



Orienting Yourself: The Use of Coordinates

Lecture - 05

CLASS-9TH

MATHS

UDAY Sir

Physics Wallah

Topics

to be covered



Important Questions

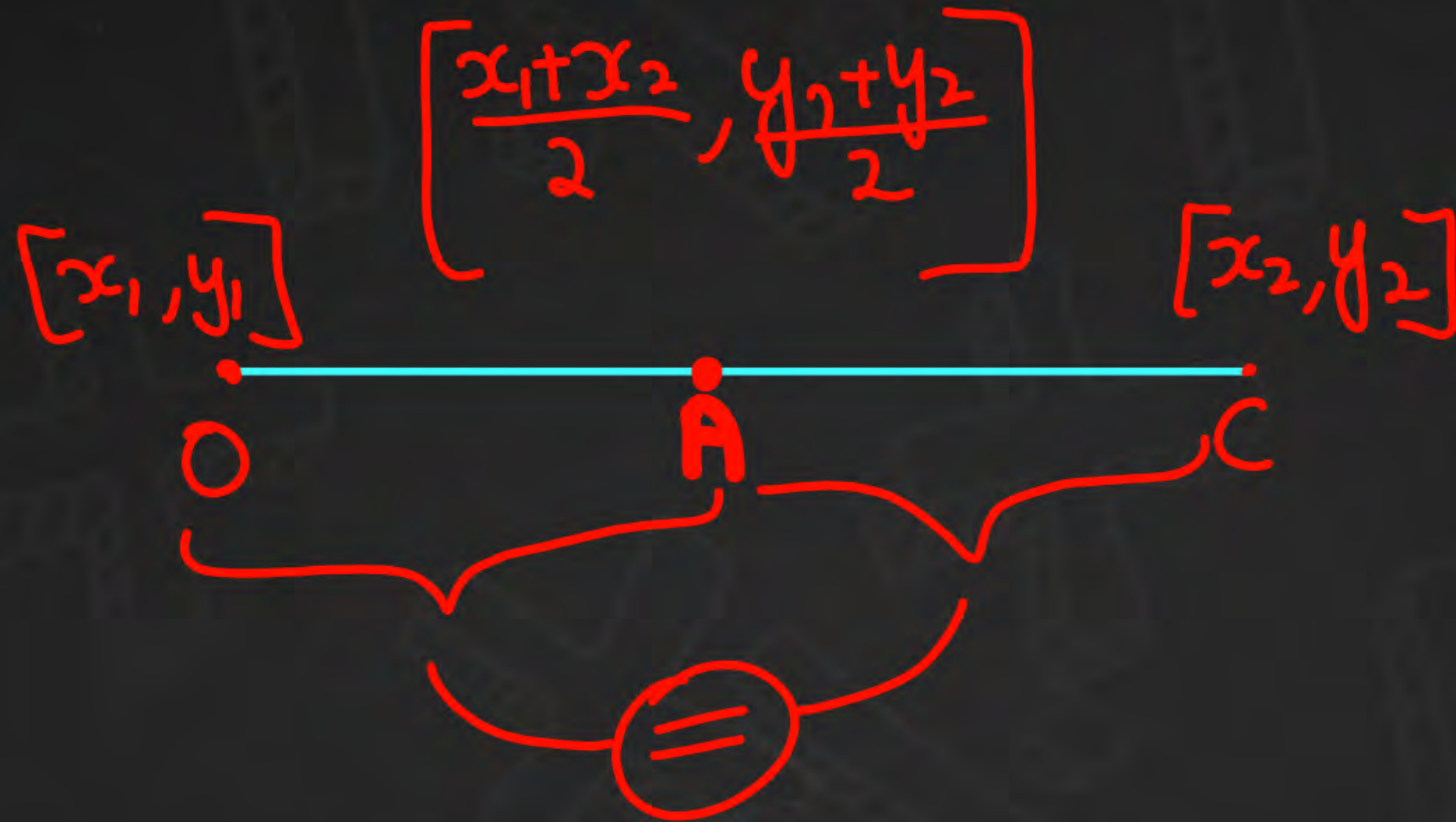
WELCOME
BACK Sheron!!



