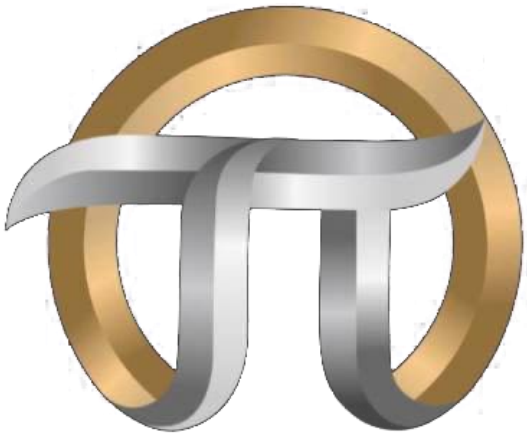
A. Geomtry



Answers of choose by steps

Exercise (1)

On the 3D orthognal coordinate system.

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Q1

Solution (c)

$(2,3,0) \rightarrow Z = 0$

$\therefore$ *Lies in xy plane*

Q2

Solution (c)

$(2,0,0) \rightarrow Y = 0\,, Z = 0$

$\therefore$ *Lies in x axis*

Q3

Solution (c)

The distance between $(2, -3,5)$ *and* $xz - plane = |y| = |-3| = 3$

Q4

Solution (a)

$Distance\ between\ (a, b, c)\ and\ y - axis = \sqrt{x^2 + z^2} = \sqrt{a^2 + c^2}$

Q5

Solution (b)

$Distance\ between\ (-5, -3,4)\ and\ x - axis = \sqrt{y^2 + z^2} =$

$\sqrt{(-3)^2 + (4)^2} = 5$

Q6

Solution (b)

XZ-plane → $Y = 0$

Q7

Solution (b)

$XY - plane$, $YZ - plane$

Intersects at Y-axis

Q8

Solution (a)

$XY - plane, XZ - plane, YZ - plane$

Intersects at the origin point

Q9

Solution (b)

$x\bar{x}$, $z\bar{z}$ → Creates $XZ - plane$

Equation of $XZ - plane$ is $Y = 0$

Q10

Solution (a)

$Eq.$ of $Z - axis$ → $x = 0$, $y = 0$

Q11

Solution (c)

The midpoint between $(2,3,3)$, $(6,-1,-4)$

$x=\frac{x_1+x_2}{2}$, $y=\frac{y_1+y_2}{2}$, $z=\frac{z_1+z_2}{2}$

$x=\frac{2+6}{2}=4$, $y=\frac{3-1}{2}=1$, $z=\frac{3-4}{2}=-\frac{1}{2}$

The midpoint is $(4,1,-\frac{1}{2})$

Q12

Solution (a)

Midpoint of $(-4,0,5)$, $(-2,4,-13)$

$x=\frac{-4-2}{2}=-3$, $y=\frac{0+4}{2}=2$, $z=\frac{5-13}{2}=-4$

$a=x=-3$, $b=y=2$, $c=z=-4$

$a+b+c=-3+2-4=-5$

Q13

Solution (b)

Midpoint lies on $XZ-plane \rightarrow y=0$

$y=\frac{12+K+3K}{2}=0 \rightarrow 12+4K=0 \rightarrow K=-3$

Q14

Solution (d)

$A = (7, -1, 8)$, $B = (11, 2, -4)$

$\overline{AB} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$

$\overline{AB} = \sqrt{(7 - 11)^2 + (-1 - 2)^2 + (8 + 4)^2} = 13\ cm.$

Q15

Solution (b)

$(2, 0, -3) \rightarrow y = 0 \rightarrow Lies\ on\ XZ - plane$

Q16

Solution (c)

$XZ - plane \rightarrow y = 0$

$(2a, a + 3, 5)$, $a + 3 = 0 \rightarrow a = -3$

$(2a, a + 3, 5) \rightarrow (-6, 0, 5)$

Distance between YZ - Plane and the point $= |x| = |-6| = 6$

Q17

Solution (c)

$(a-2,5,a-4)$

$\rightarrow$ 5 units from $YZ-$ $Plane$

$|a-2|=5$

$a-2=5\rightarrow a=7$ $\quad or \quad$ $a-2=-5\rightarrow a=-3$

$\rightarrow$ 3 units from $XZ-$ $Plane$

$|a-4|=3$

$a-4=3\rightarrow a=7$ $\quad or \quad$ $a-4=-3\rightarrow a=1$

$a=7$

Q18

Solution (b)

$A=(3,-1,5)$, $B(x,y,z)$, $Midpoint=(5,6,-3)$

$\frac{3+x}{2}=5\rightarrow x=7$, $\frac{-1+y}{2}=6\rightarrow y=13$, $\frac{5+z}{2}=-3\rightarrow z=-11$

$B=(7,13,-11)$

Q19

Solution (b)

