Recap of Previous Lecture

Topic — Most important questions on section formula.

Topic — Most important questions on mid point formula.

Kesi chal rahi hai mid-term Preparation?

A) Ak damm bahiya.

B) Revision karna baahi hai.

C) (Marathon) ka wait karr rahe hain.

d) ye kya hota hai?

#Q. Point P divides the line segment joining the points $A(-1, 3)$ and $B(9, 8)$ such that $\frac{AP}{BP} = \frac{k}{1}$. If P lies on othe lien $x - y + 2 = 0$. find the value of k. **[CBSE 2010]**

$$x = \frac{mx_2 + nx_1}{m+n}, \quad y = \frac{my_2 + ny_1}{m+n}$$

$$x = \frac{9k-1}{k+1}, \quad y = \frac{8k+3}{k+1}$$

$$\rightsquigarrow x - y + 2 = 0$$

$$x - y + 2 = 0$$

$$\frac{9k-1}{k+1} - \frac{8k+3}{k+1} + \frac{2}{1} = 0$$

$$\frac{9k-1 - (8k+3) + 2(k+1)}{k+1} = 0$$

$k : 1$

A
$(-1,3)$
(x_1, y_1)

P
(x,y)

B
$(9,8)$
(x_2, y_2)

$$9k - 1 - 8k - 3 + 2k + 2 = 0$$

$$3k - 2 = 0$$

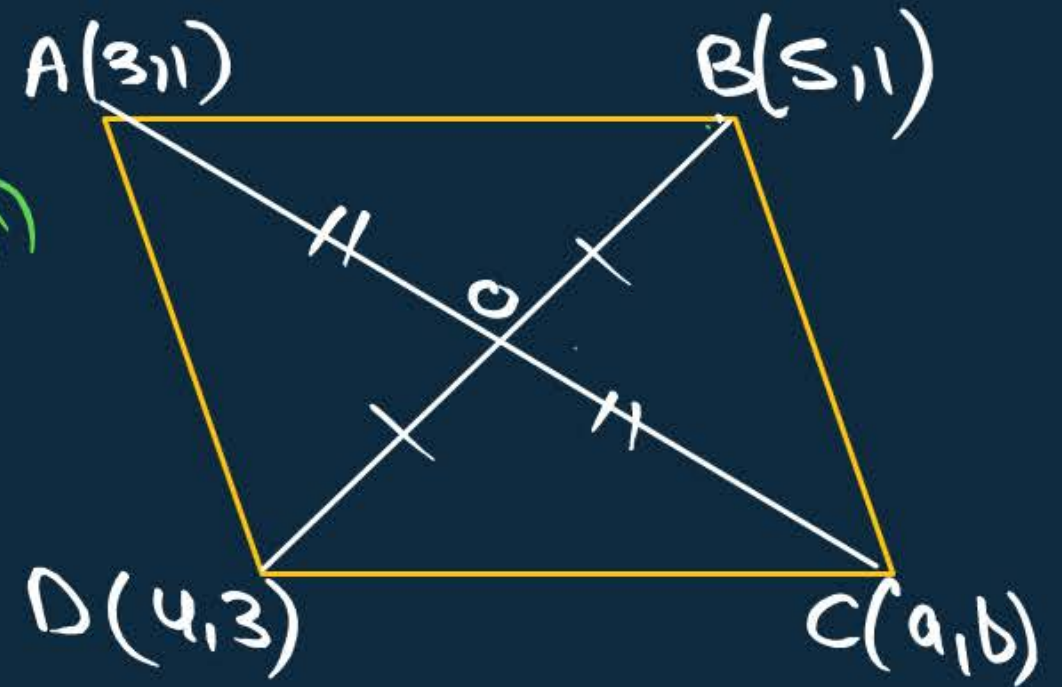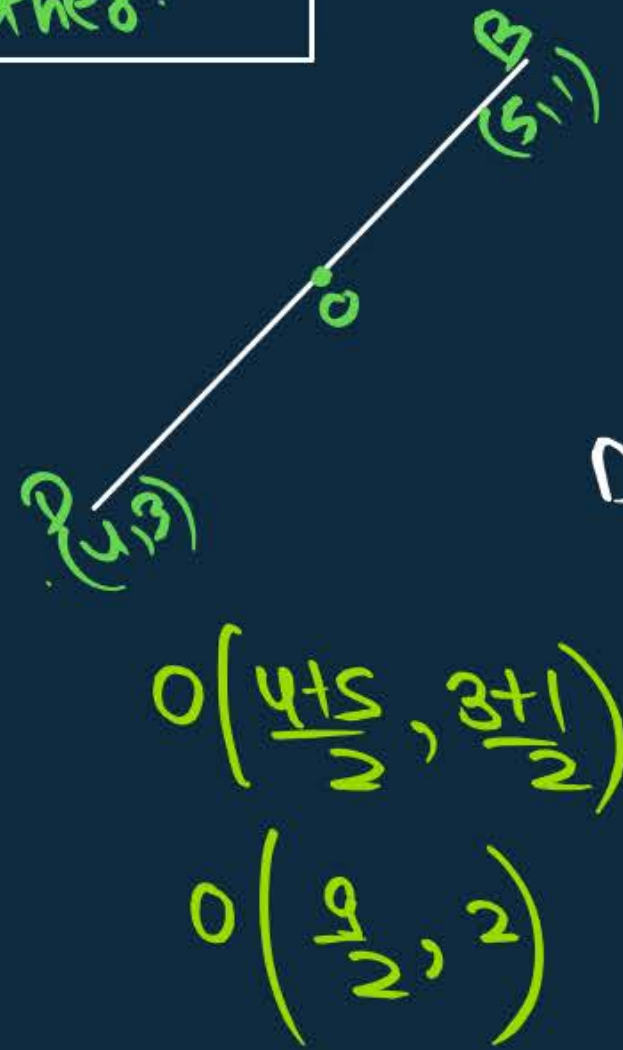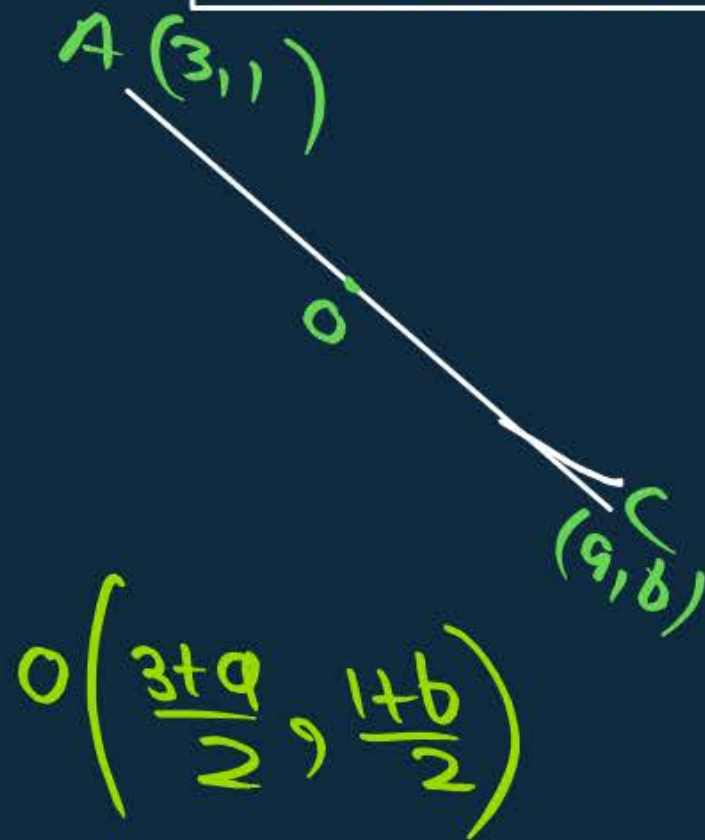$$3k = 2$$

$$\boxed{k = \frac{2}{3}}$$

H.W →

$x = \dfrac{x_1 + x_2}{2}$ $y = \dfrac{y_1 + y_2}{2}$

(P)(W)

#Q. In parallelogram ABCD, A(3, 1), B(5, 1), C(a, b) and D(4, 3) are the vertices. Find vertex C(a, b).

