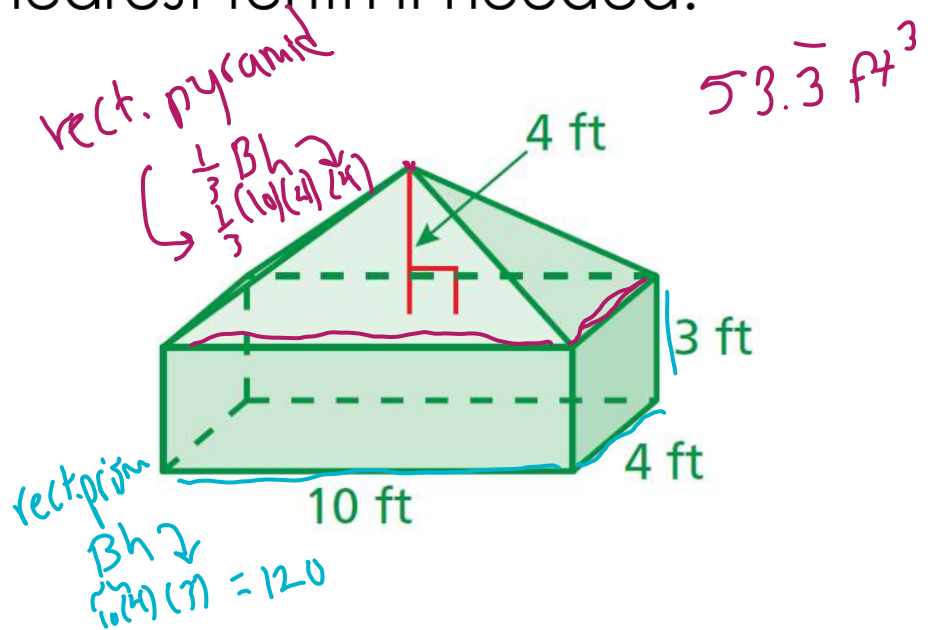Find the total volume of the figure.
Round the nearest tenth if needed.
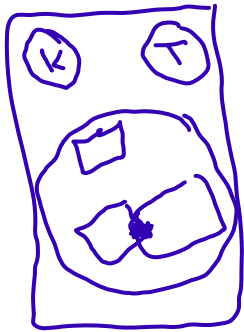
A. 280 ft³

