

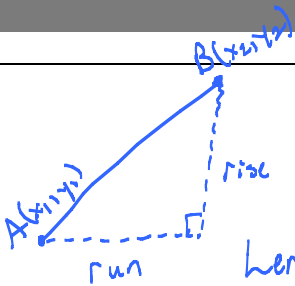
LENGTH OF LINE APPLICATIONS

LEARNING GOALS

Students will:

- Use the length formula to find the distance between two points on a graph.

LENGTH OF LINE

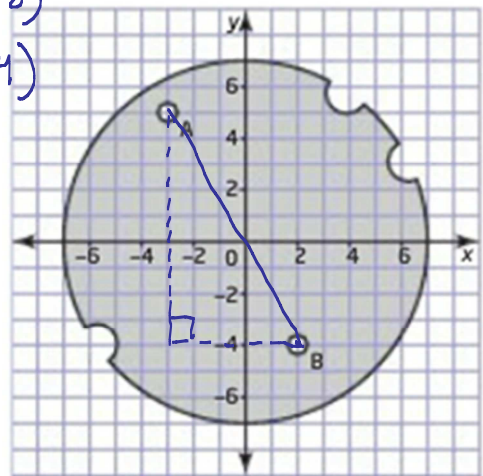
Length of Line	<p>Formula:</p>  $AB^2 = \text{rise}^2 + \text{run}^2$ $AB = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$ $\text{length} = \sqrt{\left(\begin{array}{c} \text{difference} \\ \text{in } y\text{'s} \end{array}\right)^2 + \left(\begin{array}{c} \text{difference} \\ \text{in } x\text{'s} \end{array}\right)^2}$
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EXAMPLE 1: CALCULATE A LENGTH

To make round parts programmable machine tools often use a coordinate system with the origin at the centre of the part. How far apart are the centres of the mounting holes A and B in this cam? *The coordinates are in centimetres. Round your answer to the nearest tenth.*

$$\begin{aligned}
 AB &= \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2} \\
 &= \sqrt{(-4 - 5)^2 + (2 - (-3))^2} \\
 &= \sqrt{(-9)^2 + (5)^2} \\
 &= \sqrt{81 + 25} \\
 &= \sqrt{106} \approx 10.3 \text{ cm}
 \end{aligned}$$

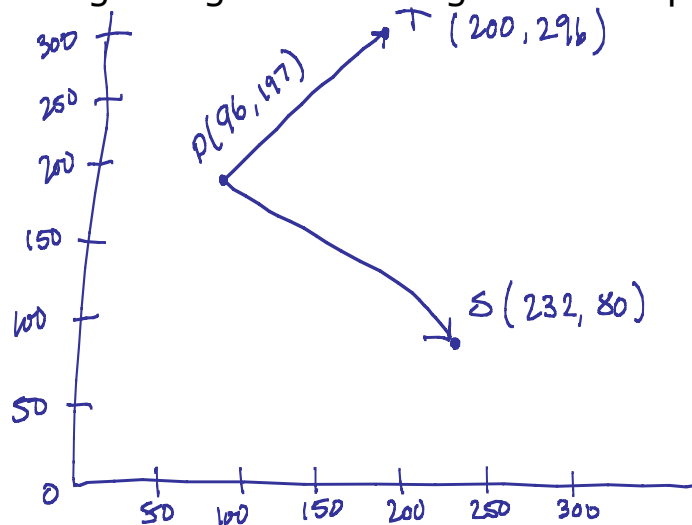
$$\begin{aligned}
 A(-3, 5) \\
 B(2, -4)
 \end{aligned}$$



EXAMPLE 2: COMPARE DISTANCES

An air ambulance service uses a grid system to help estimate flying times and fuel requirements. Coordinates on this grid are distances in km east and north of a reference point on the lower left corner of a map of northern Ontario. A helicopter ambulance picks up a patient at point P (96, 197). The nearest hospitals that can provide the treatment the patient needs are in Timmins at T (200, 296) and Sudbury at S (232, 80).

a) Draw a rough diagram showing the three points.



b) To which hospital should the helicopter take the patient?

$$\begin{aligned}
 PT &= \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2} \\
 &= \sqrt{(296 - 197)^2 + (200 - 96)^2} \\
 &= \sqrt{99^2 + 104^2} \\
 &= 143.6 \text{ km}
 \end{aligned}$$

$$\begin{aligned}
 PS &= \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2} \\
 &= \sqrt{(80 - 197)^2 + (232 - 96)^2} \\
 &= 179.4 \text{ km}
 \end{aligned}$$

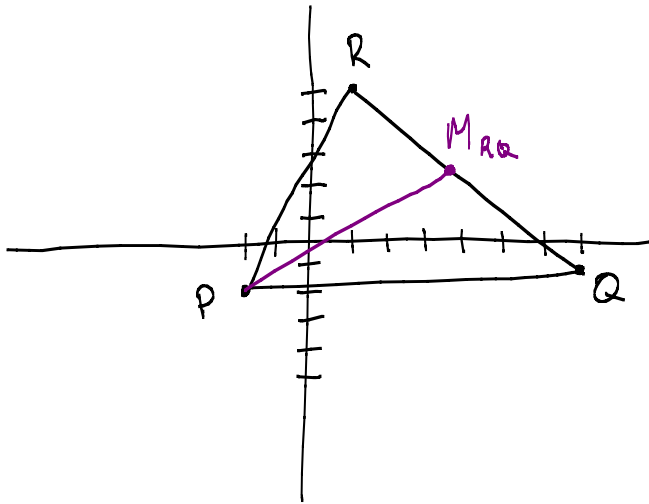
Timmins is closer

c) List any assumptions you made for your answer.

Air Traffic is minimal
 Wind is minimal
 No alien invasions
 No vertical blocks.

EXAMPLE 3: FIND THE LENGTH OF A MEDIAN

Find the length of the median from P for a triangle with vertices P (-2, -2), Q (7, -1), and R (1, 5).



- 1) Solve for the M_{RQ}
- 2) length of PM

HOMEFUN 😊

Ho-Calculating the Length of a Line Segment

Ho-Worksheet 4-1-2: Length of Dot Paper Segments

Read pgs. 70, 74-76. pg. 77-79 #1-6,12,13,15,20