

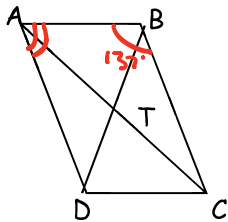
# Quadrilaterals – Tests for Parallelograms

Homework Section 6.3

Name \_\_\_\_\_

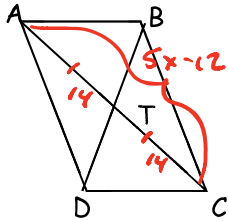
Use parallelogram ABCD and the given information to find each value.

#1)  $m\angle ABC = 137$ . Find  $m\angle DAB$ .



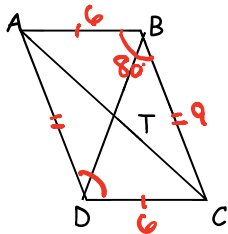
$$\begin{aligned} m\angle ABC + m\angle DAB &= 180 \\ (137) + m\angle DAB &= 180 \\ m\angle DAB &= 43 \end{aligned}$$

#2)  $AC = 5x - 12$  and  $AT = 14$ . Find  $x$ .



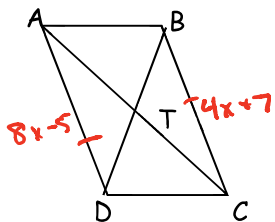
$$\begin{aligned} AT + TC &= AC \\ (14) + (14) &= 5x - 12 \\ 28 &= 5x - 12 \\ 40 &= 5x \\ 8 &= x \end{aligned}$$

#3)  $AB = 6$ ,  $BC = 9$  and  $m\angle ABC = 80$ . Find  $CD$ .



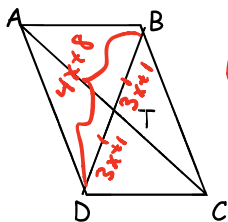
$$CD = 6$$

#4)  $BC = 4x + 7$  and  $AD = 8x - 5$ . Find  $x$ .



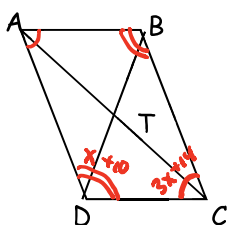
$$\begin{aligned} AD &= BC \\ 8x - 5 &= 4x + 7 \\ 4x - 5 &= 7 \\ 4x &= 12 \\ x &= 3 \end{aligned}$$

#5)  $BT = 3x + 1$  and  $BD = 4x + 8$ . Find  $x$ .



$$\begin{aligned} BT + TD &= BD \\ (3x+1) + (3x+1) &= 4x+8 \\ 6x+2 &= 4x+8 \\ 2x+2 &= 8 \\ 2x &= 6 \\ x &= 3 \end{aligned}$$

#6)  $m\angle BCD = 3x + 14$  and  $m\angle ADC = x + 10$ . Find  $m\angle ADC$ .

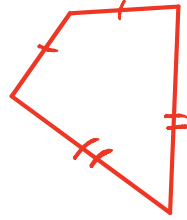


$$\begin{aligned} m\angle ADC + m\angle BCD &= 180 \\ (x+10) + (3x+14) &= 180 \\ 4x+24 &= 180 \\ 4x &= 156 \\ x &= 39 \end{aligned}$$

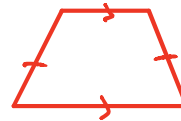
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$$\begin{aligned} m\angle ADC &= x + 10 \\ &= (39) + 10 \\ m\angle ADC &= 49 \end{aligned}$$

#7) Draw a quadrilateral that has two pairs of congruent sides, but is not a parallelogram.



#8) Draw a quadrilateral that is not a parallelogram and has one pair of parallel sides and one pair of congruent sides.



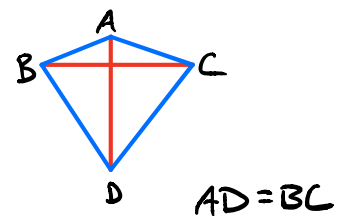
Determine if each conditional is true or false. If it is false, draw a counterexample.

#9) If the opposite angles in a quadrilateral are congruent, then the quadrilateral is a parallelogram.

True

#10) If the diagonals in a quadrilateral are the same length, then the quadrilateral is a parallelogram.