[CBSE Board Term 2019]

A   a = 6, b = 3

B   a = 6, b = –3

C   a = –6, b = 3

D   None of these

Diagonals of a ||gm bisect each other.

A (3, 1)

O

C (a, b)

B (5, 1)

O

D (4, 3)

$O\left(\dfrac{3+a}{2}, \dfrac{1+b}{2}\right)$

$O\left(\dfrac{4+5}{2}, \dfrac{3+1}{2}\right)$

$O\left(\dfrac{9}{2}, 2\right)$

A(3,1)   B(5,1)

O

D(4,3)   C(a,b)

$$O\left(\frac{3+a}{2}, \frac{1+b}{2}\right) = O\left(\frac{9}{2}, 2\right)$$

$$\frac{3+a}{2} = \frac{9}{2}$$

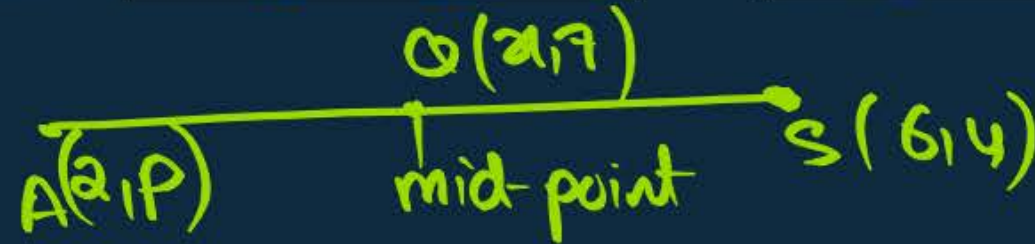$$\frac{1+b}{2} = 2$$

$$\boxed{a = 6}$$

$$\boxed{b = 3}$$

#Q. If the point P, Q(x, 7), R, S(6, y) in this order divide the line segment joining A(2, p) and B(7, 10) in 5 equal parts, find x, y and p.
[CBSE 2015]

