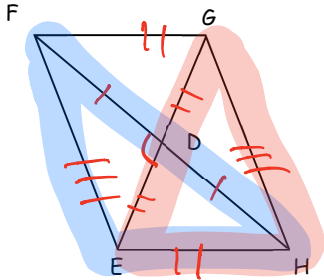


# Quadrilaterals – Parallelograms

Homework Section 6.2

Name \_\_\_\_\_

EFGH is a parallelogram. Determine whether each statement must be true. If it must be true, then state the theorem or definition that justifies the statement.



#1)  $\overline{FE} \parallel \overline{GH}$

True, Def'n of parallelogram

#2)  $\triangle FDE \cong \triangle HDG$

True, Vertical Angles Theorem, diagonals of a parallelogram bisect each other and SAS Theorem

#3)  $\angle FGH \cong \angle FEH$

True, opposite angles in a parallelogram are congruent.

#4)  $\overline{FD} \cong \overline{DG}$

False

#5)  $\triangle FHE \cong \triangle GHE$

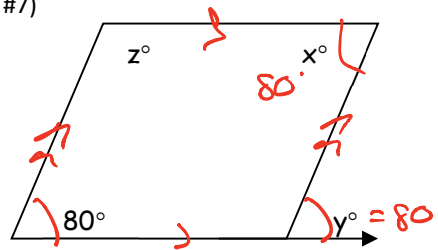
False

#6)  $DE = \frac{1}{2} EG$

True, the diagonals of a parallelogram bisect each other.

If each quadrilateral is a parallelogram, find the value of x, y, and z.

#7)

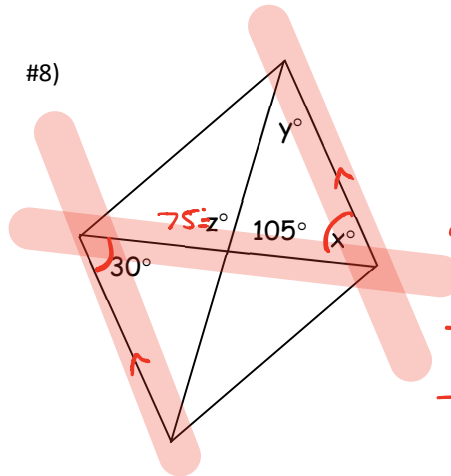


$$z + 80^\circ = 180^\circ$$

$$z = 100^\circ$$

(80°, 80°, 100°)

#8)



$$z + 105 = 180$$

$$z = 75$$

$$x = 30$$

$$x + y + 105 = 180$$

$$30 + y + 105 = 180$$

$$y + 135 = 180$$

$$y = 45$$

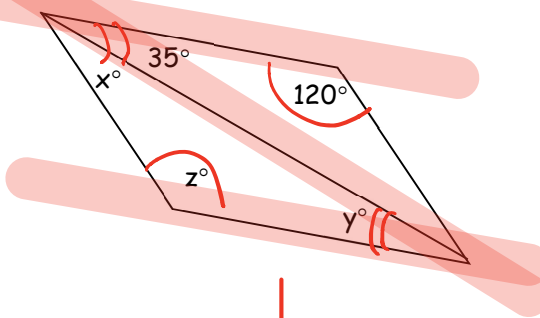
(30°, 45°, 75°)

# Quadrilaterals – Parallelograms

Homework Section 6.2

Name \_\_\_\_\_

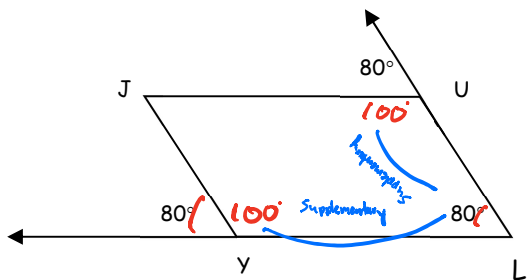
#9)



