



Orienting Yourself: The Use of Coordinates

Lecture - 03

CLASS-9TH

MATH

UDAY Sir

Physics Wallah

Topics To Be Covered



Distance between 2 points on a 2D plane

WELCOME
BACK FIGHTERS

$$H = AB$$

$$P^2 + B^2 = H^2$$

$$\cdot AC = [x_1 - x_2]$$

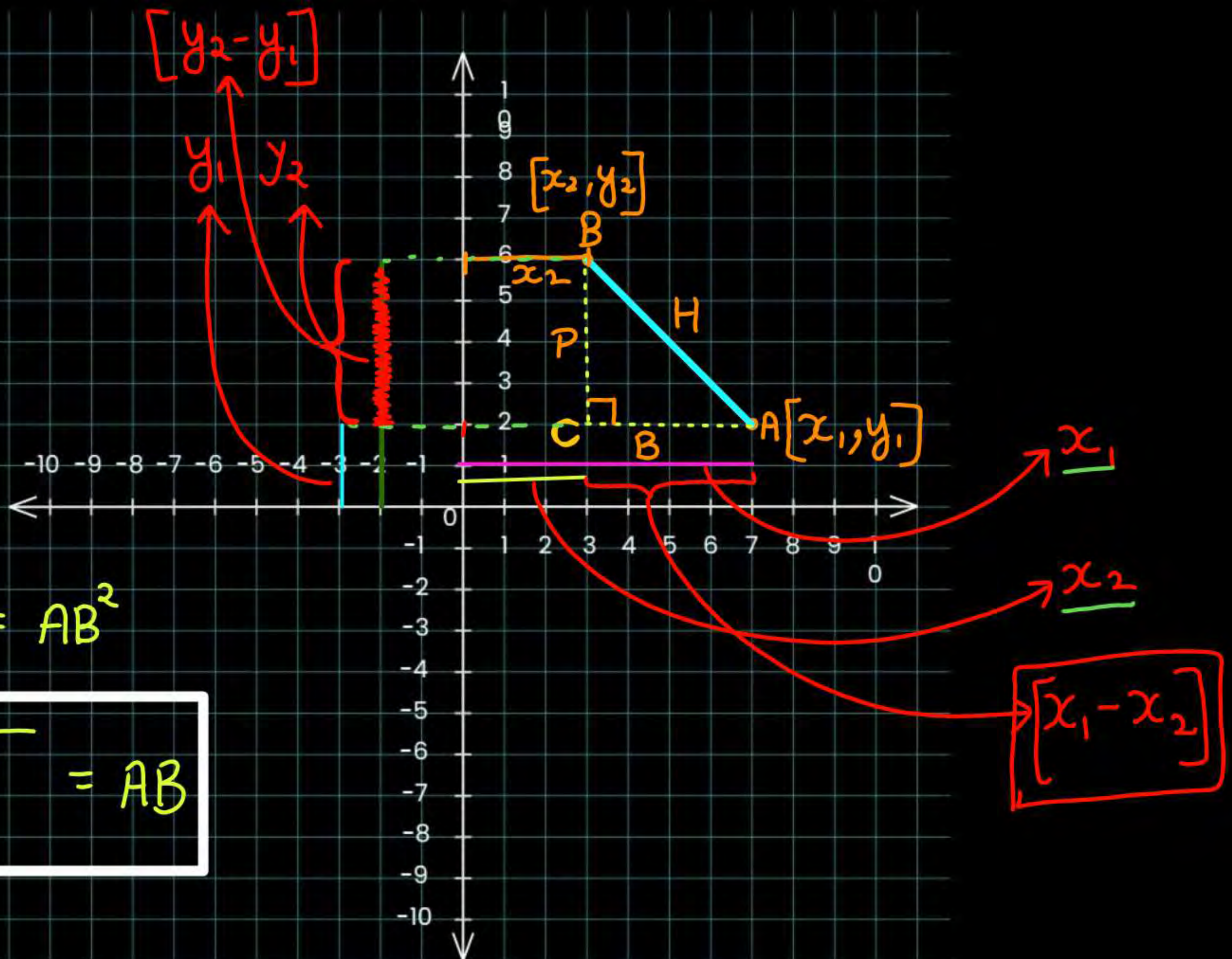
$$\cdot AC = \text{Base}[B]$$

$$BC = [y_2 - y_1]$$

BC = Perpendicular

$$[y_2 - y_1]^2 + [x_1 - x_2]^2 = AB^2$$