A $x = 3, y = 8, p = 5$

B $x = 4, y = 9, p = 6$

C $x = 4, y = 9, p = 5$

D None of these

$Q(2,7)$

$A(2,p)$ mid-point $S(6,y)$

$$\frac{2+6}{2} = x, \quad \frac{p+y}{2} = 7$$

$\{y = 9\}$

$2 : 1$ $(6,y)$

O _____ S $B(2,10)$
$(4,7)$

$$y = \frac{my_2 + ny_1}{m+n}$$

$$y = \frac{20+7}{3}$$

$\{y = 9\}$

A   P   R $(6,y)$ $(7,10)$ B
$(2,p)$ S

              Q
           $(2,7)$

$$\frac{p+9}{2} = 7$$
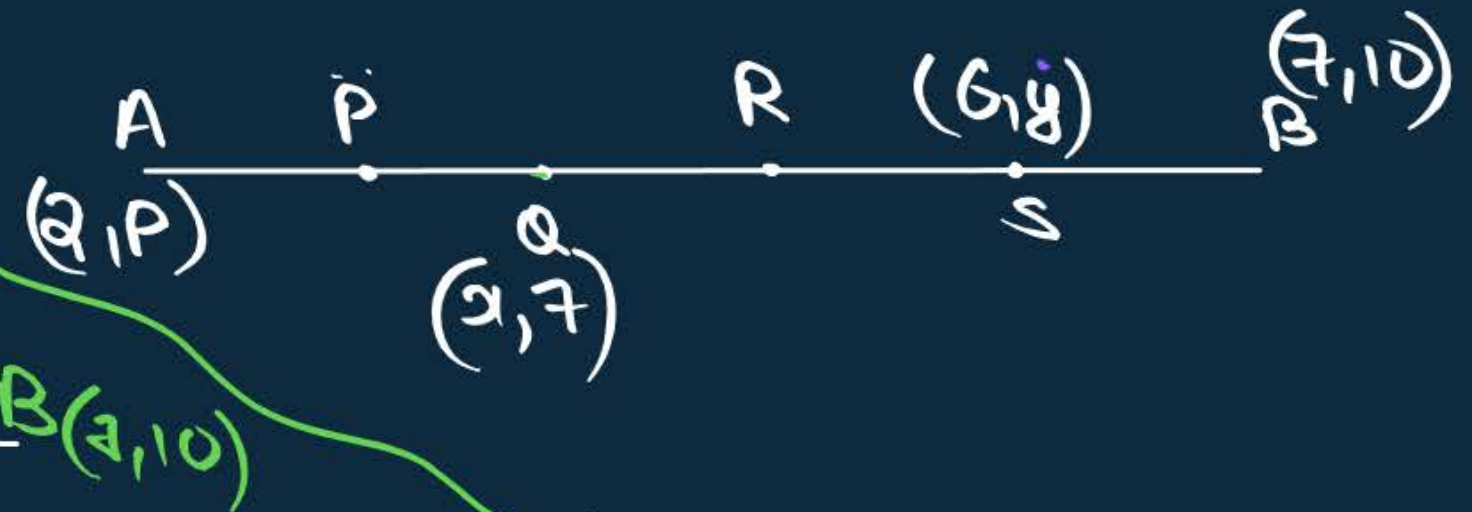
$$p + 9 = 14$$

$\{p = 5\}$

#Q. The vertices of a $\triangle ABC$ are A(5, 5), B(1, 5) and C(9, 1). A line is drawn to intersect sides AB and AC at P and Q respectively, such that $\dfrac{AP}{AB} = \dfrac{AQ}{AC} = \dfrac{3}{4}$. Find the length of the line segment PQ.
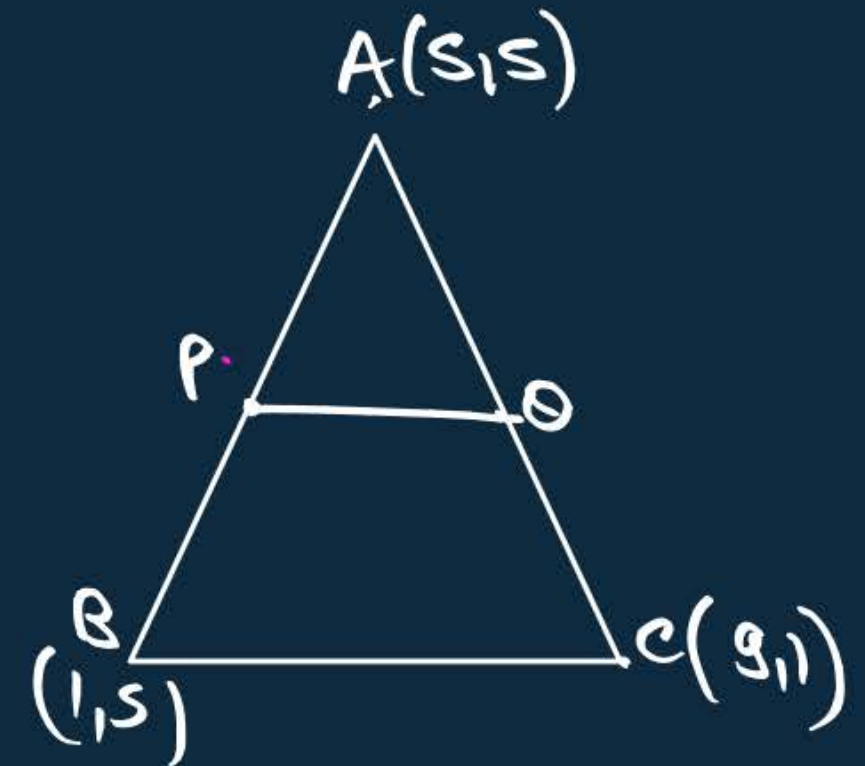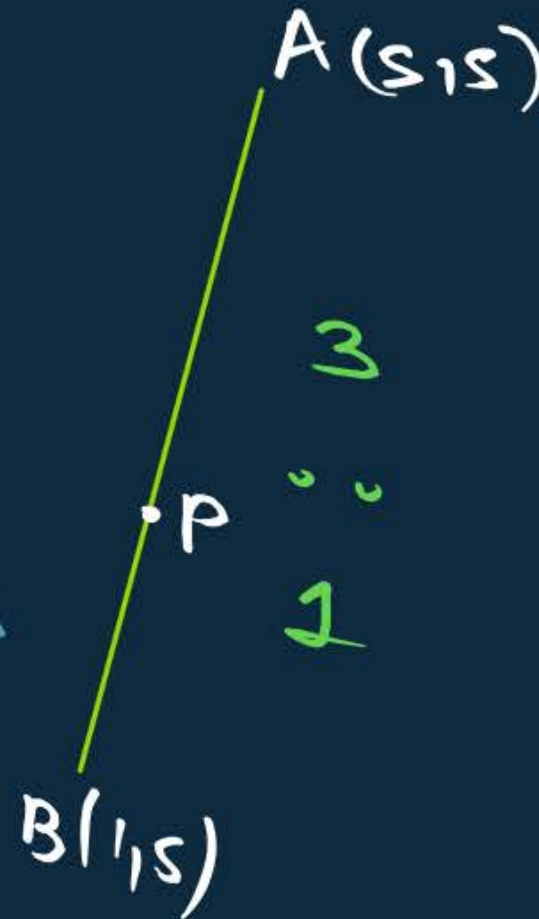
Bacha hua
kaslena !
🙂

$$\frac{AP}{AB} = \frac{3}{4}$$

$$\frac{AP}{AP+PB} = \frac{3}{4}$$

$$4AP = 3AP + 3PB$$

$$AP = 3PB$$

$$\boxed{\frac{AP}{PB} = \frac{3}{1}}$$

A(5,5)

3

∙P ∵

1

B(1,5)

A(5,5)

P∙   ∙Q

B
(1,5)

C(9,1)

#Q. If the coordinates of the mid-points of the sides of a triangle are (1, 2), (0, −1) and (2, −1). Find the coordinates of its vertices.

$$\frac{x_1 + x_2}{2} = 1 \rightarrow x_1 + x_2 = 2$$
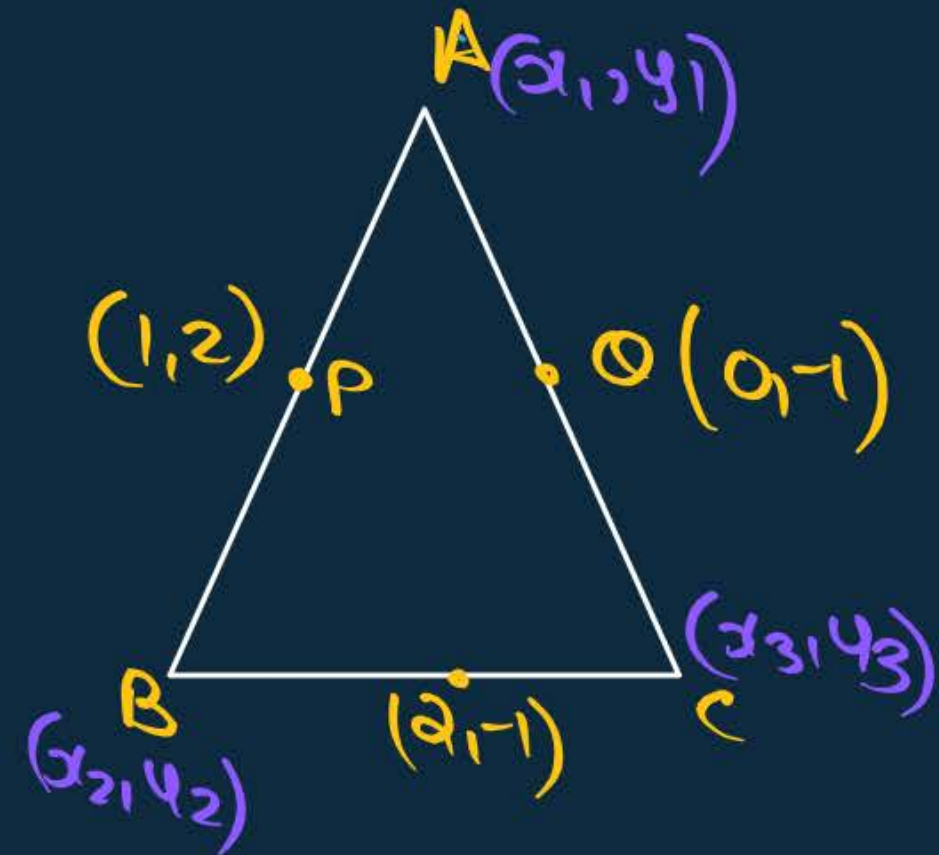
$$\frac{y_1 + y_2}{2} = 2 \rightarrow y_1 + y_2 = 4$$

$$\frac{x_2 + x_3}{2} = 2 \rightarrow x_2 + x_3 = 4$$

$$\frac{y_2 + y_3}{2} = -1 \rightarrow y_2 + y_3 = -2$$

$$\frac{x_1 + x_3}{2} = 0 \rightarrow x_1 + x_3 = 0$$

$$\frac{y_1 + y_3}{2} = -1 \rightarrow y_1 + y_3 = -2$$

$A(x_1, y_1)$

$(1, 2)$ P

$O(0, -1)$

(x_3, y_3) C

$B(x_2, y_2)$

$(2, -1)$

$$x_1 + x_2 = 2 \quad \leadsto \quad x_1 = 2 - x_2 \quad \Rightarrow \quad x_1 = 2 - 3 = -1$$