$$\begin{array}{r} z = 120^\circ \\ \hline y = 35^\circ \end{array}$$

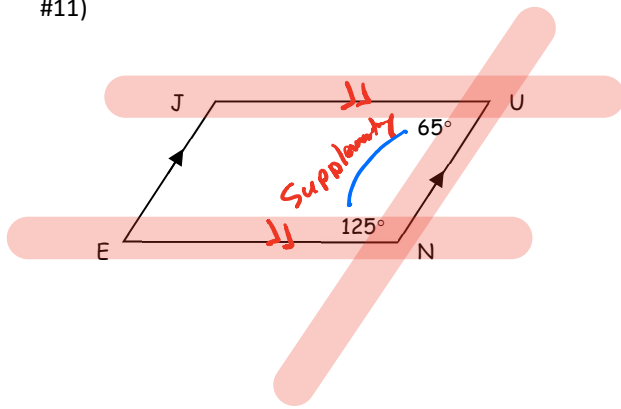
$$\begin{aligned} x + y + z &= 180 \\ x + 35 + 120 &= 180 \\ x + 155 &= 180 \\ x &= 25 \end{aligned}$$

Is each quadrilateral a parallelogram? Justify your answer.  
#10)



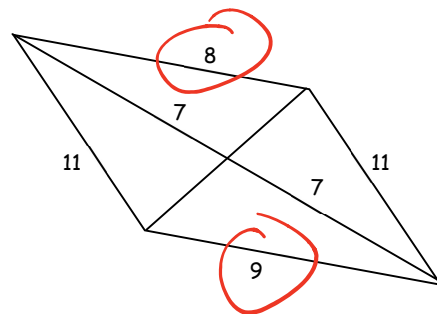
Yes, both pairs of opposite sides are parallel.

#11)



Yes, both pairs of opposite sides are parallel.

#12) Explain why it is impossible for the figure to be a parallelogram.



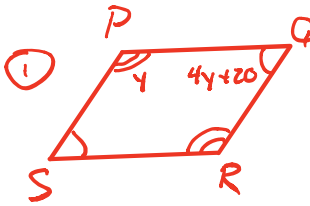
Opposite sides are not congruent.

# Quadrilaterals – Parallelograms

Homework Section 6.2

Name \_\_\_\_\_

#13) Given parallelogram PQRS with  $m\angle P = y$  and  $m\angle Q = 4y + 20$ , find measures of  $\angle R$  and  $\angle S$ .



②

$$m\angle P + m\angle Q = 180$$

$$y + (4y + 20) = 180$$

$$5y + 20 = 180$$

$$5y = 160$$

$$y = 32$$

③

$$m\angle P = y$$

$$m\angle P = 32$$

④

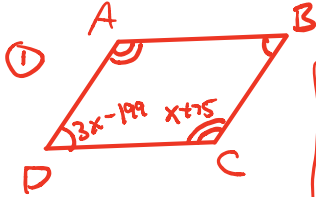
$$m\angle Q = 4y + 20$$

$$= 4(32) + 20$$

$$= 128 + 20$$

$$m\angle Q = 148$$

#14) Given parallelogram ABCD with  $m\angle C = x + 75$  and  $m\angle D = 3x - 199$ , find the measures of each angle.



