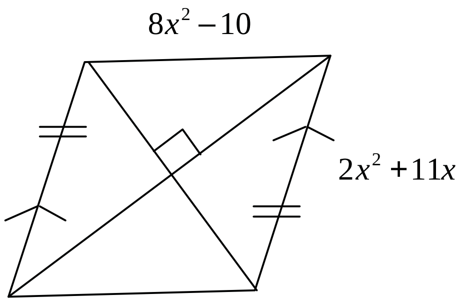
A.M.D.G.

Geometry Accelerated
Chapter 6 Practice Test

Name: ___________________________

1. Solve for *x*. Tell the rule(s) used to justify your setup.



Parallelogram: one pair of opposite sides both $\cong$ and $\parallel$

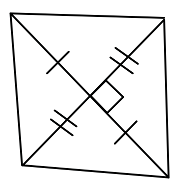
Rhombus: parallelogram with $\perp$ diagonals

$$8x^2-10=2x^2+11x$$
$$6x^2-11x-10=0$$
$$(3x+2)(2x-5)=0$$
$$\boxed{x=}\ \cancel{-\frac{2}{3}},\ \boxed{\frac{5}{2}}$$

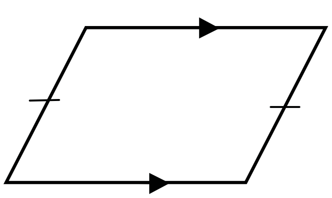
2. Identify the following quadrilaterals as specifically as possible. Give a brief explanation of why you can identify the figure as you did. **(Note: drawings are not to scale!)**

a) Rectangle: opposite angles are $\cong$ and supplementary so ▱; ▱ with one right $\angle$ is a rectangle

b) Rhombus: diagonals bisect each other so ▱; ▱ with $\perp$ diagonals is rhombus

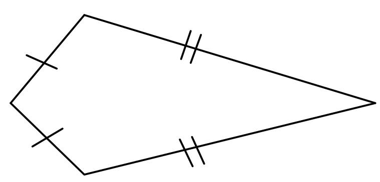


c) Isosceles trapezoid: one pair of $\parallel$ sides so trapezoid; one pair of $\cong$ sides and $\cong$ diagonals, so isosceles trapezoid

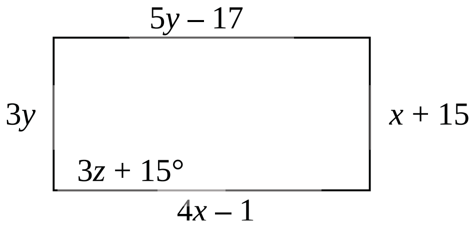


Diagonals are congruent but <u>do not</u> bisect each other

d) Kite: two pairs of adjacent $\cong$ sides



3. Solve for x, y, and z given the figure below is a rectangle.



$$4x-1=5y-17 \qquad x+15=3y$$
$$4x-5y=-16 \qquad x-3y=-15$$

$$\begin{array}{l} x-3y=-15 \\ \underline{4x-5y=-16} \end{array} \Rightarrow \begin{array}{l} -4(x-3y=-15) \\ \underline{4x-5y=-16} \end{array} \Rightarrow \begin{array}{r} \cancel{-4x}+12y=60 \\ \underline{\cancel{4x}-5y=-16} \\ 7y=44 \end{array}$$

$$3z+15=90$$
$$3z=75$$
$$\boxed{z=25}$$

$$\boxed{y=\frac{44}{7}}$$

$$\therefore \boxed{x=\frac{27}{7}}$$

4. Find the sum of the interior angles, measure of each interior angle, and measure of each exterior angle for the following ***regular*** polygons.

a) Nonagon = 9 sides

Sum interior $\angle s$: $(9-2)180° = 1260°$ $\qquad$ $\therefore$ Each interior $\angle$: $\frac{1260°}{9} = 140°$

Each exterior $\angle$: $\frac{360°}{9} = 40°$

b) 15-gon = 15 sides

Sum interior $\angle s$: $(15-2)180° = 2340°$ $\qquad$ $\therefore$ Each interior $\angle$: $\frac{2340°}{15} = 156°$