$(-3,4,5)$, $(0,0,0)$

$Distance\ from\ the\ origin=\sqrt{x^2+y^2+z^2}=\sqrt{(-3)^2+4^2+5^2}=5\sqrt{2}$

Q20

Solution (d)

$A = (-4, -2, 3)$, $B = (1, 2, K)$

$\overline{AB} = \sqrt{(-4-1)^2 + (-2-2)^2 + (K-3)^2} = \sqrt{77}$

$(K-3)^2 + 25 + 16 = 77$

$(K-3)^2 = 36$

$K - 3 = 6 \rightarrow K = 9$ $\quad or \quad$ $K - 3 = -6 \rightarrow K = -3$

Q21

Solution (b)

$(x, 5, z) \rightarrow y = 5$

Q22

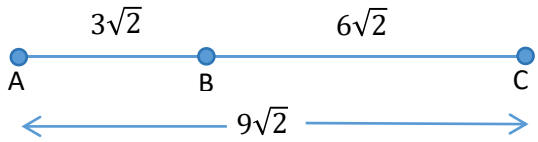
Solution b)

$A = (6, 0, 3)$, $B = (7, 1, 7)$, $C = (9, 3, 15)$

$AB = 3\sqrt{2}$, $BC = 6\sqrt{2}$, $AC = 9\sqrt{2}$

$\rightarrow$ *Point A divides BC in the ratio*

$\frac{AB}{AC} = \frac{3\sqrt{2}}{9\sqrt{2}} = \frac{1}{3}$ *externally*



Q23

Solution (b)

$Equidistant \rightarrow the\ disances\ are\ equal$

$(k, 3, -5)$

$\rightarrow dist.\ from\ x-axis = \sqrt{3^2 + (-5)^2} = \sqrt{34}$

$\rightarrow dist.\ from\ y-axis = \sqrt{k^2 + (-5)^2} = \sqrt{34}$

$k^2 = 9 \rightarrow k = \pm 3$

Q24

Solution (b)

$A = (2, 12 + k, k)\ ,\ B = (4, m, 8 - m)$

$Midpoint\ \epsilon\ x-axis \rightarrow y = 0\ ,\ z = 0$

$y = \frac{12+k+m}{2} = 0 \rightarrow k + m = -12$

$z = \frac{k + 8 - m}{2} = 0 \rightarrow k - m = -8$

$by\ solving\ the\ two\ Eq. \rightarrow k = -10\ ,\ m = -2$

$k - 3m = -10 + 6 = -4$

Q25

Solution (c)

$A = (3, -5, 1)$

$the\ sum\ of\ dist.\ from\ three\ planes = |x| + |y| + |z| = |3| + |-5| + |1| = 9$

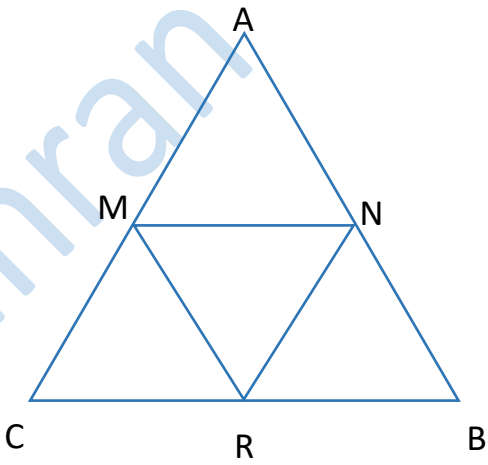
Q26

نغير إشارة اللي متقالش

Solution (b)

$$(-2, 3, 4)$$
$$\downarrow$$
By reflection $(2, -3, 4)$

Q27



Solution (d)

$$\frac{MN}{BC} = \frac{MR}{AB} = \frac{NR}{AC} = \frac{P.of\ \Delta ABC}{P.of\ \Delta MNR} = \frac{1}{2}$$

$MN = 3$, $NR = 5$, $MR = 4$

$P.of \Delta MNR = 3 + 5 + 4 = 12$

$P.of\ \Delta ABC = 2 \times 12 = 24$

Q28

Solution (c)

$A = (2, -5, 7)$, $B = (1, 3, 6)$, $C = (0, y, 0)$

$$AC = BC \rightarrow \sqrt{(2)^2 + (y+5)^2 + (7)^2} = \sqrt{(1)^2 + (y-3)^2 + (6)^2}$$

$$(y+5)^2 + 53 = (y-3)^2 + 37$$

$$y^2 + 10y + 25 + 53 = y^2 - 6y + 9 + 37$$

$$16y = -32 \rightarrow y = -2$$

Q29

Solution (c)

$A = (3, 4, 8)$, $B = (1, 2, 7)$, $C = (3, 0, 6)$

$AB = 3$, $BC = 3$ $\rightarrow AB = BC$

Q30

Solution (b)

