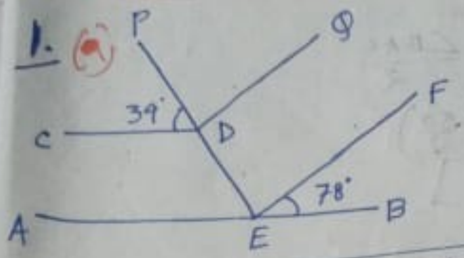
1. (a)



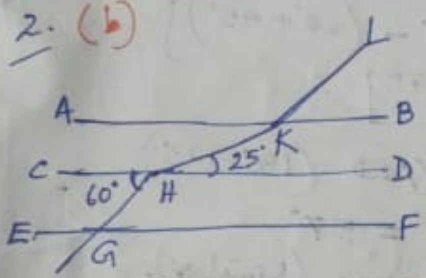
$\angle AEP = \angle CDP = 34°$

$\therefore \angle AEP + \angle BEF + \angle DEF = 180°$

$\Rightarrow 34° + 78° + \angle DEF = 180°$

$\Rightarrow \boxed{\angle DEF = 68°}$

2. (b)

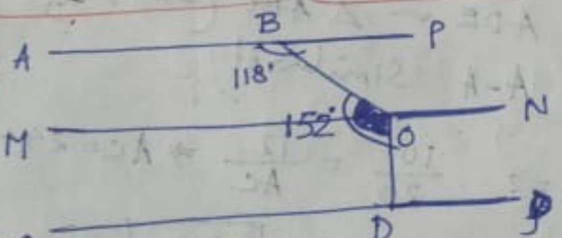


$\angle AKH = \angle KHD = 25°$

$\angle EGH = \angle AKL = (180° - 60°) = 120°$

$\therefore \angle HKL = (120° + 25°) = \boxed{145°}$

3. (c)



AB extended to P and CD extened to Q.

Now; MN || AB and also MN || CQ.

$\angle ABO = 118°$

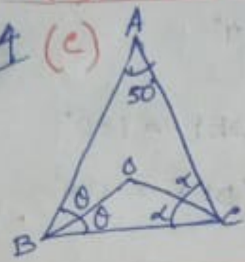
$\therefore \angle MOB = (180° - 118°) = 62°$

$\therefore \angle MOD = (152° - 62°) = 90°$

$\therefore \angle ODC = (180° - 90°) = \boxed{90°}$

(A) GEOMETRY (ANSWERS) ⟨14⟩

4 (c)

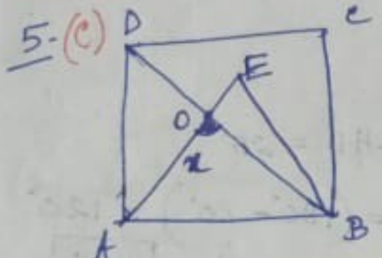


$\therefore \angle BOC = 90^\circ + \dfrac{\angle BAC}{2}$

$= \left(90^\circ + \dfrac{50}{2}\right)$

$= \boxed{115^\circ}$

5-(c)



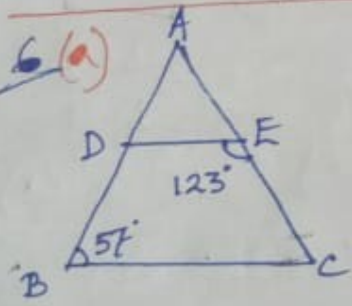
$\therefore \angle EAB = \angle OAB = 60^\circ$

$\angle ABD = 45^\circ$

$\therefore \angle AOB = \{180^\circ - (60^\circ + 45^\circ)\}$

$= \boxed{75^\circ}$

6 (a)



Now, [redacted] $\angle AED = (180^\circ - 123^\circ)$

$= 57^\circ$

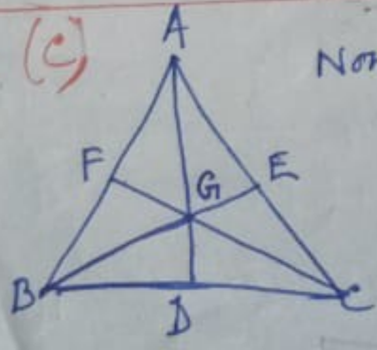
$\therefore \triangle ADE \sim \triangle ABC$ (Similar);

By A-A Similarity.