UDAY SIR

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QUESTION



END-OF-CHAPTER EXERCISES

- What are the x-coordinate and y-coordinate of the point of intersection of the two axes?
- Point W has x-coordinate equal to -5 . Can you predict the coordinates of point H which is on the line through W parallel to the y-axis? Which quadrants can H lie in?
- Consider the points R (3, 0), A (0, -2), M (-5 , -2) and P (-5 , 2). If they are joined in the same order, predict:
 - Two sides of RAMP that are perpendicular to each other.
 - One side of RAMP that is parallel to one of the axes.
 - Two points that are mirror images of each other in one axis. Which axis will this be?

Now plot the points and verify your predictions.
- Plot point Z (5, -6) on the Cartesian plane. Construct a right-angled triangle IZN and find the lengths of the three sides.
(**Comment:** Answers may differ from person to person.)
- What would a system of coordinates be like if we did not have negative numbers? Would this system allow us to locate all the points on a 2-D plane?
- Are the points M (-3 , -4), A (0, 0) and G (6, 8) on the same straight line? Suggest a method to check this without plotting and joining the points.
- Use your method (from Problem 6) to check if the points R (-5 , -1), B (-2 , -5) and C (4, -12) are on the same straight line. Now plot both sets of points and check your answers.
- Using the origin as one vertex, plot the vertices of:
 - A right-angled isosceles triangle.
 - An isosceles triangle with one vertex in Quadrant III and the other in Quadrant IV.
- The following table shows the coordinates of points S, M and T. In each case, state whether M is the midpoint of segment ST. Justify your answer.

S	M	T	Is M the midpoint of ST? Yes or No	Reason for your answer
(-3 , 0)	(0, 0)	(3, 0)		
(2, 3)	(3, 4)	(4, 5)		
(0, 0)	(0, 5)	(0, -10)		
(-8 , 7)	(0, -2)	(6, -3)		

When M is the mid-point of ST, can you find any connection between the coordinates of M, S and T?

- Use the connection you found to find the coordinates of B given that M (-7 , 1) is the midpoint of A (3, -4) and B (x, y).
- Let P, Q be points of trisection of AB, with P closer to A, and Q closer to B. Using your knowledge of how to find the coordinates of the midpoint of a segment, how would you find the coordinates of P and Q? Do this for the case when the points are A (4, 7) and B (16, -2).
- Given the points A (1, -8), B (-4 , 7) and C (-7 , -4), show that they lie on a circle K whose center is the origin O (0, 0). What is the radius of circle K?
 - Given the points D (-5 , 6) and E (0, 9), check whether D and E lie within the circle, on the circle, or outside the circle K.
- The midpoints of the sides of triangle ABC are the points D, E, and F. Given that the coordinates of D, E, and F are (5, 1), (6, 5), and (0, 3), respectively, find the coordinates of A, B and C.
- A city has two main roads which cross each other at the centre of the city. These two roads are along the North-South (N-S) direction and East-West (E-W) direction. All the other streets of the city run parallel to these roads and are 200 m apart. There are 10 streets in each direction.
 - Using 1 cm = 200 m, draw a model of the city in your notebook. Represent the roads/streets by single lines.
 - There are street intersections in the model. Each street intersection is formed by two streets—one running in the N-S direction and another in the E-W direction. Each street

QUESTION



14 *Ganita Manjari | Grade 9 | Part I*

intersection is referred to in the following manner: If the second street running in the N-S direction and 5th street in the E-W direction meet at some crossing, then we call this street intersection (2, 5). Using this convention, find:

- (a) how many street intersections can be referred to as (4, 3).
 - (b) how many street intersections can be referred to as (3, 4).
15. A computer graphics program displays images on a rectangular screen whose coordinate system has the origin at the bottom-left corner. The screen is 800 pixels wide and 600 pixels high. A circular icon of radius 80 pixels is drawn with its centre at the point A (100, 150). Another circular icon of radius 100 pixels is drawn with its centre at the point B (250, 230). Determine:
- (i) whether any part of either circle lies outside the screen.
 - (ii) whether the two circles intersect each other.
16. Plot the points A (2, 1), B (-1, 2), C (-2, -1), and D (1, -2) in the coordinate plane. Is ABCD a square? Can you explain why? What is the area of this square?

