



2027

6th

Orienting Yourself : The Use of Coordinates

Lecture - 06

CLASS-9TH

MATHS

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Topics To Be Covered

- 1 Remaining questions of NCERT ✓

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

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:

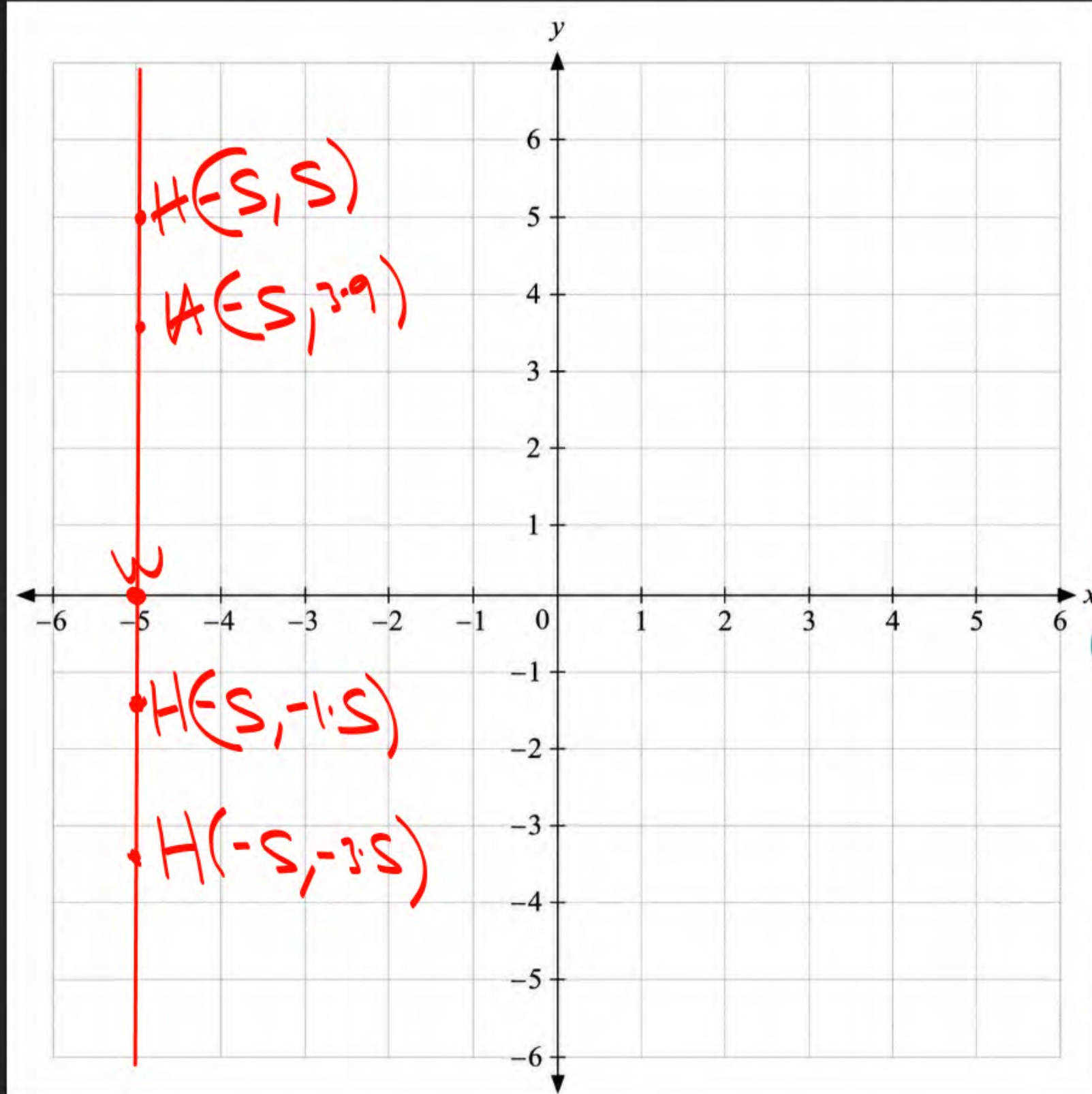
- how many street intersections can be referred to as (4, 3).
- how many street intersections can be referred to as (3, 4).

- 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:
 - whether any part of either circle lies outside the screen.
 - whether the two circles intersect each other.
- 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?

QUESTIONS

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?

II, III



$H(-s, y)$

y can be any real no.

$\rightarrow y > 0$

$\rightarrow y < 0$

$\rightarrow y = 0$

QUESTIONS



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?

