7}{B} + 2 \times C + 5 \times \frac{1}{D} + 0 + 6 \times E$

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

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

* $a^m = a^n$

$\Rightarrow m = n$

$x^{x^{\frac{3}{2}}} = \left(x^{\frac{3}{2}}\right)^x$

$\Rightarrow x^{x^{\frac{3}{2}}} = x^{\frac{3}{2}x}$

$\Rightarrow x^{\frac{3}{2}} = \frac{3}{2}x$

$\Rightarrow x\sqrt{x} = \frac{3}{2}x$

$\Rightarrow x = \frac{9}{4}$

20. If $x^{x\sqrt{x}} = \left(x\sqrt{x}\right)^x$, then x equals

(a) $\frac{4}{9}$

(b) $\frac{2}{3}$

(c) $\frac{9}{4}$

(d) $\frac{3}{2}$

$x^{x\sqrt{x}} = x^{\frac{3}{2}x}$

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

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

$x = \frac{9}{4}$

20. If $x^{x\sqrt{x}} = \left(x\sqrt{x}\right)^{x}$, then x equals

$x^1 \cdot x^{\frac{1}{2}} = x^{\frac{3}{2}}$

(a) $\frac{4}{9}$

(b) $\frac{2}{3}$

(c) $\frac{9}{4}$

(d) $\frac{3}{2}$

$a^5 + a^4 + 1$

$= a^2 \cdot a^3 + a \cdot a^3 + 1$

$= a^2 + a + 1$

$= 0$

21. If $a^2 + a + 1 = 0$ then the value of $a^5 + a^4 + 1$ is :

(a) a^2 (b) 1

(c) 0 (d) $a + 1$

$a^2 + a + 1 = 0$

$(a-1)(a^2+a+1) = 0$

$\Rightarrow (a^3 - 1) = 0$

$\Rightarrow a^3 = 1$

$a^3 = 1$

21. If $a^2 + a + 1 = 0$ then the value of $a^5 + a^4 + 1$ is :

$= a^2 + a + 1$

(a) a^2

(b) 1

(c) 0

(d) $a + 1$

22. If $x = 16$, then $x^4 - 17x^3 + 17x^2 - 17x + 17$ is

(a) 0 **(b) 1**

(c) 4 **(d) 3**

$-x+17$

$= -16+17$

$= 1$

$= x^4 - 17x^3 + 17x^2 - 17x + 17$

$= x^4 - 16x^3 - x^3 + 16x^2 + x^2 - 16x - x + 16 + 1$

$= x^4 - x^4 - x^3 + x^3 + x^2 - x^2 - x + x + 1$

$= 1$

23. If $x = 11$, then $x^5 - 12x^4 + 12x^3 - 12x^2 + 12x - 1$ is

(a) 5 **(b) 10**

(c) 15 **(d) 20**

$x - 1$
$= 11 - 1$
$= 10$

$= x^5 - 12x^4 + 12x^3 - 12x^2 + 12x - 1$

$= x^5 - 11x^4 - x^4 + 11x^3 + x^3 - 11x^2 - x^2 + 11x + x - 1$

$= \cancel{x^5} - \cancel{x^5} - \cancel{x^4} + \cancel{x^4} + \cancel{x^3} - \cancel{x^3} - \cancel{x^2} + \cancel{x^2} + x - 1$

$= 11 - 1$

$= 10$

24. If $x = 86$ then $x^7 - 87x^6 + 87x^5 - 87x^4 + 87x^3 - 87x^2 + 87x + 50 = ?$ is

(a) 126 (b) 136

(c) 146 (d) 156

$x + 50$
$= 86 + 50$
$= 136$

25. If $x = \frac{\sqrt{3}}{2}$ then the value of $\frac{\sqrt{1+x}+\sqrt{1-x}}{\sqrt{1+x}-\sqrt{1-x}}$ is

(a) $-\sqrt{3}$ (b) 1

(c) -1 (d) $\sqrt{3}$

$\sqrt{1+x} = \sqrt{1+\frac{\sqrt{3}}{2}} = \sqrt{\frac{2+\sqrt{3}}{2}} = \sqrt{\frac{4+2\sqrt{3}}{4}}$

