Solutions – Class X

1). $f(x+2a) = f(\overline{x+a}+a) = \dfrac{f(x+a)-1}{f(x+a)+1} = \dfrac{\frac{f(x)-1}{f(x)+1}-1}{\frac{f(x)-1}{f(x)+1}+1}$

C]. f(x).

$$= \frac{f(x)-1-f(x)-1}{f(x)-1+f(x)+1} = \frac{-2}{2f(x)} = -\frac{1}{f(x)}$$

$$\therefore f(x+4a) = f(\overline{x+2a}+2a) = -\frac{1}{f(x+2a)} = \frac{-1}{-\frac{1}{f(x)}} = f(x)$$

2). $f(y) = \dfrac{4-y}{y+1}$

$f(g(x)) = x+2 \Rightarrow \dfrac{4-g(x)}{g(x)+1} = x+2$

$4 - g(x) = (x+2)(g(x)+1) = x \cdot g(x) + x + 2 \cdot g(x) + 2$

$\therefore x \cdot g(x) + 3g(x) + x = 2$

$g(x)[x+3] = 2 - x.$

$\therefore g(x) = \dfrac{2-x}{x+3} \Rightarrow g(z) = \dfrac{2-z}{z+3}.$

D). $\dfrac{2-z}{z+3}$

3). C] −12 ; $a + ar = 12 \Rightarrow a(1+r) = 12$

$ar^2 + ar^3 = 48 \Rightarrow ar^2(1+r) = 48$

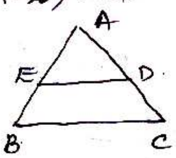
$12r^2 = 48$

$r = \pm 2$

$a + ar = 12$

$a(1-2) = 12 \Rightarrow a = -12.$

4). A] 31.25



$\dfrac{AE}{EB} = \dfrac{4}{1} \Rightarrow \dfrac{EB}{AE} = \dfrac{1}{4} \Rightarrow \dfrac{AB}{AE} = 1/4 + 1 = \dfrac{5}{4}$

$\therefore \dfrac{AE}{AB} = \dfrac{4}{5} \Rightarrow \dfrac{\Delta ADE}{\Delta ABC} = \left(\dfrac{AE}{AB}\right)^2$

$\dfrac{20}{\Delta ABC} = \left(\dfrac{4}{5}\right)^2 \Rightarrow \Delta ABC = \dfrac{20 \times 25}{4 \times 4}$

$= 31.25$

5). D] 0.

$n(A) = 100$; $n(B) = 99$

$n(A) > n(B)$

$\therefore$ no. of one – one functions = zero.

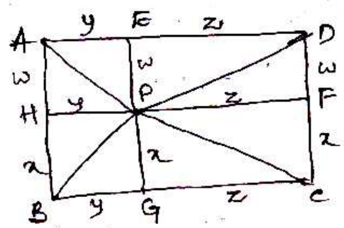
6). D]. Identity.

7). B]. 3^x

$f(x) = \log_3 x = y \Rightarrow x = 3^y \Rightarrow x = f^{-1}(y)$

$\therefore f^{-1}(x) = 3^x$.

8). D]. $\sqrt{95}$



$PA^2 = y^2 + w^2 \qquad PB^2 = x^2 + y^2 \qquad PC^2 = x^2 + z^2$

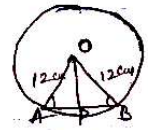
$PD^2 = w^2 + z^2 = (y^2 + w^2) + (x^2 + z^2) - (x^2 + y^2)$

$= [PA^2 + PC^2 - PB^2] = 2^2 + 10^2 - 3^2$

$= 104 - 9 = 95$

$\therefore PD = \sqrt{95}$.

