

SUBJECT: MATHEMATICS
TOPIC: COORDINATE GEOMETRY
CLASS: X

$$\text{Distance formula} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \quad \underline{\quad A(x_1, y_1) \quad \quad \quad B(x_2, y_2) \quad}$$

Working: (i) Draw line segment and their coordinates.

(ii) Use *Distance formula* to find length of AB.

Type I: To find the distance between two points using *Distance formula*.

Q. Find the distance between the pairs of following points:

- (i) (3,2) and (1,4) (ii) (10,-5) and (-4,0) (iii) (-3,5) and (-5,-6) (iv) (-8,3) and (4,-1).

Type II: To find unknown value using *Distance formula*.

Q1. Find the value of a when the distance between the points (3, a) and (4, 1) is $\sqrt{10}$.

Q2. Find the values of y for which the distance between the points P (2, -3) and Q (10, y) is 10 units.

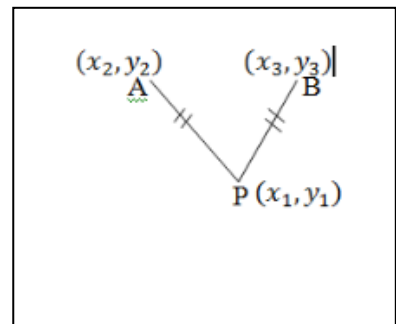
Q3. Find the value of p when the distance between the points (4,p) and (1,0) is 5 units.

Type III: Problems based on Equidistant .

Always remember the V shape for equidistant related questions.

Here P is equidistant(of same distance) from A and B.

Working : (i) First draw the V shape figure as shown.



(ii) Write $AP = BP$.

(iii) Use *Distance formula*, we get

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(x_3 - x_1)^2 + (y_3 - y_1)^2}$$

(iv) Squaring both sides, we get

$$(x_2 - x_1)^2 + (y_2 - y_1)^2 = (x_3 - x_1)^2 + (y_3 - y_1)^2$$

(v) Now simplify.

Q1. Which point on x-axis is equidistant from (5, 9) and (-4, 6)?

Q2. Which point on y-axis is equidistant from (2, 3) and (-4, 1)?

Q3. Find the value of k, if the point P (0, 2) is equidistant from (3, k) and (k, 5).

Q4. Find the value of x such that PQ = QR where the coordinates of P, Q and R are (6,-1), (1,3) and (x, 8) respectively.

Q5. If the point P(x, y) is equidistant from the points A(5, 1) and B (1, 5), prove that x = y.

Q6. If Q (0, 1) is equidistant from P (5,-3) and R (x, 6), find the values of x. Also, find the distances QR and PR.

Q7. Find a point on y-axis which is equidistant from the points (5,-2) and (-3, 2).

Q8. Find a relation between x and y such that the point (x, y) is equidistant from the points (3,6) and (-3, 4).

Q9. Find a point on the y-axis which is equidistant from the points A(6, 5) and B(-4, 3).

Special questions :

Working : (i) Draw circle as shown.

(ii) Write AO = BO. (Radii)

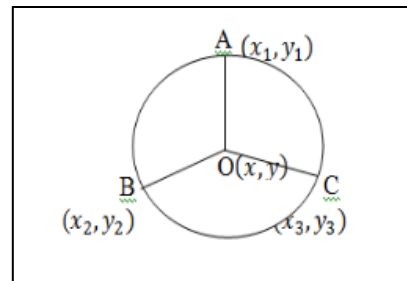
(iii) Use Distance formula, we get

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

(iv) Squaring both sides and simplify

(v) Write AO = CO. (Radii)

And repeat the process.



Q1. Find the centre of a circle passing through the points (6, -6), (3, -7) and (3, 3).

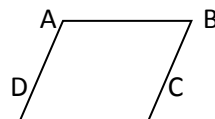
Q2. Find the circumcenter of the triangle whose vertices are (-2,-3), (-1, 0), (7,-6).

Q3. Find the centre of the circle passing through (5,-8), (2,-9) and (2, 1).

Q4. Find the coordinates of the circumcenter of the triangle whose vertices are (3, 0), (-1,-6) and (4,-1). Also, find its circumradius.

TypeIV: Applying *Distance formula* in determining the type of Quadrilateral.

Working : (i) Draw figure as shown.



(ii) Use *Distance formula* to find AB, BC, CD and AC

(iii) If Opposite sides equal then, it's a PARALLELOGRAM.

(iv) If ALL sides equal then, it's a RHOMBUS.

(v) If Opposite sides equal and Diagonals are equal then, it's a RECTANGLE.

(vi) If ALL sides equal and Diagonals are equal then, it's a SQUARE.

Q1. Show that the points $(-2, -4)$, $(4, 0)$ and $(2, 3)$ are the vertices of a rectangle.

Q2. Show that the points $A(1, -2)$, $B(3, 6)$, $C(5, 10)$ and $D(3, 2)$ are the vertices of a parallelogram

Q3. Prove that the points $A(1, 7)$, $B(4, 2)$, $C(-1, -1)$ and $D(-4, 4)$ are the vertices of a square.

Q4. Show that the quadrilateral whose vertices are $(2, -1)$, $(3, 4)$, $(-2, 3)$ and $(-3, -2)$ is a rhombus.

TypeV: Applying *Distance formula* in determining the type of Triangle.

Working : (i) Use *Distance formula* to find all sides.