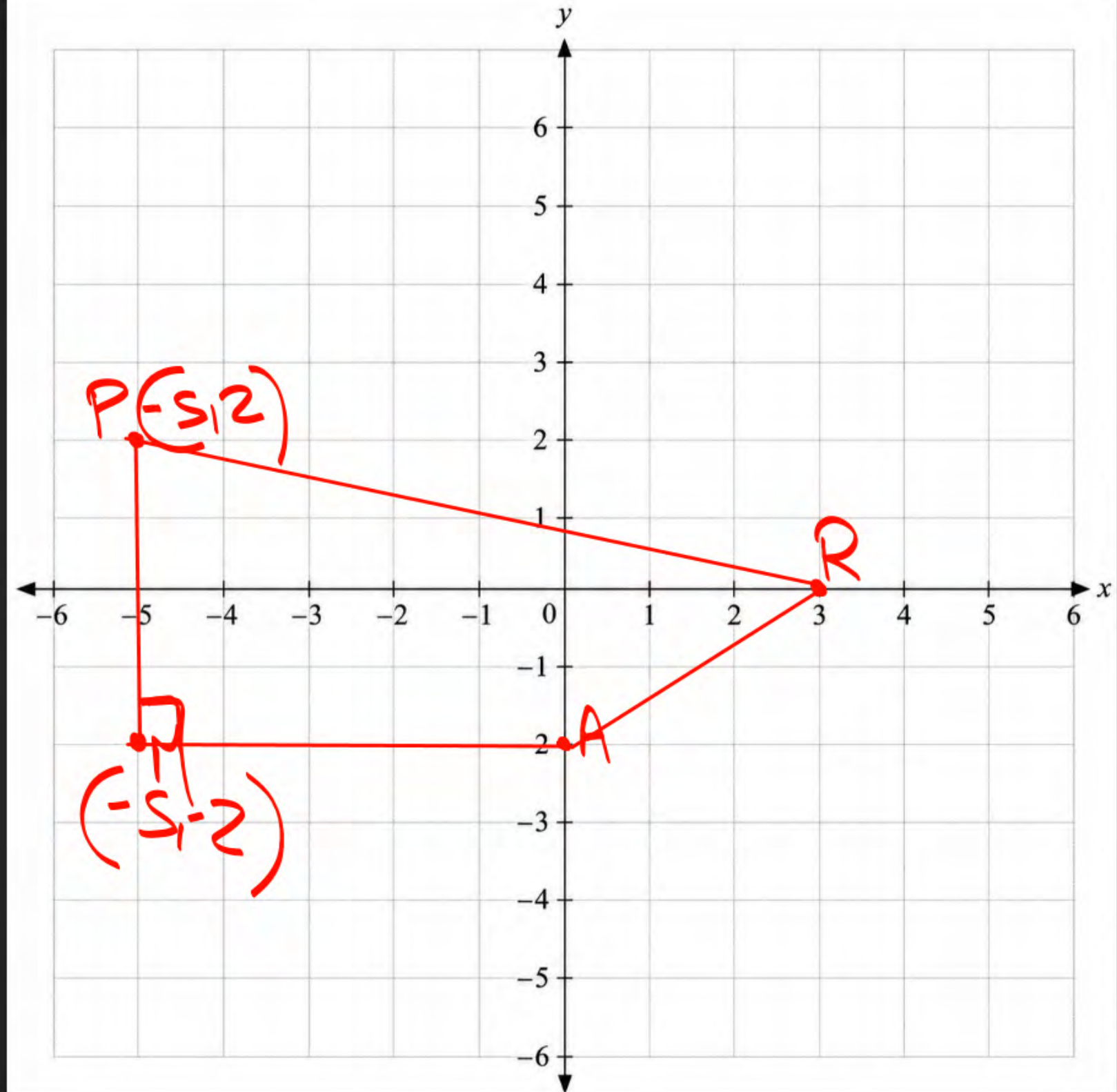
Now plot the points and verify your predictions.

- (i) AM $\rightarrow$ horizontal
- (ii) AM $\parallel$ x-axis
- MP $\rightarrow$ vertical
- MP $\parallel$ y-axis

AM $\perp$ MP

R(3, 0)
A(0, -2)
M(-5, -2)
P(-5, 2)