9). C] $96\sqrt{2 - 2\sqrt{2}}$



In $\triangle AOB$, $\angle AOB = \frac{360}{8} = 45^\circ$, $OP \perp AB$

$\sin\left(\frac{45}{2}\right) = \frac{AP}{AO} = \frac{AP}{12} \Rightarrow AP = 12\sin\left(\frac{45}{2}\right)$

$AB = 2AP = 24\sin\left(\frac{45}{2}\right)$

perimeter $= 8 \cdot AB$

$= 8 \times 24 \times \sin\left(\frac{45}{2}\right)$

$= 8 \times 24 \times \frac{1}{2}\sqrt{2 - 2\sqrt{2}}$

$= 96\sqrt{2 - 2\sqrt{2}}$

$\cos 2\theta = 1 - 2\sin^2\theta$

$\cos 45^\circ = 1 - 2\sin^2\left(\frac{45}{2}\right)$

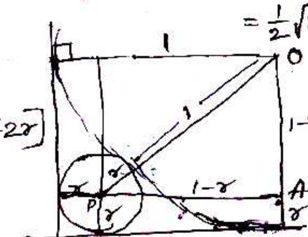
$2\sin^2\left(\frac{45}{2}\right) = 1 - \frac{1}{\sqrt{2}}$

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

$\therefore \sin\left(\frac{45}{2}\right) = \sqrt{\frac{\sqrt{2} - 1}{2\sqrt{2}}}$

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

10). B] $3 - 2\sqrt{2}$



$OP^2 = OA^2 + AP^2 = (1-r)^2 + (1-r)^2$

$\Rightarrow (1+r)^2 = 2[1 + r^2 - 2r]$

$\therefore 2r^2 + 2 - 4r - 1 - r^2 - 2r = 0$

$r^2 - 6r + 1 = 0$

$r = \frac{-(-6) \pm \sqrt{36 - 4}}{2} = \frac{6 \pm 4\sqrt{2}}{2} = 3 \pm 2\sqrt{2}$

Given $r < 1 \Rightarrow r = 3 - 2\sqrt{2}$

11). B]. $c\,\Delta\,(A\cap B)$, Given attempt mark.

12). C]. 1024 kilobytes.

13). D] $\widehat{\text{IV}}$.

14) D) $2^n - 2$.

15). B] ϕ

16). C] $\mathcal{U}$; $((A^c \cap B)\cap B^c)^c$

$= (A^c\cap B)^c \cup (B^c)^c = ((A^c)^c \cup B^c)\cup B = (A\cup B^c)\cup B = \mathcal{U}.$

17). C). $\begin{bmatrix} -1 & -1 \\ -1 & 2 \end{bmatrix}$

$1+x+x^2=0 \Rightarrow \alpha+\beta=-1 \Rightarrow \alpha+1=-\beta$

$\alpha\beta=1 \Rightarrow \beta+1=-\alpha$

$$\begin{pmatrix} 1 & \beta \\ \alpha & \alpha \end{pmatrix}\begin{pmatrix} \alpha & \beta \\ 1 & \beta \end{pmatrix} = \begin{pmatrix} \alpha+\beta & \beta+\beta^2 \\ \alpha^2+\alpha & \alpha\beta+\alpha\beta \end{pmatrix} = \begin{pmatrix} -1 & \beta(1+\beta) \\ \alpha(1+\alpha) & 2\times 1 \end{pmatrix} = \begin{pmatrix} -1 & \beta(-\alpha) \\ \alpha(-\beta) & 2 \end{pmatrix}$$

$$= \begin{pmatrix} -1 & -1 \\ -1 & 2 \end{pmatrix}$$

18). D) 4, 3, 9.

$z^x = y^{2x} \rightarrow z = y^2$

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

$\therefore x = \frac{y^2-1}{2}$

$x+y+z = \frac{y^2-1}{2} + y + y^2 = 16$

$\Rightarrow 3y^2+2y-1 = 32 \Rightarrow 3y^2+2y-33=0$

$\Rightarrow 3y^2+11y-9y-33=0$

$\Rightarrow (y-3)(3y-11)=0$

$y=3 \Rightarrow x = \frac{9-1}{2} = 4$

$z = 3^2 = 9.$

19). A) $\frac{1}{3}$.

