<u>Perimeter</u>

The distance around a figure

<u>Area</u>

Amount of square units covered by figure

Formulas

Perimeter = sum of all sides

$A_{triangle} = \frac{1}{2}bh$

$A_{rectangle} = bh$

$A_{square} = s^2$

$A_{parallelogram} = bh$

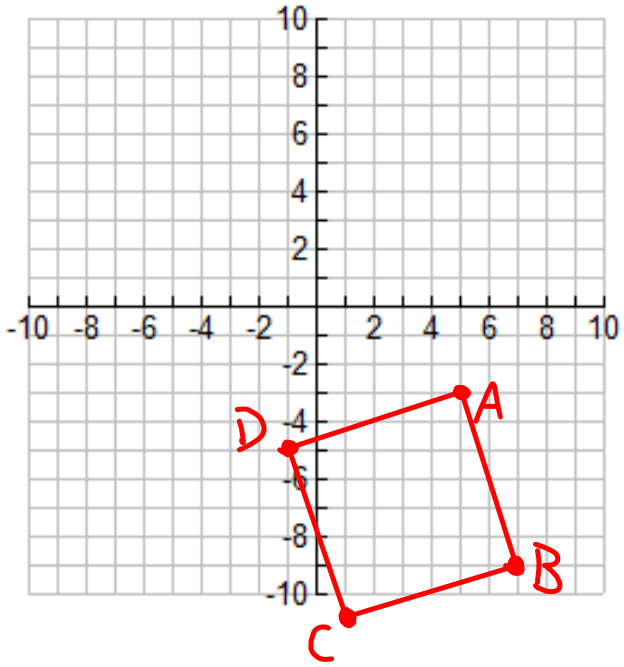
$A_{isosceles\ trapezoid} = \frac{1}{2}h(b_1 + b_2)$

$A_{any\ figure\ with\ perpendicular\ diagonals} = \frac{1}{2}d_1d_2$

(SQUARE, KITE, RHOMBUS)

Graph the Quadrilateral:

A(5, -3) *B*(7, -9) *C*(1, -11) *D*(-1, -5)



Find the type of quadrilateral, and calculate its perimeter and area

$m\overline{AB} = \frac{-3+9}{5-7} = \frac{6}{-2} = -3$ $\quad m\overline{BC} = \frac{-9+11}{7-1} = \frac{2}{6} = 1/3$

$m\overline{CD} = \frac{-11+5}{1+1} = \frac{-6}{2} = -3$ $\quad m\overline{DA} = \frac{-5+3}{-1-5} = \frac{-2}{-6} = 1/3$

$\left.\begin{array}{l} m\overline{AB} = m\overline{CD} \\ m\overline{BC} = m\overline{DA} \end{array}\right\}$ PARALLELOGRAM

$\left.\begin{array}{l} \overline{AB} \perp \overline{BC} \\ \overline{BC} \perp \overline{CD} \\ \overline{CD} \perp \overline{DA} \\ \overline{DA} \perp \overline{AB} \end{array}\right\}$ SQUARE OR RECTANGLE

