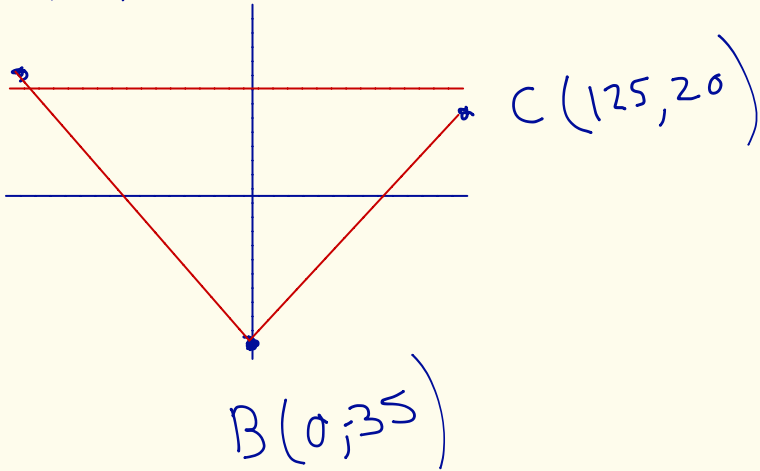


$$A(-90, 28)$$



$$B(0, 35)$$

$$C(125, 20)$$

- Plan
- ① Det. midpoint of each side
 - ② Det slope of each side
 - ③ slope perpendicular bisector is negative reciprocal of slope in ②
 - ④ Det. b for each perpendicular bisector using midpoint from ① and slope from ③
 - ⑤ Write equation for each perp. bisector.
 - ⑥ Determine P.O.I. for the perpendicular bisector.

Execute Plan

$$\textcircled{1} M_{AC} = (17.5, 24)$$

$$M_{AB} = (-45, 35)$$

$$M_{BC} = (62.5, -7.5)$$

$$\textcircled{2} m_{AC} = -8/215$$

$$m_{AB} = -63/90$$

$$m_{BC} = 55/125$$

$$\textcircled{3} m = 215/8$$

$$= -7/10$$

$$= 11/25$$

$$m = 10/7$$

$$m = -25/11$$

Perpendicular Bisector for AC

$$M_{AC} = (17.5, 24)$$

$$m = \frac{215}{8}$$

$$y = mx + b$$

$$24 = \frac{215}{8}(17.5) + b$$

$$24 = \frac{215 \times 17.5}{8} + b$$

$$24 = \frac{3762.5}{8} + b$$

$$24 - \frac{3762.5}{8} = b$$

$$\frac{24 \times 8}{8} - \frac{3762.5}{8} = b$$

$$\frac{192}{8} - \frac{3762.5}{8} = b$$

$$\frac{-3570.5}{8} = b$$

$$y = mx + b$$

$$y = \frac{215}{8}x - \frac{3570.5}{8}$$

④ b
from AC

b
from AB

b
from BC

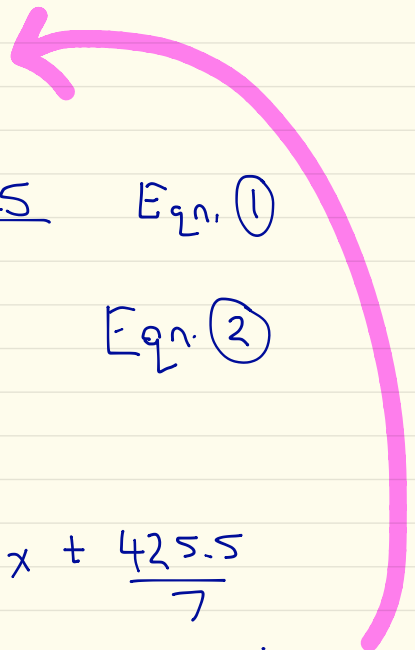
$$b = \frac{-3570.5}{8}$$

$$b = \frac{425.5}{7}$$

$$b = \frac{1480}{11}$$

⑤

$$y = \frac{215}{8}x - \frac{3570.5}{8} \quad y = \frac{10}{7}x + \frac{425.5}{7} \quad y = \frac{-25}{11}x + \frac{1480}{11}$$

$$\frac{8}{8} \times 7 = 56$$


⑥ $y = \frac{215x}{8} - \frac{3570.5}{8}$ Eqn. (1)

$$y = \frac{10}{7}x + \frac{425.5}{7}$$
 Eqn. (2)