$2^x = 4^{x+1} \Rightarrow 2^x = 2^{2x+2} \Rightarrow x = 2x+2 \Rightarrow x=-2$

$\therefore x^0+x^1+x^2+ \cdots \infty = (-2)^0+(-2)^1+(-2)^2+(-2)^3+\cdots\infty$

$= 1-2+4-8+\cdots\infty$

$\therefore a=1,\ r=-2$

$S_\infty = \frac{a}{1-r} = \frac{1}{1-(-2)} = \frac{1}{3}.$

20). A]. $(a+b)(a^{2n} - a^{2n-1}b + \cdots\ b^{2n})$

21). B]. 13.

$f(x) = 13-|7+x|$ is maximum when $|7+x|$ is minimum.

$\therefore$ minimum value of $|7+x|$ is zero.

$\therefore$ max. value of $f(x)$ is 13.

22). A).1

$y+z = ax \Rightarrow x+y+z = x+ax = x(1+a)$

$z+x = by \Rightarrow x+y+z = by+y = y(1+b)$

$x+y = cz \Rightarrow x+y+z = cz+z = z(1+c).$

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

$\therefore \frac{1}{1+a} + \frac{1}{1+b} + \frac{1}{1+c} = \frac{x}{x+y+z} + \frac{y}{x+y+z} + \frac{z}{x+y+z} = 1$

23). A]. 28.

$$\begin{array}{ccc} a & b & c \\ d & e & f \\ \hline 10 & 0 & 0 \end{array} \qquad \begin{aligned} c+f &= 10 \\ b+e &= 9 \\ a+d &= 9 \end{aligned}$$

$\therefore a+d+c+f+b+e = 9+9+10 = 28.$

24). C] $m\alpha+\beta$.

$$\frac{(\alpha a_1+\beta) + \text{-------} + (\alpha a_n+\beta)}{n}$$

$$= \frac{\alpha(a_1+a_2+\cdots+a_n)+n\beta}{n}$$

$$= \frac{\alpha mn+n\beta}{n} = m\alpha+\beta.$$

25]. A]. 5

$11 = \frac{1}{n}\left[1^2+2^2+3^2+\cdots+n^2\right]$

$11 = \frac{1}{n} \cdot \frac{n(n+1)(2n+1)}{6}$

$(n+1)(2n+1) = 66$

$\therefore 2n^2+3n-65 = 0$

$n = \frac{-3 \pm \sqrt{9+520}}{2\times 2} = \frac{-3 \pm 23}{4} = 5$ or $-\frac{13}{2}$

natural numbers be +ve.

26). $\left(\frac{1}{3}, \frac{2}{3}\right)$. D]

mode = 3 median − 2 mean

3 median = mode + 2 mean

$\therefore$ median $= \frac{1}{3}$ mode $+ \frac{2}{3}$ mean.

CLASS : X

27). B]. $\begin{pmatrix}1&0\\0&1\end{pmatrix}$

$$\sin\alpha\begin{bmatrix}\sin\alpha & -\cos\alpha\\ \cos\alpha & \sin\alpha\end{bmatrix} + \cos\alpha\begin{bmatrix}\sin(\frac{\pi}{2}+\alpha) & -\cos(\frac{\pi}{2}+\alpha)\\ \cos(\frac{\pi}{2}+\alpha) & \sin(\pi/2+\alpha)\end{bmatrix}$$

$$= \begin{bmatrix}\sin^2\alpha & -\sin\alpha\cos\alpha\\ \sin\alpha\cos\alpha & \sin^2\alpha\end{bmatrix} + \begin{bmatrix}\cos^2\alpha & \sin\alpha\cos\alpha\\ -\sin\alpha\cos\alpha & \cos^2\alpha\end{bmatrix} = \begin{pmatrix}1&0\\0&1\end{pmatrix}$$

28). B] $I+A+A^2$

$$(I-A)(I+A+A^2) = I+A+A^2-A-A^2-A^3$$
$$= I-A^3 = I-0 = I.$$
$$(I+A+A^2)(I-A) = I-A+A-A^2+A^2-A^3$$
$$= I-0 = I$$
$$(I-A)^{-1} = I+A+A^2$$

29). c] $I\cos\theta + A\sin\theta$

$$\cos\theta\begin{pmatrix}1&0\\0&1\end{pmatrix} + \sin\theta\begin{pmatrix}0&1\\-1&0\end{pmatrix} = \begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$$

30). A]. Skew Symmetric matrix.