Each exterior $\angle$: $\frac{360°}{15} = 24°$

c) Decagon = 10 sides

Sum interior $\angle s$: $(10-2)180° = 1440°$ $\qquad$ $\therefore$ Each interior $\angle$: $\frac{1440°}{10} = 144°$

Each exterior $\angle$: $\frac{360°}{10} = 36°$

d) 18-gon = 18 sides

Sum interior $\angle s$: $(18-2)180° = 2880°$ $\qquad$ $\therefore$ Each interior $\angle$: $\frac{2880°}{18} = 160°$

Each exterior $\angle$: $\frac{360°}{18} = 20°$

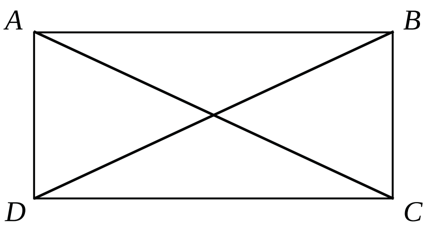
e) Octagon = 8 sides

Sum interior $\angle s$: $(8-2)180° = 1080°$ $\qquad$ $\therefore$ Each interior $\angle$: $\frac{1080°}{8} = 135°$

Each exterior $\angle$: $\frac{360°}{8} = 45°$

A.M.D.G.

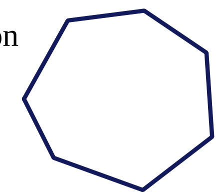
5. Sketch rectangle *ABCD*. If $AC = x^2 + 2x$ and $BD = 35$ cm, find the value(s) of x.



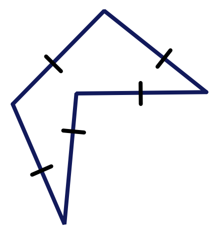
$$x^2 + 2x = 35$$
$$x^2 + 2x - 35 = 0$$
$$(x+7)(x-5) = 0$$
$$\boxed{x = -7,\ 5}$$

6. Sketch each of the following. Mark all congruent sides and/or angles.

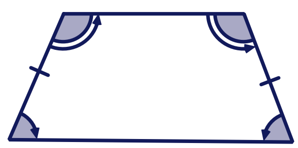
a) A convex heptagon



b) A non-convex (concave), equilateral pentagon



c) An isosceles trapezoid



d) An equiangular quadrilateral that is **not** equilateral

7. A regular polygon has interior angles of 157.5°. Find the number of sides that the regular polygon must have.

$$\frac{(n-2)180}{n} = 157.5$$
$$(n-2)180 = 157.5n$$
$$180n - 360 = 157.5n$$
$$22.5n = 360$$
$$n = \boxed{16 \text{ sides}}$$

8. Name each of the following as specifically as possible given the listed facts.

   a) An eight-sided polygon that is equilateral and equiangular: __regular octagon____

   b) The figure illustrated to right: convex hexagon

   c) A regular quadrilateral: __square____________

   d) A quadrilateral with one pair of sides that are congruent and parallel: _parallelogram______

   e) A three-sided polygon with two sides congruent: isosceles triangle

9. Determine whether the statements are **TRUE** or **FALSE**. If they are false, ***explain*** why.

   a) All squares are also rectangles. **TRUE**

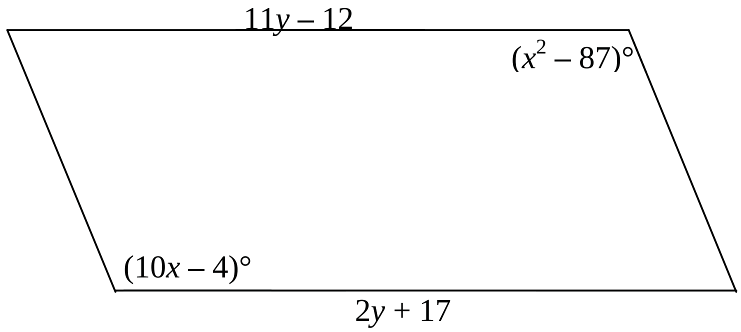
   b) The measure of each interior angle in every pentagon is 108°. **FALSE**; the measure of each angle of a regular pentagon is 108°