$A = (3, 4, 5)$

$\rightarrow Projection\ on\ x-axis = L = (3,0,0)$

$\rightarrow Projection\ on\ y-axis = M = (0,4,0)$

$\rightarrow Projection\ on\ z-axis = N = (0,0,5)$

Q31

Solution (c)

$A = (3, 4, 5)$

$\rightarrow Projection\ on\ xy-plane = L = (3,4,0)$

$\rightarrow Projection\ on\ yz-plane = M = (0,4,5)$

$\rightarrow Projection\ on\ xz-plane = N = (3,0,5)$

اللي متقالش نحطه ZERO

Q32

Solution (d)

$O = (0,0,0)$, $A = (l,0,0)$, $B = (0,m,0)$, $C = (0,0,n)$

Let $E = (x,y,z)$

$EO = \sqrt{x^2+y^2+z^2}$

- $EO = EA$

$\rightarrow \sqrt{x^2+y^2+z^2} = \sqrt{(x-l)^2+y^2+z^2}$

$x^2+y^2+z^2 = x^2-2lx+l^2+y^2+z^2 \rightarrow l^2 = 2xl$

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

- $EO = EB$

$\rightarrow \sqrt{x^2+y^2+z^2} = \sqrt{x^2+(y-m)^2+z^2}$

$x^2+y^2+z^2 = x^2+y^2-2my+m^2+z^2 \rightarrow m^2 = 2my$

$y = \frac{m}{2}$

- $EO = EC$

$\rightarrow \sqrt{x^2+y^2+z^2} = \sqrt{x^2+y^2+(z-n)^2}$

$x^2+y^2+z^2 = x^2+y^2+z^2-2zn+n^2 \rightarrow n^2 = 2nz$

$z = \frac{n}{2}$

$$E = (\frac{l}{2},\frac{m}{2},\frac{n}{2})$$

Q33

Solution (b)

$Point \in y-axis \rightarrow x=0 \ , \ z=0$

$Let\ the\ point = (0,y,0)$

$dist. = \sqrt{1^2+(y-2)^2+3^2} = \sqrt{10}$

$(y-2)^2+10=10 \rightarrow y-2=0$

$y=2$

Q34

Solution (c)

$A=(6,-2,4) \ , \ B=(2,4,-8) \ , \ C=(-2,2,4)$

$AB = CD$

$\sqrt{(6-2)^2+(-2-4)^2+(4+8)^2} = \sqrt{(x+2)^2+(y-2)^2+(z-4)^2}$

$14 = \sqrt{(x+2)^2+(y-2)^2+(z-4)^2} \rightarrow$ بتجربة الاختيارات

$D=(2,-4,16)$

Q35

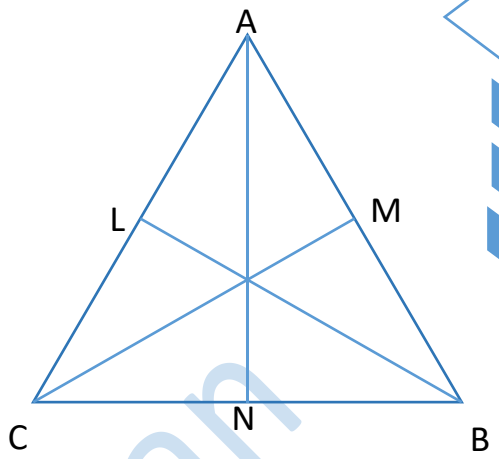
Solution (d)

$A=(3,1,5) \ , \ B=(2,3,7) \ , \ C=(0,3,1)$

$D = \frac{B+C}{2} = (\frac{2+0}{2}, \frac{3+3}{2}, \frac{7+1}{2}) \rightarrow (1,3,4)$

$AD = 3$

Q36



Solution (a)

$A = (3, -4, 0)$, $B = (15, 0, 2)$, $C = (0, -8, 4)$

$Midpoint = \frac{A+B+C}{3} = (6, -4, 2)$

$\rightarrow dist.\ from\ xz - plane = |-4| = 4$

$\rightarrow dist.\ from\ xy - plane = 2$

$\rightarrow dist.\ from\ yz - plane = 6$

Q37

Solution (1- B, 2- D)

$A = (5, 8, 4)$

$B = (0, 8, 4)$

$C = (0, 0, 4)$

Q38

Solution (1- B, 2- D, 3- B)

$C = (5, 5, 5)$

$D` = (5, 0, 0)$

$Diagonal\ of\ cube = \sqrt{5^2 + 5^2 + 5^2} = 5\sqrt{3}$

Q39

Solution (1- C, 2- B, 3- C, 4-C)

$C` = (5,8,0)$

$D = (5,0,3)$

$C = (5,8,3)$

$Volume = L.W.H = 5 \times 8 \times 3 = 120$

O B`C`D` is on $xy - \ plane \ \rightarrow \ Eq. = z = 0$

D D` C` C is parallel to $yz - \ plane \rightarrow Eq. = x = 5$