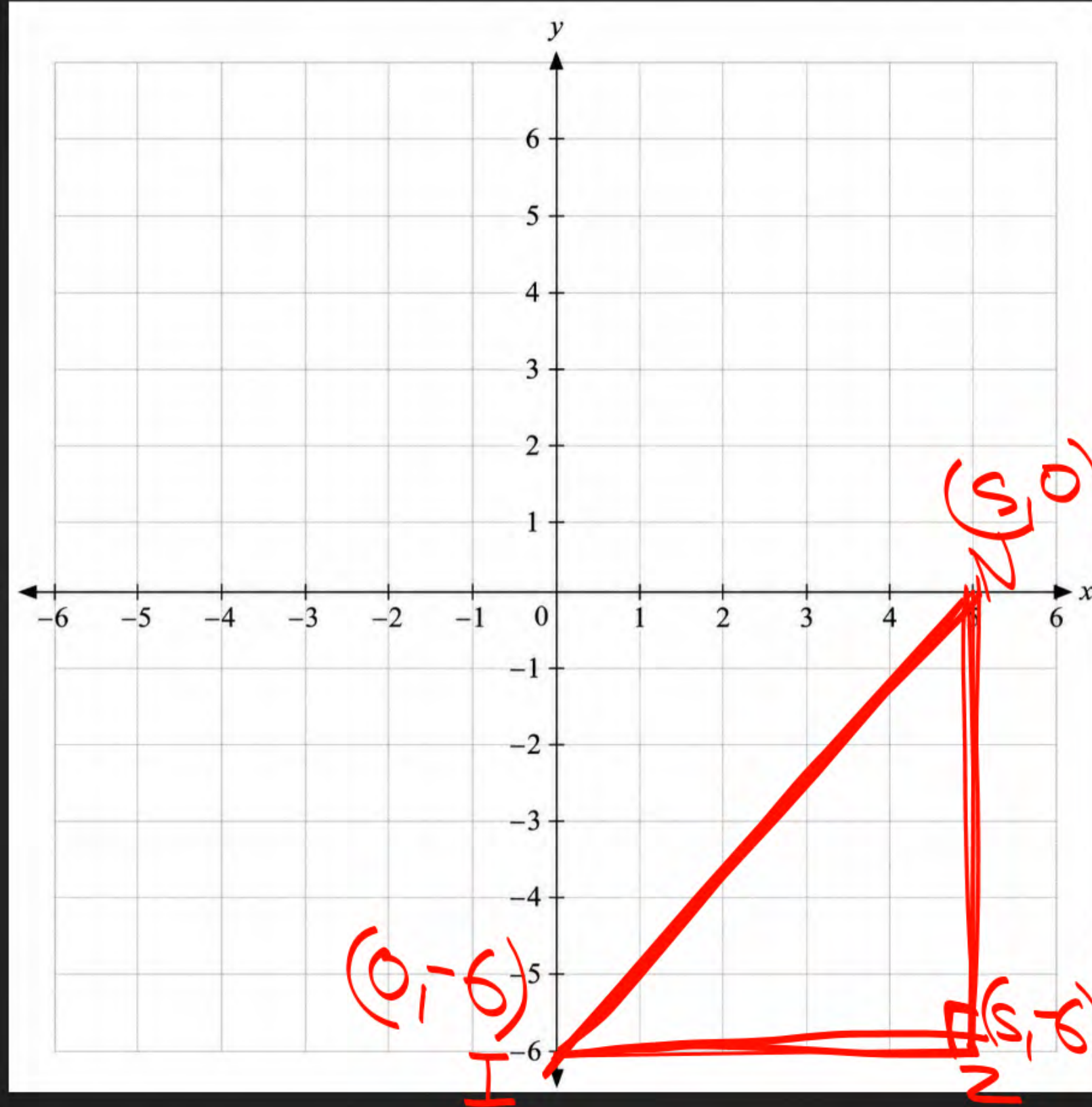
(iii) M and P
Mirror images.
axis = x-axis.