B. 173.3 ft³

C. 160 ft³

D. 66.7 ft³

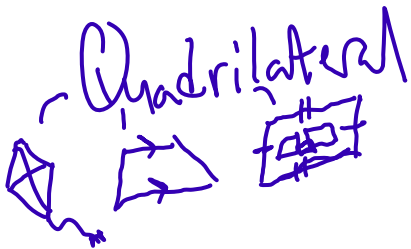rect. pyramid

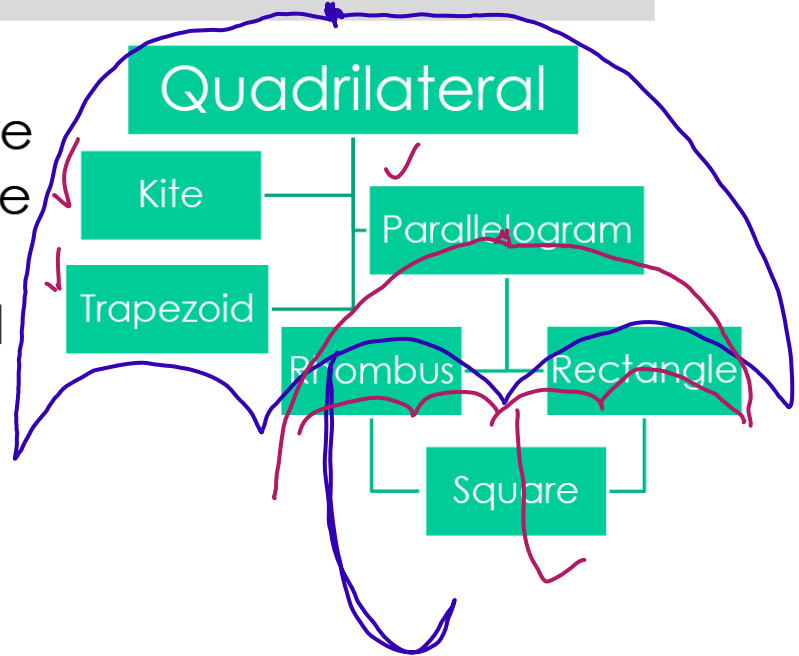$\rightarrow \frac{1}{3} Bh$

$\frac{1}{3}(10)(4)(4)$

$53.\overline{3} \ ft^3$

4 ft

3 ft

4 ft

10 ft

rect prism

Bh

$(10)(4)(3) = 120$

53.3
+120
―――
173.3

Proving shapes in the Coordinate Plane

- Properties/ definitions are used to prove the type of quadrilateral on the coordinate plane.

Quad.

Quadrilateral

Kite

Parallelogram

Trapezoid

Rhombus

Rectangle

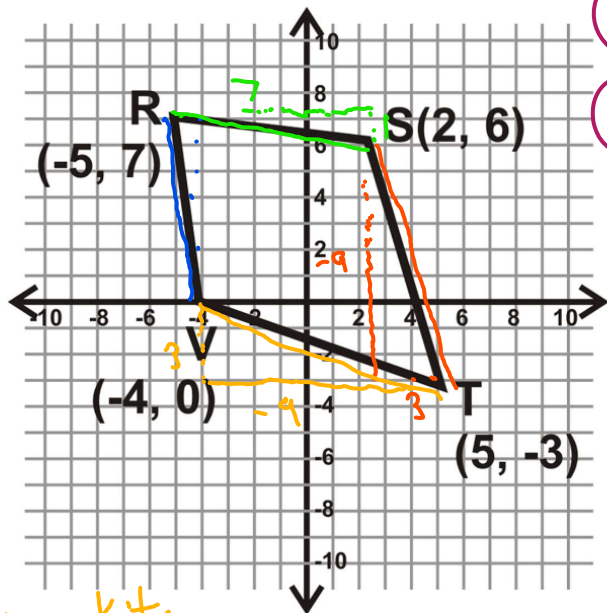Square

Quadrilateral

KITE

A quadrilateral with 2 pairs of adjacent congruent sides, but opposites sides are NOT parallel

Special Properties of Kite

- Diagonals are _perpendicular_.
- The _cross-diagonal_ (shorter diagonal) is bisected.

Show that RSTV is a kite.

① Pair of adjacent sides $\cong$ ✓ ✓

② opp. sides not //.

R (-5, 7)
S(2, 6)
(-4, 0)
T (5, -3)

$RS = \sqrt{7^2 + (1)^2}$
$= \sqrt{49 + 1}$
$= \sqrt{50}$
$m\overline{RS} = \frac{-1}{7} = -\frac{1}{7}$

$VR = \sqrt{(-1)^2 + 7^2}$
$= \sqrt{1 + 49}$
$= \sqrt{50}$
$m\overline{VR} = \frac{7}{-1} = -7$

$ST = \sqrt{3^2 + (-9)^2}$
$= \sqrt{9 + 81}$
$= \sqrt{90}$
$m\overline{ST} = \frac{-9}{3} = -3$

$TV = \sqrt{(-9)^2 + (-3)^2}$
$= \sqrt{81 + 9}$
$= \sqrt{90}$
$m\overline{TV} = \frac{3}{-9} = -\frac{1}{3}$

