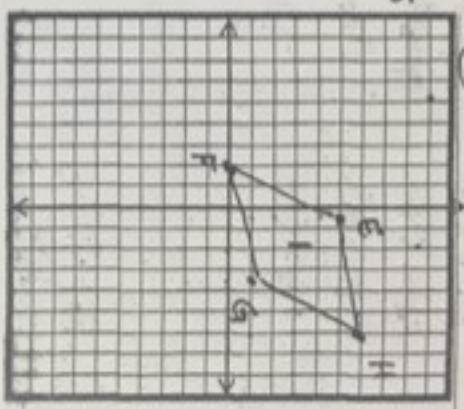


Given each set of vertices, prove that  $\square EFGH$  is the quadrilateral listed at the right of each problem.

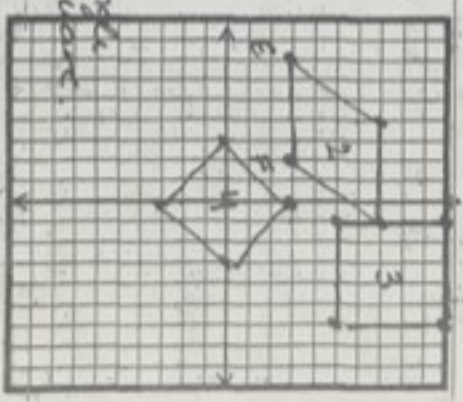
1.  $E(1, 10), F(-4, 0), G(7, 2), H(12, 12)$ : Rhombus  
 $EF = \sqrt{125}$   $FG = \sqrt{125}$   $GH = \sqrt{125}$   $EH = \sqrt{125}$

$\overline{EF} \cong \overline{FG} \cong \overline{GH} \cong \overline{EH}$  Since all sides are  $\cong$  it is a rhombus

2.  $E(-7, 3), F(-2, 3), G(1, 7), H(4, 7)$ : Rhombus  
 $EF = 5$   $FG = 5$   $GH = 5$   $HE = 5$   
 $\overline{EF} \cong \overline{FG} \cong \overline{GH} \cong \overline{EH}$  Since all sides are  $\cong$  it is a rhombus



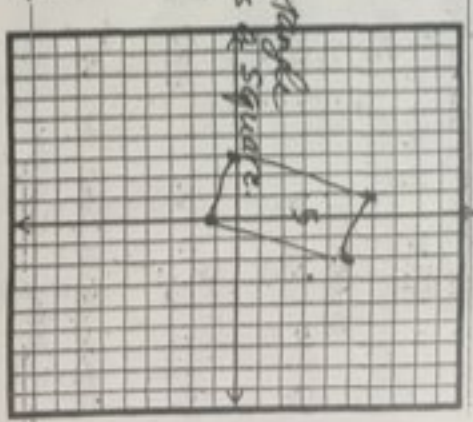
3.  $E(1, 5), F(6, 5), G(6, 10), H(1, 10)$ : Square  
 $EF = 5$   $GH = 5$   $FG = 5$   $HE = 5$   
 All sides are  $\cong$ , so it is a rhombus



Slopes  $\rightarrow$   $EF = 0$   $GH = 0$   $FG = \text{und.}$   $HE = \text{und.}$   
 $EF \perp EH$  and  $GF \perp GH$  to  $EH$  and  $GF$   
 Because consecutive sides are  $\perp$  it is a rectangle.  
 Since it is a rhombus & rectangle, it is a square.  
 $EF = \sqrt{8}$   $FG = \sqrt{8}$   $GH = \sqrt{8}$   $EH = \sqrt{8}$   
 Slopes  $EF = 1$   $EH = -1$   $GH = 1$   $FG = -1$

Because all sides are  $\cong$  it is a rhombus.  
 Because consecutive sides are  $\perp$  since they have negative reciprocal slopes it is a rectangle.  
 Since the figure is a rhombus & rectangle, it is a square.

5.  $E(-3, 0), F(0, -1), G(2, 5), H(-1, 6)$ : Rectangle  
 $HG$  and  $EF$  slopes =  $-1/3$   
 $FH$  and  $EG$  slopes =  $2/3 = 3$



Slopes for consecutive sides are negative reciprocals so they are  $\perp$ .  
 It has 4 right  $\angle$ 's so it is a rectangle.

Determine whether the points are the vertices of a parallelogram. Use the method indicated.

6. E(0, 2), F(6, 4), G(4, 0), H(-2, -2): Distance formula

$$EF = \sqrt{40}$$

Both pair of

$$GH = \sqrt{40}$$

Opposite sides are

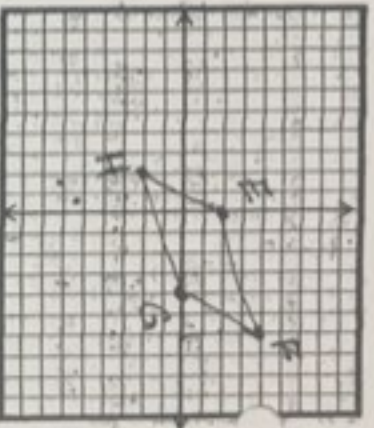
$$EH = \sqrt{20}$$

congruent.

$$FG = \sqrt{20}$$

It is a

parallelogram



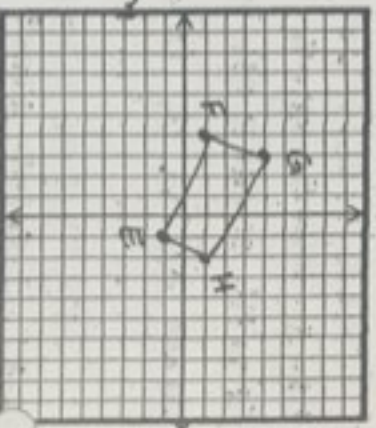
7. E(1, -1), F(-4, 1), G(-3, 4), H(2, 1): Distance formula

$$FG = \sqrt{10}$$

$$EH = \sqrt{5}$$

Opposite sides are not congruent.