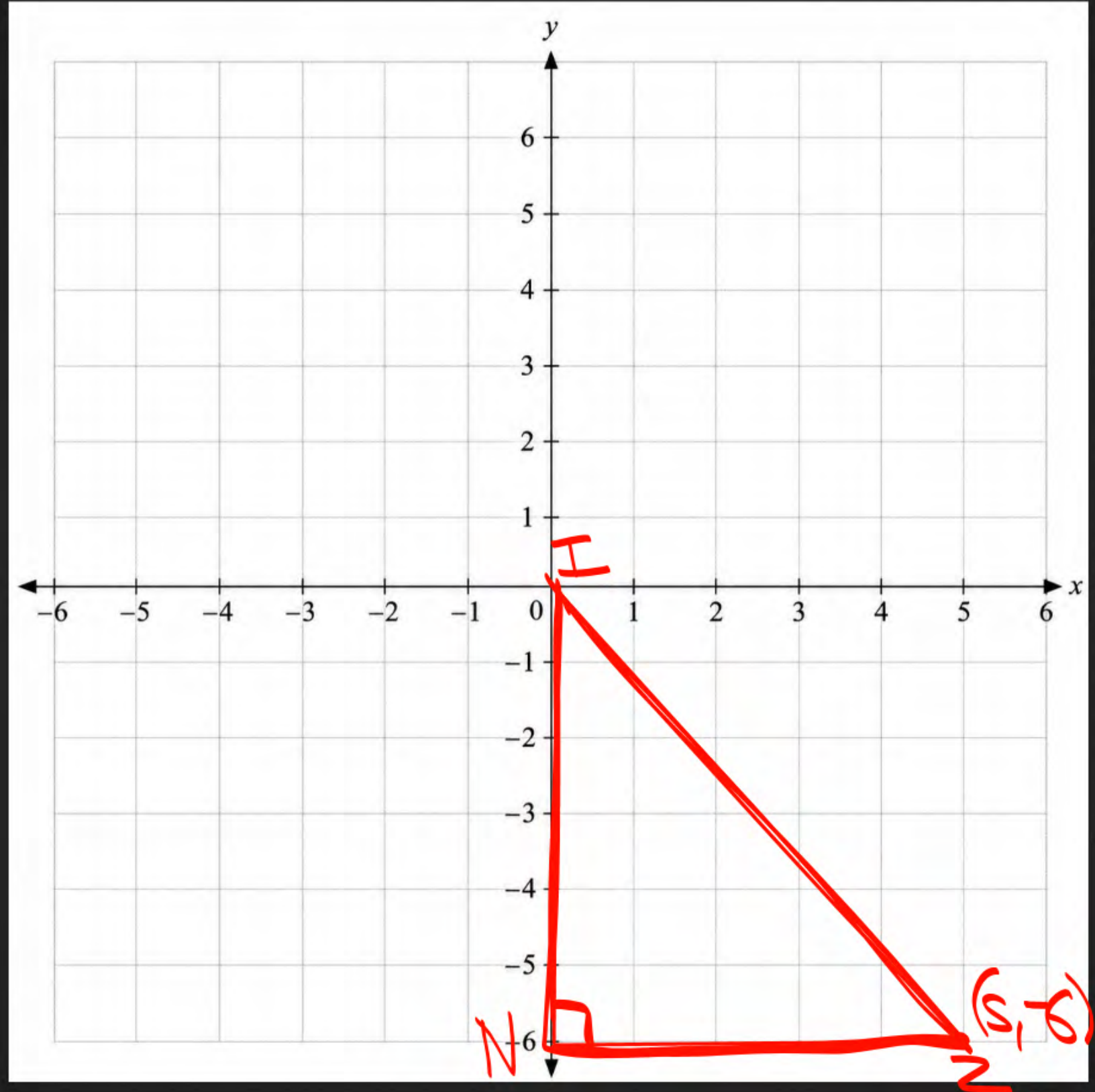


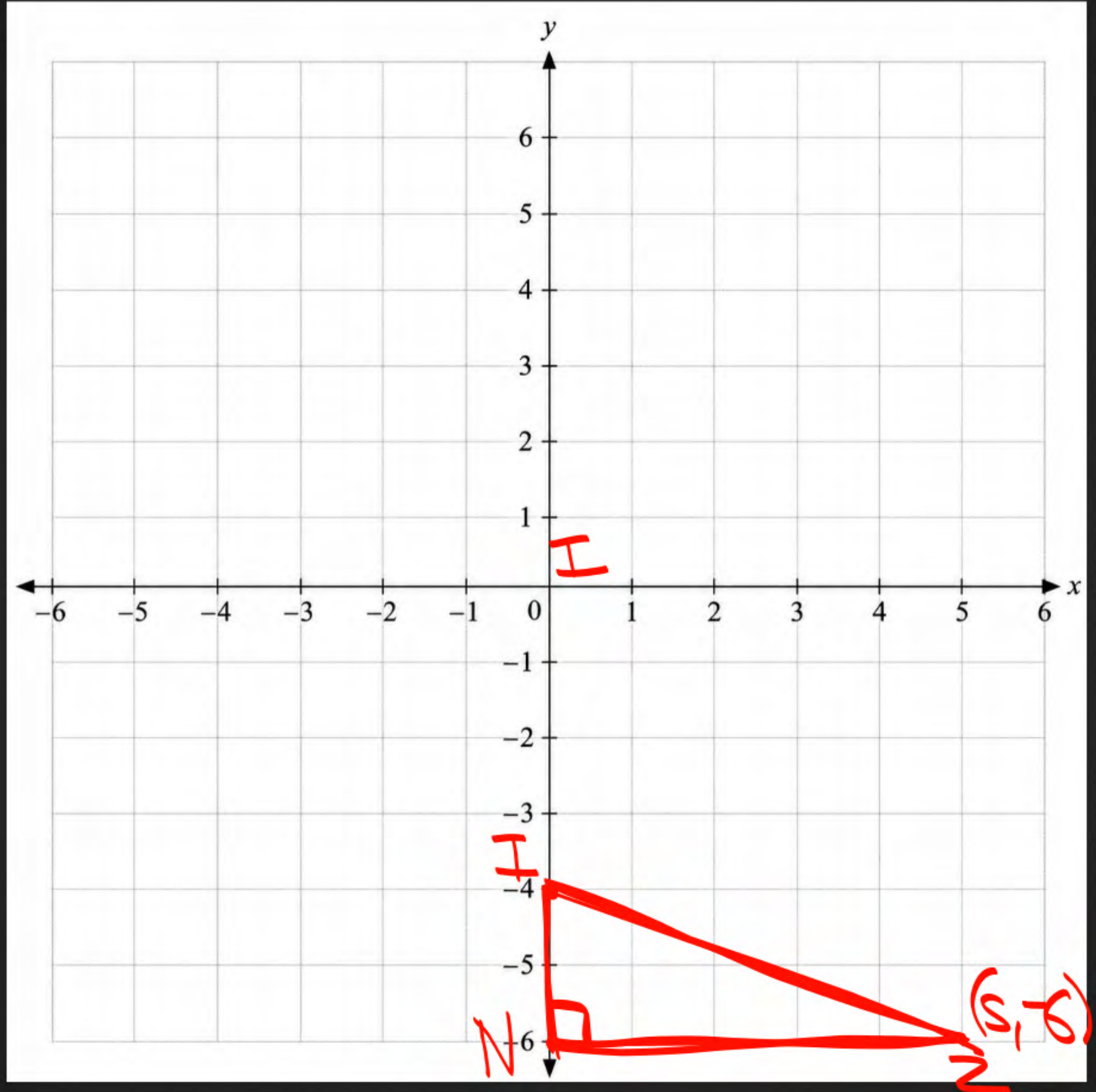
QUESTIONS

Plot point Z (5, -6) on the Cartesian plane. Construct a right-angled triangle
IZN and find the lengths of the three sides.

