

Coordinate Geometry - NCERT Examples

Examples 1-10 with independently verified solutions.

CHAPTER

Coordinate Geometry

RESOURCE

NCERT Examples

SOURCE

NCERT Mathematics, Reprint 2026-27

PART 1

Verified NCERT questions and solutions

Verified NCERT questions and solutions

Solutions are checked independently and follow the supplied NCERT chapter edition.

NCERT EXAMPLE

Example 1

distance formula · right triangle · converse of Pythagoras theorem

Do the points P(3, 2), Q(-2, -3) and R(2, 3) form a triangle? If so, name the type of triangle formed.

Solution

Board-exam working:

Using the distance formula:

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

$$PQ = \sqrt{5^2 + 5^2} = \sqrt{50} = 5\sqrt{2}$$

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

$$QR = \sqrt{4^2 + 6^2} = \sqrt{52} = 2\sqrt{13}$$

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

$$PR = \sqrt{1^2 + (-1)^2} = \sqrt{2}$$

The sum of any two distances is greater than the third, so the three points form a triangle.

Now:

$$PQ^2 + PR^2 = 50 + 2 = 52 = QR^2$$

By the converse of the Pythagoras theorem, $\angle P = 90^\circ$. Therefore, $\triangle PQR$ is right-angled at P.

Final answer

The points form a right triangle, right-angled at P.

NCERT EXAMPLE

Example 2

distance formula · square · diagonals

Show that the points A(1, 7), B(4, 2), C(-1, -1) and D(-4, 4) are the vertices of a square.

Solution

Board-exam working:

Using the distance formula for each side:

$$AB = \sqrt{(4-1)^2 + (2-7)^2} = \sqrt{9+25} = \sqrt{34}$$

$$BC = \sqrt{(-1-4)^2 + (-1-2)^2} = \sqrt{25+9} = \sqrt{34}$$

$$CD = \sqrt{(-4-(-1))^2 + (4-(-1))^2} = \sqrt{9+25} = \sqrt{34}$$

$$DA = \sqrt{(1-(-4))^2 + (7-4)^2} = \sqrt{25+9} = \sqrt{34}$$

Now calculate the diagonals:

$$AC = \sqrt{(-1-1)^2 + (-1-7)^2} = \sqrt{4+64} = \sqrt{68}$$

$$BD = \sqrt{(-4-4)^2 + (4-2)^2} = \sqrt{64+4} = \sqrt{68}$$

$$AB = BC = CD = DA$$

$$AC = BD$$

All four sides are equal and both diagonals are equal. Therefore, ABCD is a square.

Final answer

ABCD is a square.

NCERT EXAMPLE

Example 3

distance formula · collinear points · classroom grid

Figure 7.6 shows Ashima, Bharti and Camella seated at A(3, 1), B(6, 4) and C(8, 6). Are they seated in a line? Give reasons.

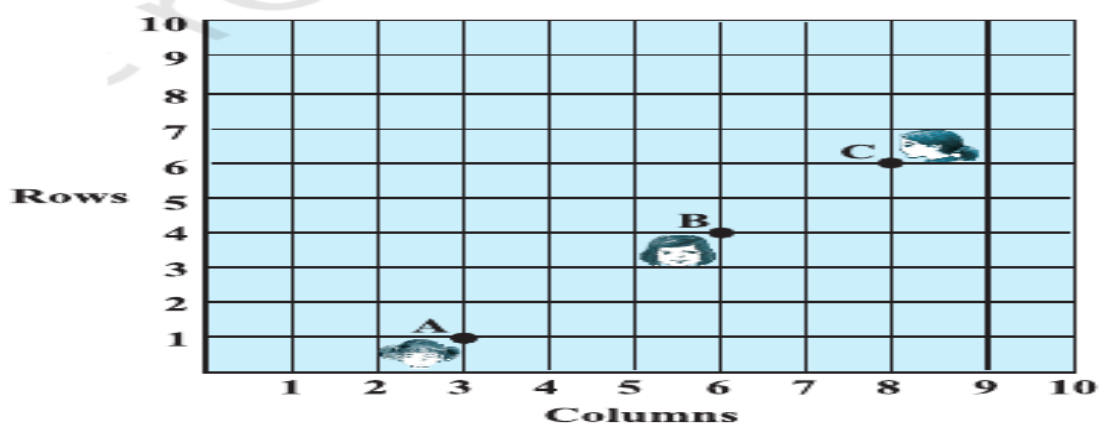


Fig. 7.6

Figure 7-6 from the supplied NCERT chapter.