   c) A regular polygon is either equilateral or equiangular. **FALSE**; the definition of a regular polygon is that it is both equilateral and equiangular

   d) If a quadrilateral is a rhombus, then it is also a square. **FALSE**; a rhombus can only become a square if it takes on the properties of a rectangle

   e) All rectangles are parallelograms. **TRUE**

10. Given the parallelogram illustrated below, solve for x and y.



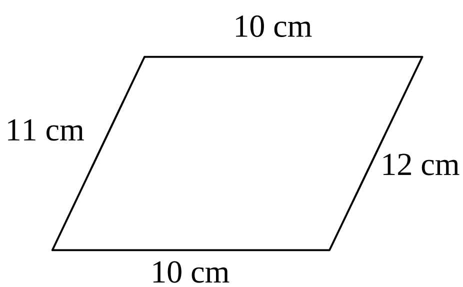
$$x^2 - 87 = 10x - 4$$
$$x^2 - 10x - 83 = 0$$
$$x = \frac{-(-10) \pm \sqrt{(-10)^2 - 4(1)(-83)}}{2(1)}$$
$$= \frac{10 \pm \sqrt{100 + 332}}{2}$$
$$= \frac{10 \pm \sqrt{432}}{2}$$
$$= \frac{10 \pm 12\sqrt{3}}{2}$$
$$\boxed{x = 5 \pm 6\sqrt{3}}$$

$$11y - 12 = 2y + 17$$
$$9y = 29$$
$$\boxed{y = \frac{29}{9}}$$

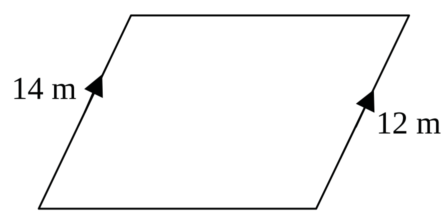
Expect to see a problem like this but not one that requires the quadratic formula to solve

11. Determine if the figures below are parallelograms. If it is a parallelogram, ***explain*** why. If it is not, ***explain*** why not.

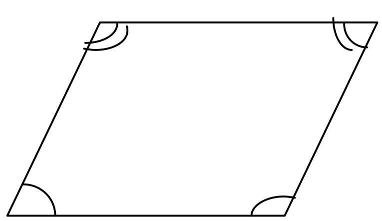
a) NO – opposite sides are not congruent



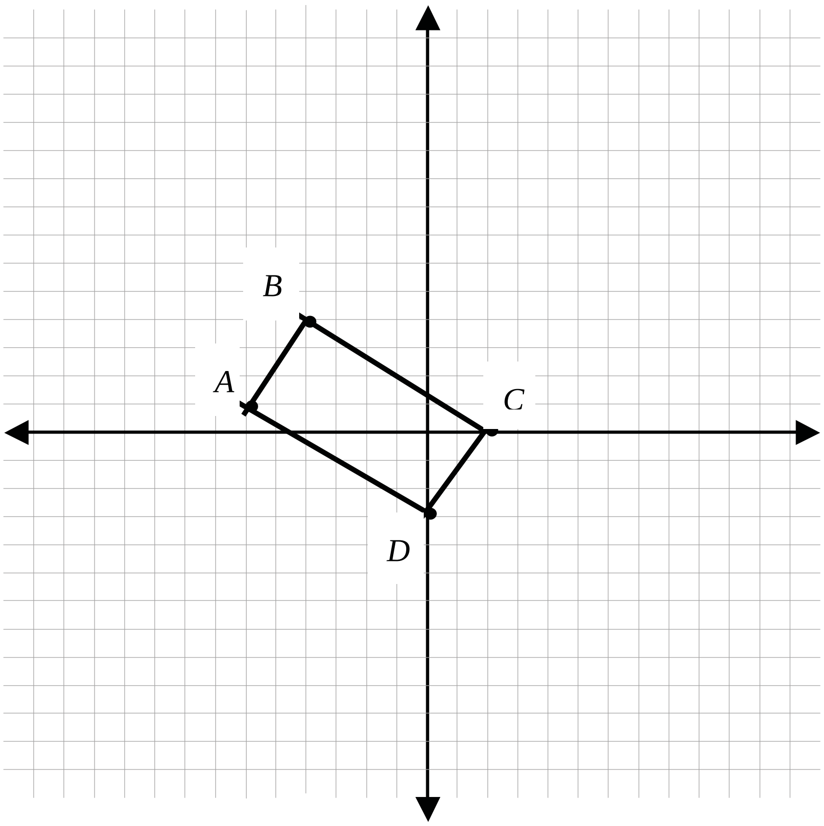
b) NO – one pair of sides is not congruent and parallel