RSTV is a kite
because adj. sides are congruent
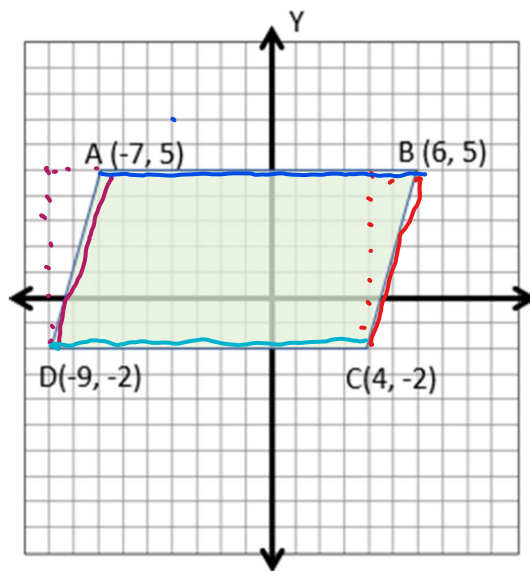and opp. sides not parallel.

PARALLELOGRAMS

Properties of Parallelograms
- Opposite sides are _Parallel_
- Opposite sides are _congruent_
- Diagonals _bisect_ each other
- Opposite Angles are _congruent_
- Consecutive Angles are _Supplementary_

unit1

Is ABCD a parallelogram?

Opposite sides are parallel.

Y

A (-7, 5)   B (6, 5)

D(-9, -2)   C(4, -2)

X

m is same

$m\overline{AB} = \frac{0}{13} = 0$ ✓

$m\overline{CD} = \frac{0}{13} = 0$

$m\overline{BC} = \frac{7}{2}$ ✓
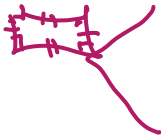
$m\overline{DA} = \frac{7}{2}$

Slopes of opposite sides are equal then are parallel. ABCD is a parallelogram.
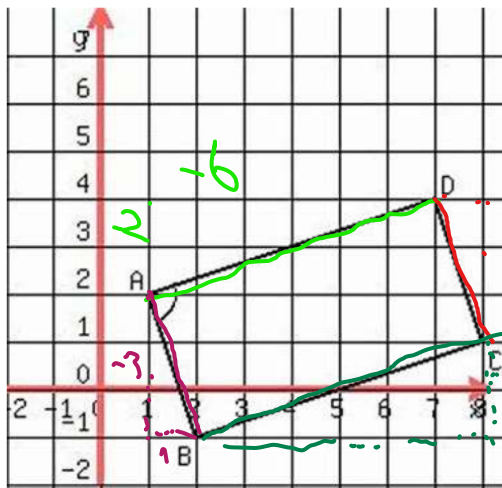
Rectangle
A parallelogram with 4 right angles

Some Special Properties of Rectangles

✓ • All the properties of a parallelogram

• Diagonals are _Congruent_ .

• 4 _right_ angles

Is ABCD a rectangle?

① opp. sides $\cong$ ✓

② adj. sides $\perp$ ✓

$AB = \sqrt{(1)^2 + (-3)^2}$ $CD = \sqrt{(-1)^2 + (3)^2}$

$ = \sqrt{10}$ $= \sqrt{1 + 9}$

$AB_m = -\dfrac{3}{1} = -3$ $= \sqrt{10}$

$CD_m = \dfrac{3}{-1} = -3$

$DA = \sqrt{(-6)^2 + (2)^2}$ $BC = \sqrt{(-6)^2 + (2)^2}$

$ = \sqrt{36 + 4}$ $= \sqrt{36 + 4}$

$ = \sqrt{40}$ $= \sqrt{40}$

$ = 2\sqrt{10}$ $= 2\sqrt{10}$

$DA_m = \dfrac{-2}{-6} = \dfrac{1}{3}$ $BC_m = \dfrac{-2}{-6} = \dfrac{1}{3}$
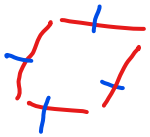
$AB = CD$ $\overline{AB} \perp \overline{BC}$