(ii) If Two sides equal then, it's a ISOSCELES triangle.

(iii) If Two sides equal and

(iv) If ALL sides equal then, it's an EQUILATERAL triangle.

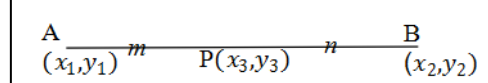
Q1. Prove that the points $(3, 0)$, $(6, 4)$ and $(-1, 3)$ are vertices of a right angled isosceles triangle.

Q2. Do the points $(3, 2)$, $(-2, -3)$ and $(2, 3)$ form a triangle? If so, name the type of triangle formed.

Q3. Check whether $(5, -2)$, $(6, 4)$ and $(7, -2)$ are the vertices of an isosceles triangle.

TypeV: Applying SECTION and MIDPOINT formula

$$\text{Coordinates of P} = \left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n} \right)$$



If P is mid-point then,

$$\text{Coordinates of P} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Questions based on parallelogram:

Working : (i) Draw a parallelogram and allot the coordinates in order.

(ii) Use *mid-point formula* to find coordinates of P.

(iii) Use *mid-point formula* to find coordinates of P.

(iv) As coordinates of P are same thus, it is a parallelogram.

(v) If you have to find unknown value then equate Step(ii) and Step(iii). Compare the x-coordinate and y-coordinates to get values.

Q1. If three consecutive vertices of a parallelogram are (1,-2), (3,6) and (5,10), then find the fourth vertex.

Q2. If three consecutive vertices of a parallelogram are (-2,-1), (1,0) and (4,3), then find the fourth vertex.

Q3. If three consecutive vertices of a parallelogram are (3,-2), (4,0) and (6,-3), then find the fourth vertex.

Q4. If the points (-2, -1), (1, 0), (x, 3) and (1, y) form a parallelogram, find the values of x and y.

Q5. If the points A (a, -11), B (5, b), C (2, 15) and D (1, 1) are the vertices of a parallelogram ABCD, find the values of a and b.

Q6. If the points A (6, 1), B (8, 2), C (9, 4) and D (k, p) are the vertices of a parallelogram taken in order, then find the values of k and p.

Q7. Find the coordinates of a point A, where AB is a diameter of the circle whose centre is (2, -3) and B is (1, 4).

Questions based on ratio:

Working : (i) Draw a line with a point in between them and write their coordinates.

(ii) Take the ratio as $k:1$

(iii) Use *section formula* to find the unknown value/coordinates.

Q1. Find the ratio in which the y-axis divides the line segment joining the points (5, -6) and (-1, -4). Also, find the coordinates of the point of division.

Q2. In what ratio does the point (-4, 6) divide the line segment joining the points A (-6, 10) and B (3, -8)?

Q3. Find the ratio in which the point (2,y) divides the line segment joining the points A(-2,2) and B(3,7). Also, find the value of y.

Q4. In what ratio is the line segment joining (-3,-1) and (-8,-9) divided by the point (-5,-21/5)?

Questions based on trisection:

Working : (i) Draw a line with two points in between them and write their coordinates.

(ii) To find the first coordinate of trisection take the ratio as 1:2.

(iii) Use *section formula* to find the coordinates.

(iv) To find the second coordinate of trisection take the ratio as 2:1.

(v) Use *section formula* to find its coordinates.

Q1. Find the points of trisection of the line segment joining the points:

(i) (2,-2) and (7,-4) (ii) (3,-2) and (-3,-4) (iii) (5,-6) and (-7,5)

TYPE VI: Problems on *Collinear points and Area of triangle :*

If $A(x_1, y_1)$, $B(x_2, y_2)$ and $C(x_3, y_3)$ are the vertices of a triangle then,

$$\text{Area of the triangle} = \frac{1}{2} [x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$$

Note: If area of triangle is zero, then the points A, B and C are collinear.

Working : (i) Draw a triangle and write their coordinates.

(ii) Use Area formula.

(iii) Use *section formula* to find the coordinates.

(iv) To find the second coordinate of trisection take the ratio as 2:1.

(v) Use *section formula* to find its coordinates.

Q1. Do the points $(3, 2)$, $(-2, -3)$ and $(2, 3)$ form a triangle? If so, name the type of triangle formed.

Q2. Find the area of a triangle whose vertices are $(1, -1)$, $(-4, 6)$ and $(-3, -5)$.

Q3. Find the area of a triangle formed by the points $A(5, 2)$, $B(4, 7)$ and $C(7, -4)$.

Q4. If $A(-5, 7)$, $B(-4, -5)$, $C(-1, -6)$ and $D(4, 5)$ are the vertices of a quadrilateral, find the area of the quadrilateral ABCD.

Q5. Find the value of k if the points $A(2, 3)$, $B(4, k)$ and $C(6, -3)$ are collinear.

Q6. In each of the following find the value of ' k ', for which the points are collinear.

(i) $(7, -2)$, $(5, 1)$, $(3, k)$ (ii) $(8, 1)$, $(k, -4)$, $(2, -5)$.

Q7. Determine if the points $(1, 5)$, $(2, 3)$ and $(-2, -11)$ are collinear.

Undertaking

I, Jagdish Gannavarapu mathematics teacher in Jain Heritage A Cambridge School, Nagpur hereby declare that the above teaching material(format) is purely drafted by me under the guidance of my Principal Mr.Praveen Sharma.