Now, $\dfrac{AD}{AC} = \dfrac{AE}{AB} \Rightarrow \dfrac{10}{20} = \dfrac{12}{AC} \Rightarrow AC = 24c$

$\therefore EC = (AC - AE) = (24 - 10) = \boxed{14cm}$

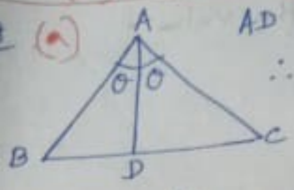
7 (c)



Now, the area of BDGF is →

$\left(\dfrac{1}{3} \times 60\right) = \boxed{20 \text{ sq.cm}}$

8 (a)

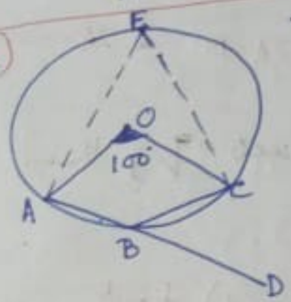


AD is the internal bisector of A.

$\therefore \frac{AB}{AC} = \frac{BD}{DC} \Rightarrow \frac{AB}{AC} = \frac{5}{(7.5-5)}$

$\therefore \frac{AB}{AC} = \frac{5}{2.5} \Rightarrow \frac{AB}{AC} = \boxed{2:1}$

9 (a)



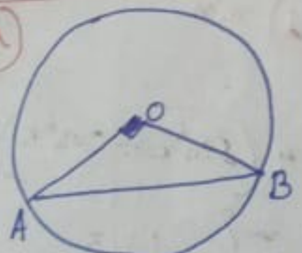
Take E as a point on the remaining part of circumference of the circle. Join AE and CE.

Now, $\angle AEC = \frac{1}{2}\angle AOC = \left(\frac{100}{2}\right)^\circ = 50^\circ$

Now, the side AB of cylic quadrilateral ABCE has been produced to D. So, exterior $\angle CBD = \angle AEC = 50^\circ$

$\therefore \angle CBD = \boxed{50^\circ}$

10. (a)



Here; $AO = OB = r$ (Radious)

$\angle AOB = 90^\circ$

$\therefore \underset{\sim}{\Delta AOB} \rightarrow (AB)^2 = (OA)^2 + (OB)^2$

$\Rightarrow 2r^2 = (3\sqrt{2})^2 \Rightarrow 2r^2 = 18 \Rightarrow r = 3$ units

$\therefore$ Area of the Sector AOB $= \frac{1}{4}\pi r^2 = \boxed{\frac{9}{4}\pi \text{ sq. units}}$

1/ (a) $\tan(x+y)\tan(x-y) = 1$

Now; $\tan(x+y) \cdot \tan(x-y) = \sqrt{3} \times \frac{1}{\sqrt{3}}$

$\therefore \tan(x+y) = \tan 60^\circ \Rightarrow x+y = 60^\circ \rightarrow (i)$

and $\tan(x-y) = \tan 30^\circ \Rightarrow x-y = 30^\circ \rightarrow (ii)$

Now; solving eqⁿ(i) & eqⁿ(ii); We get →

$x = 45^\circ$

then; $\tan\left(\frac{2x}{3}\right) = \tan\left(\frac{2 \times 45}{3}\right) = \tan 30^\circ = \boxed{\frac{1}{\sqrt{3}}}$

---

2. (c) $A = \tan 11^\circ \cdot \tan 29^\circ$

$\therefore A = \tan(90^\circ - 79^\circ) \cdot \tan(90^\circ - 61^\circ)$

$\therefore A = \cot 61^\circ \cdot \cot 79^\circ \quad [\because \tan(90^\circ - \theta) = \cot\theta]$