QUESTION

$$\frac{x_1 + x_2}{2} = \frac{0 + 0}{2} = \frac{0}{2} = 0$$

The following table shows the coordinates of points S, M and T. In each case, state whether M is the midpoint of segment ST. Justify your answer.

$$\frac{0 + (-10)}{2} = \frac{0 - 10}{2} = \frac{-10}{2} = -5$$

S	M	M	Is M the midpoint of ST? Yes or No	Reason for your answer
(-3, 0)	(0, 0)	(3, 0)		
(2, 3)	(3, 4)	(4, 5)		
(0, 0)	(0, 5)	(0, -10)	a) Y b) N	
(-8, 7)	(0, -2)	(6, -3)	1	

When M is the mid-point of ST, can you find any connection between the coordinates of M, S, and T?

QUESTION

→ 3 Equal Parts



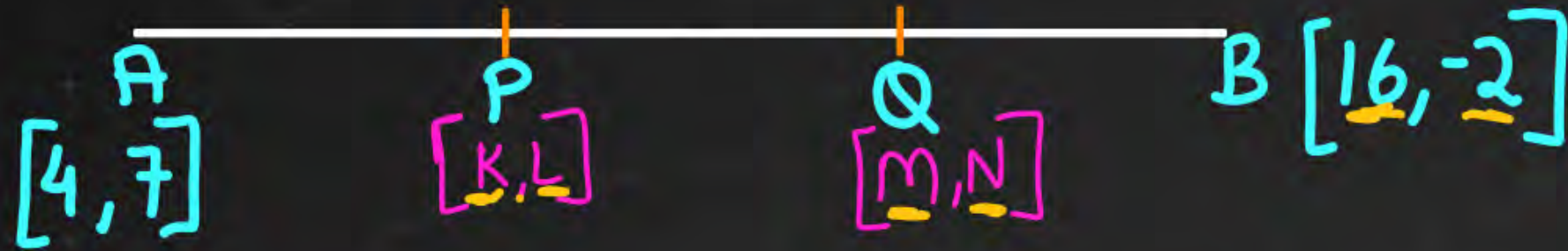
Let P , Q be points of trisection of AB , with P closer to A , and Q closer to B . Using your knowledge of how to find the coordinates of the midpoint of a segment, how would you find the coordinates of P and Q ? Do this for the case when the points are $A(4, 7)$ and $B(16, -2)$.

