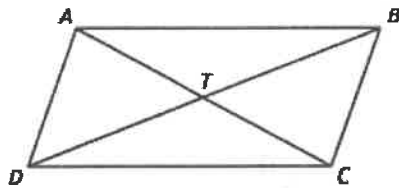Activity 15 Extra Practice (parallelograms)
Name: ___KEY___   Date: _____

In the diagram, ABCD is a parallelogram. The diagonals of the parallelogram intersect at point T.

1) If $AB = 3x + 27$ and $DC = 60$, find x.

$AB = DC$

$3x + 27 = 60$

$3x = 33$

$\boxed{x = 11}$

2) If $AT = 2x - 1$ and $AC = 3x + 5$, what is TC?

$2(AT) = AC \qquad AT \cong TC$

$2(2x-1) = 3x+5$

$4x - 2 = 3x + 5$

$x = 7$

$TC = 2(7) - 1$

$\boxed{TC = 13}$

3) If $m\angle ABC = 3y + 5$ and $m\angle ADC = 5y - 45$, what is $m\angle BCD$?

$m\angle ABC = m\angle ADC$

$3y + 5 = 5y - 45$

$50 = 2y$

$25 = y$

$m\angle BCD + m\angle ABC = 180°$

$m\angle BCD = 180 - 3(25) + 5$

$\boxed{m\angle BCD = 100°}$

4) If $AB = 3z + 1$, $DC = z + 7$, and $AD = 2z$, what is BC?

$AB = DC \qquad\qquad BC = AD$

$3z + 1 = z + 7 \qquad AD = 2(3)$

$2z = 6 \qquad\qquad AD = 6$

$z = 3$

$\boxed{BC = 6}$

5) If $m\angle ATD = 6n + 2$, $m\angle BTC = 5n + 8$, and $m\angle ADC = 13n + 2$, what is $m\angle DAB$?

$m\angle ADC + m\angle DAB = 180$

$m\angle ATD = m\angle BTC$

$6n + 2 = 5n + 8$

$n = 6$

$m\angle DAB = 180 - m\angle ADC$

$= 180 - 13(6) + 2$

$\boxed{m\angle DAB = 100°}$

Find x and y so that the quadrilateral is a parallelogram.

6)

(opposite sides are congruent)

$2x + 9 = x + 11$

$\boxed{x = 2}$

(opposite angles are congruent)

$3y + 19 = 106$

$3y = 87$

$\boxed{y = 29}$

7)

(opposite sides are congruent)

$2x + 4y = 6y + \frac{1}{2}x$

$4x + 8y = 12y + x$

$3x - 4y = 0$

$3x - 4(3) = 0$

$3x - 12 = 0$

$3x = 12$

$\boxed{x = 4}$

$3x + 3y = 21$

$- \ 3x + 4y = 0$

$7y = 21$

$\boxed{y = 3}$

Activity 15 Extra Practice (parallelograms)
Name: _____   Date: _____

8) In parallelogram TPQR, $\overline{TP}$ is 8 units longer than side $\overline{PQ}$. If the perimeter of the figure is 56, find the lengths of the sides.
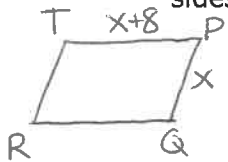
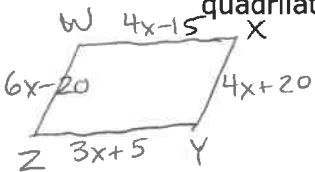$$P = 2(x) + 2(x+8)$$
$$2x + 2x + 16 = 56$$
$$4x + 16 = 56$$
$$4x = 40$$
$$x = 10$$

$$\boxed{\begin{array}{l} PQ = TR = 10 \\ TP = QR = 18 \end{array}}$$

9) In quadrilateral WXYZ, $WX = 4x - 15$, $XY = 4x + 20$, $YZ = 3x + 5$, and $ZW = 6x - 20$. What value of x proves that quadrilateral WXYZ is a parallelogram?

$$WX = ZY$$
$$4x - 15 = 3x + 5$$
$$\boxed{X = 20}$$
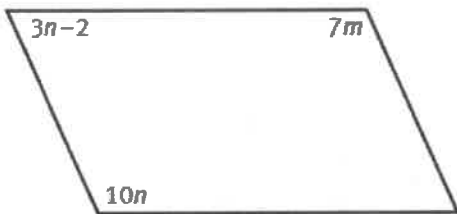
$-OR-$

$$ZW = XY$$
$$6x - 20 = 4x + 20$$
$$2x = 40$$
$$\boxed{X = 20}$$

10) Find the values of m and n that make the quadrilateral a parallelogram.

$$10n + 3n - 2 = 180 \quad \left(\begin{array}{l}\text{consecutive angles}\\\text{are supplementary}\end{array}\right)$$
$$13n - 2 = 180$$
$$13n = 182$$
$$\boxed{n = 14}$$

$\left(\begin{array}{l}\text{opp. angles}\\\text{are}\\\text{congruent}\end{array}\right) \begin{array}{l} 7m = 10n \\ 7m = 140 \end{array}$ $\boxed{m = 20}$

11) The vertices of a quadrilateral are $A(1,5)$, $B(5,-3)$, $C(2,-5)$, and $D(-2,3)$. Show that quadrilateral ABCD is a parallelogram.
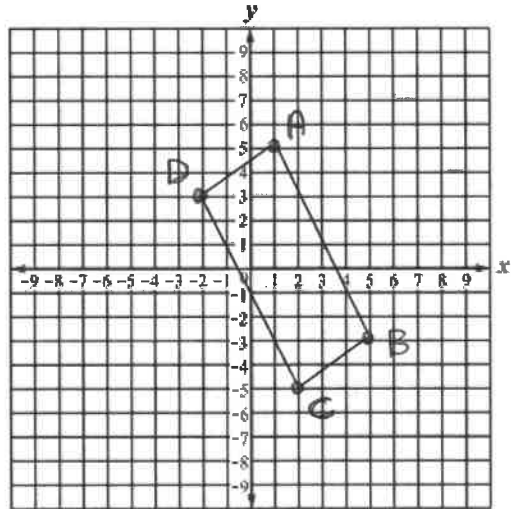
Opposite sides are parallel

→ Slope of $\overline{AD}$ and $\overline{BC}$ is $\frac{2}{3}$

→ slope of $\overline{AB}$ and $\overline{CD}$ is -2

So, $\overline{AD} \| \overline{BC}$ and $\overline{AB} \| \overline{CD}$

By diagonals

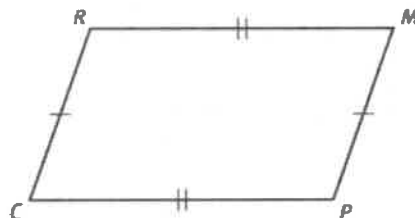The midpoint of diagonals $\overline{AC}$ and $\overline{BD}$ is $(1.5, 0)$. Therefore, they bisect each other.

Opposite sides are $\cong$

$$AD = BC = \sqrt{13}$$
$$AB = CD = 4\sqrt{5}$$

12) Use the diagram shown. Is the given information enough to conclude that RMPC is a parallelogram? *Explain*.

Yes. If both pairs of opposite sides of a quadrilateral are congruent, then the quadrilateral is a parallelogram.