$DA = BC$ $\overline{CD} \perp \overline{DA}$
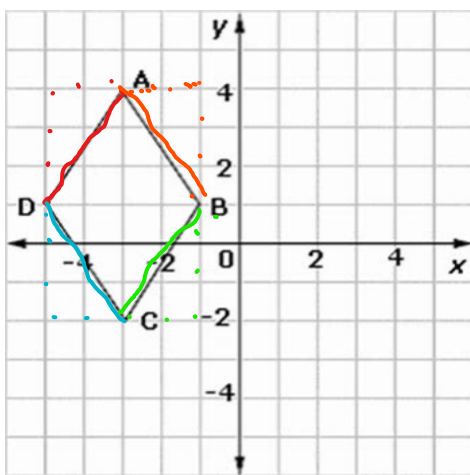
ABCD is a rectangle!

RHOMBUS

A parallelogram with 4 congruent sides

Special Properties of Rhombus

- All the properties of a parallelogram
- Diagonals are _perpendicular_
- 4 _congruent_ sides

Show that ABCD is a rhombus.

4 sides are congruent

$$DA = \sqrt{(2)^2 + (3)^2}$$
$$= \sqrt{4+9}$$
$$= \sqrt{13}$$

$$AB = \sqrt{(2)^2 + (-3)^2}$$
$$= \sqrt{4+9}$$
$$= \sqrt{13}$$

$$BC = \sqrt{(-2)^2 + (-3)^2}$$
$$= \sqrt{4+9}$$
$$= \sqrt{13}$$

$$CD = \sqrt{(-2)^2 + (3)^2}$$
$$= \sqrt{4+9}$$
$$= \sqrt{13}$$

$$\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{DA}$$

ABCD is a rhombus.

SQUARE

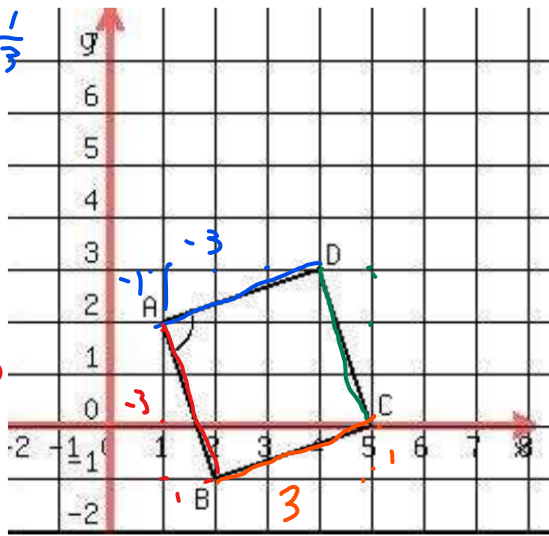## A parallelogram with 4 congruent sides and 4 right angles

Special Properties of Square

- All the properties of a
  parallelogram , _rectangle_ ,
  & _rhombus_

*Like the child of a rhombus and a rectangle

Show that ABCD is a square.

· 4 sides $\cong$ ✓

· 4 angles 90°

    ↳ sides are perp. ⊥

$DA_m = \dfrac{-1}{-3} = \dfrac{1}{3}$

$CD_m = \dfrac{3}{-1} = -3$

$AB_m = \dfrac{-3}{1} = -3$

$BC_m = \dfrac{1}{3}$

$AB = \sqrt{1^2 + (-3)^2}$
$= \sqrt{1+9}$
$= \sqrt{10}$

$BC = \sqrt{3^2 + 1^2}$
$= \sqrt{10}$

$CD = \sqrt{(-1)^2 + 3^2}$
$= \sqrt{10}$

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

$AB \perp BC \quad CD \perp BC \quad DA \perp BC$

$\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{DA}$

ABCD is a square.

