8. a) Midpoint AB: (6,0) (F) Midpoint BC: (11, 4) (G)

Midpoint CD: (8, 6) (H) Midpoint DA (3, 2) (J)

slope FG: 4/5 slope HJ = 4/5 => parallel

slope HG: 2/3 slope JF = 2/3 => parallel

b) A (a, b) B (c, d)C (e, f) D (g, h)

Find midpoints. Find slopes like before. See that they are the same.

Proof Using Analytic Geometry

1. Where do you need to go?
2. What do you have?
3. How do you get there?

Some important information for geometric proofs...

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

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

Midpoint: $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$y = ax + b$

point-slope

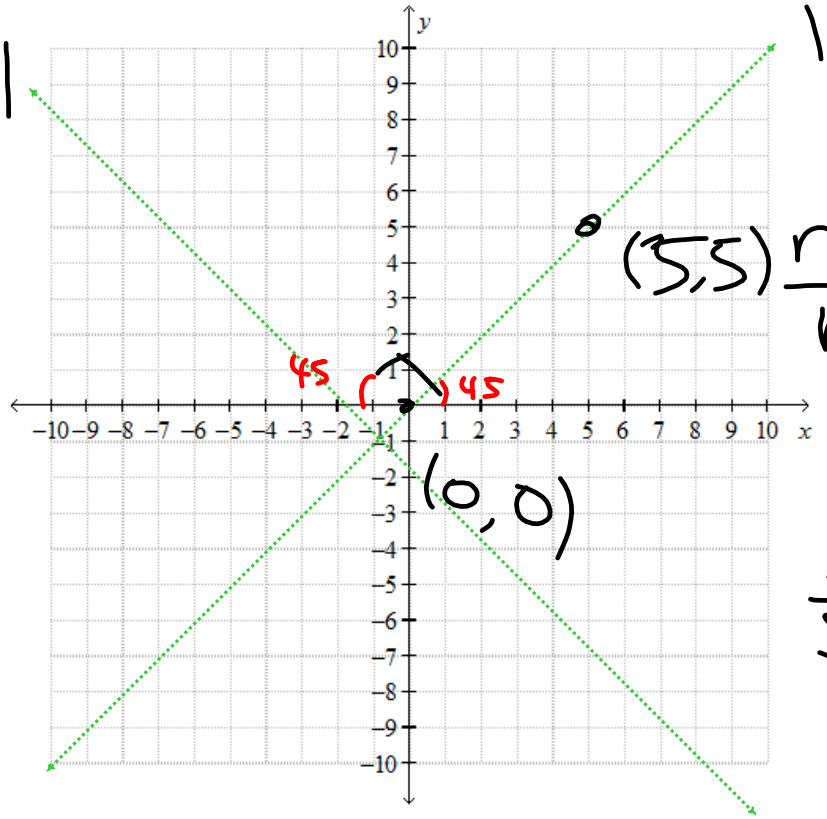
$a^2 + b^2 = c^2$

Parallel lines: same slope

Perpendicular lines (90° angles): slopes are negative reciprocals (i.e. slopes multiply to give -1)

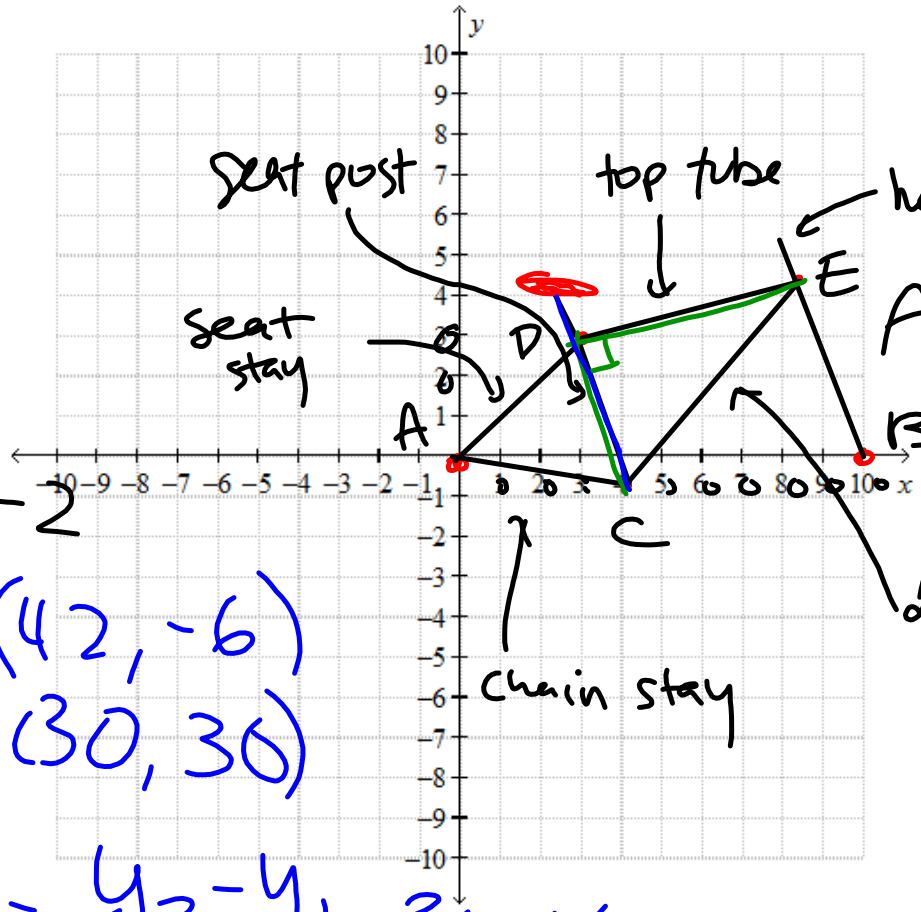
(Slopes at 45° angles: slope is 1 or -1)

$a: -\frac{4}{3}$ $a = \frac{3}{4}$ $-\frac{4}{3} \cdot \frac{3}{4} = -1$



-1 1

(5,5) $\frac{\text{rise}}{\text{run}}$ $\frac{y_2 - y_1}{x_2 - x_1}$ $\frac{5-0}{5-0} = 1$



0.5

$\frac{1}{2}$ -2

$A = \frac{b \times h}{2}$

C(42, -6)

D(30, 30)

$a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{30+6}{30-42} = \frac{36}{-12} = -3$

$y = ax + b$

Before you go...

1. Find the slope and intercepts for the pair of points

(4, 2) and (2, -4). Find the equation in function form.

2. Rearrange the equation $y = 5x - 3$ into general form and symmetric form.

3. The symmetric form of an equation is:

$\frac{-4x}{3} + \frac{2y}{3} = 1$ Find the slopes and intercepts.

Try p. 98 #17