$= \frac{\sqrt{3}+1}{2}$

$\sqrt{1-x} = \frac{\sqrt{3}-1}{2}$

26. If $x = \frac{\sqrt{3}}{2}$ then find $\frac{\sqrt{1+x}}{1+\sqrt{1+x}} + \frac{\sqrt{1-x}}{1-\sqrt{1-x}}$ is

(a) $\sqrt{3}$ (b) $\frac{\sqrt{3}}{2}$

(c) $\frac{2}{\sqrt{3}}$ (d) 1

$$\frac{\frac{\sqrt{3}+1}{2}}{2+\frac{\sqrt{3}+1}{2}} + \frac{\frac{\sqrt{3}-1}{2}}{2-\frac{(\sqrt{3}-1)}{2}}$$

$$= \frac{\sqrt{3}+1}{\sqrt{3}(\sqrt{3}+1)} + \frac{\sqrt{3}-1}{\sqrt{3}(\sqrt{3}-1)}$$

$$= \frac{2}{\sqrt{3}}$$

27. If $(x-a)(x-b)=1$ & $x-b+3=0$ find

$x(x-b)=1$

$\Rightarrow x-b=\frac{1}{x}$

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

$a=0$ $b=3$

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

$x^3-\frac{1}{x^3}=n^3+3n$

$=27+9$

$=36$

(a) 18 (b) 36

(c) 27 (d) None

a=0 b=5

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

28. If $a-b+5=0$ & $(x-a)(x-b)=1$ then find

$$(x-a)^3-\frac{1}{(x-a)^3}.$$

$x^3-\frac{1}{x^3}=5^3+3\times5$

$=140$

(a) 110 **(b) 140**

(c) 105 **(d) 115**

$x(x-b)=1$

$x-b=\frac{1}{x}$

$x-\frac{1}{x}=b$

Use option

29. If $\dfrac{x+\sqrt{x^2-1}}{x-\sqrt{x^2-1}} + \dfrac{x-\sqrt{x^2-1}}{x+\sqrt{x^2-1}} = 34$. Find x.

(a) -1 **(b)** -2

(c) ± 3 **(d)** -4

$= 2(9+8)$

$\frac{1}{3+\sqrt{8}} = 3-\sqrt{8}$

$\frac{3+\sqrt{8}}{(3-\sqrt{8})} + \frac{3-\sqrt{8}}{3+\sqrt{8}}$

$= (3+\sqrt{8})(3+\sqrt{8}) + (3-\sqrt{8})(3-\sqrt{8})$

$= (3+\sqrt{8})^2 + (3-\sqrt{8})^2$

30. If then $\underbrace{\sqrt{3x^2-12x+19}}_{a}+\underbrace{\sqrt{3x^2-12x-11}}_{b}=6$

then $\sqrt{3x^2-12x+19}-\sqrt{3x^2-12x-11}=?$ k

(a) 4 (b) 3

(c) 0 (d) 5

$(3x^2-12x+19)-(3x^2-12x-11)=6k$

$\Rightarrow \frac{30}{5}=6k$

$k=5$

$a+b=6$

$a-b=k$

$\Rightarrow (a^2-b^2)=6k$

30. If then $\sqrt{3x^2-12x+19}+\sqrt{3x^2-12x-11}=6$

then $\sqrt{3x^2-12x+19}-\sqrt{3x^2-12x-11}=?$

(a) 4 (b) 3

(c) 0 (d) 5

$19-(-11)=6R$

$30=6R$

5

31. If $\sqrt{x^2-12x+7}+\sqrt{x^2-12x-7}=2$ then find the value of $\sqrt{x^2-12x+7}-\sqrt{x^2-12x-7}=?$ k

(a) 0 (b) 1

(c) 7 (d) 9

$7-(-7)=2\times k$

$7+7=2k$

32. If $ax + by = 4$, $bx - ay = 3$, $x^2 + y^2 = 5$ find $a^2 + b^2 = ?$

(a) 15 (b) 5

(c) 35 (d) None

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

$$4^2 + 3^2 = (a^2+b^2)5$$

$$\Rightarrow \quad \frac{25}{5} = \frac{5(a^2+b^2)}{5}$$

$P = y+z-x$	$= -x$
$Q = z+x-y$	$= x$
$R = x+y-z$	$= x$

$x^3+y^3+z^3 = 3(1+xyz)$

$x^3 = 3$ $y = 0$ $z = 0$

33. If $x^3 + y^3 + z^3 = 3(1 + xyz)$, $P = y + z - x$, $Q = Z + x - y$, $R = x + y - z$ then what is the value of

$P^3 + Q^3 + R^3 - 3PQR = ?$

(a) 9 (b) 8

(c) 12 (d) 6

2017 mains

$-x^3 + x^3 + x^3 - 3(-x)(x)(x)$

$= x^3 + 3x^3$

$= 4x^3$

$= 4 \times 3 = 12$