#6PK







QUESTIONS

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?



- If negative numbers did not exist, then the coordinate system would have only positive coordinates and zero. In such a case, we could plot points only in the first quadrant and on the positive parts of the axes.
- Points lying to the left of the y-axis or below the x-axis could not be represented because they require negative coordinates.
- Therefore, without negative numbers, the coordinate system would not allow us to locate all the points on a 2-dimensional plane.



QUESTIONS

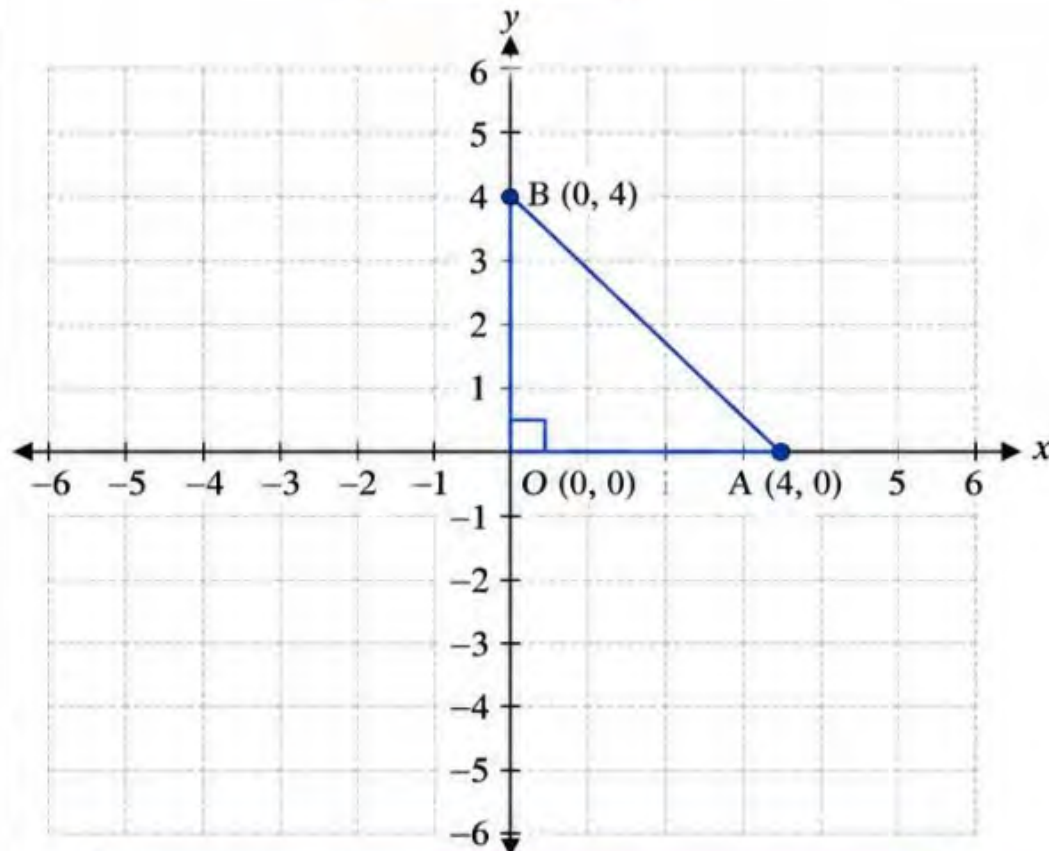
Using the origin as one vertex, plot the vertices of:

- (i) A right-angled isosceles triangle.
- (ii) An isosceles triangle with one vertex in Quadrant III and the other in Quadrant IV.

Using the origin as one vertex, plot the vertices of:

(i) A right-angled isosceles triangle.

Solution (i)