$\therefore A$

Now; $B = 2\cot 61^\circ \cdot \cot 79^\circ \Rightarrow B = 2A$

OR $\boxed{2A = B}$

---

3. (c) Let $\theta = 45^\circ$;

$\therefore \sec\theta + \tan\theta = P$

$\Rightarrow P = \sqrt{2} + 1$

Now; $\frac{P^2 - 1}{P^2 + 1}$

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

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

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

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

$= \frac{\cancel{(\sqrt{2}+1)}}{\sqrt{2}\,\cancel{(\sqrt{2}+1)}} = \frac{1}{\sqrt{2}}$

$\therefore$ By option $\sin\theta = \sin 45^\circ = \frac{1}{\sqrt{2}}$

$\therefore$ Required answer is $\boxed{\sin\theta}$.

4. (d). $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1}$

Let $\theta = 45°$; put the value of θ in the given condition

Now; $\frac{1 + \sqrt{2} - 1}{1 - \sqrt{2} + 1} \Rightarrow \frac{\sqrt{2}}{2 - \sqrt{2}} \Rightarrow \frac{\cancel{\sqrt{2}}}{\cancel{\sqrt{2}}(\sqrt{2}-1)}$

$\therefore$ By the option $\rightarrow \frac{\cos\theta}{1-\sin\theta} = \frac{1}{(\sqrt{2}-1)}$

then, Required answer is $\boxed{(d)}$.

5. (c) Let $\theta = 45$; put the value of θ in the given condition; we get $\rightarrow$

$4m = \cot\theta(1 + \sin\theta)$

$\Rightarrow 4m = \left(1 + \frac{1}{\sqrt{2}}\right)$

$\Rightarrow m = \frac{1}{4}\left(1 + \frac{1}{\sqrt{2}}\right)$

$4n = \cot\theta(1 - \sin\theta)$

$\Rightarrow 4n = \left(1 - \frac{1}{\sqrt{2}}\right)$

$\Rightarrow n = \frac{1}{4}\left(1 - \frac{1}{\sqrt{2}}\right)$

$\therefore (m^2 - n^2)^2 = \left[\frac{1}{16}\left\{\left(1+\frac{1}{\sqrt{2}}\right)^2 - \left(1-\frac{1}{\sqrt{2}}\right)^2\right\}\right]^2$

$= \left[\frac{1}{\cancel{16}_4} \times \cancel{4} \times 1 \times \frac{1}{\sqrt{2}}\right]^2 = \frac{1}{32}$

Now; put the values of m and n in [redacted] option (c); we get $\rightarrow$ $mn = \frac{1}{16}\left(1+\frac{1}{\sqrt{2}}\right)\left(1-\frac{1}{\sqrt{2}}\right)$

$= \frac{1}{16}\left(1 - \frac{1}{2}\right) = \frac{1}{32}$

$\therefore$ Required answer is $\boxed{(c)}$.

6 (d) $3(\sin x - \cos x)^4 + 6(\sin x + \cos x)^2 + 4(\sin^6 x + \cos^6 x)$.

Let $x = 0°$; putting the value of x in above expression; We get $\rightarrow$

$= 3(0-1)^4 + 6(0+1)^2 + 4(0+1)$

$= (3+6+4) = \boxed{13}$

7. (d) $\sqrt{\dfrac{1+\cos\theta}{1-\cos\theta}} + \sqrt{\dfrac{1-\cos\theta}{1+\cos\theta}}$

$= \sqrt{\dfrac{(1+\cos\theta)^2}{\sin^2\theta}} + \sqrt{\dfrac{(1-\cos\theta)^2}{\sin^2\theta}}$

$= \dfrac{1+\cos\theta}{\sin\theta} + \dfrac{1-\cos\theta}{\sin\theta}$

$= \dfrac{1+\cancel{\cos\theta}+1-\cancel{\cos\theta}}{\sin\theta} = \boxed{2\operatorname{cosec}\theta}$