Sub (1) into (2)

$$\frac{215x}{8} - \frac{3570.5}{8} = \frac{10}{7}x + \frac{425.5}{7}$$

multiply both sides by 56 to get rid of fraction

$$7(215x) - 7(3570.5) = 8(10x) + 8(425.5)$$

$$1505x - 24993.5 = 80x + 3404$$

$$1505x - 80x = 3404 + 24993.5$$

$$1425x = 28397.5$$

$$x = 19.9$$

$$x \approx 20$$

② was

$$y = \frac{10}{7}x + \frac{425.5}{7}$$

$$y = \frac{10(20)}{7} + \frac{425.5}{7}$$

$$y = \frac{200}{7} + \frac{425.5}{7}$$

$$y = \frac{625.5}{7}$$

$$y = 89.3$$

$$y \approx 89$$

∴ The tower should be built at (20, 89). What do you notice?

The circumcentre was
not inside the triangle

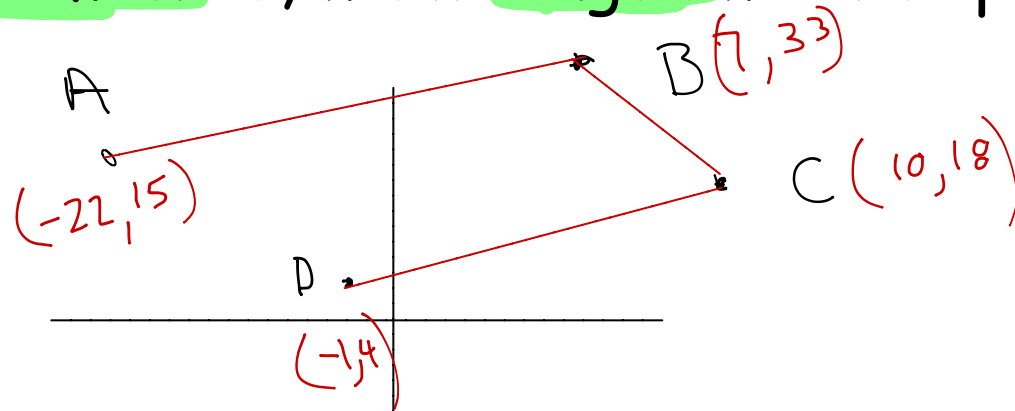
Obtuse Triangle - circumcentre is
not inside the
triangle.

Acute Triangle - circumcentre is
inside the triangle.

Right Triangle - circumcentre is
the midpoint of
the hypotenuse.

Example #4

- A power line is going to be laid from $A(-22, 15)$ to $B(7, 33)$ to $C(10, 18)$ to $D(-1, 4)$. If the units are metres, what length will the power line be?



Distance \rightarrow find length of each line segment.

Plan: Use distance formula $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

- (1) d_{AB}
- (2) d_{BC}
- (3) d_{CD}
- (4) (1) + (2) + (3)

Execute Plan

$$\begin{aligned}d_{AB} &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\&= \sqrt{(7 - (-22))^2 + (33 - 15)^2} \\&= \sqrt{29^2 + 18^2} \\&= \sqrt{841 + 324} \\&= \sqrt{1165}\end{aligned}$$

$$d_{AB} = 34.1 \text{ m}$$

$$\begin{aligned}d_{BC} &= \sqrt{3^2 + (-15)^2} \\&= \sqrt{9 + 225} \\&= \sqrt{234} \\d_{BC} &= 15.3 \text{ m}\end{aligned}$$

$$\begin{aligned}d_{CD} &= \sqrt{11^2 + 14^2} \\&= \sqrt{317} \\d_{CD} &= 17.8 \text{ m}\end{aligned}$$

$$d = 34.1 \text{ m} + 15.3 \text{ m} + 17.8 \text{ m}$$

$$d = 67.2 \text{ m}$$

∴ The power line needs to be 67.2 m long.

Consolidation

- What are the tools in your mathematical tool belt?



Reinforcement

- Pages 120 - 121
 - #8, 9, 12, 14, 16, & 17