$$\sqrt{[y_2 - y_1]^2 + [x_1 - x_2]^2} = AB$$



$$[5-3]^2$$

$$\leftarrow [x_2 - x_1]^2$$

$$[x_1 - x_2]^2$$

$$[2]^2$$

$$(4)$$

$$x_1 = 3$$

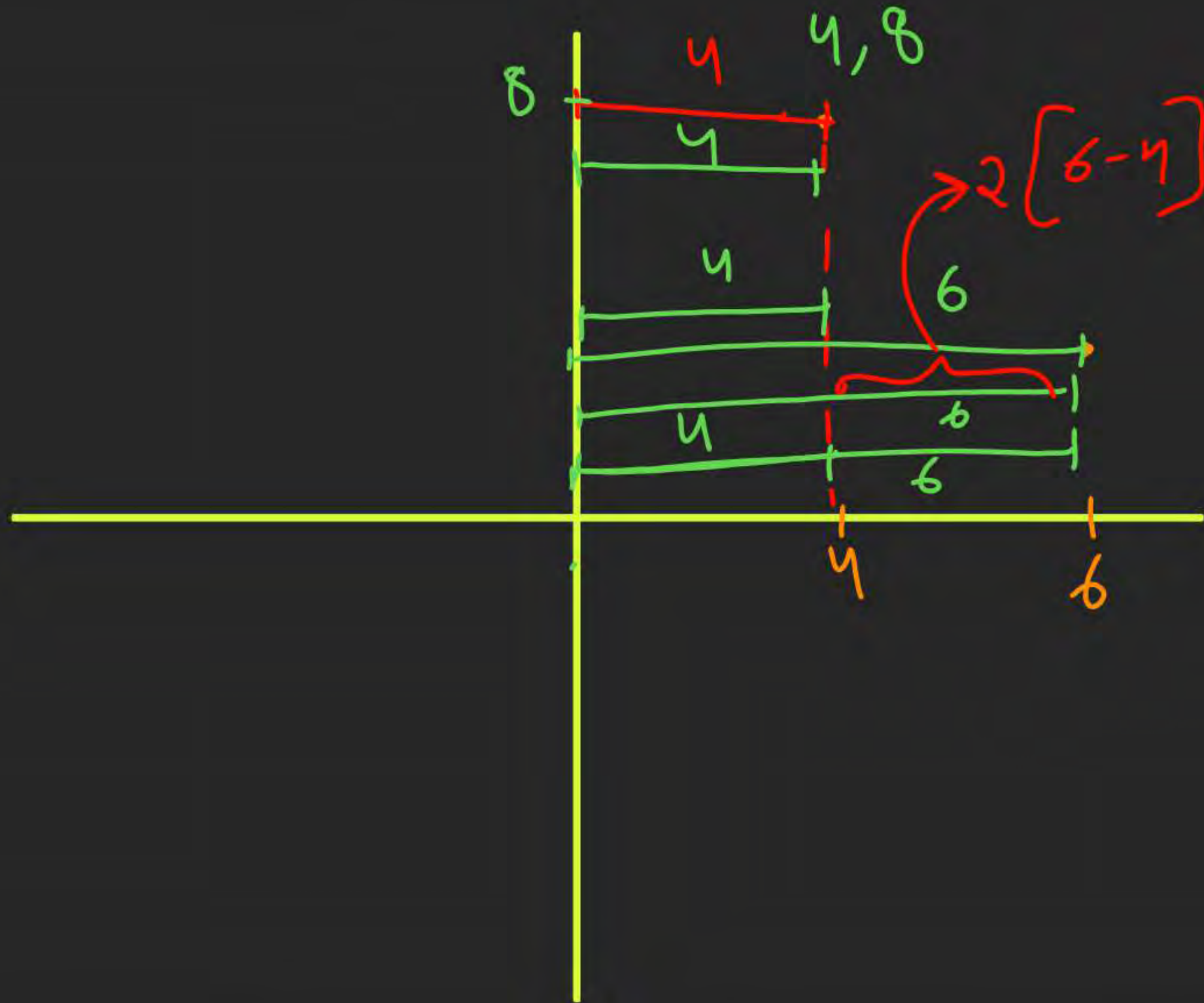
$$x_2 = 5$$

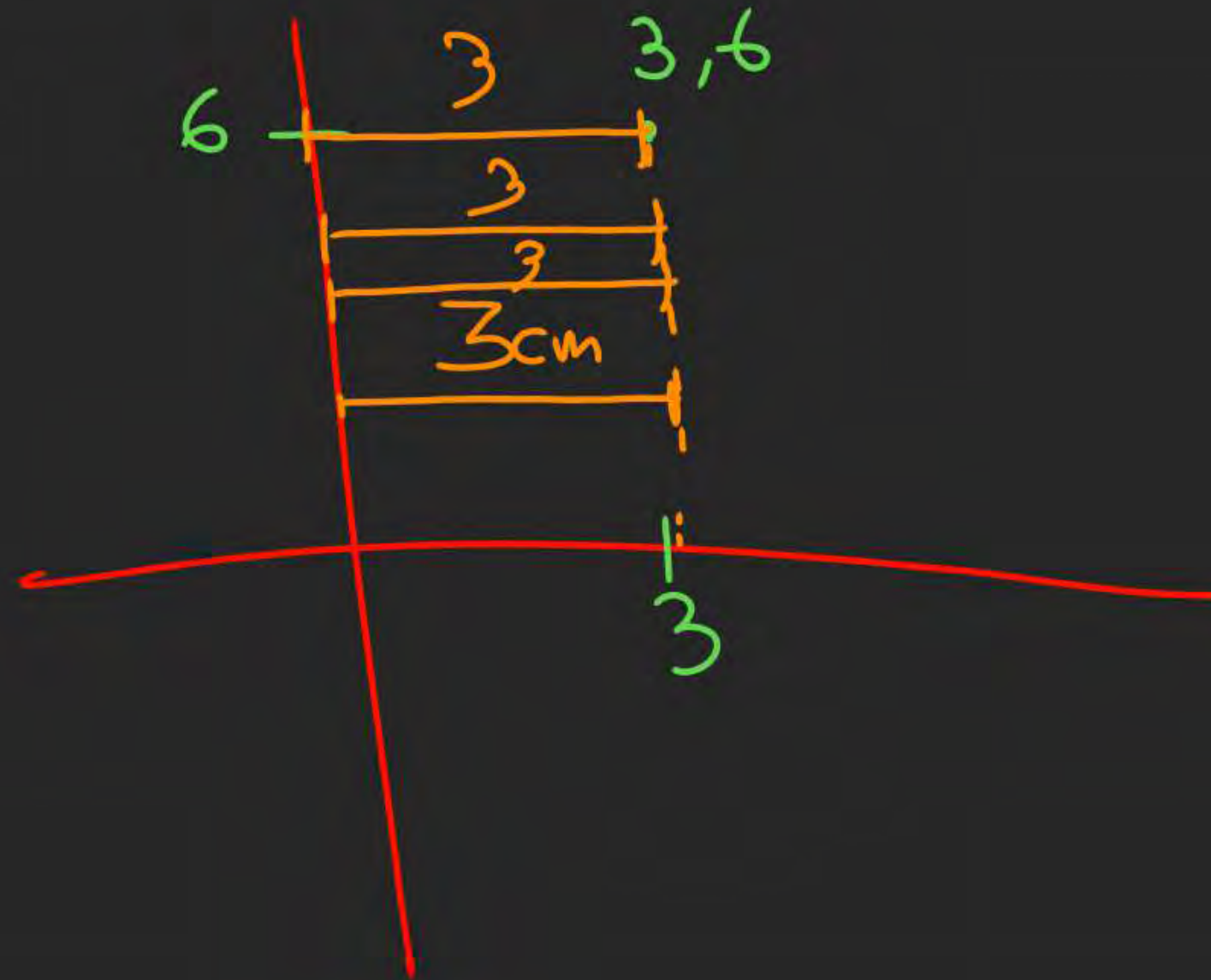