c) NO – opposite angles are not congruent



14. Prove that the quadrilateral with vertices $A(-6, 1)$, $B(-4, 4)$, $C(2, 0)$, $D(0, -3)$ is a parallelogram. Then determine whether the parallelogram is a rectangle, rhombus, or square. Use coordinate geometry to justify your reasoning.



If $\overline{AB} \parallel \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$, then $ABCD$ is a parallelogram.

$m_{\overline{AB}} = \frac{3}{2}$ $\quad$ $m_{\overline{BC}} = -\frac{2}{3}$

$m_{\overline{CD}} = \frac{3}{2}$ $\quad$ $m_{\overline{AD}} = -\frac{2}{3}$

$\therefore \overline{AB} \parallel \overline{CD}$ $\quad$ $\therefore \overline{BC} \parallel \overline{AD}$

Since the slopes of $\overline{AB}$ and $\overline{BC}$ are opposite reciprocals, $\overline{AB} \perp \overline{BC}$ and form a right angle. Therefore, $ABCD$ is a rectangle.

If $\overline{AC} \perp \overline{BD}$, then $ABCD$ is a rhombus.

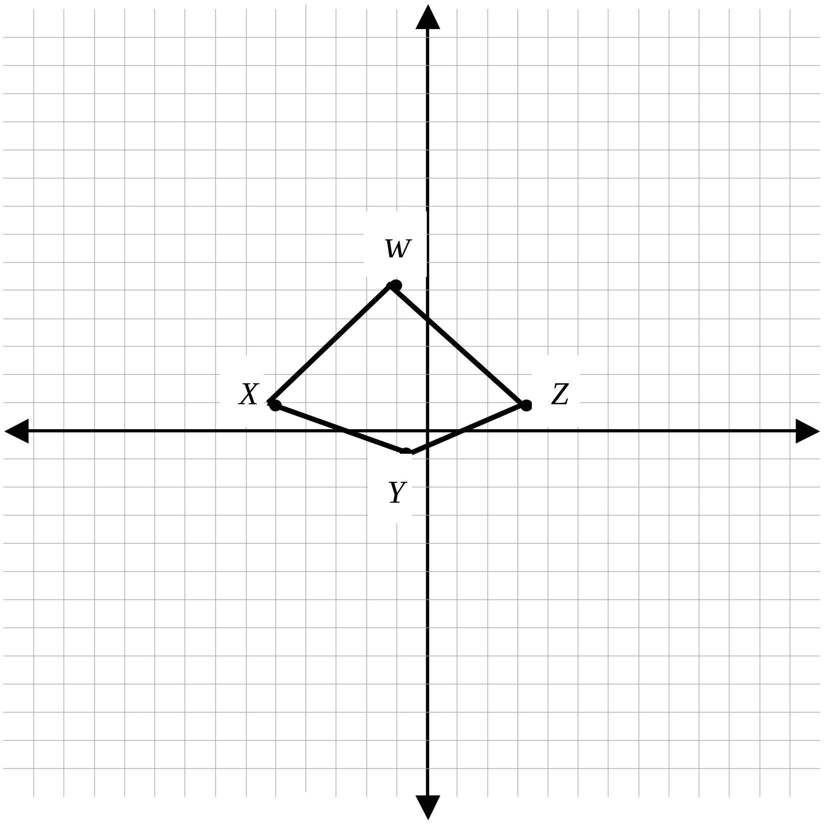
$m_{\overline{AC}} = -\frac{1}{8}$

$m_{\overline{BD}} = -\frac{7}{4}$

$\overline{AC} \not\perp \overline{BD}$

$\therefore$ $\boxed{ABCD \text{ is a rectangle}}$

15. What type of quadrilateral is formed by the vertices $W(-1, 5)$, $X(-5, 1)$, $Y(-1, -1)$, $Z(3, 1)$? Use coordinate geometry to justify your reasoning.