$$x_2 + x_3 = 4 \quad \leadsto \quad x_3 = 4 - x_2 \quad \Rightarrow \quad x_3 = 4 - 3 = 1$$

$$\boxed{x_1 + x_3 = 0}$$

$y \rightarrow$ do in H.W

$$(2 - x_2) + (4 - x_2) = 0$$

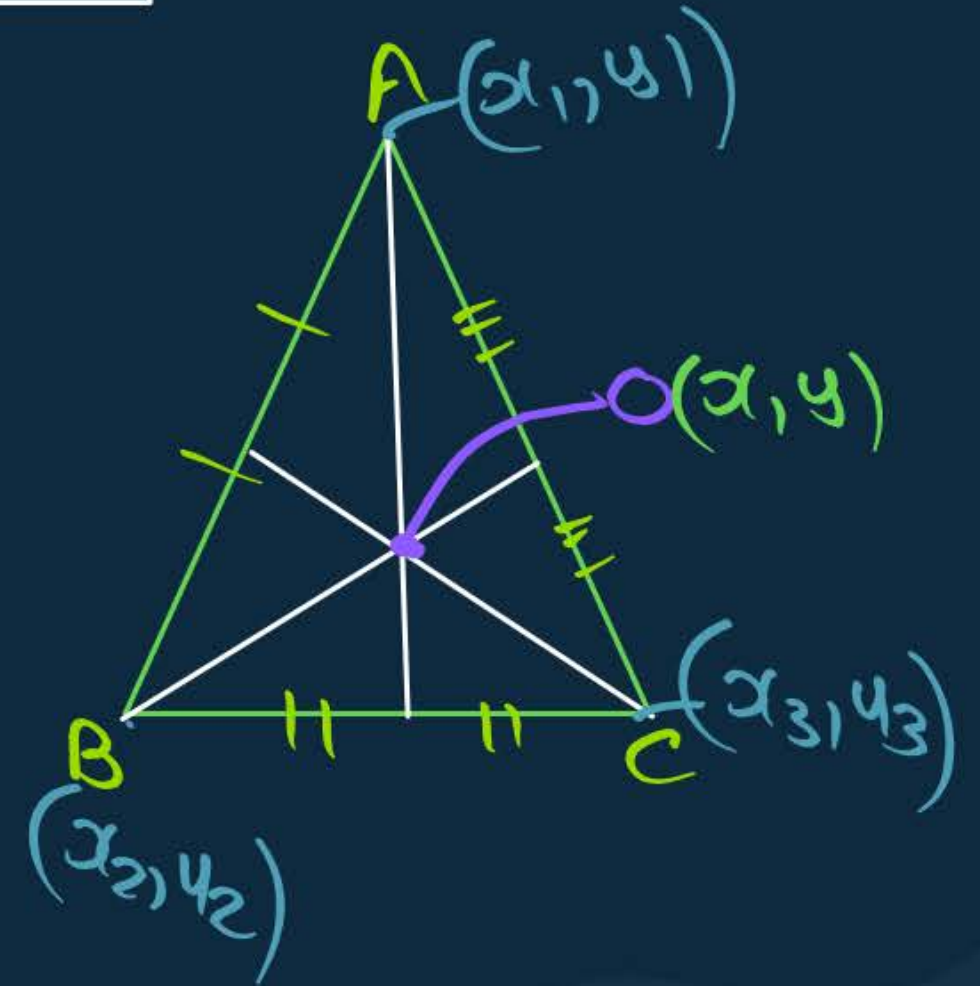$$2 - x_2 + 4 - x_2 = 0$$

$$6 - 2x_2 = 0$$

$$6 = 2x_2$$

$$\boxed{3 = x_2}$$

Centroid of a Triangle

Intersecting point of 3 medians

$$x = \frac{x_1 + x_2 + x_3}{3}$$

$$y = \frac{y_1 + y_2 + y_3}{3}$$

$A\,(x_1, y_1)$

$O\,(x, y)$

$C\,(x_3, y_3)$

$B\,(x_2, y_2)$

#Q. Find the coordinates of the centroid of a triangle whose vertices are $(0, 6)$, $(8, 12)$ and $(8, 0)$.

$$\left(\frac{0+8+8}{3}, \frac{6+12+0}{3} \right)$$

$$= \left(\frac{16}{3}, 6 \right)$$

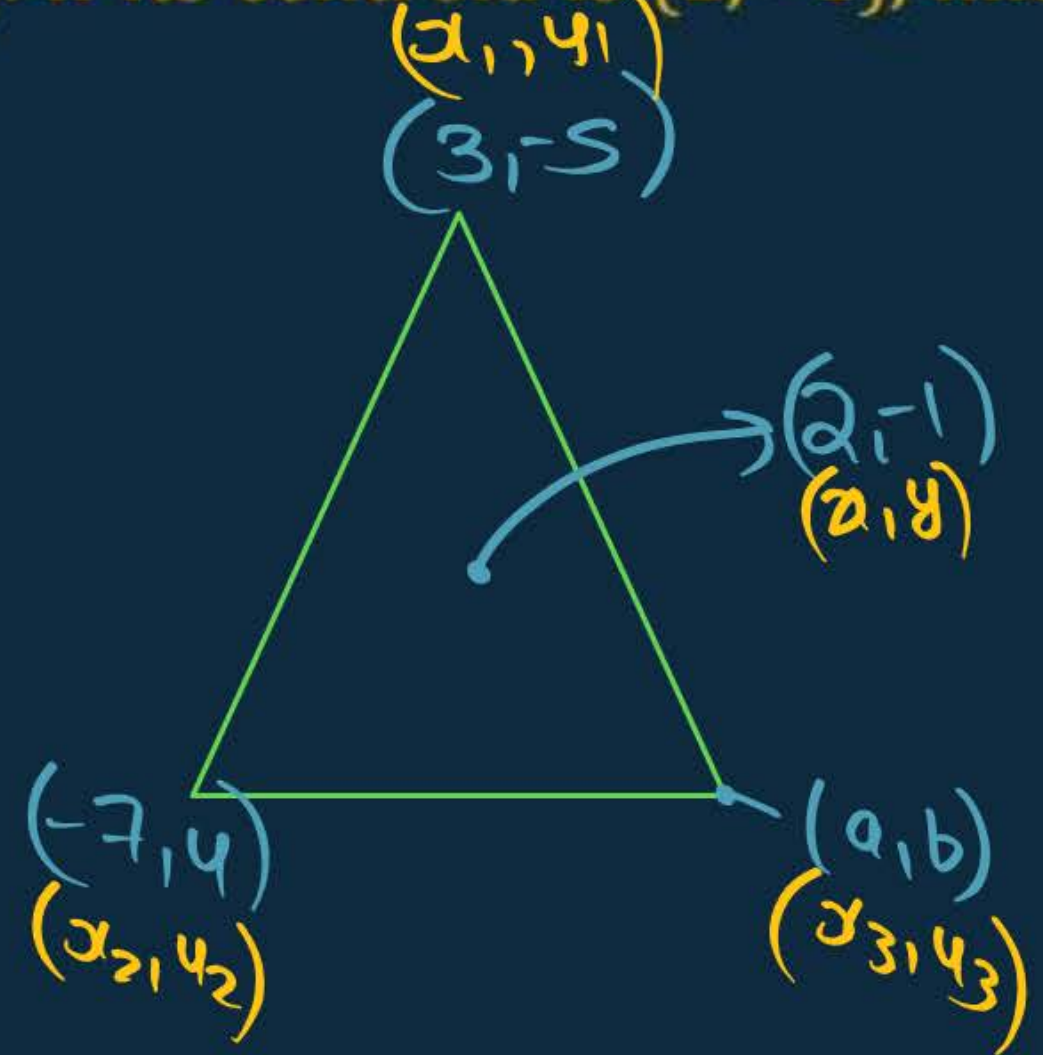**#Q.** Two vertices of a triangle are $(3, -5)$ and $(-7, 4)$. If its centroid is $(2, -1)$, find the third.