$$[3-5]^2$$

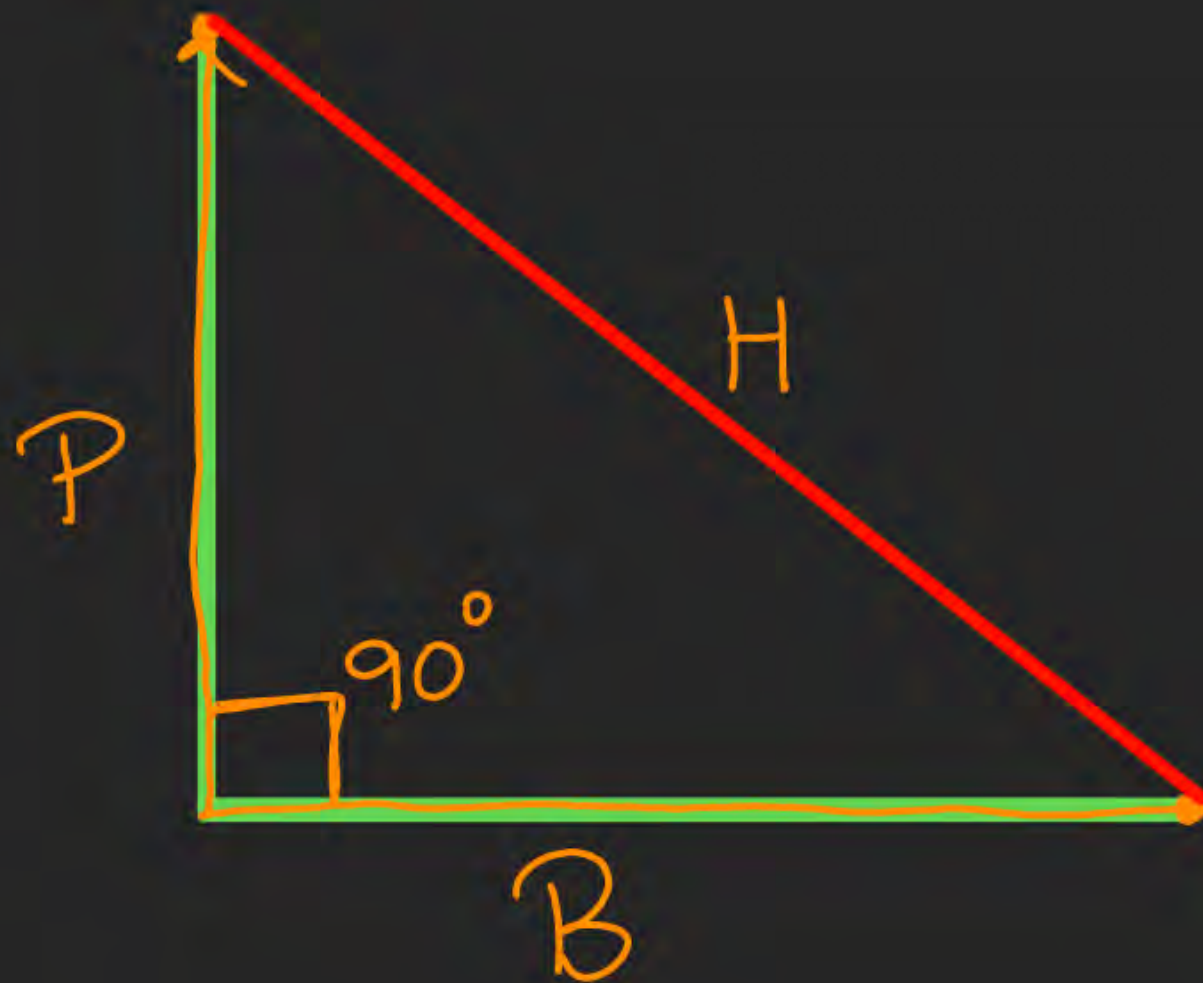
$$[-2]^2 = 02 \times 02$$

$$(4)$$

$$(4)$$





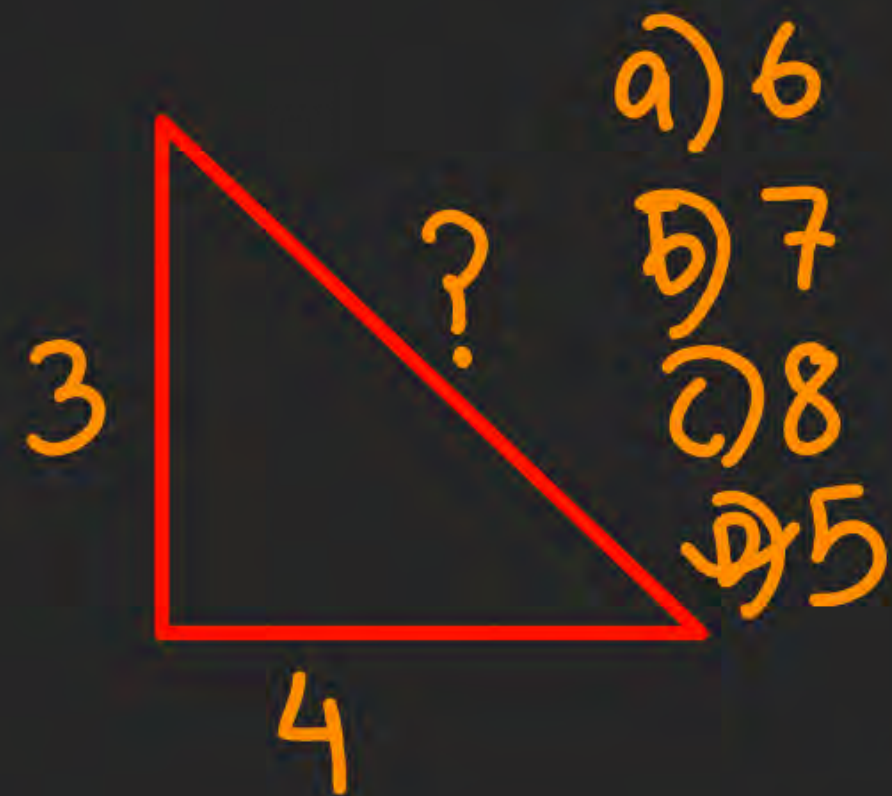


$$H^2 = (3)^2 + (4)^2$$

$$H^2 = 9 + 16$$