$$x = \frac{x_1 + x_2}{2}$$

$$y = \frac{y_1 + y_2}{2} \quad [m=12]$$

1. P is the Mid pt of AQ

2. Q is the Mid pt of PB



$$2.] \quad M = \frac{K + 16}{2}, \quad N = \frac{L - 2}{2}$$

$$= 2M = K + 16$$

$$= 2M = \frac{4 + M}{2} + \frac{16}{1}$$

$$2M = \frac{4 + M + 16 \times 2}{2}$$

• AP = PQ = QB

$$1.] \quad K = \frac{4 + M}{2}, \quad L = \frac{7 + N}{2} \quad \checkmark$$

$$K = \frac{4 + 12}{2}$$

$$K = \frac{16}{2} = 8$$

$$L = \frac{7+N}{2}$$

$$N = \frac{L-2}{2}$$

$$2N = L - 2$$

$$2N = \frac{7+N}{2} - 2$$

$$2N = \frac{7+N-2 \times 2}{2}$$

$$2N = \frac{7+N-4}{2}$$

$$4N = 7+N-4$$

$$4N = 3+N$$

$$4N - N = 3$$

$$3N = 3$$

$$N = \frac{3}{3} = 1$$

$$\underline{N=1}$$

$$\begin{aligned} L &= \frac{7+1}{2} \\ &= \frac{8}{2} \\ &= 4 \end{aligned}$$

Do it properly like Exam

$$2m = \frac{4 + m + 16 \times 2}{2}$$

$$2m = \frac{4 + m + 32}{2}$$


$$4m = 4 + m + 32$$

$$4m = 36 + m$$

$$4m - m = 36$$

$$3m = 36$$

$$m = \frac{36}{3} = 12$$

$$m = 12$$

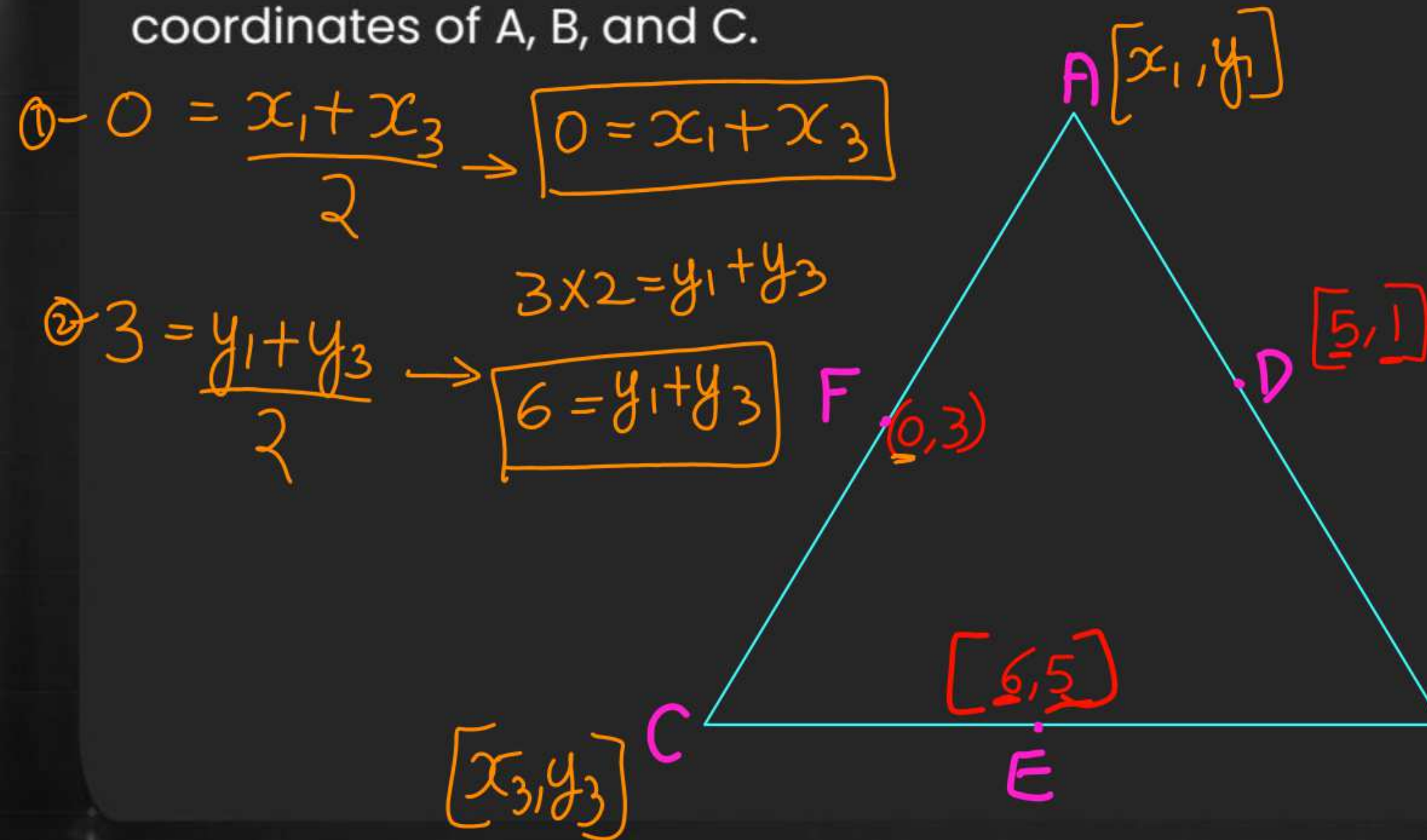
$$\frac{2}{3} + \frac{5x^2}{1 \times 2}$$

