

Lesson 4 – Coordinate Geometry

Grade 10

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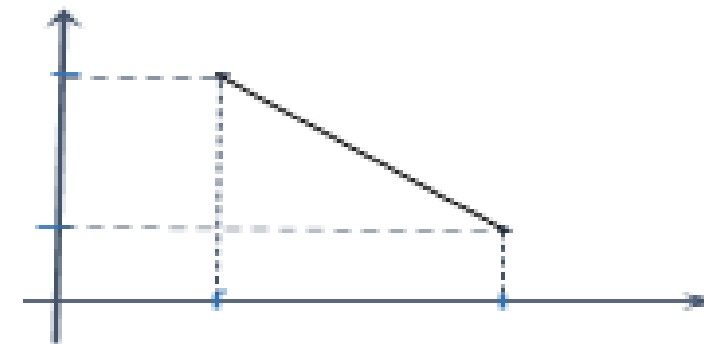
Distance Between Two Points on a Line and on a Plane

Distance between the two points $A(x_1)$ and $B(x_2)$ on a line can be determined by the formula:

$$L(A, B) = |x_2 - x_1|$$


Distance between the two point $A(x_1, y_1)$ and $B(x_2, y_2)$ on a plane can be determined by the formula:

$$L(A, B) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



Determine the distance between the two points $M(3, -2)$ and $N(7, 1)$ on a plane:

$$L(M, N) = \sqrt{(7 - 3)^2 + (1 - (-2))^2} = \sqrt{4^2 + 3^2} = \sqrt{25} = 5$$

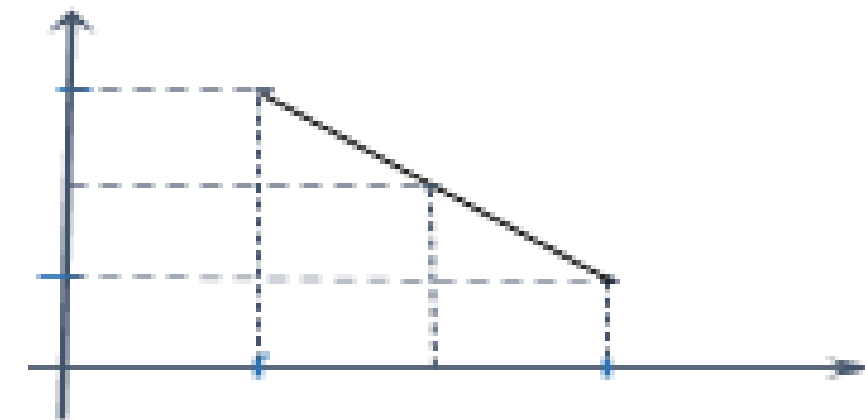
Coordinates of a Midpoint of a Line Segment on a Plane

Two points on a plane are given as $A(x_1, y_1)$ and $B(x_2, y_2)$

The midpoint of a line segment connecting the two given points is $M(x_0, y_0)$

The coordinates of the midpoint can be found as

$$x_0 = \frac{x_1 + x_2}{2}, \quad y_0 = \frac{y_1 + y_2}{2}$$



Point $M(5, -2)$ is the midpoint of a line segment AB

Determine the coordinates of point B if another point is $A(7, -10)$

If point B has the coordinates (x, y) , then $5 = \frac{7+x}{2}, \quad -2 = \frac{-10+y}{2}$

$$7+x=10, \quad -10+y=-4$$

$$x=3, \quad y=6$$

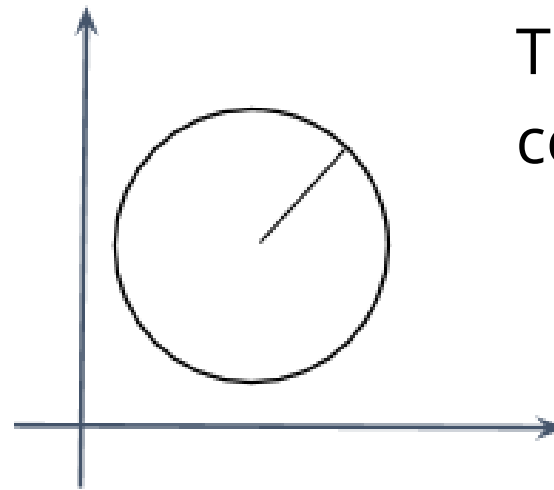
$B(3, 6)$

Equation of a Circle

An equation of a 2D figure on a plane is an equation containing two variables x and y , where any point on the figure satisfies the equation.

The equation of a circle with the radius R and its center at a point $A(a,b)$ is:

$$(x-a)^2 + (y-b)^2 = R^2$$



The equation of a circle with the radius R and its center at the origin where $a=b=0$ is:

$$x^2 + y^2 = R^2$$

Determine the radius and the coordinates of a center of a circle given by the following equation:

$$x^2 + 4x + y^2 - 2y - 20 = 0$$

$$(x^2 + 4x + 4) + (y^2 - 2y + 1) - 4 - 1 - 20 = 0$$

$$(x+2)^2 + (y-1)^2 = 25$$

$$A(-2,1) \quad R = 5$$



MOVE ON TO GRADE 10 LESSON 5

**GREAT
WORK!**