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**Analytical Geometry Notes**

Distance / Length

Ordered Pairs: $(x,y)$

$Δ$ Delta: means change

$Δx $refers to the change in $x$

$Δy $refers to the change in $y$

$d$ denotes distance

$d(A,B)$the distance between $Point A$and $Point B$

Distance between two points is the length of the line segment that joins the two points together.

Absolute Value is used to make sure that the result will always be positive. It is written using two vertical lines, one on each side of the number. When the number is positive it stays positive. When the number is negative it makes it positive.

example: $\left|5\right|=5$ and $\left|-5\right|=5$

Distance is always positive.

$\left|d\right|$ the absolute value of the distance

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| **Distance Formula:** $d(A,B)=\left|\sqrt{ \left(Δx\right)^{2}+\left(Δy\right)^{2} }\right|$Distance formula can be used to calculate the length of line segments and find perimeters (distance / length) |

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$d(A, B)$ means the distance between $Point A$and $Point B$ where as

$d(C, D)$ means the distance between $Point C$and $Point D$

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| **Distance Formula:** $d(A,B)=\left|\sqrt{ \left(Δx\right)^{2}+\left(Δy\right)^{2} }\right|$Distance formula can be used to calculate the length of line segments and find perimeters (distance / length) |

Example 1: Find the distance between $Point A (1,2)$and $Point B(4,6)$

Point 1:$ A (1,2)$ Point 2: $ B(4,6)$

 $x\_{1} y\_{1}$ $ x\_{2} y\_{2}$

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| --- | --- |
|  |  |
| $Δx=x\_{2}-x\_{1}$ $=\left(4\right)-\left(1\right)$ $=3$ | $d(A,B)=\left|\sqrt{ \left(Δx\right)^{2}+\left(Δy\right)^{2} }\right|$ $=\left|\sqrt{\left(3\right)^{2}+\left(4\right)^{2}}\right|$ $=\left|\sqrt{9+16}\right|$ $=\left|\sqrt{25}\right|$ $=\left|\pm 5\right|$  $=5$ |
| $Δy=y\_{2}-y\_{1}$ $=\left(6\right)-\left(2\right)$ $= 4$ |
|  |  |

Example 2: Find the distance between $Point C (1, 10)$and $Point D(-4,-2)$



Point 1:$ C (1, 10)$ Point 2: $D(-4,-2)$

 $x\_{1} y\_{1}$ $ x\_{2} y\_{2}$

|  |  |
| --- | --- |
|  |  |
| $Δx=x\_{2}-x\_{1}$ $=\left(-4\right)-\left(1\right)$ $= -5$ | $d(C,D)=\left|\sqrt{ \left(Δx\right)^{2}+\left(Δy\right)^{2} }\right|$ $=\left|\sqrt{\left(-5\right)^{2}+\left(-12\right)^{2}}\right|$ $=\left|\sqrt{25+144}\right|$ $=\left|\sqrt{169}\right|$ $=\left|\pm 13\right|$   $=13$ |
| $Δy=y\_{2}-y\_{1}$ $=\left(-2\right)-\left(10\right)$ $= -12$ |