$$\frac{2}{3} + \frac{10}{2} = \frac{13}{3}$$

,

QUESTION

The midpoints of the sides of triangle ABC are the points D, E, and F. Given that the coordinates of D, E, and F are (5, 1), (6, 5), and (0, 3), respectively, find the coordinates of A, B, and C.



on AB [D is M.P]

$$5 = \frac{x_1 + x_2}{2} \rightarrow 10 = x_1 + x_2$$

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

• on line BC [MP is E]

$$\frac{6 = x_2 + x_3}{2} \quad \frac{5 = y_2 + y_3}{2}$$

$$12 = x_2 + x_3 \quad 10 = y_2 + y_3$$

From AC

$$\textcircled{1} \quad x_1 + x_3 = 0$$

$$\textcircled{2} \quad y_1 + y_3 = 6$$

From AB

$$\textcircled{3} \quad x_1 + x_2 = 10$$

$$\textcircled{4} \quad y_1 + y_2 = 2$$

From BC

$$\textcircled{5} \quad x_2 + x_3 = 12$$

$$\textcircled{6} \quad y_2 + y_3 = 10$$

$$x_1 + 1 = 0$$

$$x_1 = -1$$

$$x_2 + x_3 = 12$$

$$x_2 + 1 = 12$$

$$x_2 = 12 - 1$$

$$x_2 = 11$$

$$x_1 + x_3 = 0$$

$$\boxed{x_1 = -x_3} - \textcircled{7}$$

Putting $\textcircled{7}$ in $\textcircled{3}$

$$-x_3 + x_2 = 10$$

$$\boxed{x_2 = 10 + x_3} - \textcircled{8}$$

Putting $\textcircled{8}$ in $\textcircled{5}$

$$\boxed{x_3 = 1} - \textcircled{9}$$

$$10 + x_3 + x_3 = 12$$

$$x_3 = \frac{2}{2} = 1$$

$$10 + 2x_3 = 12$$

↑

$$2x_3 = 12 - 10 \Rightarrow 2x_3 = 2$$

QUESTION

A city has two main roads which cross each other at the center of the city. These two roads are along the North-South (N-S) direction and East-West (E-W) direction. All the other streets of the city run parallel to these roads and are 200 m apart. There are 10 streets in each direction.

- (i) Using $1 \text{ cm} = 200 \text{ m}$, draw a model of the city in your notebook. Represent the roads/streets by single lines.



(ii) There are street intersections in the model. Each street intersection is formed by two streets—one running in the N-S direction and another in the E-W direction. Each street intersection is referred to in the following manner: If the second street running in the N-S direction and 5th street in the E-W direction meet at some crossing, then we call this street intersection $(2, 5)$. Using this convention, find:

- (a) How many street intersections can be referred to as $(4, 3)$.
- (b) How many street intersections can be referred to as $(3, 4)$.

HW

QUESTION

Plot the points A (2, 1), B (-1, 2), C (-2, -1), and D (1, -2) in the coordinate plane. Is ABCD a square? Can you explain why? What is the area of this square?