$$H^2 = 25 \rightarrow H = \sqrt{25} = \boxed{+5} / -5$$

$$H^2 = P^2 + B^2$$



Distance between two points in the 2-D plane

$$\text{Distance formula} = \sqrt{[x_2 - x_1]^2 + [y_2 - y_1]^2}$$

Find AB

$$x_1 = 7$$

$$x_2 = 3$$

$$y_1 = 2$$

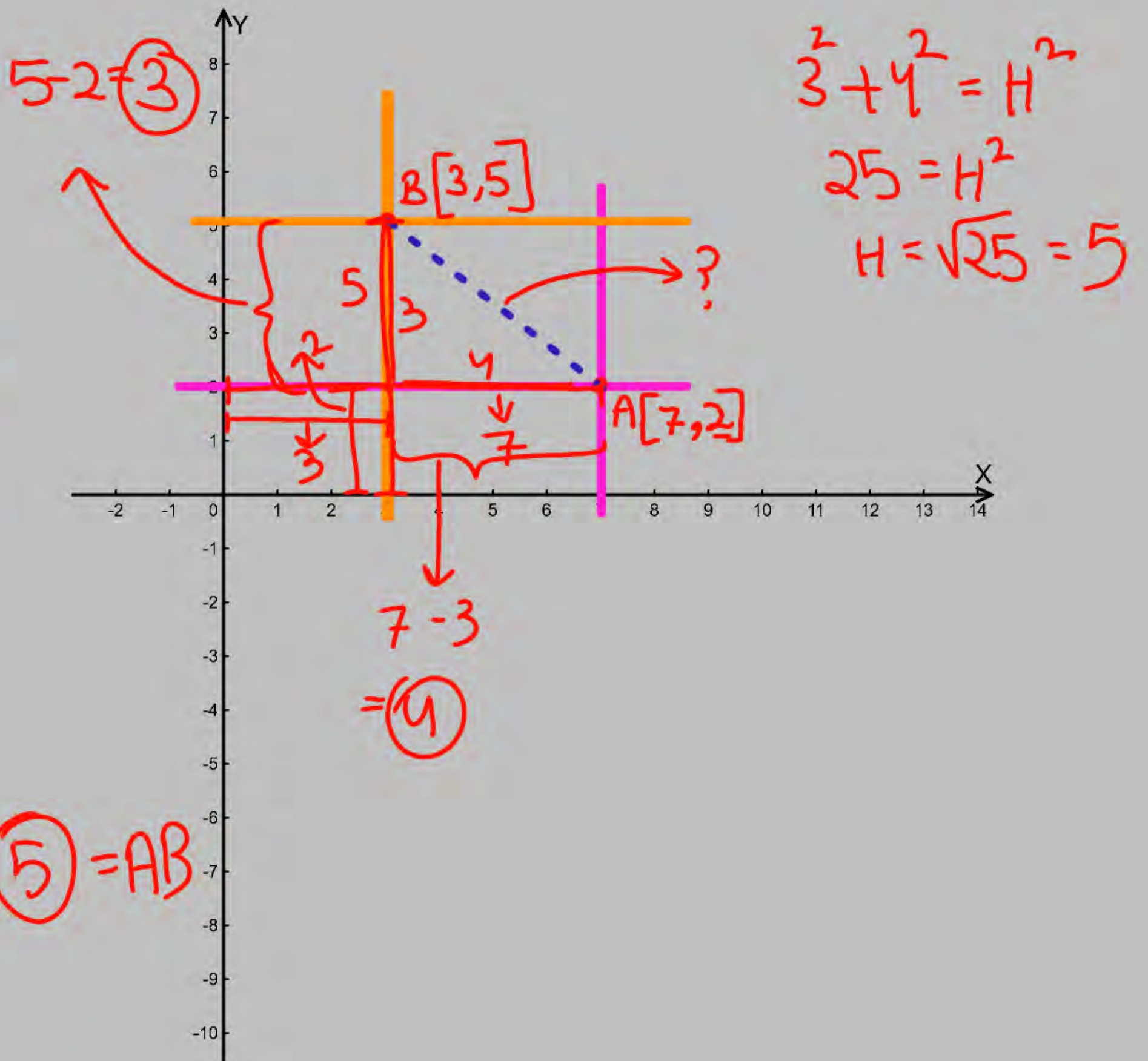
$$y_2 = 5$$

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

$$= \sqrt{[3 - 7]^2 + [5 - 2]^2}$$

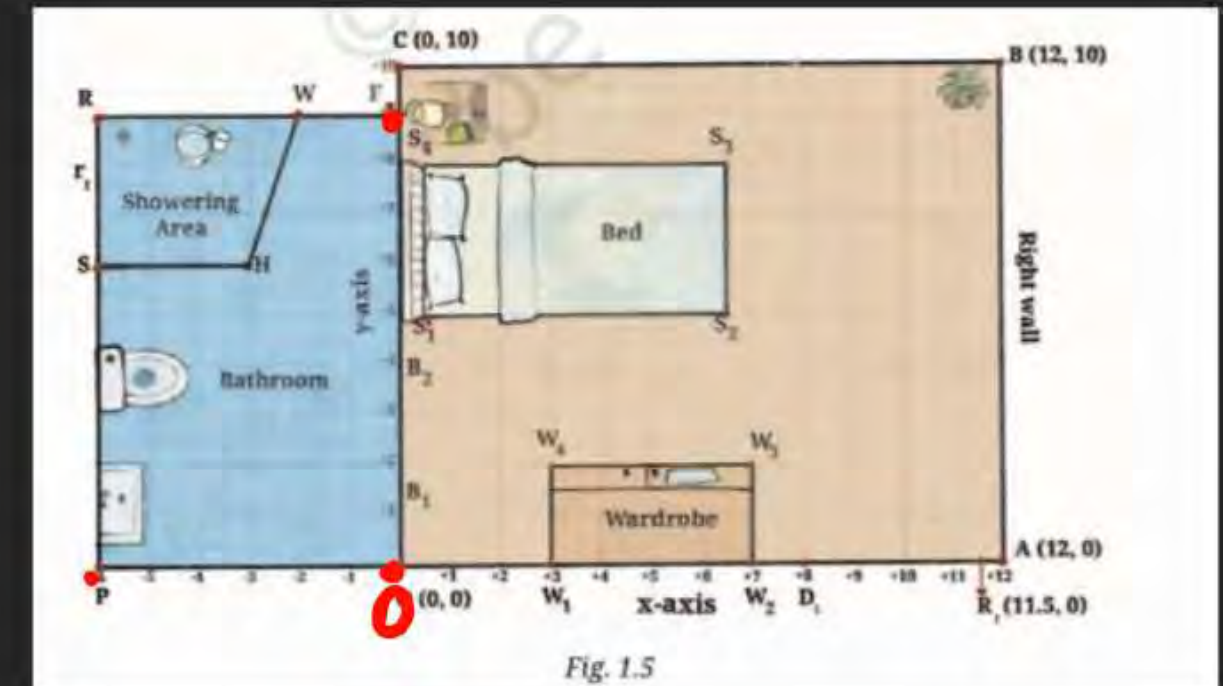