Vertices: $O (0, 0)$, $A (4, 0)$, $B (0, 4)$

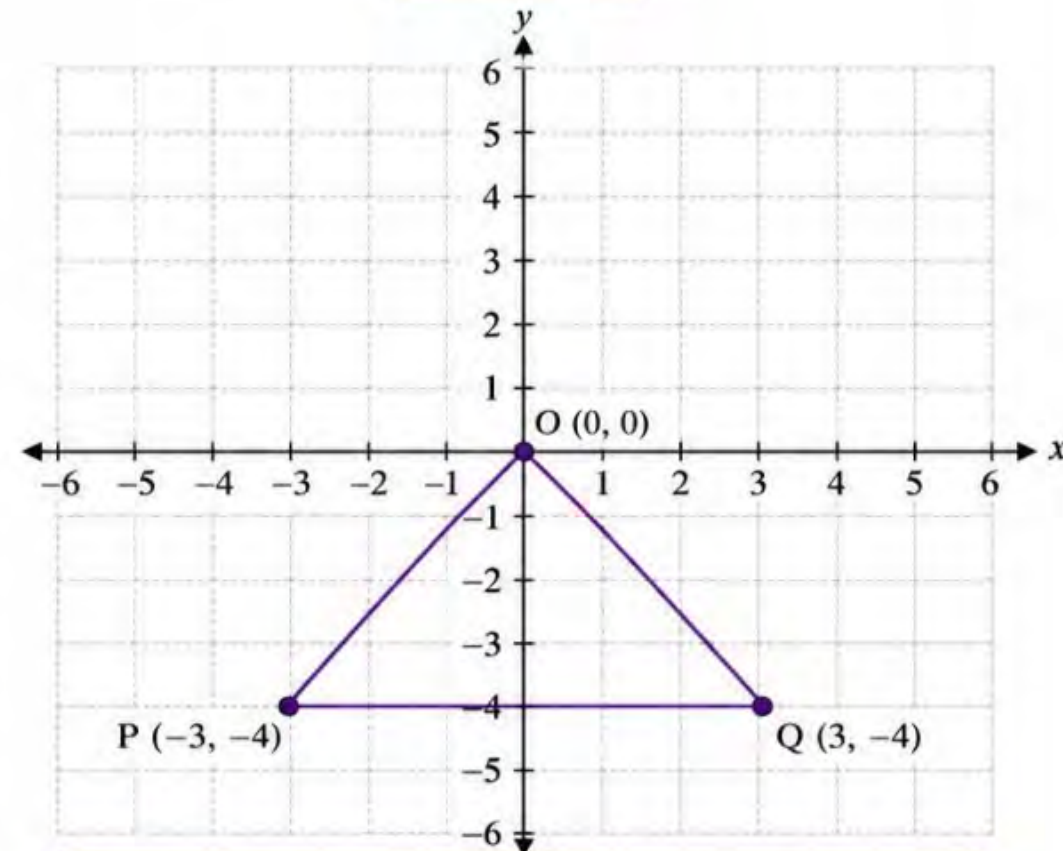
$OA = 4$ units, $OB = 4$ units

$OA \perp OB$ and $OA = OB$

Hence, $\triangle OAB$ is a right-angled isosceles triangle (right angle at O).

(ii) An isosceles triangle with one vertex in Quadrant III and the other in Quadrant IV.

Solution (ii)



Vertices: $O (0, 0)$, $P (-3, -4)$, $Q (3, -4)$

$OP = \sqrt{(-3 - 0)^2 + (-4 - 0)^2} = \sqrt{9 + 16} = 5$ units

$OQ = \sqrt{(3 - 0)^2 + (-4 - 0)^2} = \sqrt{9 + 16} = 5$ units

$OP = OQ = 5$ units

Hence, $\triangle OPQ$ is an isosceles triangle with O as the vertex, P in Quadrant III and Q in Quadrant IV.

Note: Many other correct triangles are possible. The above are just one example for each part.

QUESTIONS



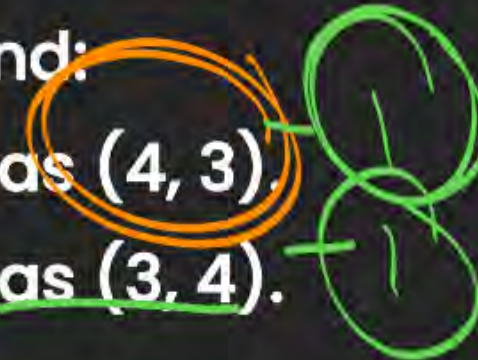
A city has two main roads which cross each other at the centre of the city. These two roads are along the North–South (N–S) direction and East–West (E–W) direction. All the other streets of the city run parallel to these roads and are 200 m apart. There are 10 streets in each direction.