$AB = \sqrt{(5-7)^2 + (-3+9)^2} = \sqrt{4+36} = \sqrt{40} = 2\sqrt{10}$

$BC = \sqrt{(7-1)^2 + (-9+11)^2} = \sqrt{36+4} = \sqrt{40} = 2\sqrt{10}$

$CD = \sqrt{(-11+5)^2 + (1+1)^2} = \sqrt{36+4} = \sqrt{40} = 2\sqrt{10}$

$DA = \sqrt{(-1-5)^2 + (-5+3)^2} = \sqrt{36+4} = \sqrt{40} = 2\sqrt{10}$

$AB = BC = CD = DA$

$\therefore$ ABCD IS A SQUARE

PERIMETER $= 4s$

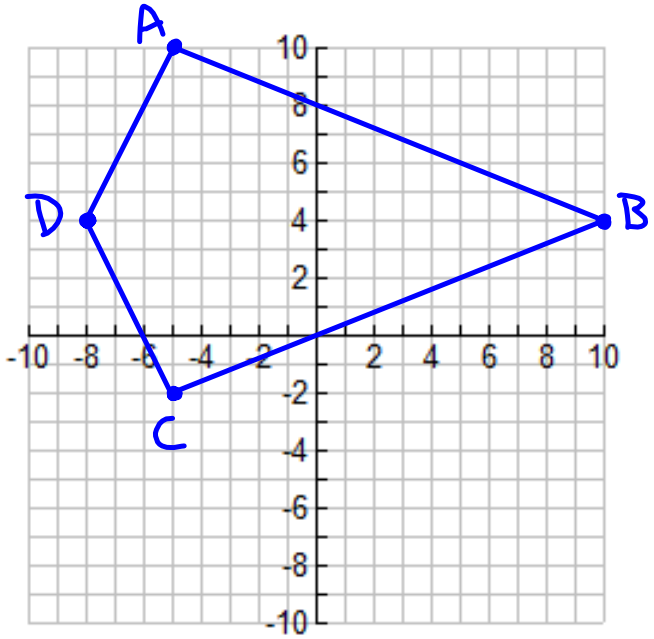
$= 4(2\sqrt{10}) = 8\sqrt{10}$ u

AREA $= s^2$

$= (2\sqrt{10})^2 = 40$ u^2

Graph the Quadrilateral:

A(-5, 10) *B*(10, 4) *C*(-5, -2) *D*(-8, 4)



Find the type of quadrilateral, and calculate its perimeter and area

$m\overline{AB} = \frac{10-4}{-5-10} = \frac{6}{-15} = -\frac{2}{5}$ $\quad m\overline{BC} = \frac{4+2}{10+5} = \frac{6}{15} = \frac{2}{5}$

$m\overline{CD} = \frac{-2-4}{-5+8} = \frac{-6}{3} = -2$ $\quad m\overline{DA} = \frac{4-10}{-8+5} = \frac{-6}{-3} = 2$

$$\left.\begin{array}{l} m\overline{AB} \neq m\overline{CD} \\ m\overline{BC} \neq m\overline{DA} \end{array}\right\} \text{NOT PARALLELOGRAM}$$