$$x = \frac{x_1 + x_2 + x_3}{3} \quad , \quad y = \frac{y_1 + y_2 + y_3}{3}$$
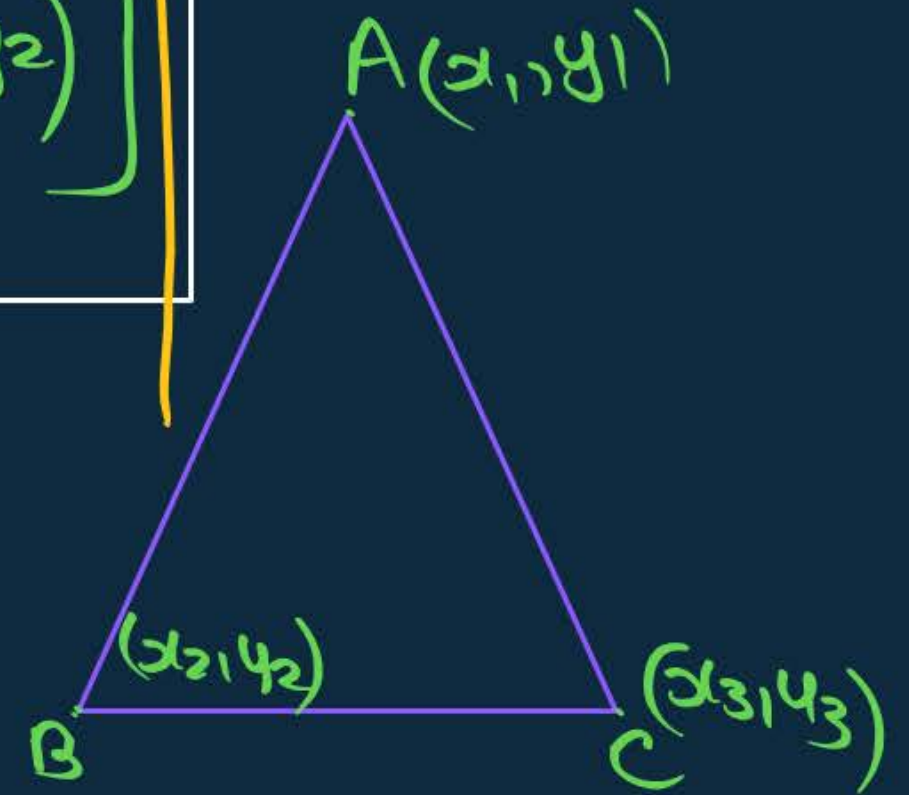
$$2 = \frac{3 + (-7) + a}{3} \qquad -1 = \frac{-5 + 4 + b}{3}$$

$$6 = -4 + a \qquad\qquad -3 = -1 + b$$

$$10 = a \qquad\qquad\qquad -2 = b$$

(x_1, y_1)
$(3, -5)$

$(2, -1)$
(a, b)

$(-7, 4)$
(x_2, y_2)

(a, b)
(x_3, y_3)

Area of Triangle

$$\text{Area} = \frac{1}{2}\left|\left[x_1(y_2-y_3) + x_2(y_3-y_1) + x_3(y_1-y_2)\right]\right|$$

$A(x_1, y_1)$

(x_2, y_2)

B

(x_3, y_3)

C

#Q. Find the area of a triangle whose vertices are A(3, 2), B(11, 8) and C(8, 12).

$$(x_1, y_1) \quad (x_2, y_2) \qquad (x_3, y_3)$$

$$= \frac{1}{2}\left| \left[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2) \right] \right|$$

$$= \frac{1}{2}\left| \left[3(8-12) + 11(12-2) + 8(2-8) \right] \right|$$

$$= \frac{1}{2}\left| \left[-12 + 110 - 48 \right] \right|$$

$$= \frac{1}{2}|50|$$

$$= \frac{1}{2} \times 50$$

$$= 25 \text{ sq. units} \quad \text{Ans.}$$

#Q. Prove that the area of triangle whose vertices are $(t, t - 2)$, $(t + 2, t + 2)$ and $(t + 3, t)$ is independent of t.

(x_1, y_1) (x_2, y_2)

(x_3, y_3)

$$= \frac{1}{2}\left[x_1(y_2-y_3) + x_2(y_3-y_1) + x_3(y_1-y_2)\right]$$

$$= \frac{1}{2}\left\{t\left[(t+2)-(t)\right] + (t+2)\left[(t)-(t-2)\right] + (t+3)\left[(t-2)-(t+2)\right]\right\}$$

$$= \frac{1}{2}\left[(t)(t+2-t) + (t+2)(t-t+2) + (t+3)(t-2-t-2)\right]$$

$$= \frac{1}{2}\left[2t + 2t + 4 - 4t - 12\right]$$
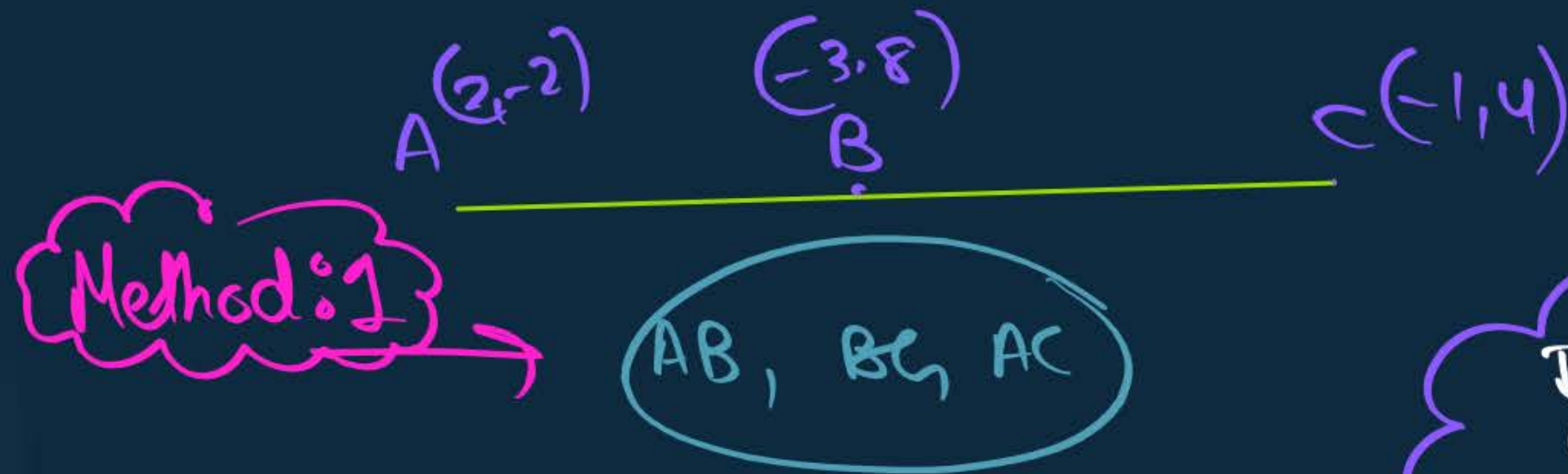
$$= \frac{1}{2}|-8| = \frac{1}{2} \times 8 = 4 \text{ sq. units}$$