Solution

Board-exam working:

Using the distance formula:

$$AB = \sqrt{(6-3)^2 + (4-1)^2} = \sqrt{9+9} = 3\sqrt{2}$$

$$BC = \sqrt{(8-6)^2 + (6-4)^2} = \sqrt{4+4} = 2\sqrt{2}$$

$$AC = \sqrt{(8-3)^2 + (6-1)^2} = \sqrt{25+25} = 5\sqrt{2}$$

Now compare the distances:

$$AB + BC = 3\sqrt{2} + 2\sqrt{2} = 5\sqrt{2} = AC$$

Since $AB + BC = AC$, point B lies between A and C. Therefore, A, B and C are collinear.

Final answer

Yes. Ashima, Bharti and Camella are seated in a straight line.

NCERT EXAMPLE

Example 4

equidistant point · distance formula · perpendicular bisector

Find a relation between x and y such that $P(x, y)$ is equidistant from $A(7, 1)$ and $B(3, 5)$.

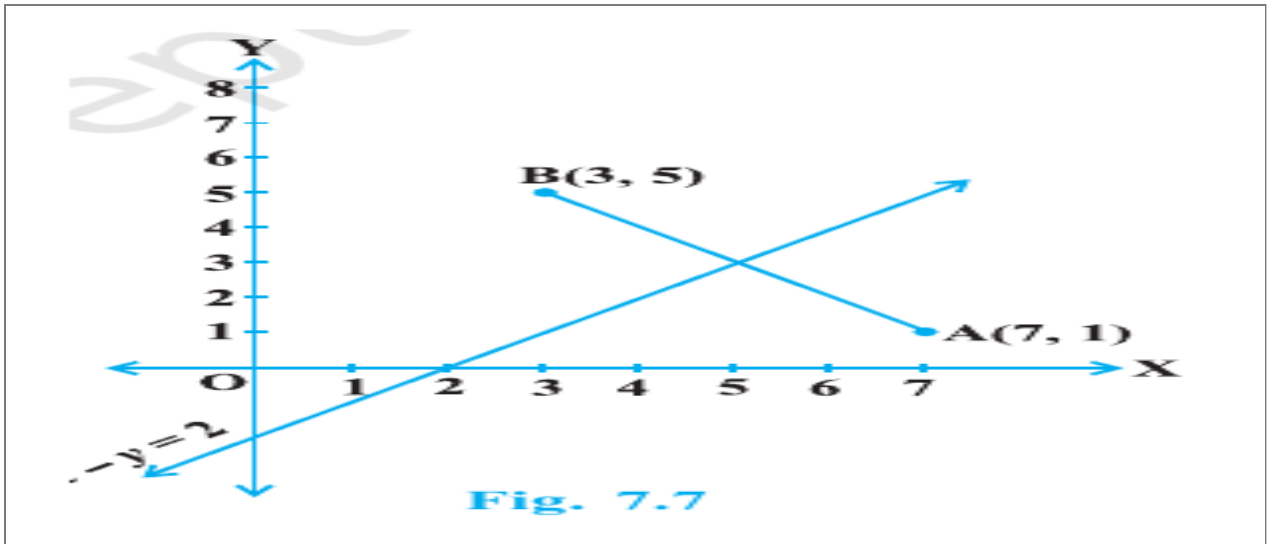


Figure 7-7 from the supplied NCERT chapter.

Solution

Board-exam working:

Since P is equidistant from A and B:

$$AP = BP$$

Squaring both sides:

$$AP^2 = BP^2$$

$$(x - 7)^2 + (y - 1)^2 = (x - 3)^2 + (y - 5)^2$$

Expanding both sides:

$$x^2 - 14x + 49 + y^2 - 2y + 1 = x^2 - 6x + 9 + y^2 - 10y + 25$$

Cancelling equal terms and simplifying:

$$-14x - 2y + 50 = -6x - 10y + 34$$

$$8y - 8x + 16 = 0$$

$$x - y = 2$$

Final answer

The required relation is $x - y = 2$.

NCERT EXAMPLE

Example 5

y-axis · equidistant point · distance formula

Find a point on the y-axis which is equidistant from A(6, 5) and B(-4, 3).