$AB = \sqrt{(-5-10)^2+(10-4)^2} = \sqrt{225+36} = \sqrt{261} = 3\sqrt{29}$

$BC = \sqrt{(10+5)^2+(4+2)^2} = \sqrt{225+36} = \sqrt{261} = 3\sqrt{29}$

$CD = \sqrt{(-5+8)^2+(-2-4)^2} = \sqrt{9+36} = \sqrt{45} = 3\sqrt{5}$

$DA = \sqrt{(-8+5)^2+(4-10)^2} = \sqrt{9+36} = \sqrt{45} = 3\sqrt{5}$

$AB = BC$

$CD = DA$

$BC \neq CD$

$\therefore$ ABCD IS A KITE

PERIMETER $= 2(3\sqrt{29}) + 2(3\sqrt{5})$

$= 6\sqrt{29} + 6\sqrt{5}$ u

AREA $= \frac{1}{2}(AC)(BD)$

WHERE

$AC = \sqrt{(-5+5)^2+(10+2)^2} = \sqrt{0+144} = 12$

$BD = \sqrt{(10+8)^2+(4-4)^2} = \sqrt{324+0} = 18$

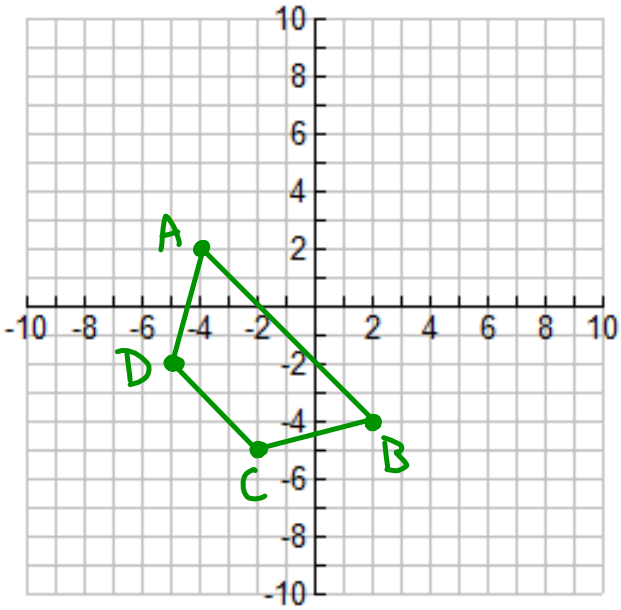
AREA $= \frac{1}{2} d_1 d_2$

$= \frac{1}{2}(AC)(BD)$

$= \frac{1}{2}(12)(18) = 108$ u^2

Graph the Quadrilateral:

A(-4, 2) *B*(2, -4) *C*(-2, -5) *D*(-5, -2)



Find the type of quadrilateral, and calculate its perimeter and area

Lesson 4 - Perimeter and Area in the Coordinate Plane Marked

$m\overline{AB} = \frac{2+4}{-4-2} = \frac{6}{-6} = -1$ $\quad m\overline{BC} = \frac{-4+5}{2+2} = 1/4$

$m\overline{CD} = \frac{-5+2}{-2+5} = \frac{-3}{3} = -1$ $\quad m\overline{DA} = \frac{-2-2}{-5+4} = \frac{-4}{-1} = 4$

$\left.\begin{array}{l} m\overline{AB} = m\overline{CD} \\ m\overline{BC} \neq m\overline{DA} \end{array}\right\}$ NOT A PARALLELOGRAM

$AB = \sqrt{(-4-2)^2+(2+4)^2} = \sqrt{36+36} = \sqrt{72} = 6\sqrt{2}$

$BC = \sqrt{(2+2)^2+(-4+5)^2} = \sqrt{16+1} = \sqrt{17}$

$CD = \sqrt{(-2+5)^2+(-5+2)^2} = \sqrt{9+9} = \sqrt{18} = 3\sqrt{2}$

$DA = \sqrt{(-5+4)^2+(-2-2)^2} = \sqrt{1+16} = \sqrt{17}$

$m\overline{AB} = m\overline{CD}$

$BC = AD$

$\therefore$ ABCD IS AN ISOSCELES TRAPEZOID

PERIMETER $= 6\sqrt{2} + 3\sqrt{2} + \sqrt{17} + \sqrt{17}$

$= 9\sqrt{2} + 2\sqrt{17}$ u

AREA $= \frac{1}{2}h(b_1+b_2)$

WHERE $b_1 = 6\sqrt{2}$

$b_2 = 3\sqrt{2}$

h = DISTANCE B/T MIDPOINTS OF // SIDES

MIDPOINT AB $= \left(\frac{-4+2}{2}, \frac{2-4}{2}\right) = (-1,-1)$

MIDPOINT CD $= \left(\frac{-2-5}{2}, \frac{-5-2}{2}\right) = (-7/2, -7/2)$

h = DISTANCE B/T MIDPOINTS

$= \sqrt{(-1+7/2)^2+(-1+7/2)^2}$

$= \sqrt{(5/2)^2+(5/2)^2}$

$= \sqrt{25/4 + 25/4}$

$= \sqrt{\frac{50}{4}} = \frac{\sqrt{50}}{\sqrt{4}} = \frac{5\sqrt{2}}{2}$

AREA $= \frac{1}{2}h(b_1+b_2)$

$= \frac{1}{2}\left(\frac{5\sqrt{2}}{2}\right)(6\sqrt{2}+3\sqrt{2})$

$= \left(\frac{5\sqrt{2}}{4}\right)(9\sqrt{2})$

$= \frac{90}{4} = 45/2$ u^2