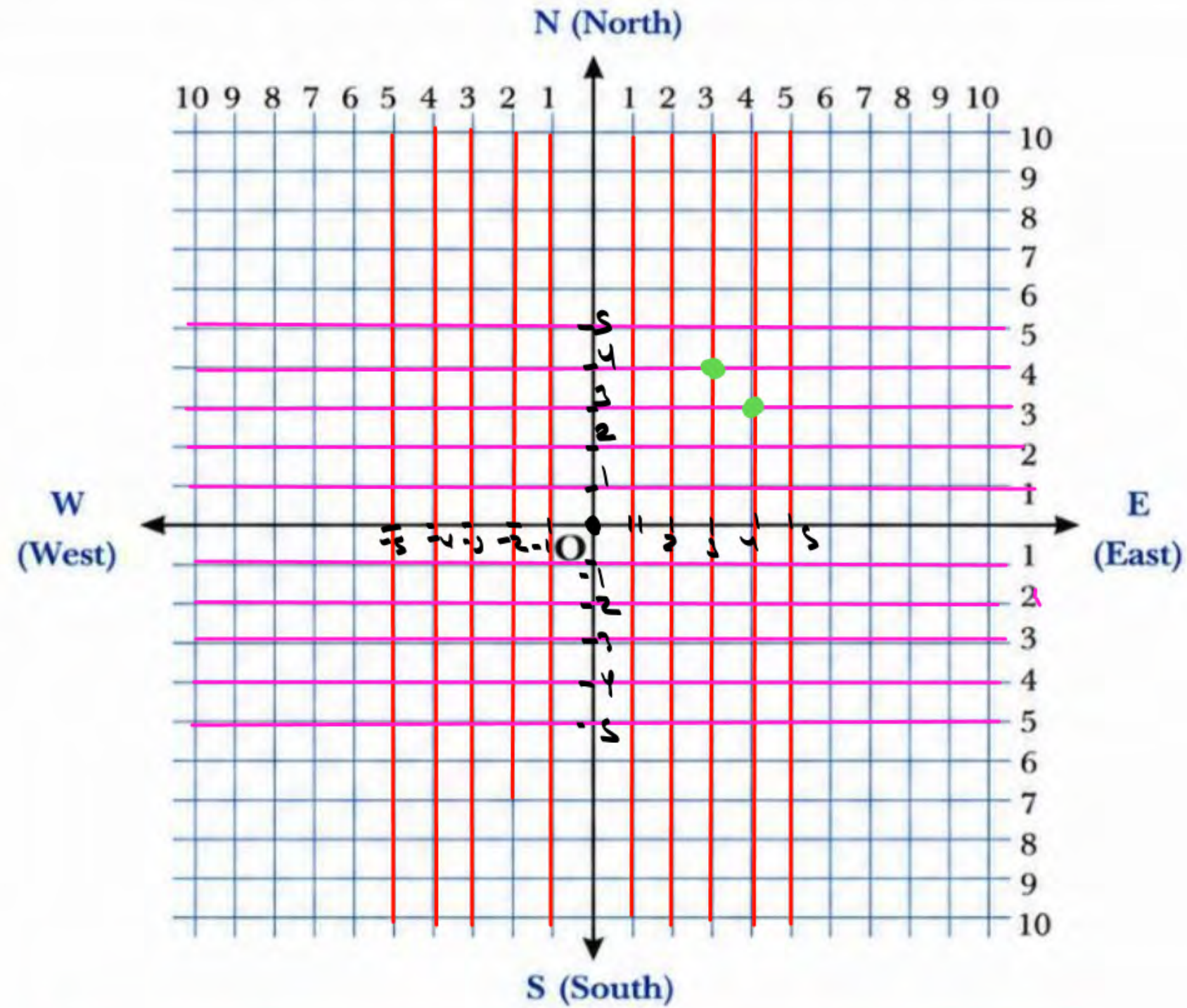
(i) Using $1\text{ cm} = 200\text{ m}$, draw a model of the city in your notebook. Represent the roads/streets by single lines.

(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 $(3, 4)$.





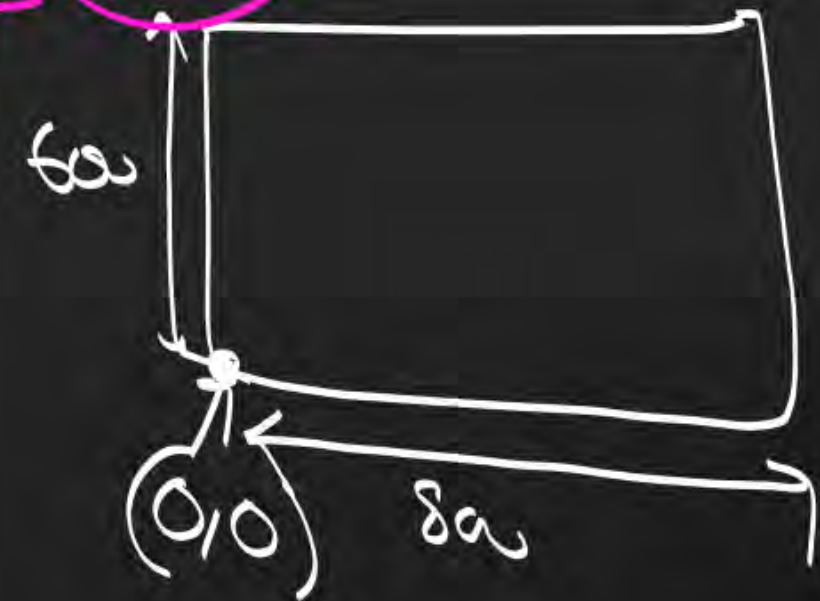
Scale: 1 cm = 200 m (So, 1 cm between two consecutive streets)

