

Objectives:

- I know and can use the distance formula and the Pythagorean Theorem.
- I can prove, given the coordinates of the vertices, the classification of the shape formed by identifying the slope and distance between the vertices.

Formulas:

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

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

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \begin{matrix} \text{rise} \\ \text{run} \end{matrix}$$

$\frac{1}{a}$ is the opposite reciprocal of $-\frac{1}{a}$
 0 is the opposite reciprocal of undefined

Pythagorean Theorem

Distance Formula

Slope Formula

Opposite Reciprocals

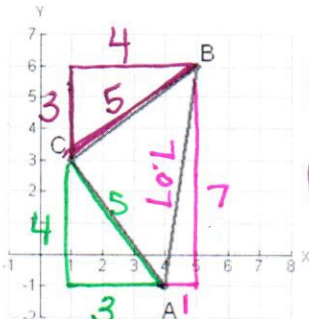
change the sign flip the fraction

★ if slopes of two lines are opposite reciprocals, the lines make 90° .

★ if slopes of two lines are the same, the lines are parallel.

Example Set:

1. Classify the triangle as scalene, isosceles, or equilateral. Decide whether it is a right triangle.



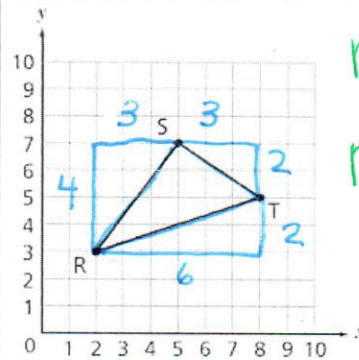
$m_{BC} = \frac{+3}{+4}$ opposite reciprocals
 $m_{AC} = \frac{4}{-3}$
 $\angle C = 90^\circ$

$3^2 + 4^2 = c^2$
 $9 + 16 = c^2$
 $\sqrt{25} = \sqrt{c^2}$
 $c = 5$

$1^2 + 7^2 = c^2$
 $1 + 49 = c^2$
 $\sqrt{50} = \sqrt{c^2}$
 $c = 7.07$

Conclusion: Isosceles. Right \triangle .

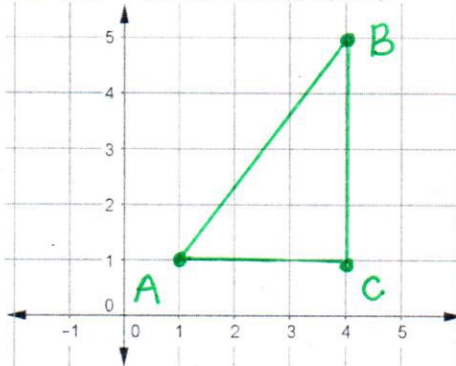
2. Classify the triangle as scalene, isosceles, or equilateral. Decide whether it is a right triangle.



$m_{ST} = -\frac{2}{3}$
 $m_{RS} = \frac{4}{3}$
 NOT 90°

Conclusion: Scalene \triangle

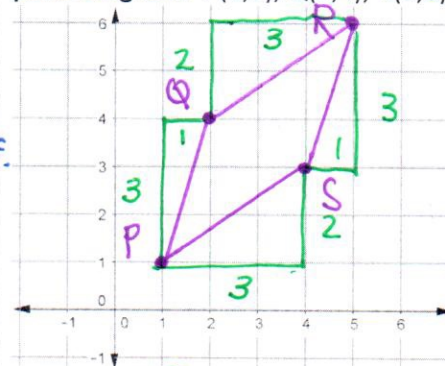
3. Prove or disprove that the given vertices form a right triangle. A(1, 1), B(4, 5), C(4, 1)



$m_{AC} = \frac{0}{3} = 0$
 $m_{BC} = \frac{4}{0} = \text{undef.}$
 opposite reciprocals
 $\angle C = 90^\circ$

Conclusion: yes, a right \triangle

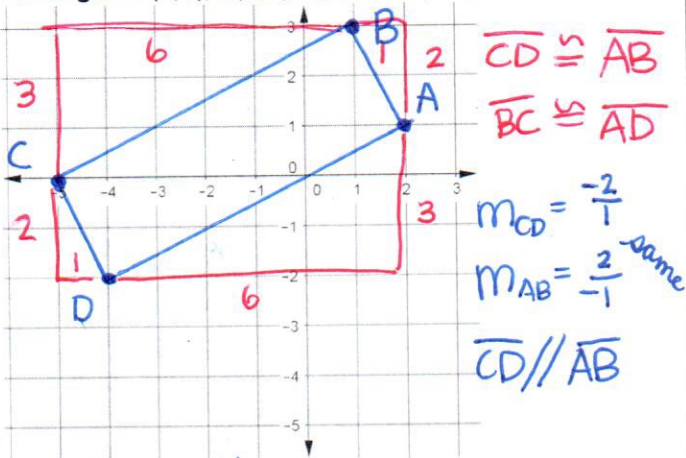
4. Prove or disprove that the given vertices form a parallelogram. P(1,1), Q(2,4), R(5,6), S(4,3)



$\overline{PQ} \cong \overline{RS}$
 $\overline{QR} \cong \overline{PS}$
 $m_{PQ} = \frac{3}{1}$ same
 $m_{SR} = \frac{+3}{+1}$
 $\overline{PQ} \parallel \overline{RS}$