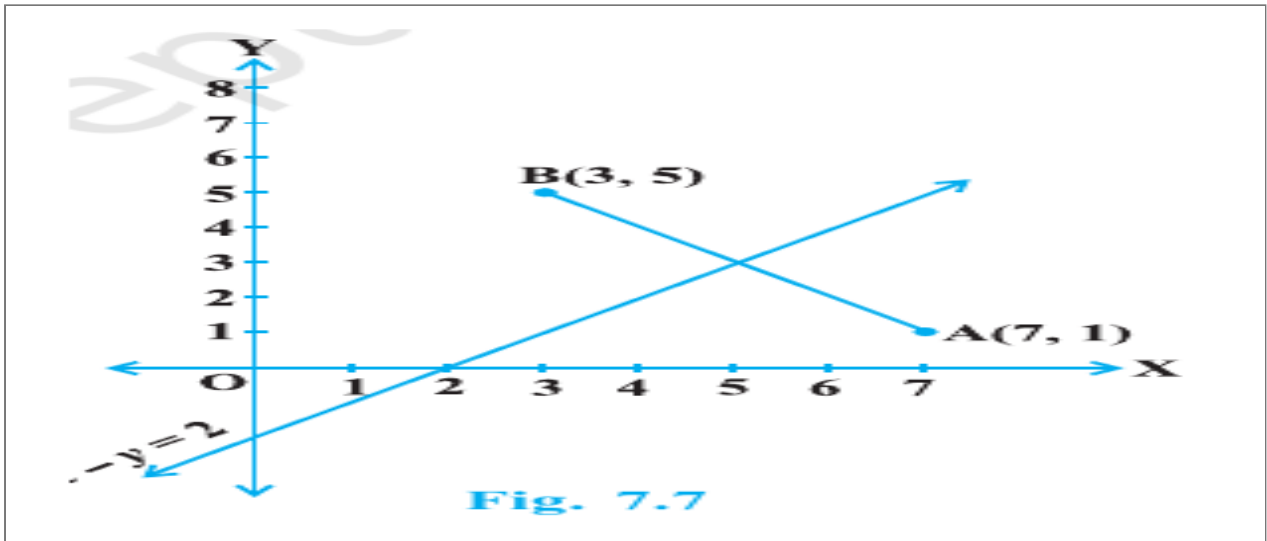


Figure 7-7 from the supplied NCERT chapter.

Solution

Board-exam working:

A point on the y-axis has x-coordinate 0. Let the required point be P(0, y).

Since P is equidistant from A and B:

$$AP = BP$$

Squaring both sides:

$$(6 - 0)^2 + (5 - y)^2 = (-4 - 0)^2 + (3 - y)^2$$

Expanding:

$$36 + 25 + y^2 - 10y = 16 + 9 + y^2 - 6y$$

Cancelling y^2 and simplifying:

$$61 - 10y = 25 - 6y$$

$$36 = 4y$$

$$y = 9$$

Check:

$$AP = \sqrt{(6 - 0)^2 + (5 - 9)^2} = \sqrt{36 + 16} = \sqrt{52}$$

$$BP = \sqrt{(-4 - 0)^2 + (3 - 9)^2} = \sqrt{16 + 36} = \sqrt{52}$$

Thus $AP = BP$.

Final answer

The required point is (0, 9).

NCERT EXAMPLE

Example 6

section formula · internal division · ratio

Find the coordinates of the point which divides the line segment joining (4, -3) and (8, 5) internally in the ratio 3 : 1.

Solution

Board-exam working:

Let A(4, -3), B(8, 5), and let P(x, y) divide AB in the ratio 3 : 1.

Using the section formula:

$$x = \frac{3(8) + 1(4)}{3 + 1}$$

$$x = \frac{24 + 4}{4} = \frac{28}{4} = 7$$

$$y = \frac{3(5) + 1(-3)}{3 + 1}$$

$$y = \frac{15 - 3}{4} = \frac{12}{4} = 3$$

Final answer

The required point is (7, 3).

NCERT EXAMPLE

Example 7

section formula · ratio of division · coordinate comparison

In what ratio does P(-4, 6) divide the line segment joining A(-6, 10) and B(3, -8)?

Solution

Board-exam working:

Let P divide AB internally in the ratio $m_1 : m_2$.