$(A+B)^T = A^T+B^T \qquad A^T=-A, \quad B^T=-B.$

$= -A-B$

$= -(A+B)$

$\therefore$ $A+B$ is Skew Symmetric matrix.

31). c). $2pr$.

$\sin\theta+\cos\theta = -\frac{q}{p}, \quad \sin\theta\cos\theta = \frac{r}{p}$

$(\sin\theta+\cos\theta)^2 = \frac{q^2}{p^2}$

$1+2\cdot\frac{r}{p} = \frac{q^2}{p^2}$

$\frac{q^2}{p^2} - \frac{2r}{p} = 1 \Rightarrow \frac{q^2-2pr}{p^2} = 1 \Rightarrow q^2-2pr = p^2$

$\Rightarrow q^2-p^2 = 2pr$

32). A]. 256.

$c_0+c_1+ \cdots +c_n = 2^n$

$c_0+c_2+\cdots = c_1+c_3+\cdots = 2^{n-1}$

$\therefore\ c_0+c_2+c_4+c_6+c_8 = 2^{9-1} = 2^8 = 256.$

33). D] . none.

$f(1) = f(-1) \Rightarrow a+b+c = a-b+c \Rightarrow 2b=0 \Rightarrow b=0$

if a, b, c are in A.P $\Rightarrow 2b = a+c \Rightarrow a+c=0 \Rightarrow a=-c$

$\therefore f(a) = a \cdot a^2 + b \cdot a + c = a^3 - a$

$f(b) = a \cdot b^2 + b \cdot b + c = -a$

$f(c) = a \cdot c^2 + b \cdot c + c = a^3 - a$

$2f(b) = -2a$

$\therefore f(c) + f(a) = a^3 - a + a^3 - a$

$= 2a^3 - 2a$

$\therefore 2f(b) \neq f(c) + f(a)$.

34). c] -1

$\cos\theta \longrightarrow \min \longrightarrow -1$

$\max \longrightarrow +1$

$\therefore 1 + 2\cos 4x = 1 + 2(-1) = -1$

35). D] -17

$f(x) = ax^7 + bx^3 + cx - 5$

$f(-7) = -a \cdot 7^7 - b \cdot 7^3 - 7c - 5$

$f(7) = a \cdot 7^7 + b \cdot 7^3 + 7c - 5$

$\therefore f(-7) + f(7) = -5 - 5$

$7 + f(7) = -10$

$f(7) = -17$

36). c] $2(1 - 2\sqrt{2} + \sqrt{3})$

$x+y+z = \sqrt{2} - 1 + 1 - \sqrt{3} + \sqrt{3} - \sqrt{2} = 0$

$x^3 + y^3 + z^3 = 3xyz$.

$x^3 + y^3 + z^3 - xyz = 3xyz - xyz = 2xyz$

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

$= 2(\sqrt{2} - \sqrt{6} - 1 + \sqrt{3})(\sqrt{3} - \sqrt{2})$

$= 2(\sqrt{6} - 2 - 3\sqrt{2} + 2\sqrt{3} - \sqrt{3} + \sqrt{2} + 3 - \sqrt{6})$

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

37) c]. $\alpha^2\beta, \alpha\beta^2$

$ax^2 + bx + c = 0, \quad \alpha + \beta = -b/a, \quad \alpha\beta = \frac{c}{a}$

$a^3x^2 + abcx + c^3 = 0$

Sum of the roots $= -\frac{abc}{a^3} = -\frac{bc}{a^2} = -\frac{b}{a}\cdot\frac{c}{a} = (\alpha+\beta)\alpha\beta$

$= \alpha^2\beta+\alpha\beta^2$

product of the roots $= \frac{c^3}{a^3} = \left(\frac{c}{a}\right)^3 = \alpha^3\beta^3 = (\alpha^2\beta)(\alpha\beta^2)$

38). c]. Constant

$\cos^2(52+\theta) + \cos^2[90-(52+\theta)]$

$\cos^2(52+\theta) + \sin^2(52+\theta) = 1, \forall \theta \in R$

$\therefore f(\theta) = 1.$

39). c] 0.6384

The possible value of $\cos 50.20'$ must lies between $\cos 50^\circ.18'$ and $\cos 50^\circ.42'$. then the possible value is 0.6384.

