COORDINATE GEOMETRY DAY 1 NOTES

- Recall that to prove that the figures is a parallelogram, you must show // sides.

Which means you need to look at the some slopes

- Recall that to prove that the figures is a rhombus, you must show 4 ≅ sides.

Which means you need to look at the distances

- Recall that to prove that the figures is a rectangle, you must show 4 Right ∠s

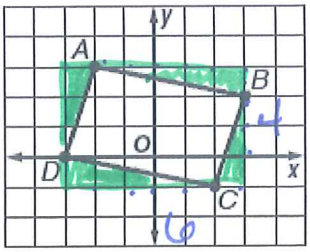
Which means you need to look at the ⊥ slopes $m = -\frac{7}{5}$ $m_\perp = \frac{5}{7}$

- Recall that to prove that the figures is a square, you must show 4 Rt ∠ + 4 ≅ sides

Which means you need to look at the ⊥ slopes + ≅ distances

Example 1. Determine whether ABCD is a parallelogram, rectangle, rhombus, square or just a general quadrilateral. Explain your reasoning. (Classify all that apply)

Slopes:



$$\text{slope of } \overline{AD} = \frac{3-0}{-2-(-3)} = \frac{3}{1} = 3 \qquad \text{slope of } \overline{BC} = \frac{2-(-1)}{3-2} = \frac{3}{1} = 3$$

$$\text{slope of } \overline{AB} = \frac{2-3}{3-(-2)} = -\frac{1}{5} \qquad \text{slope of } \overline{CD} = \frac{-1-0}{2-(-3)} = -\frac{1}{5}$$

NOT ⊥

Distances:

AB= $\sqrt{26}$, CD= $\sqrt{26}$, AD= $\sqrt{10}$, BC= $\sqrt{10}$ ← only op. sides ≅

Conclusion: ABCD is a parallelogram because it has op. sides Parallel.

Perimeter: add up all sides

$\sqrt{26} + \sqrt{26} + \sqrt{10} + \sqrt{10}$

$P = 2\sqrt{26} + 2\sqrt{10}$

P = 16.5 units

Area: A = b·h but bc it is not a parallelogram that is easy to find height, use the middle school model.

□ - 4 As

□ 4 $- \frac{1}{2}1\cdot3 - \frac{1}{2}1\cdot3 - \frac{1}{2}1\cdot5 - \frac{1}{2}15$

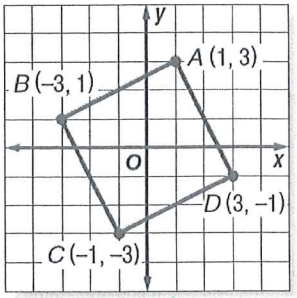
6

$6\cdot4 - 8$

$24 - 8$

A = 16 units²

Example 2. Determine whether ABCD is a parallelogram, rectangle, rhombus, square or just a general quadrilateral. Explain your reasoning. (Classify all that apply)



Slopes:

Slope BC = -2 slope AD = -2 slope BA = ½ slope CD = ½

Distances:

AB= $2\sqrt{5}$, CD= $2\sqrt{5}$, AD= $2\sqrt{5}$, BC= $2\sqrt{5}$

Conclusion: all 4 sides are ≅, opp. sides are ∥ and consecutive sides are ⊥, ∴ it is a square rhombus rectangle & parallelogram.

Perimeter:

$2\sqrt{5} + 2\sqrt{5} + 2\sqrt{5} + 2\sqrt{5} = P$

$P = 8\sqrt{5}$ units or

$P = 17.89$ units

Area:

Square is $l \cdot w$

so $2\sqrt{5} \times 2\sqrt{5}$

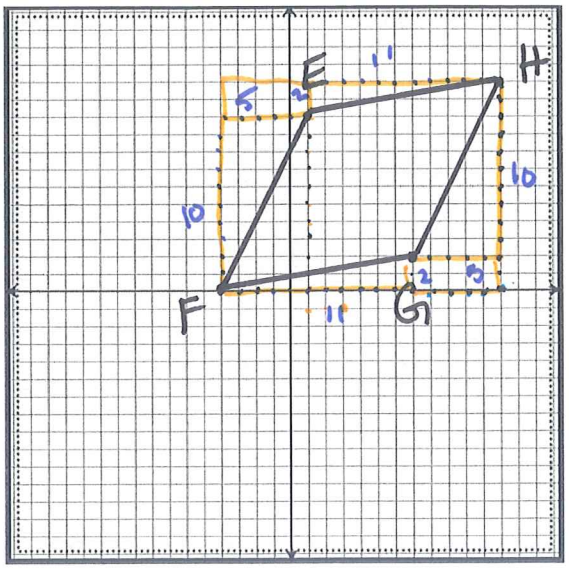
$= 4 \cdot \sqrt{25}$

$= 4 \cdot 5$

$A = 20 \text{ units}^2$

Example 3. Determine whether ABCD is a parallelogram, rectangle, rhombus, square or just a general quadrilateral. Explain your reasoning. (Classify all that apply)