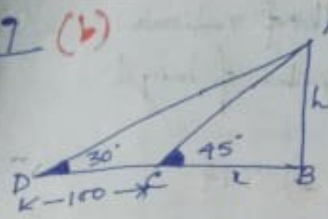
8. (a) $\cos^3\theta + \sec^3\theta$

$= (\cos\theta + \sec\theta)^3 - 3.\cos\theta.\sec\theta(\cos\theta + \sec\theta)$

$= 3\sqrt{3} - 3\sqrt{3}$ $\left[\because \cos\theta + \sec\theta = \sqrt{3}\right]$

$= \boxed{0}$

9 (b)



Here; let AB be the height of the light house and D, C are the ships. Such that CD = 100m

$AB = h$; $BC = x$.

then, from $\triangle ABC \rightarrow \frac{h}{x} = \tan 45° \Rightarrow \frac{h}{x} = 1$

$\Rightarrow h = x \longrightarrow$ (i)

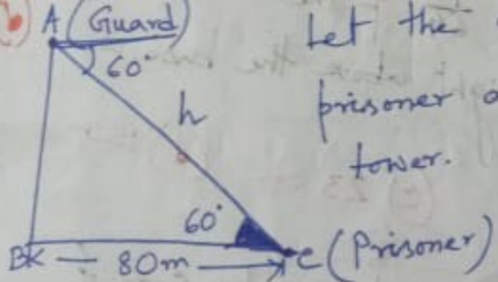
from $\triangle ABD \rightarrow \frac{h}{(x+100)} = \tan 30° = \frac{1}{\sqrt{3}}$

$\Rightarrow \sqrt{3}h = x + 100 = h + 100 \quad [\because h = x]$

$\Rightarrow h = \frac{100}{(\sqrt{3}-1)} = \frac{100(\sqrt{3}+1)}{2}$

$\Rightarrow h = \boxed{50(\sqrt{3}+1)}$

10 (b)



Let the Guard be A, C is the prisoner and B is the foot of the tower.

Now $AC = h$ and $BC = 80m$

$\therefore \cos 60° = \frac{BC}{AC}$

$\Rightarrow \frac{1}{2} = \frac{80}{h}$

$\Rightarrow \boxed{h = 160 \text{ m}}$

(C) 3D FIGURES (ANSWERS) ⟨20⟩

1.(b) Let the number of balls be x.

$\therefore \pi \times 7 \times 7 \times 8 = x \times \frac{4}{3}\pi \times 1^3$

$\Rightarrow x = \boxed{294}$

2.(c) Let the radious and height of the cone is r unit and h unit respectively.

Now; New height $= (h+h) = 2h$ unit

New radious $= (r+r) = 2r$ "

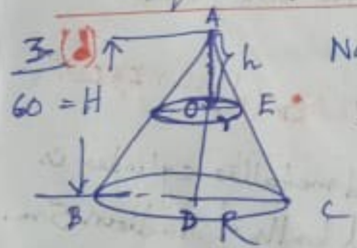
New Volume $= \frac{1}{3}\pi (2r)^2 2h$

$= \frac{8}{3}\pi r^2 h$

$\therefore \frac{\text{New Volume}}{\text{Original Volume}} = \frac{\frac{8}{3}\pi r^2 h}{\frac{1}{3}\pi r^2 h} = 8$

$\therefore$ Required answer is $\rightarrow$ $\boxed{\text{Eight times of the Original}}$

3.(d)



Now; $\triangle AOE \sim \triangle ADC$ [Similar]

$\therefore \frac{r}{R} = \frac{h}{H}$

According to the question:

$\frac{1}{3}\pi r^2 h = \frac{1}{64} \times \frac{1}{3}\pi R^2 H$

$\Rightarrow \frac{r^2}{R^2} = \frac{H}{h} \times \frac{1}{64}$

$\Rightarrow \frac{h^2}{H^2} = \frac{H}{h} \times \frac{1}{64}$ $\left[\because \frac{r}{R} = \frac{h}{H}\right]$

$\Rightarrow \frac{h^3}{H^3} = \frac{1}{64}$

$\Rightarrow \frac{h}{H} = \frac{1}{4}$

$\Rightarrow h = \frac{60}{4}$ [H=60]

$\Rightarrow \boxed{h = 15\text{ cm}}$

(C) 3D FIGURES (ANSWERS) <21>

1\. (c) Let the height of the water in the bottle is h cm.