40). A]. 1

$\sin A, \cos A, \tan A \rightarrow G.P.$

$\cos^2 A = \sin A \cdot \tan A = \frac{\sin^2 A}{\cos A}$

$\cos^3 A = \sin^2 A.$

$\therefore \cot^6 A - \cot^2 A = \frac{\cos^6 A}{\sin^6 A} - \frac{\cos^2 A}{\sin^2 A} = \frac{\sin^4 A}{\sin^6 A} - \frac{\cos^2 A}{\sin^2 A}$

$= \frac{1}{\sin^2 A} - \frac{\cos^2 A}{\sin^2 A}$

$= \frac{1-\cos^2 A}{\sin^2 A} = \frac{\sin^2 A}{\sin^2 A} = 1$

41). B]. Equilateral.

$2(\tan^2 A + \tan^2 B + \tan^2 C - \tan B\tan C - \tan C\tan B - \tan A\tan B) = 0\times 2$

$2\tan^2 A + 2\tan^2 B + 2\tan^2 C - 2\tan B\tan C - 2\tan C\tan B - 2\tan A\tan B = 0$

$(\tan A - \tan B)^2 + (\tan B - \tan C)^2 + (\tan C - \tan A)^2 = 0$

$\tan A - \tan B = 0, \quad \tan B - \tan C = 0, \quad \tan C - \tan A = 0$

$\therefore \tan A = \tan B = \tan C$

$\therefore A = B = C;$

42). B] $\frac{\sqrt{5}-1}{2}$

$\tan x = \cos x \Rightarrow \sin x = \cos^2 x \Rightarrow \sin x = 1 - \sin^2 x.$

$\sin^2 x + \sin x - 1 = 0$

$\sin x = \frac{-1 \pm \sqrt{1^2 - 4(-1)(1)}}{2(1)} = \frac{-1 \pm \sqrt{5}}{2}$

$-1 \leq \sin x \leq 1 \quad \therefore \sin x = \frac{-1+\sqrt{5}}{2}$

43). C]. $\frac{\pi}{4}$

$\tan\alpha = \frac{1}{7}$, $\sin\beta = \frac{1}{\sqrt{10}}$

$\sin\alpha = \frac{1}{5\sqrt{2}}$ $\cos\beta = \frac{3}{\sqrt{10}}$

$\cos\alpha = \frac{7}{5\sqrt{2}}$

$\sin 2\beta = 2\sin\beta\cos\beta = 2\cdot\frac{1}{\sqrt{10}}\cdot\frac{3}{\sqrt{10}} = \frac{6}{10} = \frac{3}{5}$

$\cos 2\beta = 1 - 2\sin^2\beta = 1 - 2\times\frac{1}{10} = \frac{8}{10} = \frac{4}{5}$

$\sin(\alpha + 2\beta) = \sin\alpha\cos 2\beta + \sin 2\beta\cdot\cos\alpha.$

$= \frac{1}{5\sqrt{2}}\cdot\frac{4}{5} + \frac{3}{5}\cdot\frac{7}{5\sqrt{2}} = \frac{4+21}{25\sqrt{2}} = \frac{25}{25\sqrt{2}} = \frac{1}{\sqrt{2}}$

But $\sin 45^\circ = \frac{1}{\sqrt{2}}$

$\therefore \alpha + 2\beta = 45^\circ = \frac{\pi}{4}$.

44). D] 1.

$m, n, r \longrightarrow A\cdot P \Rightarrow n - m = r - n$

$m - n = n - r$

$a, b, c \longrightarrow G\cdot P \Rightarrow b^2 = ac$

$a^{n-r}\cdot b^{r-m}\cdot c^{m-n} = a^{n-r}\cdot c^{n-r}\cdot b^{r-m}$

$= (ac)^{n-r}\cdot b^{r-m}$

$= (b^2)^{n-r}\cdot b^{r-m}$

$= b^{2n-2r+r-m} = b^{2n-(r+m)} = b^0 = 1$

45). B]. 2.