#Q. Prove that the points $(2, -2)$, $(-3, 8)$ and $(-1, 4)$ are collinear.

Points lying on the same line.

$A^{(2,-2)}$ $\overset{(-3,8)}{B}$ $C(-1,4)$

Method:1 $\longrightarrow$

$AB, \ BC, \ AC$

If Area of $\triangle = 0$ then points are collinear.

$$(2,-2) \quad (-3,8) \quad (-1,4)$$
$$(x_1, y_1) \quad (x_2, y_2) \quad (x_3, y_3)$$

$$A = \frac{1}{2}\left[x_1(y_2-y_3) + x_2(y_3-y_1) + x_3(y_1-y_2) \right]$$

$$A = \frac{1}{2}\left[2(8-4) + -3(4--2) + -1(-2-8) \right]$$

$$A = \frac{1}{2}\left[8 - 18 + 10 \right] \qquad \boxed{A = 0}$$

$$A = \frac{1}{2}\left[-10 + 10 \right]$$

$\therefore$ points are collinear

(x_1, y_1) (x_2, y_2) (x_3, y_3)

#Q. If the points P(−3, 9), Q(a, b) and R(4, −5) are collinear and a + b = 1, find the values of a and b.

[CBSE 2014]

∵ Points are collinear

∴ Area of D = 0

$$\frac{1}{2}\left[x_1(y_2-y_3) + x_2(y_3-y_1) + x_3(y_1-y_2)\right] = 0$$

$$\left[-3(b+5) + a(-5-9) + 4(9-b)\right] = 0$$

$$-3b-15 -14a +36 -4b = 0$$

$$-7b+21-14a=0$$

$$-b+3-2a=0$$

$$3=2a+b$$

$a+b \neq 1$

$2a+b=3$

$\underline{-a = -2}$

$a=2$

$a+b=1$

$2+b=1$

$b=-1$

(P)(W)

#Q. If the points (p, q), (m, n) and $(p - m, q - n)$ are collinear, show that $pn = qm$.

(x_1, y_1) (x_2, y_2) (x_3, y_3)

[CBSE 2010]

$$0 = \frac{1}{2}\left[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\right]$$

$$0 = p\left[n - (q - n)\right] + m(q - n - q) + (p - m)(q - n)$$

$$0 = p(n - q + n) + m(-n) + pq - pn - mq + mn$$

$$0 = p(2n - q) - mn + pq - pn - mq + mn$$

$$0 = 2pn - \cancel{pq} - \cancel{mn} + \cancel{pq} - pn - mq + \cancel{mn}$$

$$0 = pn - mq$$

$$\{mq = pn\}$$

#Q. Find the value(s) of k for which the points $(3k - 1, k - 2)$, $(k, k - 7)$, and $(k - 1, -k - 2)$ are collinear.

[CBSE 2014]

H.W

#Q. Three vertices of a parallelogram ABCD are A(3, −4). B(−1, −3) and C(−6, 2). Find the coordinates of vertex D and find the area of parallelogram ABCD.
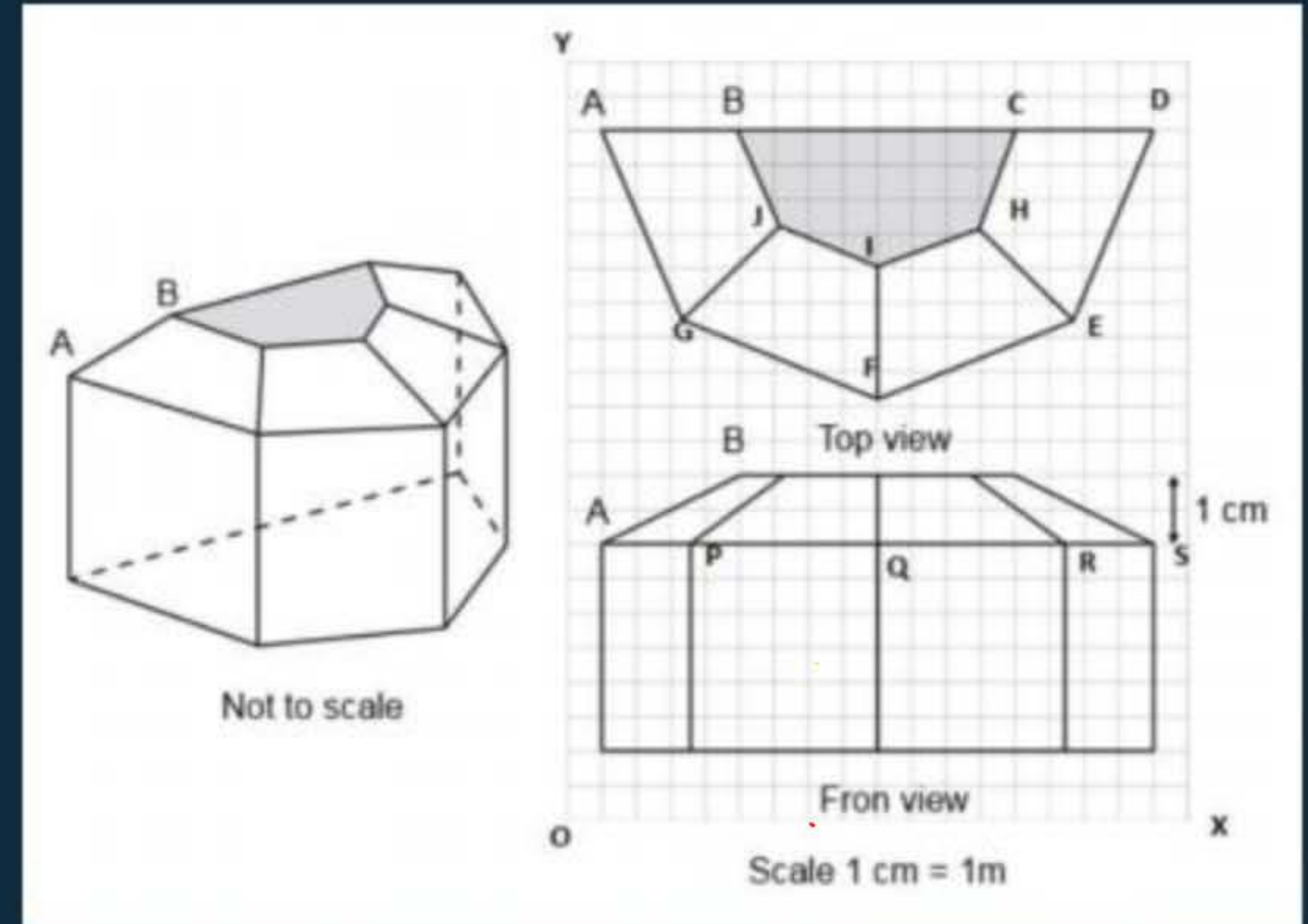
[CBSE 2013]

H.W

CBSE Board MCQ

The diagram show the pans for a sum room. It will be built onto the wall of a house. The four walls of the sun room are square clear glass panels. The roof is made using,

- Four clear glass panels, trapezium in shape, all of the same size.