$\therefore \frac{1}{3}\pi \times r^2 \times 21 = \pi \times \left(\frac{r}{3}\right)^2 \times h \Rightarrow \boxed{h = 63\text{ cm}}$

5\. (c) Area of the ceiling $= \frac{2500}{0.5} = 5000$ Sq.m

Now; • The length and breadth are $5x$ m and $2x$ m respectively.

$\therefore (5x \times 2x) = 5000$

$10x^2 = 5000$

$\Rightarrow x^2 = 500$

$\Rightarrow x = 22.36 \approx 22$

$\therefore l = 110$ m and $b = 44$ m

$2 \times h\,(110 + 44) = 7000$

$\Rightarrow h = \left(\frac{7000}{308}\right) = 22.72 = \boxed{23\text{ m}}$

$\therefore$ Area of the wall $= \frac{2100}{0.3} = 7000$ Sqm

6\. (d) Number of bricks $= \frac{\text{Volume of the wall}}{\text{Volume of brick}}$

$= \frac{\cancel{1000}^{25} \times 700 \times \cancel{20}}{\cancel{20} \times \cancel{8} \times \cancel{5}} = \boxed{17500}$

7\. (d) Diagonal $= \sqrt{l^2 + b^2 + h^2}$

$= \sqrt{(14)^2 + (8)^2 + (8)^2}$

$= \sqrt{324}$

$= \boxed{18\text{ m}}$

8. (d) Slant height $= \sqrt{(60)^2 + (32)^2}$

$= 68$ cm

Area :→ $\pi r(h+l)$ [$\because l$ = slant height]

$\left(\cancel{\frac{22}{7}} \times \cancel{32 \times 32 \times 68}\right) \cancel{cm^2}$

$\frac{22}{7} \times 32 \times (60 + 68) \Rightarrow \left(\frac{22}{7} \times 32 \times 128\right)$

$= \boxed{12873 \text{ cm}^2}$

9 (b) Let the number of balls are x.

$\therefore \cancel{4} \times \cancel{5} \times \cancel{5} \times \overset{3}{\cancel{12}} = x \times \frac{\cancel{4}}{3} \times \cancel{5} \times 5 \times \cancel{5} \times 5$

$\Rightarrow x = 1.8 \simeq \boxed{2}$

10 (c) Let the respective edges of the cubes are a unit and b units.

$\therefore a^3 : b^3 = 1 : 8$

$\Rightarrow a : b = 1 : 2$

Now; Ratio of their surface area:

$6a^2 : 6b^2 = \boxed{1 : 4}$

1. (a) $l = 14cm$ and $b = 8cm$

$\therefore$ Area of the Rectangle is: $\rightarrow lb = 112 cm^2$

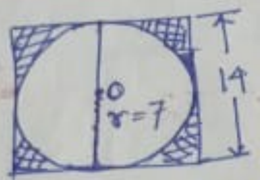
Area of the square is: $\left\{\left(\frac{112}{2}\right) - 7\right\} = 49$

$\therefore x^2 = 49$ [Since the side of the square is x cm]

$\Rightarrow x = 7$

Now the perimeter is: $\rightarrow 4x = \boxed{28 cm}$

2. (c)



Area of space left: $\rightarrow$ [(Area of the square) − (Area of the circle)]

$= \left\{(14 \times 14) - \left(\frac{22}{7} \times 7 \times 7\right)\right\} = \boxed{42 cm^2}$

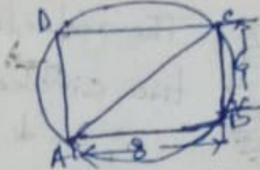
3. (a) Area of the floor $= (700 \times 400) = 280000 cm^2$

[$\because$ 1 m = 100 cm]

Area of the marble $= (10 \times 7) = 70 cm^2$

Number of marbles $= \left(\frac{28000\cancel{0}}{7\cancel{0}}\right) = \boxed{4000}$

(D) 2D FIGURES (ANSWERS) (29)

1 (a)  

$\therefore$ Diagonal of rectangle = Diameter of Circle.