If $\overline{WX} \parallel \overline{YZ}$ and $\overline{XY} \parallel \overline{WZ}$, then *WXYZ* is a parallelogram.

$m_{\overline{WX}} = 1$ $\quad m_{\overline{XY}} = -\frac{1}{2}$

$m_{\overline{YZ}} = \frac{1}{2}$ $\quad m_{\overline{WZ}} = -1$

$\overline{WX} \nparallel \overline{YZ}$ $\quad \overline{XY} \nparallel \overline{WZ}$

Since no pairs of opposite sides are parallel, quadrilateral *WXYZ* is neither a parallelogram nor a trapezoid.

If $\overline{XY} \cong \overline{YZ}$ and $\overline{XW} \cong \overline{WZ}$, then *WXYZ* is a kite.

$d_{\overline{XY}} = \sqrt{20} = 2\sqrt{5}$ $\quad d_{\overline{XW}} = \sqrt{32} = 4\sqrt{2}$

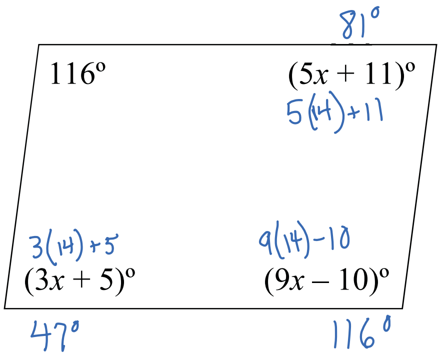
$d_{\overline{YZ}} = \sqrt{20} = 2\sqrt{5}$ $\quad d_{\overline{WZ}} = \sqrt{32} = 4\sqrt{2}$

$\therefore \overline{XY} \cong \overline{YZ}$ $\quad \therefore \overline{XW} \cong \overline{WZ}$

$\therefore$ $\boxed{\textit{WXYZ} \text{ is a kite}}$

Identify the quadrilateral by solving for the given variable

12)



$116 + 5x + 11 + 9x - 10 + 3x + 5 = 360$

$17x + 122 = 360$

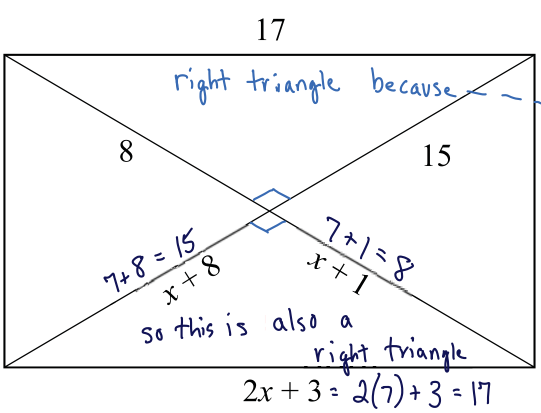
$17x = 238$

$x = 14$

One pair of congruent opposite angles

∴ Kite

13)



Hint: Note the triangles and their lengths

$8^2 + 15^2 = 17^2$

$X = -4$ does not work

$X = 7$ works

$(x+8)^2 + (x+1)^2 = (2x+3)^2$

$x^2 + 16x + 64 + x^2 + 2x + 1 = 4x^2 + 12x + 9$

$2x^2 - 6x - 56 = 0$

$x^2 - 3x - 28 = 0$

$(x-7)(x+4) = 0$

$x = -4, 7$

One diagonal bisects the other

Diagonals are perpendicular

This is a Kite