$E(1, 10), F(-4, 0), G(7, 2), H(12, 12)$



Slopes:

Slope EH $= \frac{2}{11}$ > EH // FG

Slope FG $= \frac{2}{11}$

Slope GH $= \frac{10}{5} = 2$

Slope FE $= \frac{10}{5} = 2$

GH // FE

Distances:

$2^2 + 11^2 = EH^2$ EH $= 5\sqrt{5}$

$125 = EH^2$ EH ≈ 11.2

$2^2 + 11^2 = FG^2$

FG $= 5\sqrt{5}$ or FG $= 11.2$

$5^2 + 10^2 = FE^2$ $GH^2 = 5^2 + 10^2$

$25 + 100 = FE^2$

$125 = FE^2$ $GH^2 = 125$

FE $= 5\sqrt{5}$ or 11.2 | GH $= 5\sqrt{5}$ or 11.2

Conclusion:

EFGH is a parallelogram + rhombus because it has opposite sides parallel and 4 congruent sides

Perimeter:

$P = 5\sqrt{5} + 5\sqrt{5} + 5\sqrt{5} + 5\sqrt{5}$

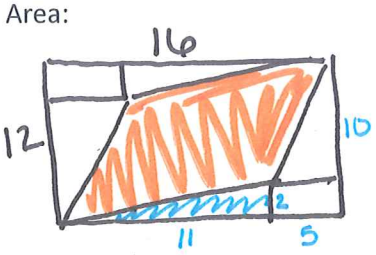
$P = 20\sqrt{5}$ units

or

$11.2 \times 4 = P$

$P = 44.8$ units

Area:



$12 \times 16 - 2\frac{1}{2}(11 \cdot 2) - 2(25) - 2\frac{1}{2}(10 \cdot 5)$

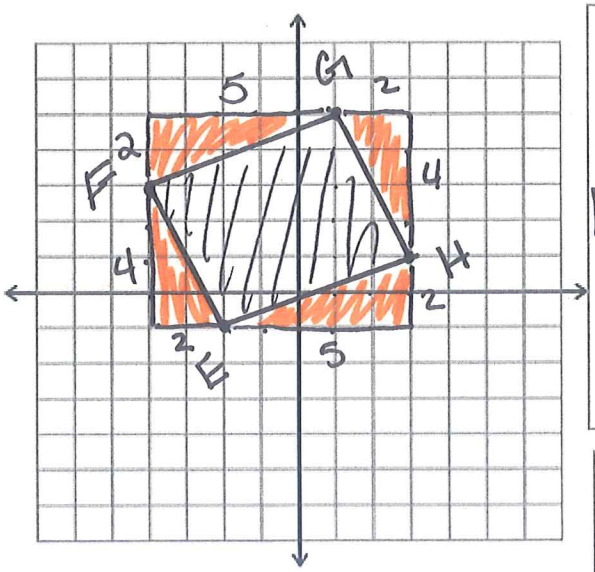
$192 - 22 - 20 - 50$

$192 - 92$

$A = 100$ units^2

Example 4. Determine whether ABCD is a parallelogram, rectangle, rhombus, square or just a general quadrilateral. Explain your reasoning. (Classify all that apply)

$E(-2,-1), F(-4,3), G(1,5), H(3,1)$



Slopes:

Slope $FG = \frac{2}{5}$

Slope $EH = \frac{2}{5}$ $\rangle$ //

$FG \parallel EH$

Slope $FE = -\frac{4}{2} = -2$

Slope $GH = -\frac{4}{2} = -2$

$FE \parallel GH$

Distances:

$2^2+5^2=FG^2$

$\sqrt{29}=FG$

$EH^2=2^2+5^2$

$EH=\sqrt{29}$

$2^2+4^2=FE^2$

$\sqrt{20}=FE$

$2\sqrt{5}=FE$

$2^2+4^2=GH^2$

$4+16=GH^2$

$2\sqrt{5}=GH$

Conclusion:

EFGH is a parallelogram because opposite sides are parallel

Perimeter:

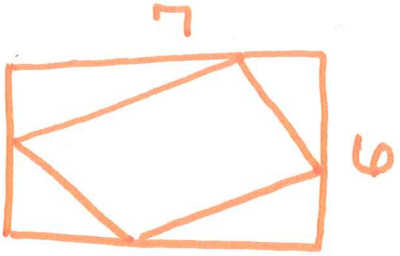
$\sqrt{29}+\sqrt{29}+2\sqrt{5}+2\sqrt{5}=P$

$2\sqrt{29}+4\sqrt{5}=P$

OR

$P \approx 19.7$ units

Area:



$7 \cdot 6 - 2\frac{1}{2}2 \cdot 5 - 2\frac{1}{2}4 \cdot 2$

$42 - 10 - 8$

$A = 24 \text{ units}^2$