$\therefore$ Diameter $= \sqrt{(6)^2 + (8)^2} = \sqrt{100} = 10$ cm

Then; Radious $= 5$ cm.

Area of the Circle $= \left(\frac{22}{7} \times 5 \times 5\right) cm^2 = \boxed{78.5\ cm^2}$

5. (c) Let the Side of the triangle is $= 100a$ unit

$\therefore$ Original perimeter of the triangle is $= 300a$ unit.

Now the new perimeter is: $(110 + 130 + 160)a = 400a$ unit.

$\therefore$ Percentage increased in perimeter $= \left[\frac{400a - 300a}{300a} \times 100\right]$

$= \boxed{33.33\%}$

6 (c) Number of rounds $\to \frac{2000}{2 \times \frac{22}{7} \times 7} = \frac{2000}{44} = 45.45$

$= \boxed{45}$

7 (b) Let the respective diagonals are $\to d_1$ and d_2 :

Now; $d_1^2 + d_2^2 = 2(a^2 + b^2)$ [Let, respective Sides of the parallelogram are a and b.]

$\Rightarrow (18)^2 + d_2^2 = 2\{(13)^2 + (11)^2\}$

$\Rightarrow 324 + d_2^2 = 580$

$\Rightarrow d_2^2 = 256$

$\Rightarrow d_2 = \boxed{16\ m}$

8 (a)

The respective radius of the two circles are r_1 and r_2 cm.

$\therefore 2 \times \frac{22}{7} \times r_1 = 212 \Rightarrow r_1 = 34$ cm

then, $2 \times \frac{22}{7} \times r_2 = 412 \Rightarrow r_2 = 66$ cm

$\therefore$ Difference between the area of the two circles:

$\frac{22}{7}(r_2^2 - r_1^2) = \frac{22}{7}\left[(66)^2 - (34)^2\right]$ cm^2

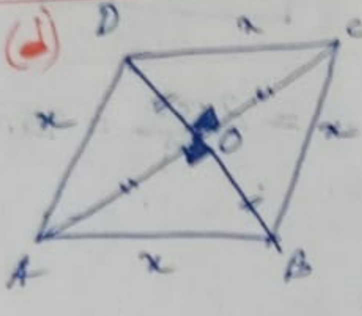
$= \frac{22}{7}\left[(66+34)(66-34)\right] = \boxed{10057 \text{ cm}^2}$

9 (b) Percentage change: $\left(10 - 10 - \frac{10 \times 10}{100}\right) = -1\%$

$\therefore 99x\% = 217 \Rightarrow x = \left(\frac{217 \times 100}{99}\right)$

$= 219.19 \approx \boxed{219}$

10. (d)



$AO = OC$; $DO = OB$

$\angle AOB = \angle DOC = 90^\circ$ [opposite (vertically)]

$\therefore 4x = 40$

$x = 10$ cm

If $AC = 16$ cm;

then $AO = 8$ cm

$\therefore OB = \sqrt{(10)^2 - (8)^2}$

$OB = 6$ cm.

$DB = 12$ cm

Area of the Rhombus:

$\left[\frac{1}{2} \times AC \times DB\right]$

$= \left(\frac{1}{2} \times 16 \times 12\right)$ cm^2

$= \boxed{96 \text{ cm}^2}$

1. (a) $\frac{7x}{2} + 14 = \frac{7}{x}$

$\Rightarrow \frac{7x}{2} - \frac{7}{x} = -14$

$\Rightarrow \frac{x}{2} - \frac{1}{x} = -2$ [∵ Dividing both sides by 7]

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

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

$\Rightarrow \frac{x^2}{4} + \frac{1}{x^2} = \boxed{5}$

2. (b) $\frac{3p}{p^2 - 3p + 3} = \frac{1}{6}$

$\Rightarrow \frac{p^2 - 3p + 3}{3p} = 6$

$\Rightarrow p + \frac{3}{p} - 3 = (6 \times 3)$

$\Rightarrow \left(p + \frac{3}{p}\right) = \boxed{21}$

3. (a) Adding all three equations;