Using the x-coordinate in the section formula:

$$-4 = \frac{3m_1 - 6m_2}{m_1 + m_2}$$

Cross multiplying:

$$-4m_1 - 4m_2 = 3m_1 - 6m_2$$

$$2m_2 = 7m_1$$

$$\frac{m_1}{m_2} = \frac{2}{7}$$

$$m_1 : m_2 = 2 : 7$$

Verification using the y-coordinate:

$$y = \frac{2(-8) + 7(10)}{2 + 7}$$

$$y = \frac{-16 + 70}{9} = \frac{54}{9} = 6$$

The y-coordinate agrees with P(-4, 6).

Final answer

The point divides the line segment internally in the ratio 2 : 7.

NCERT EXAMPLE

Example 8

section formula · trisection · internal division

Find the coordinates of the points of trisection of the line segment joining A(2, -2) and B(-7, 4).

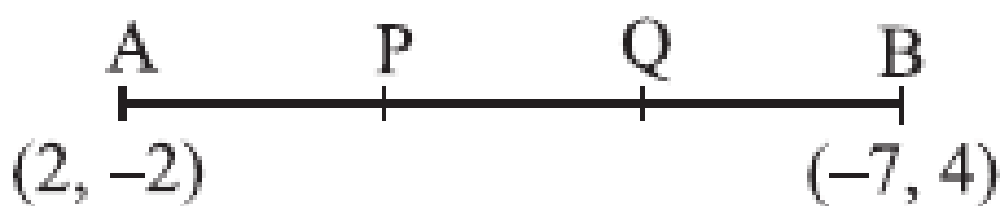


Fig. 7.11

Figure 7-11 from the supplied NCERT chapter.

Solution

Board-exam working:

Let P and Q be the trisection points, so $AP = PQ = QB$.

Point P divides AB internally in the ratio 1 : 2.

$$P = \left(\frac{1(-7) + 2(2)}{1 + 2}, \frac{1(4) + 2(-2)}{1 + 2} \right)$$

$$P = \left(\frac{-7 + 4}{3}, \frac{4 - 4}{3} \right) = (-1, 0)$$

Point Q divides AB internally in the ratio 2 : 1.

$$Q = \left(\frac{2(-7) + 1(2)}{2 + 1}, \frac{2(4) + 1(-2)}{2 + 1} \right)$$

$$Q = \left(\frac{-14 + 2}{3}, \frac{8 - 2}{3} \right) = (-4, 2)$$

Final answer

The points of trisection are (-1, 0) and (-4, 2).

NCERT EXAMPLE

Example 9

section formula · y-axis · ratio of division

Find the ratio in which the y-axis divides the line segment joining A(5, -6) and B(-1, -4). Also find the point of intersection.

Solution

Board-exam working:

Let the y-axis divide AB at P in the ratio $k : 1$.

By the section formula:

$$P = \left(\frac{k(-1) + 1(5)}{k + 1}, \frac{k(-4) + 1(-6)}{k + 1} \right)$$

Since P lies on the y-axis, its x-coordinate is 0.

$$\frac{-k + 5}{k + 1} = 0$$

$$-k + 5 = 0$$

$$k = 5$$

Therefore, the ratio is 5 : 1.

Substituting $k = 5$ in the y-coordinate:

$$y = \frac{5(-4) + 1(-6)}{5 + 1}$$

$$y = \frac{-20 - 6}{6} = \frac{-26}{6} = -\frac{13}{3}$$

Final answer

The ratio is 5 : 1, and the point of intersection is:

$$\left(0, -\frac{13}{3}\right)$$

NCERT EXAMPLE

Example 10

midpoint formula · parallelogram · diagonals

If A(6, 1), B(8, 2), C(9, 4) and D(p, 3) are the vertices of a parallelogram in order, find p.

Solution

Board-exam working:

The diagonals of a parallelogram bisect each other. Therefore, the midpoint of AC equals the midpoint of BD.

Midpoint of AC:

$$\left(\frac{6+9}{2}, \frac{1+4}{2}\right) = \left(\frac{15}{2}, \frac{5}{2}\right)$$

Midpoint of BD:

$$\left(\frac{8+p}{2}, \frac{2+3}{2}\right) = \left(\frac{8+p}{2}, \frac{5}{2}\right)$$

Equating the x-coordinates:

$$\frac{15}{2} = \frac{8+p}{2}$$

$$15 = 8 + p$$

$$p = 7$$

Final answer

$p = 7$.