QUESTION



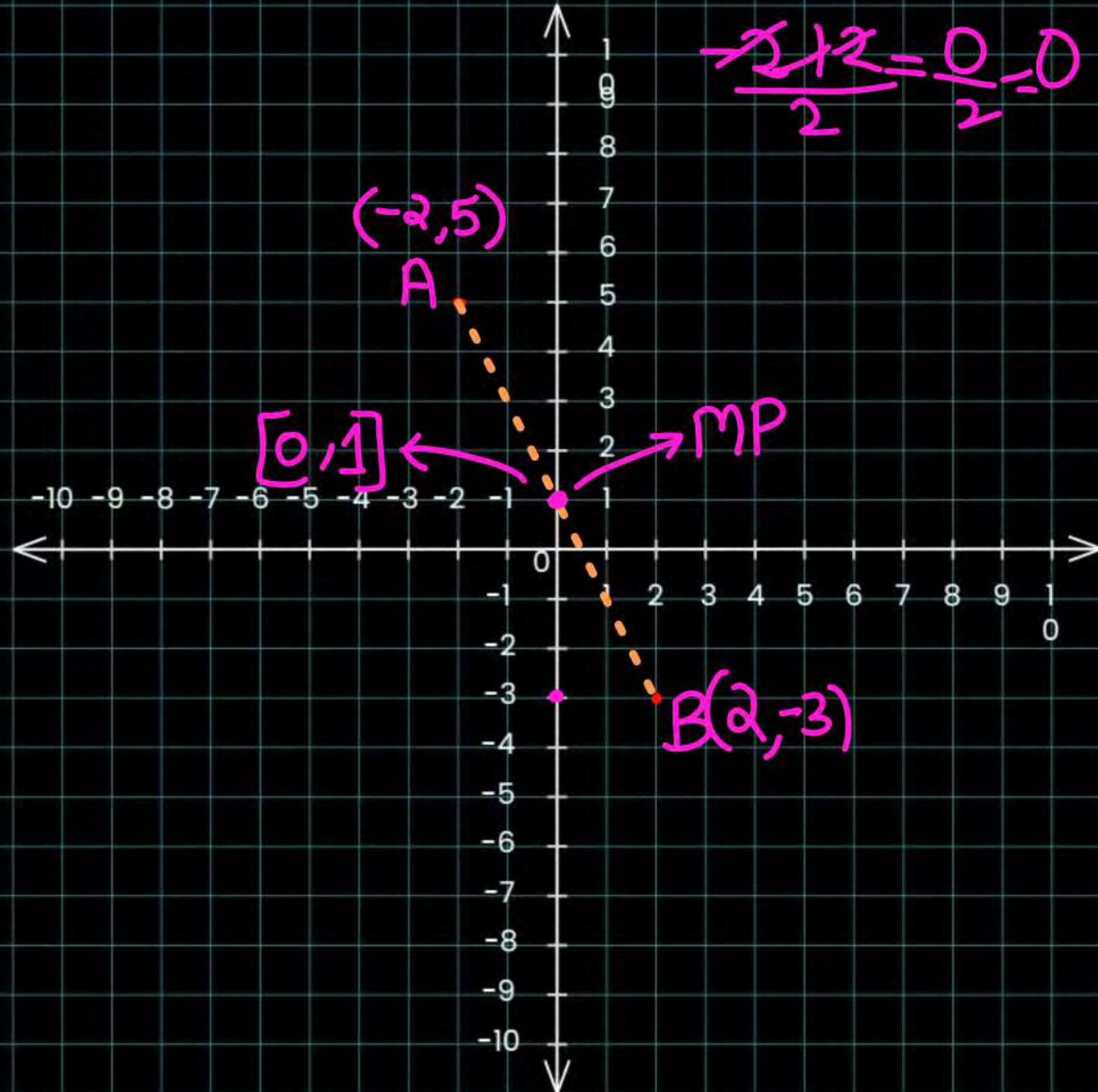
Find the point on y-axis equidistant from $(2, -3)$ and $(-2, 5)$.