GSE Geometry   5 Geometry & the Coordinate Plane   Practice

Name: _____ Date: _____

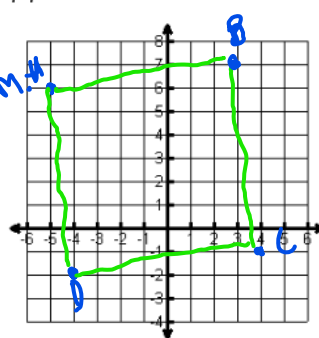## Connecting Algebra & Geometry through Coordinates

The goal of this assignment is to use the distance and slope formulas to prove statements about geometric figures on the coordinate plane. Since the purpose is to prove a statement, you **must show work.**

1. **Quadrilateral 1**: Plot and label each point. **A(-5, 6), B(3, 7), C(4, -1),** and **D(-4, -2).**

2. *Definition: A parallelogram is a quadrilateral with two pairs of opposite sides that are parallel. Using the definition of parallelogram, prove that Quadrilateral 1 is a parallelogram.*

$$\overline{AB}_m = \frac{1}{8} \qquad \overline{CD}_m = \frac{-1}{-8} = \frac{1}{8}$$

$$\overline{BC}_m = \frac{-8}{1} = -8 \qquad \overline{DA}_m = \frac{8}{-1} = -8$$

Opp. sides have same slope, so they are parallel. So ABCD is parallelogram.

3. *Theorem: A parallelogram with four right angles is a rectangle. Using the theorem, prove that Quadrilateral 1 is a rectangle.*

4. *Definition: A rhombus is a parallelogram with all sides congruent. Using the definition, prove that Quadrilateral 1 is a rhombus.*

5. *Definition: A square is a rectangle and a rhombus. Using the definition, is Quadrilateral 1 a square? Why?*

6. *Theorem: The diagonals in a rhombus are perpendicular. Prove that the theorem is true for Quadrilateral 1.*

GSE Geometry   5 Geometry & the Coordinate Plane   Practice

7. **Quadrilateral 3:** Plot and label each point. **A(-6, -13), B(-3, 3), C(4, 5)**, and **D(6, -2).**

8. *Definition: A kite is a quadrilateral with two pair of consecutive sides that are congruent.* Using the definition of a kite, prove that Quadrilateral 3 is a kite.
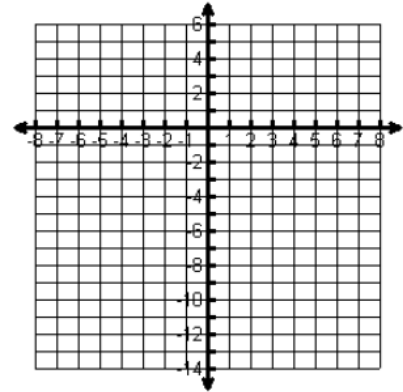
9. *Theorem: The diagonals of a kite are perpendicular.* Prove that the theorem is true for Quadrilateral 3.

10. **Quadrilateral 4:** Plot and label each point. **A(-1, 3), B(3, 1), C(1, -2)**, and **D(-3, 0).**

11. *Definition: A parallelogram is a quadrilateral with two pair of opposite sides that are parallel.* Using the definition of a parallelogram, prove that Quadrilateral 4 is a parallelogram.
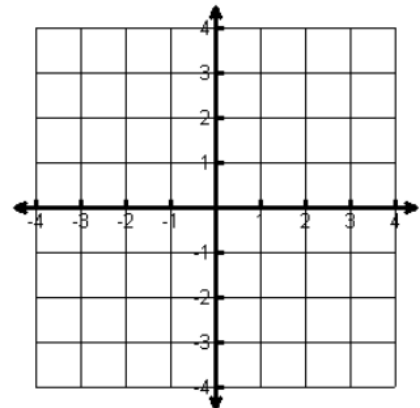
12. *Definition: A rectangle is a parallelogram with four right angles.* Using the definition of a rectangle, prove that Quadrilateral 4 is **NOT** a rectangle.

13. *Definition: A rectangle is a parallelogram with congruent diagonals.* Using the definition of a rectangle, prove that Quadrilateral 4 is **NOT** a rectangle.