- One tinted glass panel, half a regular octagon in shape.

#Q. Refer to Top View, find the mid-point of the segment joining the points J(6, 17) and I(9, 16)

A $\dfrac{33}{2}, \dfrac{15}{2}$

B $\dfrac{3}{2}, \dfrac{1}{2}$

C $\dfrac{15}{2}, \dfrac{33}{2}$

D $\dfrac{1}{2}, \dfrac{3}{2}$

$$\left(\frac{6+9}{2}, \frac{17+16}{2} \right)$$

$$\left(\frac{15}{2}, \frac{33}{2} \right)$$

#Q. Refer to front View, the distance of the point P from the Y-axis is

A 4

B 15

C 19

D 25

#Q. Refer to front View, the distance between the points A and S is

A 4

B 8

C 14

D 20

Riju wants to create an online snooker game using raycasting. The game in the creating stage on a coordinate map is shown below.

The snooker table has six pockets (P_1, P_2, P_3, P_4, P_5 and P_6) and he has shown three balls - white (W), red (R) and green (G) on the table. The objective of the game is to use the white ball to hit the coloured balls into the pockets using a cue stick.

i) How much distance will a ray travel if sent from the green ball to the nearest pocket? Show your work.

$$P_4 \to G \to (9,3) \quad (7,1) \quad \sqrt{(9-7)^2 + (3-1)^2} = \sqrt{4+4}$$
$$= \sqrt{8}\, units$$

2024

ii) Riju wants to place a yellow ball at the midpoint of the line connecting the white and green balls.

Find the coordinates of the point at which he should place the yellow ball. Show your steps.

$$\left(\frac{-3+7}{2}, \frac{-2+1}{2}\right) \to \left(2, \frac{-1}{2}\right) \to Ans.$$

White
$(-3,-2)$

yellow

Green
$(7,1)$
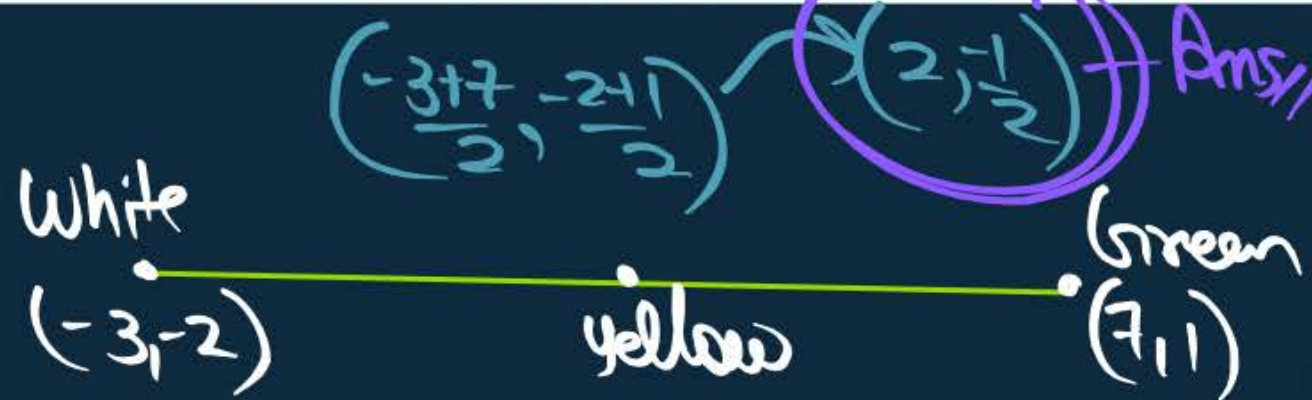
iii) Riju is running a trial on his game. He struck the white ball in a way that it rebound off the rail (line connecting P_4 and P_6) and went into the pocket P_2.

◆ After the rebound, the ball crossed the x-axis at point $X(2/7, 0)$ on the way to the pocket.

◆ The ratio of the distance between the rail and point X and the distance between point X and the pocket was $3 : 4$.