$$y = \frac{5 + (-3)}{2}$$

$$y = \frac{5 - 3}{2} = \frac{2}{2}$$

$$\boxed{y = 1}$$



$$\frac{-2 + 2}{2} = \frac{0}{2} = 0$$

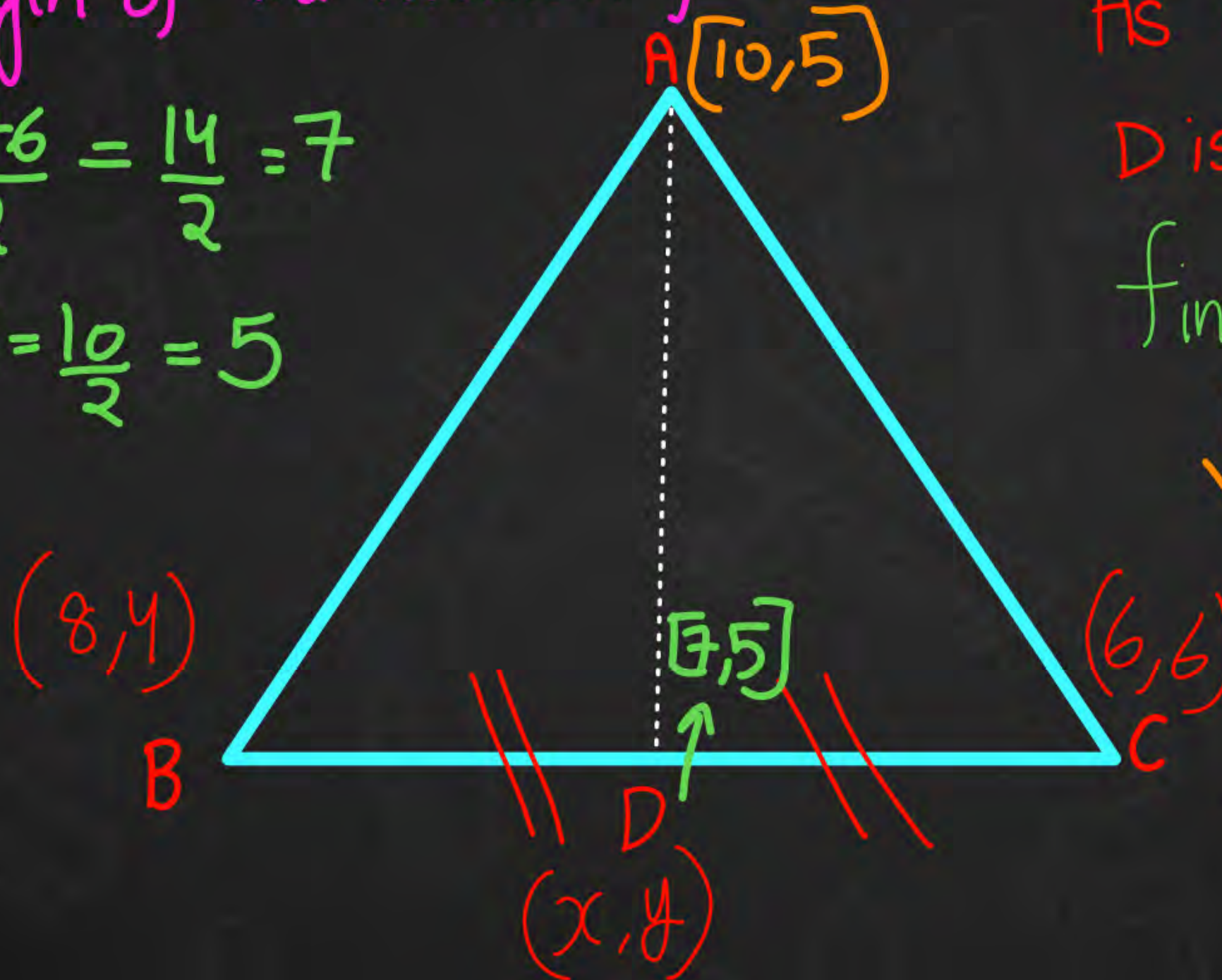
$$[0, y]$$

Q] Point $A[10,5]$, $B[8,4]$, $C[6,6]$ are vertices of a Δ

length of the median from A

$$x = \frac{8+6}{2} = \frac{14}{2} = 7$$