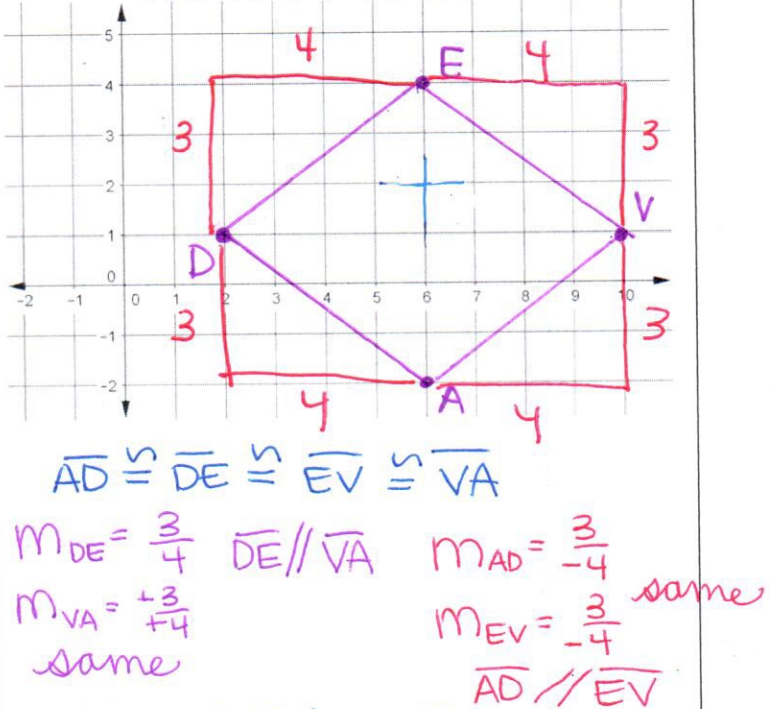
$m_{QR} = \frac{2}{3}$ same $\overline{QR} \parallel \overline{PS}$
 $m_{PS} = \frac{2}{3}$
 Conclusion: yes, parallelogram

5. Prove or disprove that the given vertices form a rectangle. A(2,1), B(1,3), C(-5,0), D(-4,-2)



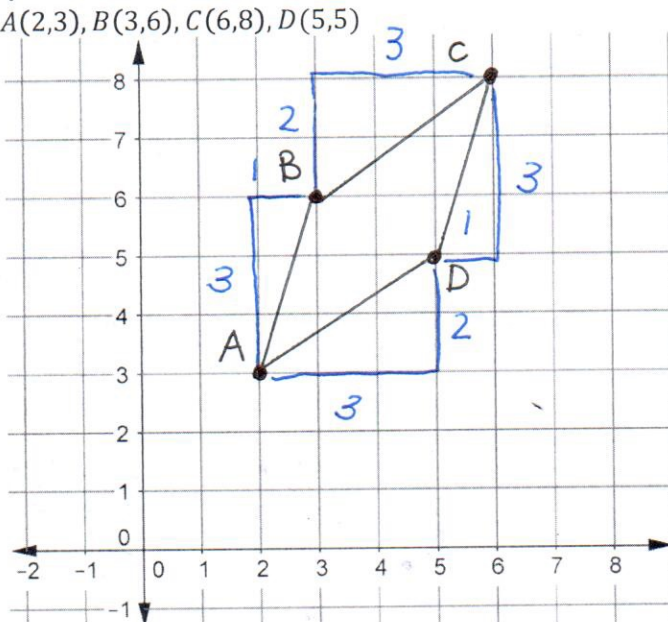
Conclusion: ABCD is a rectangle

6. Prove or disprove that the given vertices form a rhombus. D(2,1), A(6,-2), V(10,1), E(6,4)



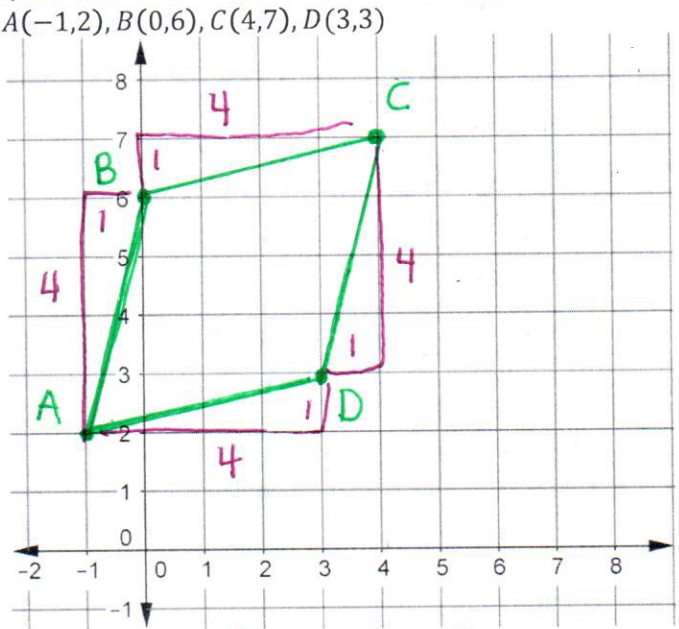
Conclusion: DAVE is a Rhombus

7. What is the most precise classification of the quadrilateral formed by the given vertices? A(2,3), B(3,6), C(6,8), D(5,5)



Conclusion: ABCD is a parallelogram

8. What is the most precise classification of the quadrilateral formed by the given vertices? A(-1,2), B(0,6), C(4,7), D(3,3)



Conclusion: ABCD is a Rhombus