

Quiz 1 - Analytic Geometry

① Midpoint = $(M_x, M_y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$
A(0, -10) B(5, 68)

$$M_x = \frac{0 + 5}{2} = \frac{5}{2} = 2.5$$

$$M_y = \frac{-10 + 68}{2} = \frac{58}{2} = 29$$

$$M = (2.5, 29)$$

② Division Point = $P_x = x_1 + \frac{P}{W}(x_2 - x_1)$
 $P_y = y_1 + \frac{P}{W}(y_2 - y_1)$

A(-3, 1) B(22, -39) Ratio = 4:1

$$\rightarrow \frac{4}{4+1} = \frac{4}{5} \quad \frac{P}{W}$$

$$P_x = -3 + \frac{4}{5}(22 - (-3))$$

$$P_x = -3 + \frac{4}{5}(25)$$

$$P_x = -3 + 20 = \boxed{17}$$

$$P_y = 1 + \frac{4}{5}(-39 - 1)$$

$$P_y = 1 + \frac{4}{5}(-40)$$

$$P_y = 1 - 32 = \boxed{-31}$$

$$P = (17, -31)$$

③ Perimeter = $\overline{AB} + \overline{BC} + \overline{AC}$

$$\text{Distance} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\overline{AB} \rightarrow A(-11, 3) \quad B(-5, 18)$$

$x_1 \quad y_1$ $x_2 \quad y_2$

$$\begin{aligned} d(AB) &= \sqrt{(-5 - (-11))^2 + (18 - 3)^2} \\ &= \sqrt{6^2 + 15^2} \\ &= \sqrt{36 + 225} \\ &= \sqrt{261} = 16.2 \text{ cm} \end{aligned}$$

$$\overline{BC} \rightarrow B(-5, 18) \quad C(14, 3)$$

$x_1 \quad y_1$ $x_2 \quad y_2$

$$\begin{aligned} d(BC) &= \sqrt{(14 - (-5))^2 + (3 - 18)^2} \\ &= \sqrt{19^2 + (-15)^2} \\ &= \sqrt{361 + 225} \\ &= \sqrt{586} = 24.2 \text{ cm} \end{aligned}$$

$$\overline{AC} \rightarrow A(-11, 3) \quad C(14, 3)$$

$x_1 \quad y_1$ $x_2 \quad y_2$

$$\begin{aligned} d(AC) &= \sqrt{(14 - (-11))^2 + (3 - 3)^2} \\ &= \sqrt{25^2 + 0^2} \\ &= \sqrt{625 + 0} \\ &= \sqrt{625} = 25 \text{ cm} \end{aligned}$$

$$\overline{AB} + \overline{BC} + \overline{AC}$$

$$16.2 + 24.2 + 25$$

$$65.4 \text{ cm}$$

↓
Perimeter
of triangle ABC

4. BONUS

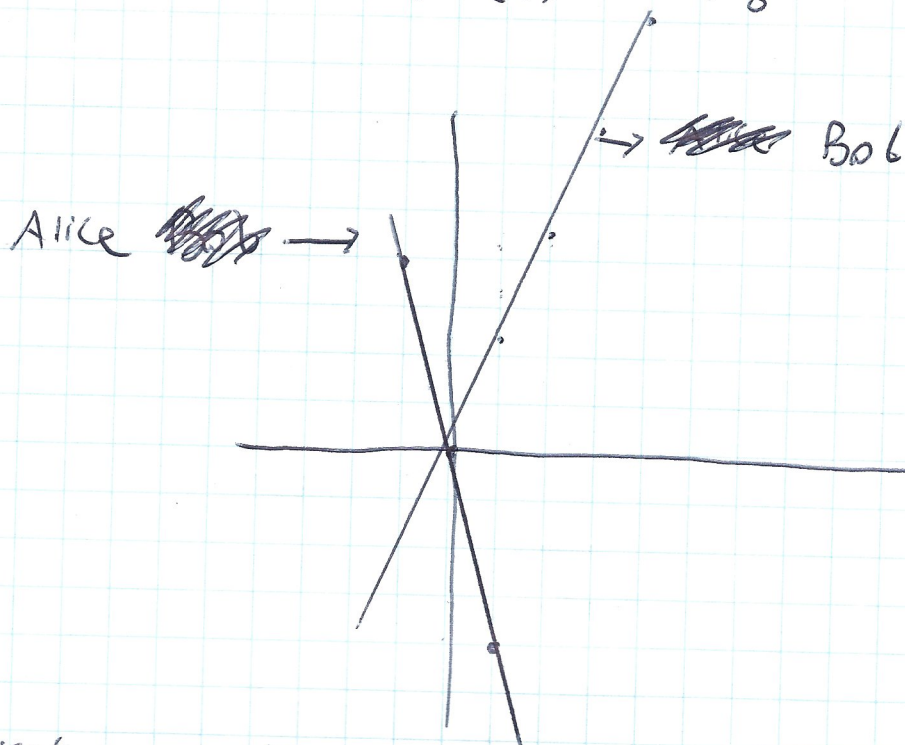
$$\text{Slope} = a = \frac{y_2 - y_1}{x_2 - x_1}$$

$$\text{Alice slope} \rightarrow A \overset{x_1}{(-4)}, \overset{y_1}{6} \quad B \overset{x_2}{1}, \overset{y_2}{-14}$$

$$a = \frac{-14 - 6}{1 - (-4)} = \frac{-20}{5} = -4$$

$$\text{Bob slope} \rightarrow C \overset{x_1}{(-1)}, \overset{y_1}{-3} \quad D \overset{x_2}{7}, \overset{y_2}{15}$$

$$a = \frac{15 - (-3)}{7 - (-1)} = \frac{18}{8} = 2.25$$



Alice's slope is larger, thus her line is steeper than Bob's, as $4 > 2.25$ (ignore the negative sign)