$$y = \frac{4+6}{2} = \frac{10}{2} = 5$$

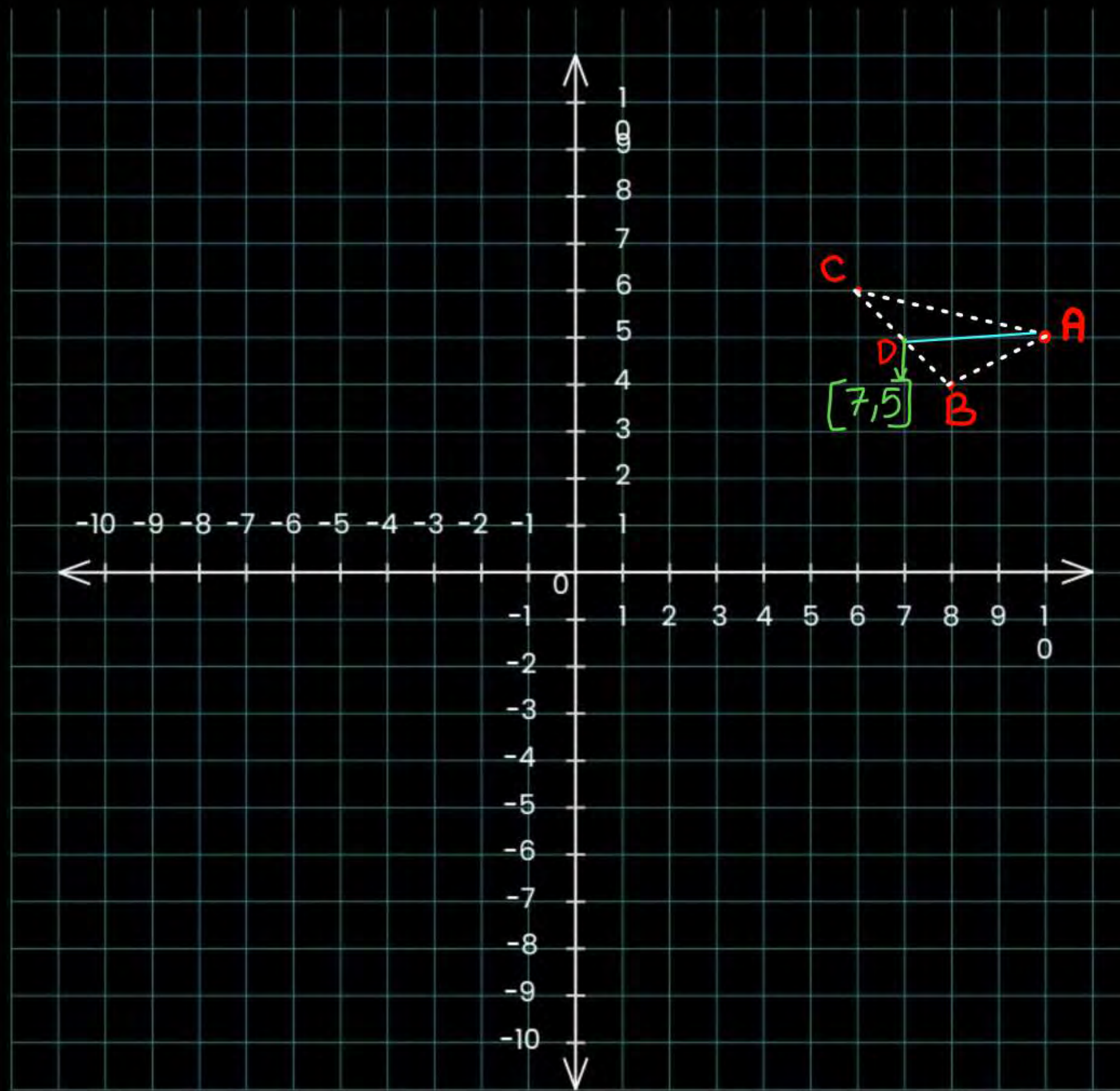


As AD is the Median
 D is the Mid pt of BC
find AD

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\sqrt{(10 - 7)^2 + (5 - 5)^2}$$

$$\sqrt{(3)^2 + 0^2} = \sqrt{3^2} = \sqrt{9} = [3]$$



Thank,
you!