$$= \sqrt{(-4)^2 + 3^2}$$

$$= \sqrt{16 + 9} = \sqrt{25} = \textcircled{5} = AB$$



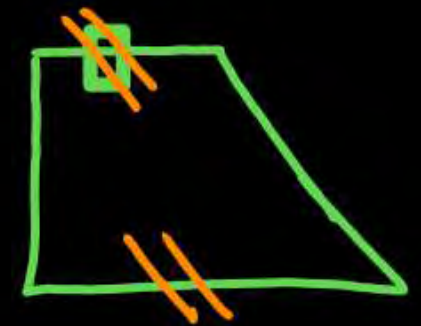
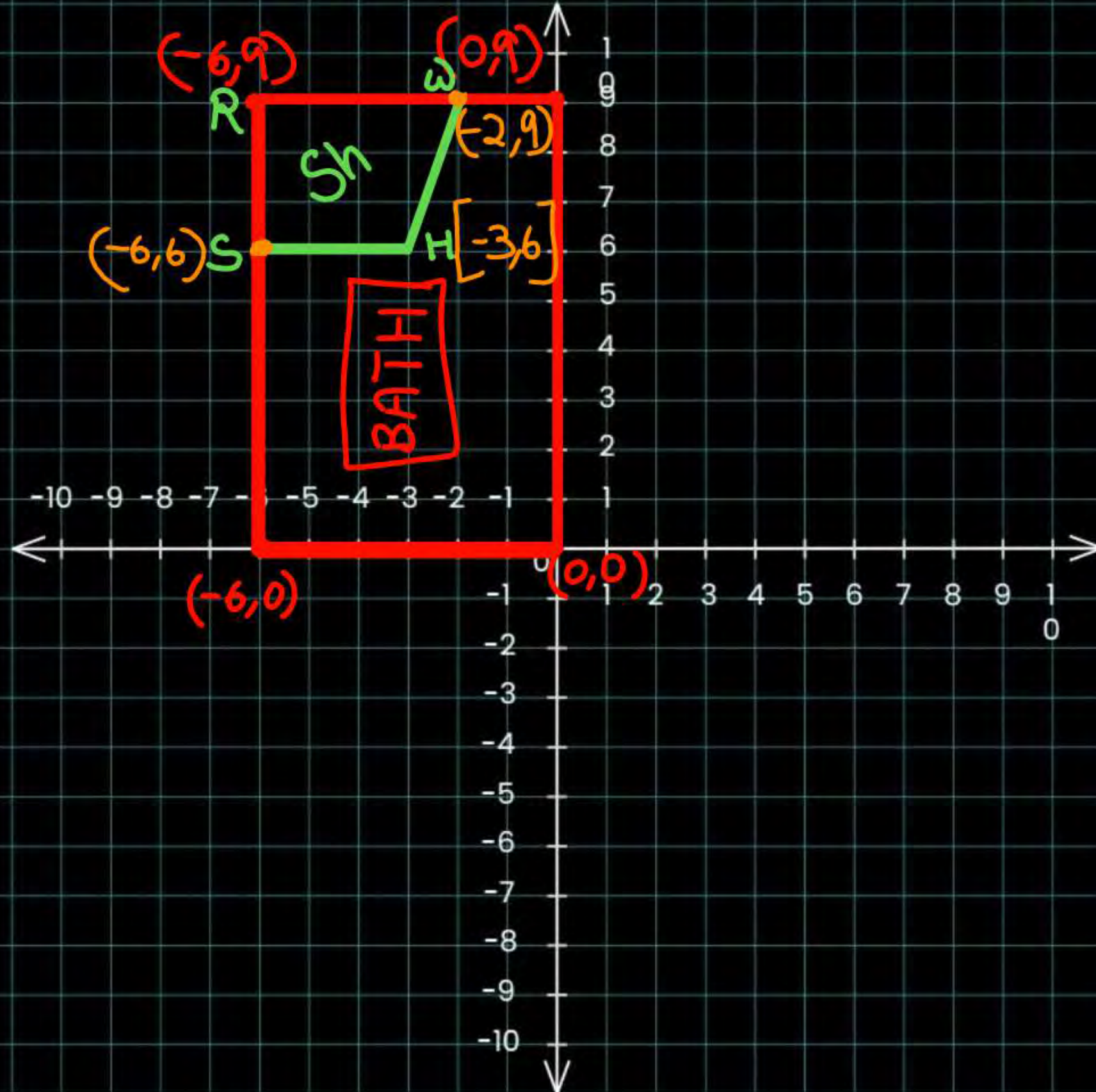
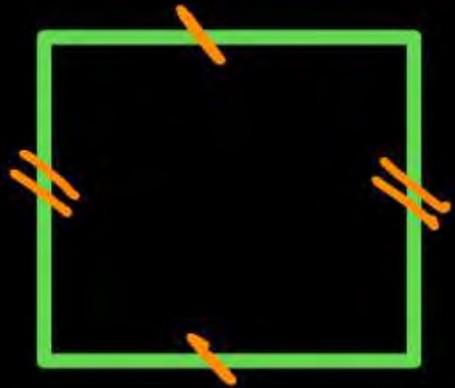
QUESTION