QUESTIONS

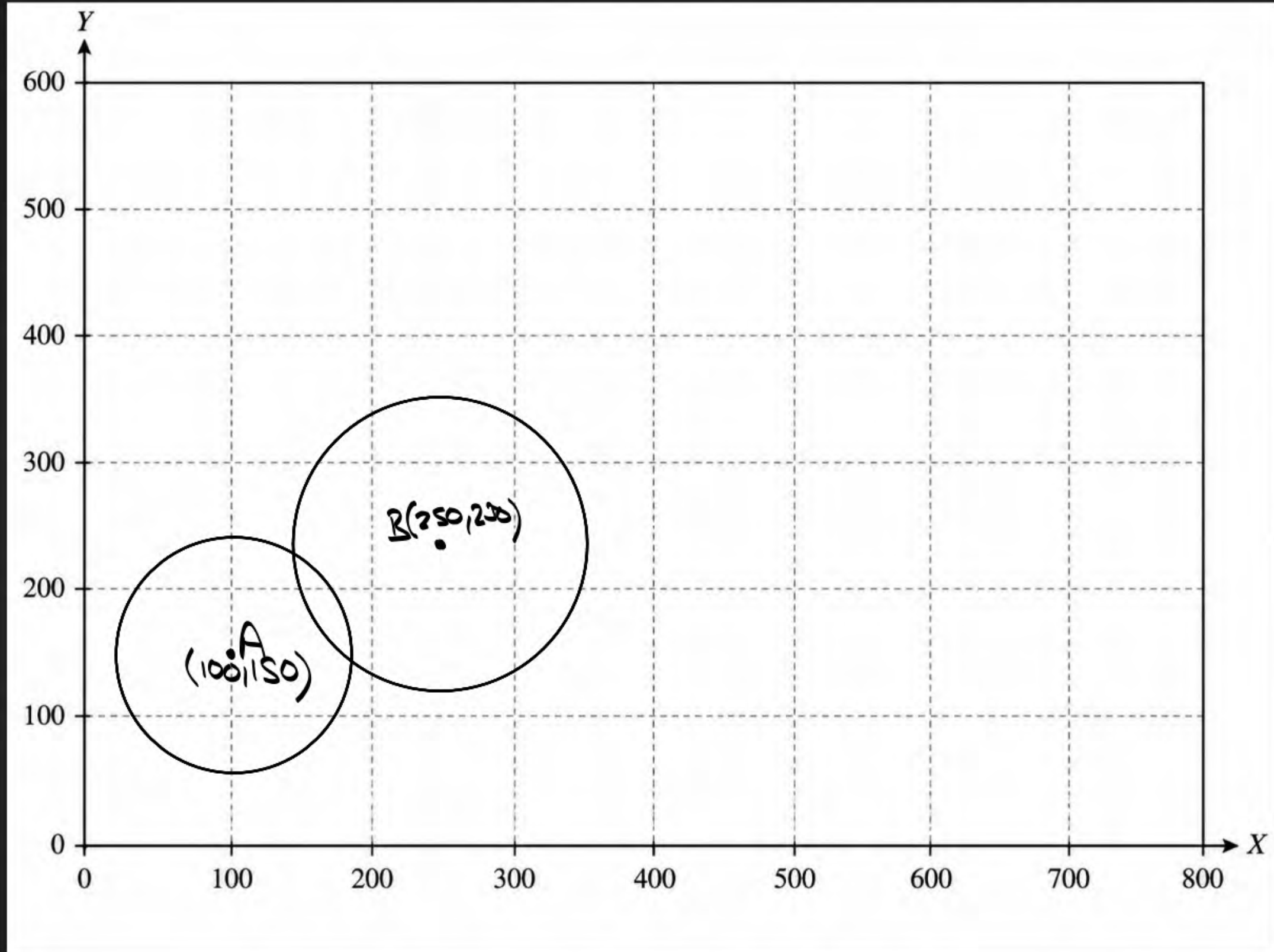


A computer graphics program displays images on a rectangular screen whose coordinate system has the origin at the bottom-left corner. The screen is 800 pixels wide and 600 pixels high. A circular icon of radius 80 pixels is drawn with its centre at the point A (100, 150). Another circular icon of radius 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.



YES



- To locate the position of an object or a point in a plane, we require two perpendicular lines—One of them is horizontal, and the other is vertical.
- The plane is called the **cartesian plane**, the **coordinate plane** or the **xy-plane** and the lines are called the coordinate axes.
- The horizontal line is called the **x-axis** and the vertical line is called the **y-axis**.
- The coordinate axes divide the plane into four parts called **quadrants**.
- The point of intersection of the axes is called the **origin**.
- The distance of a point from the y-axis is its **x-coordinate** and the distance of the point from the x-axis is its **y-coordinate**. If the x-coordinate of a point is x , and the y-coordinate is y , then (x, y) are called the **coordinates** of the point.

- The coordinates of a point on the x-axis are of the form $(x, 0)$, and those of the points on the y-axis are of the form $(0, y)$.
- The coordinates of the origin are $(0, 0)$.
- The coordinates of a point are of the form $(+, +)$ in the first quadrant, $(-, +)$ in the second quadrant, $(-, -)$ in the third quadrant and $(+, -)$ in the fourth quadrant.
- If $x = y$, then $(x, y) = (y, x)$. If $x \neq y$, then $(x, y) \neq (y, x)$.
- The distance between points (x_1, y) and (x_2, y) is the absolute value $|x_2 - x_1|$ of the difference between x_1 and x_2 .
- The distance between points (x, y_1) and (x, y_2) is the absolute value $|y_2 - y_1|$ of the difference between y_1 and y_2 .
- By the Baudhāyana–Pythagoras Theorem, the distance between points (x_1, y_1) and (x_2, y_2) is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$.

A) Bahut easy. 30%

B) Moderate. 22%

C) difficult. 4%

D) 50-50 / hojarega / practice se hojanga.
44%

$(-3, 4)$

x-axis se distance = $|4| = 4$
y-axis se distance
= $|-3|$
= 3

Thank You !

- *Work Hard.*
- *Dream big.*
- *Never give up.*