Find the coordinates of the point at which the ball struck the rail. Show your steps.
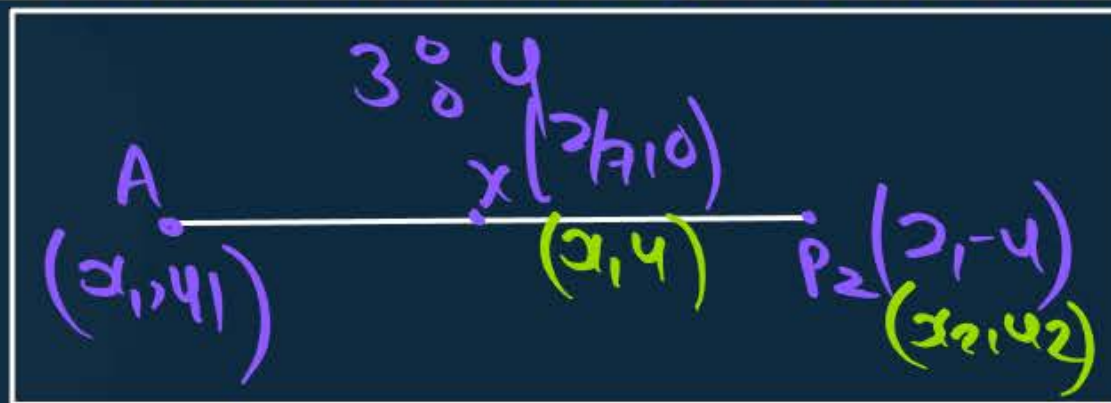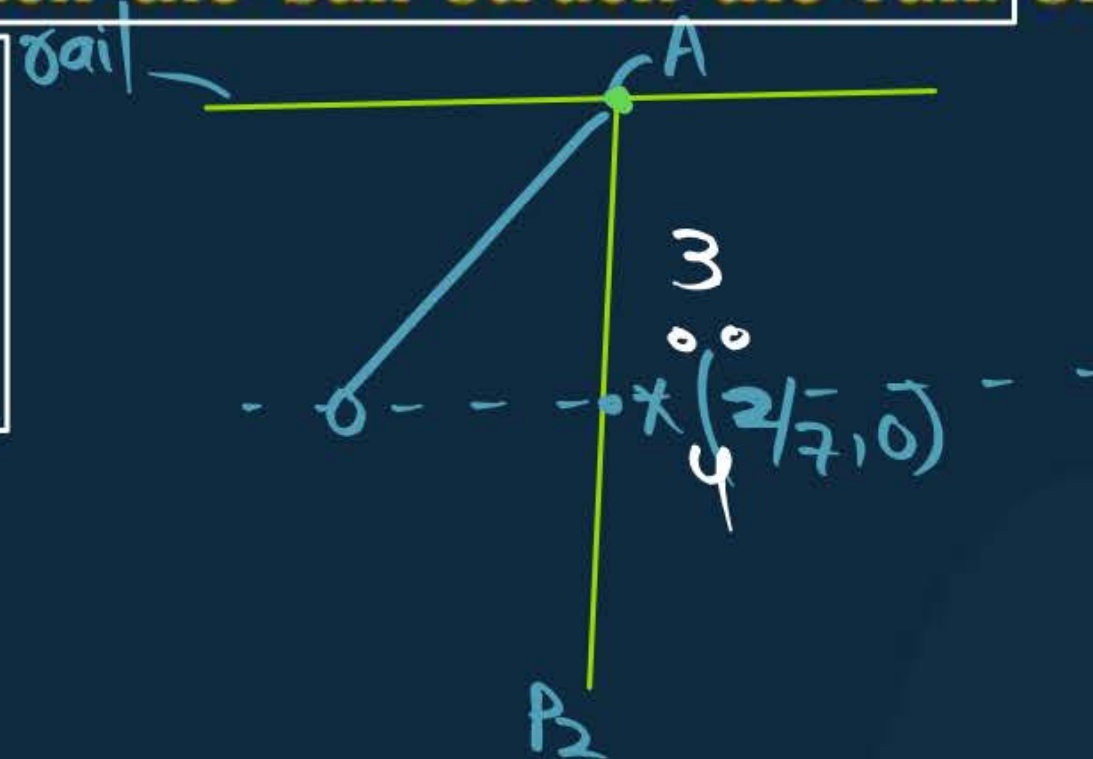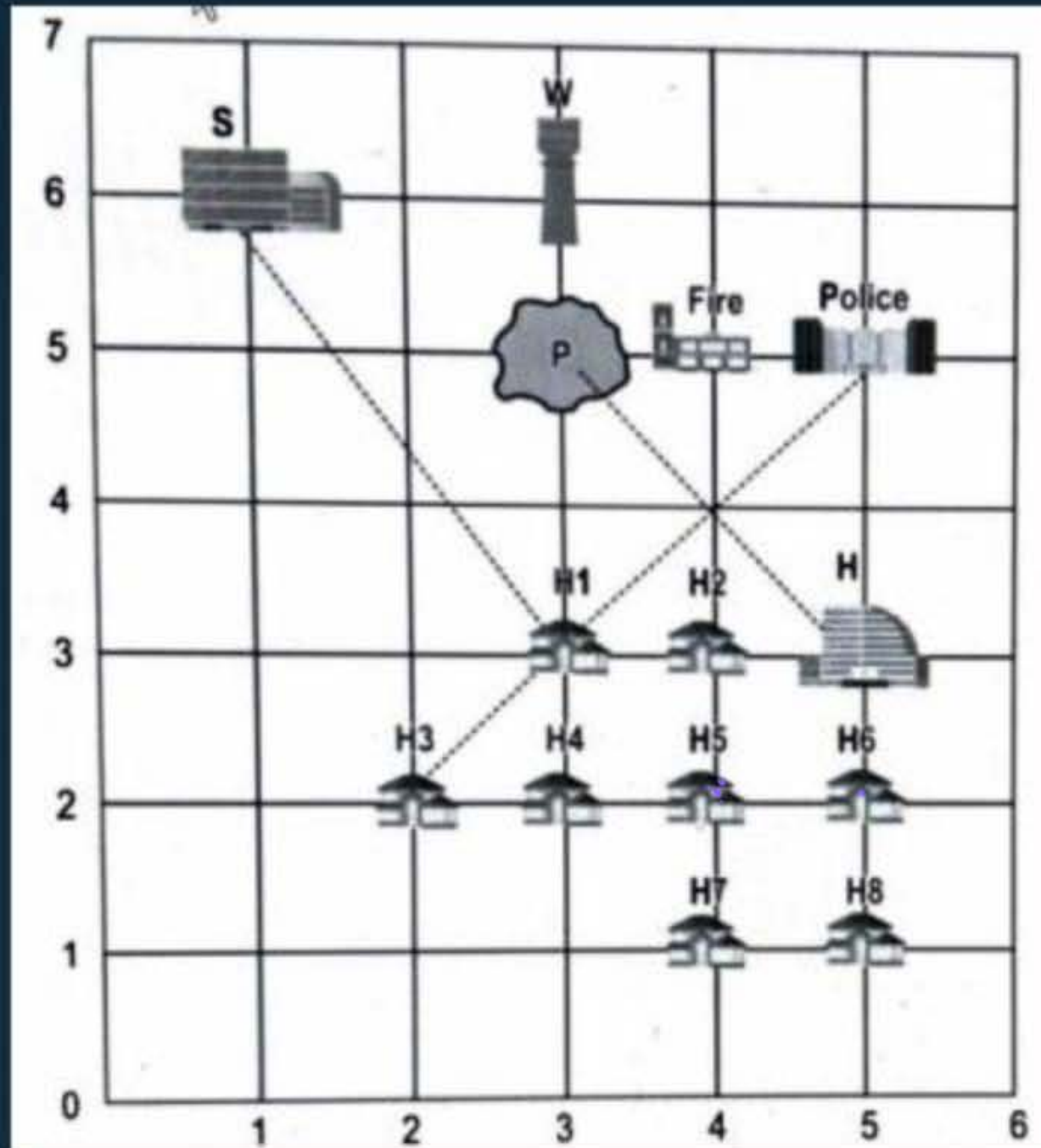
Study the given information and answer the question that follow

Shown below is a town plan on a coordinate grid, where 1 unit = 1 km. consider the co-ordinates of each building to be the point of intersection of the respective grid lines.

S - School
W - Water Tank
P - Pond
Fire - Fire Station
Police - Police Station
H - Hospital
H1 - House 1
H2 - House 2
H3 - House 3
H4 - House 4
H5 - House 5
H6 - House 6
H7 - House 7
H8 - House 8

#Q. Which of the following pairs of houses has the same abscissa (x-coordinate)?

A House 5 and House 6

B House 5 and House 7

C House 5 and House 8

D House 5 and House 1

#Q. What is the distance between the school and House 1 along the path shown?

A $\sqrt{13}$ km

B $\sqrt{97}$ km

C 13 km

D 97 km

$(1,6) \qquad (3,3)$

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

$$= \sqrt{4 + 9} = \sqrt{13} \text{ km}$$

#Q. A well is dug at a point along the path joining the pond and the hospital. The ratio of the distance between the pond and the well to that of the well and the hospital is 4 : 1 respectively. What is the-coordinate of the well?

HW

A 3.4

B 4.25

C 4.6

D 5.75

#Q. What is the ratio in which House 1 divides the path joining House 3 and the Police station?

A $1 : 2\sqrt{2}$

B $1 : \sqrt{2}$

C $1 : 3$

D $1 : 2$

H.w