Verifying Geometric Properties

Ex/ A rectangle is defined by J(10,2), K(-8,8), L(-12,-4) and M(6,-10). Show that the diagonals are of equal length and bisect each other.

Diagonal: a line joining non-consecutive vertices.

$d_{JL} = \sqrt{(10-(-12))^2 + (2-(-4))^2}$

$= \sqrt{22^2 + 6^2}$

$= \sqrt{520}$

$mp_{JL} = \left(\frac{10+(-12)}{2}, \frac{2+(-4)}{2}\right)$

$= (-1,-1)$

← Diagonals are equal length and bisect eachother →

$d_{KM} = \sqrt{(-8-6)^2 + (8-(-10))^2}$

$= \sqrt{(-14)^2 + 18^2}$

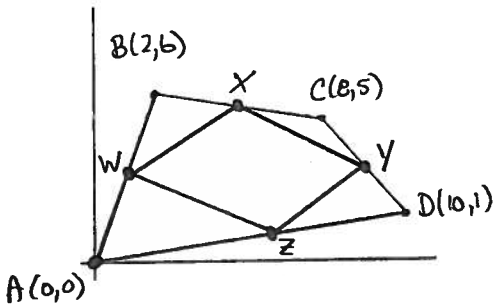
$= \sqrt{520}$

$mp_{KM} = \left(\frac{-8+6}{2}, \frac{8+(-10)}{2}\right)$

$= (-1,-1)$

Ex/ Verify that the mid-segments of the quadrilateral A(0,0), B(2,6), C(8,5) and D(10,1) form a rhombus.

Mid-segment: a line joining consecutive midpoints together.



$mp_{AB} = \left(\frac{0+2}{2}, \frac{0+6}{2}\right)$

$W = (1,3)$

$mp_{BC} = \left(\frac{2+8}{2}, \frac{6+5}{2}\right)$

$X = (5,5.5)$

$mp_{CD} = \left(\frac{8+10}{2}, \frac{5+1}{2}\right)$

$Y = (9,3)$

$mp_{AD} = \left(\frac{0+10}{2}, \frac{0+1}{2}\right)$

$Z = (5,0.5)$

$m_{WX} = \frac{5.5-3}{5-1} = \frac{2.5}{4}$

$m_{XY} = \frac{3-5.5}{9-5} = \frac{-2.5}{4}$

$m_{YZ} = \frac{0.5-3}{5-9} = \frac{-2.5}{-4} = \frac{2.5}{4}$

$m_{WZ} = \frac{0.5-3}{5-1} = \frac{-2.5}{4}$

$d_{WX} = \sqrt{(5-1)^2 + (5.5-3)^2} = \sqrt{4^2+2.5^2} = \sqrt{22.75}$

$d_{XY} = \sqrt{(9-5)^2 + (3-5.5)^2} = \sqrt{4^2+(-2.5)^2} = \sqrt{22.75}$

$d_{YZ} = \sqrt{(5-9)^2 + (0.5-3)^2} = \sqrt{(-4)^2+(-2.5)^2} = \sqrt{22.75}$

$d_{WZ} = \sqrt{(5-1)^2 + (0.5-3)^2} = \sqrt{4^2+(-2.5)^2} = \sqrt{22.75}$

∴ The shape is a rhombus

Homework: Pg. 109 #'s: 1,2,10,11