

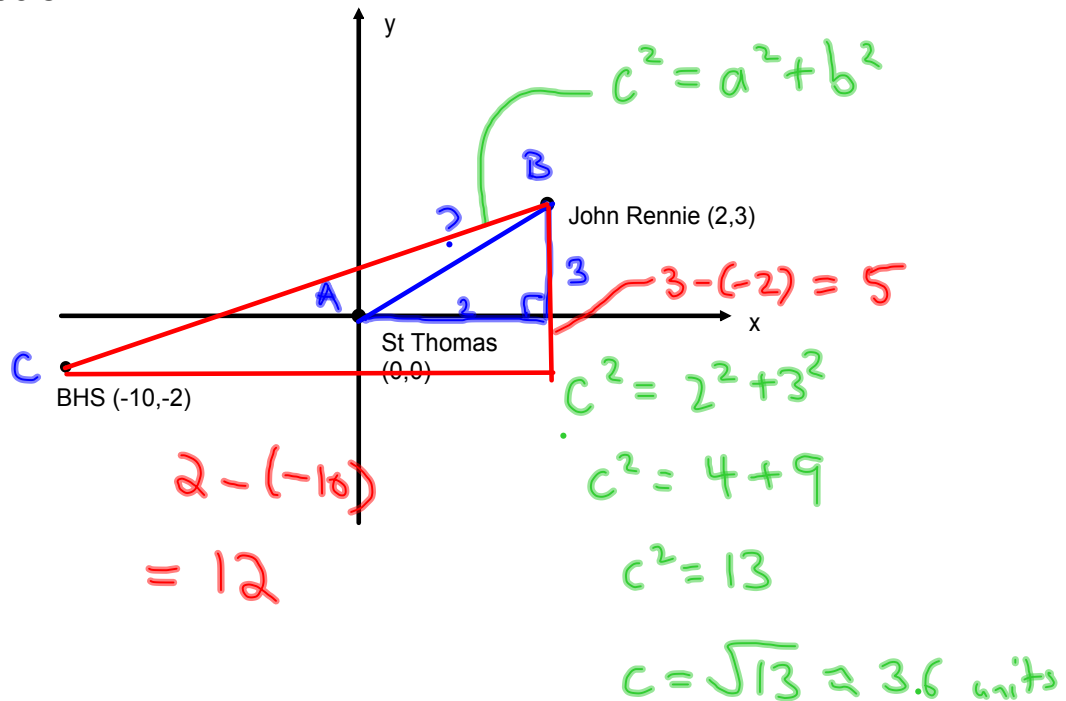
Distance Between Two Points

Goal:

- to understand the distance formula
- to find the distance between two points on a Cartesian Plane

Any point in space can be represented on a Cartesian Plane. Then it can be assigned coordinates and using these coordinates the distance between two points can be found.

Ex: Point A represents St. Thomas and point B represents John Rennie. What is the distance between the two schools?



How would you find the distance between John Rennie and BHS?

$$\begin{aligned}
 c^2 &= a^2 + b^2 \\
 c^2 &= 12^2 + 5^2 \\
 c^2 &= 144 + 25 \\
 c^2 &= 169 \\
 c &= \sqrt{169} \\
 c &= 13 \text{ units}
 \end{aligned}$$

There are various methods for determining the distance.

Using analytic geometry (equations applied to Cartesian planes) we can develop a formula.

The distance between two points $A(x_1, y_1)$ and $B(x_2, y_2)$ can be calculated by:

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

distance between
A and B

Ex: Find the distance between the following points:

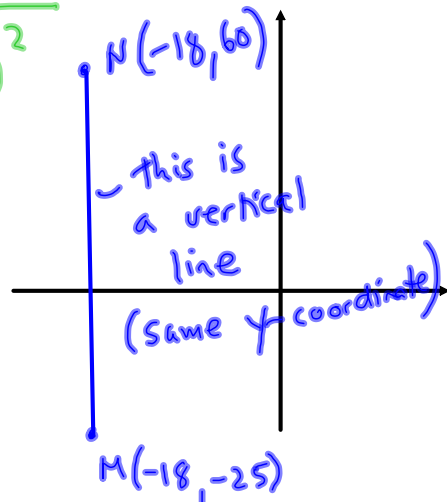
a) R(x_1, y_1) and S(x_2, y_2)
R(5, -14) and S(30, -8)

$$\begin{aligned}d(R, S) &= \sqrt{(30-5)^2 + (-8-(-14))^2} \\&= \sqrt{(25)^2 + (6)^2} \\&= \sqrt{625 + 36} = \sqrt{661} \approx 25.7 \text{ units}\end{aligned}$$

Watch
order of
operations
BEDMAS

b) M(x_1, y_1) and N(x_2, y_2)
M(-18, -25) and N(-18, 60)

$$\begin{aligned}d(M, N) &= \sqrt{(-18-(-18))^2 + (60-(-25))^2} \\&= \sqrt{(0)^2 + (85)^2} \\&= \sqrt{85^2} \\&= 85\end{aligned}$$



Vertical lines:

$$d = y_2 - y_1$$

Horizontal lines:

$$d = x_2 - x_1$$

Homework : p.17 # 4, 11, 14