$x(x+y+z) + y(x+y+z) + z(x+y+z) = (20+30+50)$

$\Rightarrow (x+y+z)(x+y+z) = 100$

$\Rightarrow x+y+z = \pm 10$

$\Rightarrow 2(x+y+z) = \boxed{\pm 20}$

4. (d) Multiplying Corresponding terms;

$$a^x \cdot a^y \cdot a^z = (x+y+z)^{x+y+z}$$

$$\Rightarrow a^{x+y+z} = (x+y+z)^{x+y+z}$$

$$\Rightarrow a = \boxed{(x+y+z)}$$

5. (b) $x = 2+\sqrt{3}$

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

$$x+\frac{1}{x} = 4$$

$$\frac{x^6+x^4+x^2+1}{x^3}$$

$$= \frac{x^4(x^2+1)+(x^2+1)}{x^3}$$

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

$$\therefore \left[\left(x+\frac{1}{x}\right)^2-2\right]\left(x+\frac{1}{x}\right)$$

$$= (4^2-2)(4) = \boxed{56}$$

6. (d) $x = y$

$$2t = \frac{2t-1}{3}$$

$$\Rightarrow 6t = 2t-1$$

$$\Rightarrow 4t = -1$$

$$\Rightarrow t = \boxed{-\frac{1}{4}}$$

7. (d) $2a-\frac{2}{a} = -3$

$$\Rightarrow a-\frac{1}{a} = -\frac{3}{2}$$

$$\Rightarrow \left(a-\frac{1}{a}\right)^3 = -\frac{27}{8}$$

$$\Rightarrow a^3-\frac{1}{a^3}-3\cdot a\cdot\frac{1}{a}\left(a-\frac{1}{a}\right) = -\frac{27}{8}$$

$$\Rightarrow a^3-\frac{1}{a^3}-3\left(-\frac{3}{2}\right) = -\frac{27}{8}$$

$$\Rightarrow a^3-\frac{1}{a^3} = -\left(\frac{27}{8}+\frac{9}{2}\right)$$

$$\Rightarrow a^3-\frac{1}{a^3} = -\frac{63}{8}$$

$$a^3-\frac{1}{a^3}+2$$

$$= -\frac{63}{8}+2$$

$$= \boxed{-\frac{47}{8}}$$

(E) ALGEBRA (ANSWERS) <28>

8. (c) $x^3+y^3 = 35$

$(x+y) = 5$

$\Rightarrow (x+y)^3 = 125$

$\Rightarrow x^3+y^3+3xy(x+y) = 125$

$\Rightarrow 35+3xy(5) = 125$

$\Rightarrow 15xy = 90$

$\Rightarrow xy = 6$

$\therefore \frac{1}{x}+\frac{1}{y} = \left(\frac{x+y}{xy}\right) = \boxed{\frac{5}{6}}$

9. (c) $\frac{x^2}{by+cz} = 1$

$\Rightarrow x^2 = (by+cz)$

$(x^2+ax) = (ax+by+cz)$

$\Rightarrow x(x+a) = ax+by+cz$

$\Rightarrow \frac{1}{(x+a)} = \frac{x}{ax+by+cz}$

$\Rightarrow \frac{a}{(x+a)} = \frac{ax}{ax+by+cz}$

$\frac{b}{b+y} = \frac{by}{ax+by+cz}$

$\frac{c}{c+z} = \frac{cz}{ax+by+cz}$

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

$= \left(\frac{ax+by+cz}{ax+by+cz}\right) = \boxed{1}$

10. (b) Let $a=1$; $b=1$ and $c=-2$

$\therefore$ putting the value of a, b and c ; the given.

Condition $a+b+c=0$ (satisfying the Condition).

$\frac{a^2+b^2+c^2}{b^2-ca} = \frac{(1)^2+(1)^2+(-2)^2}{(1)^2-(-2)(1)} = \frac{6}{3} = \boxed{2}$

——— × ———