So it is NOT a parallelogram.



8. E(-3, -7), F(3, 2), G(1, 7), H(-3, 1): Slope formula

$$\text{Slope } EF = \frac{3}{2}$$

$$FG = \frac{-9}{2}$$

$$GH = \frac{3}{2}$$

HE = undefined

Opposite sides must have

the same slopes & FG and HE

do not have the same slope.

This is NOT a parallelogram

9. E(-4, -1), F(-2, 5), G(1, 7), H(3, 3): Slope formula

Slopes

$$EF = \frac{1}{2} = 3$$

$$FG = \frac{2}{3}$$

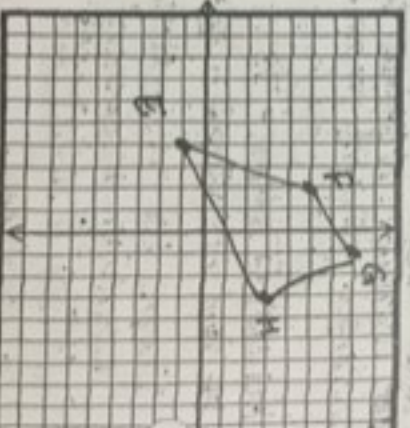
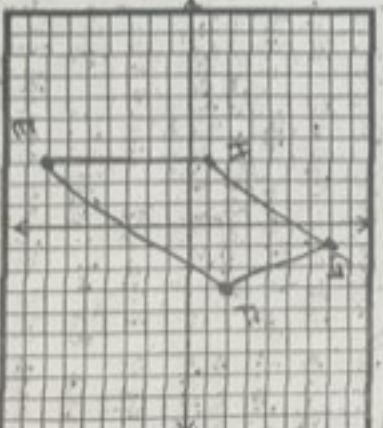
$$GH = \frac{1}{2} = -2$$

$$HE = \frac{1}{4}$$

Opposite sides do not have the

same slopes, so it is NOT

a parallelogram.



Prove the following giving detailed information and showing all work.

10. Prove that  $A(1, 4)$ ,  $B(4, -2)$  and  $C(7, 7)$  are vertices of a right triangle. Then prove what type of triangle (scalene, isosceles, or equilateral) is shown.

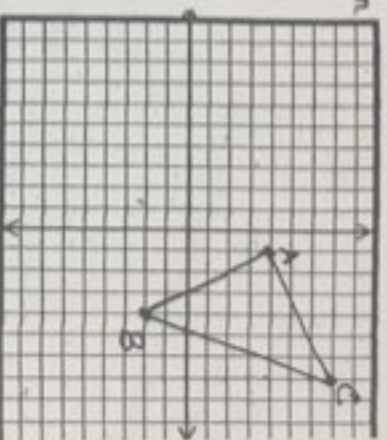
$$AB = \sqrt{45} \quad BC = \sqrt{90} \quad AC = \sqrt{45}$$

2 sides are  $\cong$ , so it is isosceles

slopes of  $AB = -2$  and  $AC = \frac{1}{2}$ , slopes are negative reciprocals so  $\angle CAB$  is a right  $\angle$  so it is a right  $\Delta$  or

Rhombus. This is true so it is a  $45^\circ-45^\circ-90^\circ$   $\Delta$ .  $(\sqrt{45})^2 + (\sqrt{45})^2 = (\sqrt{90})^2$   $45 + 45 = 90$

11. Prove if the following figure is a parallelogram, rectangle, rhombus or a square. The quadrilateral has the following vertices  $A(4, 0)$ ,  $B(8, 2)$ ,  $C(6, 6)$  and  $D(2, 4)$ .



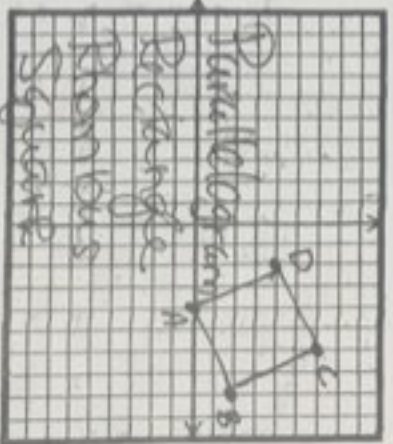
Slopes  $AB = \frac{1}{2}$   $CD = \frac{1}{2}$   
 $BC = -2$   $AD = -2$

Parallelogram and Rectangle - opposite sides

are parallel and consecutive sides have negative reciprocal slopes so they are  $\perp$  and have 4 right  $\angle$ 's.

$$AB = \sqrt{20} \quad BC = \sqrt{20} \quad CD = \sqrt{20} \quad AD = \sqrt{20}$$

all sides are  $\cong$  so it is a rhombus.



Since it is a rhombus & rectangle it is also a square.

12. Prove if the following figure is a parallelogram, rectangle, rhombus or a square. The quadrilateral has the following vertices  $A(4, 0)$ ,  $B(8, 2)$ ,  $C(8, 4)$  and  $D(4, 4)$ .

Slopes  $AD = -2$   $BC = -2$   $AB = \frac{1}{2}$   $DC = \frac{1}{2}$

Parallelogram: Rectangle - opposite sides are parallel and consecutive sides have negative reciprocal slopes so they are  $\perp$  and have four right  $\angle$ 's.

$$DA = \sqrt{5} \quad BC = \sqrt{5} \quad CD = \sqrt{20} \quad AB = \sqrt{20}$$

not a square or rhombus since not all sides are  $\cong$