On a graph sheet, mark the x-axis and y-axis and the origin O. Mark points from $(-7, 0)$ to $(13, 0)$ on the x-axis and from $(0, -15)$ to $(0, 12)$ on the y-axis. (Use the scale $1\text{cm} = 1\text{unit}$). Using Fig. 1.5, answer the given questions.



Trapezium

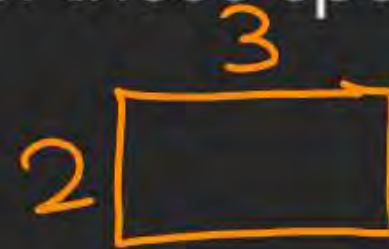
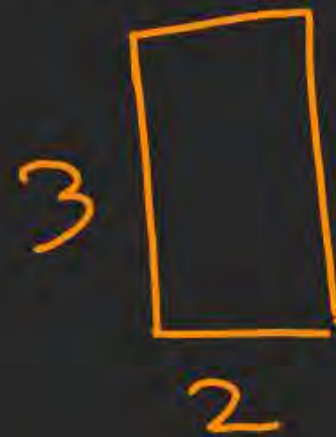
- Pair of // lines
- 4 Corner



QUESTION

Look at Reiaan's bathroom.

- What are the coordinates of the four corners O, F, R, and P of the bathroom? ✓
- What is the shape of the showering area SHWR in Reiaan's bathroom? Write the coordinates of the four corners. ✓
- Mark off a 3 ft x 2 ft space for the washbasin and a 2 ft x 3 ft space for the toilet. Write the coordinates of the corners of these spaces.



QUESTION

Other rooms in the house:

- Reiaan's room door leads from the dining room which has the length 18 ft and width 15 ft. The length of the dining room extends from point P to point A. Sketch the dining room and mark the coordinates of its corners.
- Place a rectangular 5 ft x 3 ft dining table precisely in the centre of the dining room. Write down the coordinates of the feet of the table.

QUESTION



END-OF-CHAPTER EXERCISES

- ✓ 1. What are the x-coordinate and y-coordinate of the point of intersection of the two axes?
2. 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?
3. 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:
 - (i) Two sides of RAMP that are perpendicular to each other.
 - (ii) One side of RAMP that is parallel to one of the axes.
 - (iii) 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.
4. 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.)
5. 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?
- *6. 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.
- *7. 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.
- *8. Using the origin as one vertex, plot the vertices of:
 - (i) A right-angled isosceles triangle.
 - (ii) An isosceles triangle with one vertex in Quadrant III and the other in Quadrant IV.
- *9. 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?

- *10. 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).
- *11. 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).
- *12. (i) 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?
(ii) 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.
- *13. 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.
14. 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.
 - (i) Using 1 cm = 200 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

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?

$$x, -1$$

$$5, 3$$

$$\sqrt{[5-x]^2 + [3-[-1]]^2} = 5$$

Thank
you!

$$(a-b)^2 = a^2 + b^2 - 2ab$$