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

$(1+x)(1+x^2)(1+x^4)(1+x^8)$

$= (1+x+x^2+x^3)(1+x^4)(1+x^8)$

$= 1+x+x^2+x^3+ \cdots$

$S_\infty = \frac{a}{1-r} = \frac{1}{1-\frac{1}{2}} = \frac{1}{1/2} = 2$

46). A]. A.P.

$(x-a+b)^2 + (x-b+c)^2 = 0$ $\therefore a-b = b-c$

$x-a+b=0$ $x-b+c=0$ $2b = a+c$

$x = a-b$ $x = b-c$ ie; a, b, c are in A.P.

47). A]. 9, 29.

$a = 28-16i$, $d = (27-14i)-(28-16i)$
$= 2i-1$

$t_n = (28-16i)+(n-1)(2i-1)$

$= 28-16i + n\times 2i - n - 2i + 1$

$= (29-n) + i(2n-18)$

if $(2n-18)i = 0$ then t_n is real.

$\therefore n = 9$

if $29-n=0$ then t_n is imaginary $\Rightarrow n = 29$.

48). c]. 2A.

$a, g_1, g_2, b \longrightarrow G.P$

$\frac{g_1}{a} = \frac{g_2}{g_1} = \frac{b}{g_2} \Rightarrow \frac{g_1}{a} = \frac{g_2}{g_1} \Rightarrow \frac{g_1^2}{g_2} = a$

$\frac{g_2}{g_1} = \frac{b}{g_2} \Rightarrow \frac{g_2^2}{g_1} = b$

$\frac{g_1^2}{g_2} + \frac{g_2^2}{g_1} = a+b$

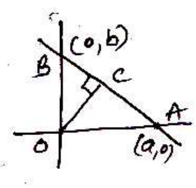
$\therefore a, A, b \rightarrow A.P \Rightarrow a+b = 2A$.

49). c] 1 : 2

$\frac{2x}{7} + \frac{y}{7} = \frac{7}{7} \Rightarrow \frac{x}{7/2} + \frac{y}{7} = 1$

$\therefore a : b = \frac{7}{2} : 7 \Rightarrow \frac{1}{2} : 1 = 1 : 2$

50]. A]. $\frac{1}{p^2}$



$\Delta AOB = \frac{1}{2}|a||b|$

$\Delta AOB = \frac{1}{2}\times AB \times OC$

$= \frac{1}{2}\times\sqrt{a^2+b^2}\cdot p$

$\cancel{\frac{1}{2}}|a||b| = \cancel{\frac{1}{2}}\sqrt{a^2+b^2}\cdot p$

$a^2b^2 = (a^2+b^2)p^2 \Rightarrow \frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$

51). D]. below the x-axis at a distance of 3/2

$y = k \rightarrow$ parallel to x-axis.

$ax + 2by + 3b = 0 \longrightarrow (1)$

$bx - 2ay - 3a = 0 \longrightarrow (2)$

① × b − ② × a

$$abx + 2b^2y = -3b^2$$
$$\underline{\begin{matrix} - & & \mp & & & + \\ abx & & 2a^2y & = & & 3a^2 \end{matrix}}$$
$$2(a^2+b^2)y = -3(a^2+b^2)$$
$$y = \frac{-3(a^2+b^2)}{2(a^2+b^2)} = -3/2$$

52) c] 4.

The given lines form a triangle

3 excircle + 1 Incircle = 4 circles.

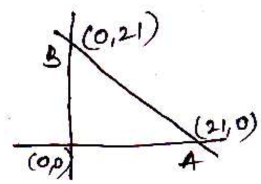
53). c]. Collinear.

Slope of AB = b/a

Slope of BC = b/a ∴ A, B, C, D are Collinear.