②

$$m\angle C + m\angle D = 180$$

$$(3x - 199) + (x + 75) = 180$$

$$4x - 124 = 180$$

$$4x = 304$$

$$x = 76$$

③

$$m\angle D = 3x - 199$$

$$= 3(76) - 199$$

$$= 228 - 199$$

$$m\angle D = 29$$

$$m\angle B = 29$$

④

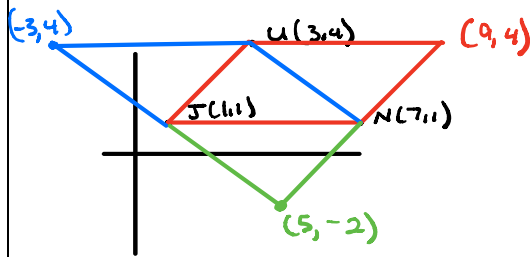
$$m\angle C = x + 75$$

$$= (76) + 75$$

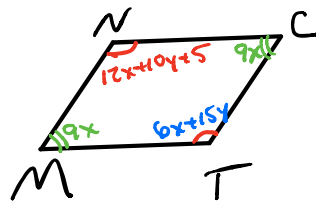
$$m\angle C = 151$$

$$m\angle A = 151$$

#15) Find all the possible ordered pairs for the fourth vertex of a parallelogram with vertices at J(1,1), U(3,4), and N(7,1).



#16) If NCTM is a parallelogram,  $m\angle N = 12x + 10y + 5$ ,  $m\angle C = 9x$ , and  $m\angle T = 6x + 15y$ , find  $m\angle M$ .



$$12x + 10y + 5 = 6x + 15y$$

$$6x + 15y + 9x = 180 \Rightarrow 15x + 15y = 180$$

$$x + y = 12$$

$$y = 12 - x$$

$$6x + 10y + 5 = 15y$$

$$6x - 5y + 5 = 0$$

$$6x - 5y = -5$$

$$6x - 5(12 - x) = -5$$

$$6x - 60 + 5x = -5$$

$$11x - 60 = -5$$

$$11x = 55$$

$$x = 5$$

$$m\angle M = 9x$$

$$= 9(5)$$

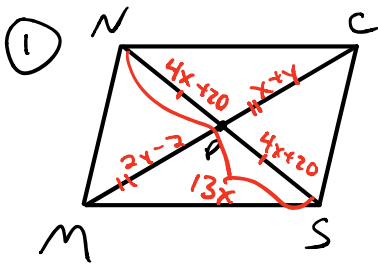
$$m\angle M = 45$$

# Quadrilaterals – Parallelograms

Homework Section 6.2

Name \_\_\_\_\_

#17) NCSM is a parallelogram with diagonals  $\overline{NS}$  and  $\overline{MC}$  that intersect at point P. If  $NP = 4x + 20$ ,  $NS = 13x$ ,  $PC = x + y$ , and  $PM = 2y - 2$ , find CM



②

$$NP + PS = NS$$

$$(4x + 20) + (4x + 20) = 13x$$

$$8x + 40 = 13x$$

$$40 = 5x$$

$$8 = x$$

③

$$CP = PM$$

$$x + y = 2y - 2$$

$$(8) + y = 2y - 2$$

$$8 = y - 2$$

$$10 = y$$

④

$$CM = CP + PM$$

$$= (x + y) + (2y - 2)$$

$$= x + 3y - 2$$

$$= (8) + 3(10) - 2$$

$$= 8 + 30 - 2$$

$$CM = 36$$

- #1) True, Def'n of Parallelogram
- #2) True, Vertical Angles Theorem, diagonals of parallelogram bisect each other, and SAS Theorem.
- #3) True, opposite angles of a parallelogram are  $\cong$
- #4) False
- #5) False
- #6) True, diagonals of a parallelogram bisect each other.
- #7) (80, 80, 100)
- #8) (30, 45, 75)
- #9) (25, 35, 120)
- #10) Yes. The opposite sides are parallel because of the converse to the corresponding angles postulate. Thus, JULY is a parallelogram by definition of a parallelogram.
- #11) No, because consecutive interior angles are not supplementary.
- #12) In a parallelogram, opposite sides are congruent. In this figure the opposite sides of 8 and 9 are not congruent.
- #13)  $m\angle R = 32$ ,  $m\angle S = 148$
- #14)  $m\angle A = 151$ ,  $m\angle B = 29$ ,  $m\angle C = 151$ ,  $m\angle D = 29$
- #15) (9, 4), (5, -2), (-3, 4)
- #16) 45
- #17) 36