Slope of CD = $\frac{b}{a}$

54). B] 190.



let (h,k) be any point inside the ΔOAB, then

$h < 21,\ h > 0 \longrightarrow$ ①

$k < 21,\ k > 0 \longrightarrow$ ②

$h + k < 21 \longrightarrow$ ③

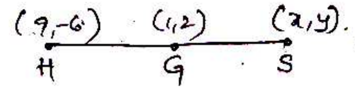
$h = 1,\ k = 1, 2, \dots 19 \longrightarrow 19$

$h = 2,\ k = 1, 2, 3, \dots 18 \longrightarrow 18$

$h = 19,\ k = 1$

$\therefore 19 + 18 + \dots + 1 = \frac{19(19+1)}{2} = 190.$

55). c] $(-3, 6)$.



HG : GS = 2 : 1

$\left(\frac{2x+9}{3}, \frac{2y+(-6)}{3}\right) = (1,2)$

$2x + 9 = 3 \qquad 2y - 6 = 6$

$x = -3 \qquad y = 6$

$(-3, 6)$.

56). B, C, D.

$A - B = A$

$B - A = B$, $A \cap B = \emptyset$.

57). $AO = 2SD$, $AG = 2GD$, $OG = 2GS$, $BC = 2BD$.

58). A, C, D

$\frac{0}{0}$, 0^0, $\frac{1}{0}$

59). A, B. ; $p \vee [(\sim p) \vee q]$, $p \vee (\sim p)$.

write truth tables and get the answers.

60). A, B, C

Substitue these points in the given in equations.

And we get < 0.

61). A, D.

62). A] 35, B) 11, D] 79.

$2+5+8+11+14+17+ \cdots$

$3+5+7+9+11+13+15+17+ \cdots$

$5, 11, 17, 23, 29, 35, \cdots$

63) A] $\Delta ABC = 0$, B] $AC = AB + BC$

64). A, C, D.

65) A, B, C

$(2, \cot\alpha)\,(1,0) = \sqrt{(2-1)^2 + (\cot\alpha - 0)^2}$

$= \sqrt{1 + \cot^2\alpha}$

$= |\operatorname{cosec}\alpha|$ Distance alway +ve.

66). 445

First number multiplied by 1 and 1 added to the result

Second " 2 and 2 "

Third " 3 " 3 "

$\therefore\ 88 \times 5 + 5 = 445$.

67). Should be 120 instead of 100.

68). 459

All others are multiples of 17 and a prime number

69) $\frac{bm}{60c}$

c caps in m minutes $\Rightarrow$ $\frac{60c}{m}$ bottles $\longrightarrow$ 1hr

b bottles $\longrightarrow$? hours.

$$\Rightarrow \frac{b}{60c/m} = \frac{bm}{60c}$$

70). 8 pm on Friday.

Gained 6 min — 168 hr

" 2 min — $168 \times \frac{2}{6} = 56$ hrs.

71). THURS DAY.

72). 30.

$x+y=45$; $y+z=55$; $3x+2=90$

$\therefore 3x-y=35 \Rightarrow x=20,\ y=25$ and $\therefore z=30$

73). 112m.

If B runs 1m, A runs $1\frac{3}{4}$ m $\Rightarrow$ B runs 4 $\longrightarrow$ A runs 7m

ie, A gains 3m, when B runs 4m

If A gains 84m, B must have run $4 \times \frac{84}{3} = 112$m.

74) 3 kmph.

Let upstream be x, down stream be y kmph

$$\frac{36}{x} + \frac{72}{y} = 7 \ ; \ \frac{72}{x} + \frac{36}{y} = 8$$

$$108\left(\frac{1}{x}+\frac{1}{y}\right) = 15$$

$$36\left(\frac{1}{x}-\frac{1}{y}\right) = 1 \Rightarrow 108\left(\frac{1}{x}-\frac{1}{y}\right) = 3$$

$$\frac{216}{x} = 18 \Rightarrow x = \frac{216}{18} = 12 \longrightarrow \text{up}$$

$$\frac{216}{y} = 12 \Rightarrow y = \frac{216}{12} = 18 \longrightarrow \text{down.}$$

75). 3.

$1 - \frac{1}{3} + \frac{1}{5}$ = white marbles = $\frac{7}{15}$

Given white are 7

$\therefore$ total are 15

$\therefore$ Brown are $\frac{1}{5}(15) = 3$.