False



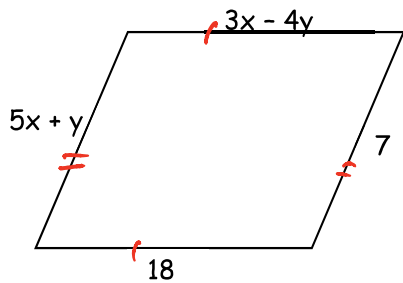
# Quadrilaterals – Tests for Parallelograms

Homework Section 6.3

Name \_\_\_\_\_

What values must  $x$  and  $y$  have in order that the quadrilateral is a parallelogram?

#11)



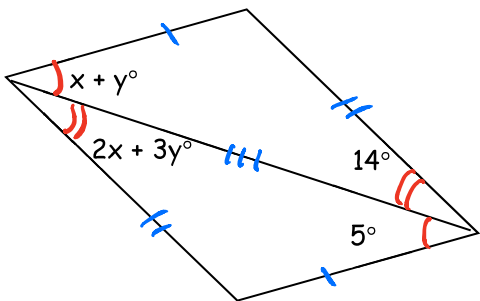
$$\begin{cases} 3x - 4y = 18 \\ 5x + y = 7 \end{cases}$$

$$\begin{aligned} & \rightarrow y = 7 - 5x \\ & \rightarrow 3x - 4(7 - 5x) = 18 \\ & \rightarrow 3x - 28 + 20x = 18 \\ & \rightarrow 23x - 28 = 18 \\ & \rightarrow 23x = 46 \\ & \rightarrow x = 2 \end{aligned}$$

$$\begin{aligned} & \rightarrow y = 7 - 5(2) \\ & \rightarrow y = 7 - 10 \\ & \rightarrow y = -3 \end{aligned}$$

**(2, -3)**

#12)



$$\begin{cases} x + y = 5 \\ 2x + 3y = 14 \end{cases}$$

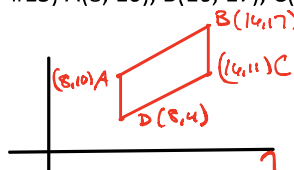
$$\begin{aligned} & \rightarrow y = 5 - x \\ & \rightarrow 2x + 3(5 - x) = 14 \\ & \rightarrow 2x + 15 - 3x = 14 \\ & \rightarrow 15 - x = 14 \\ & \rightarrow -x = -1 \\ & \rightarrow x = 1 \end{aligned}$$

$$\begin{aligned} & \rightarrow y = 5 - (1) \\ & \rightarrow y = 4 \end{aligned}$$

**(1, 4)**

Determine whether ABCD is a parallelogram given each set of vertices.

#13) A(8, 10), B(16, 17), C(16, 11), D(8, 4)



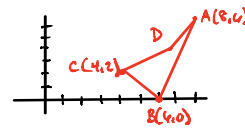
Parallelogram?  $M_{AC} = M_{BD}$

$$M_{AC} = \left( \frac{\sum x}{2}, \frac{\sum y}{2} \right) = \left( \frac{(8) + (16)}{2}, \frac{(10) + (11)}{2} \right) = \left( \frac{24}{2}, \frac{21}{2} \right)$$

$$M_{BD} = \left( \frac{\sum x}{2}, \frac{\sum y}{2} \right) = \left( \frac{(16) + (8)}{2}, \frac{(17) + (4)}{2} \right) = \left( \frac{24}{2}, \frac{21}{2} \right)$$

$M_{AC} = (12, \frac{21}{2})$        $M_{BD} = (12, \frac{21}{2})$   
 Yes the diagonals bisect each other.

#14) A(8, 6), B(6, 0), C(4, 2), D(7, 3)



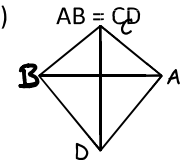
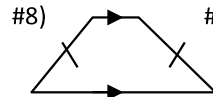
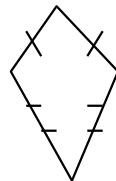
Parallelogram?  $M_{AC} = M_{BD}$

$$M_{AC} = \left( \frac{\sum x}{2}, \frac{\sum y}{2} \right) = \left( \frac{(8) + (4)}{2}, \frac{(6) + (2)}{2} \right) = \left( \frac{12}{2}, \frac{8}{2} \right)$$

$$M_{BD} = \left( \frac{\sum x}{2}, \frac{\sum y}{2} \right) = \left( \frac{(6) + (7)}{2}, \frac{(0) + (3)}{2} \right) = \left( \frac{13}{2}, \frac{3}{2} \right)$$

No, the diagonals don't bisect each other.

- #1) 43
- #2) 8
- #3) 6
- #4) 3
- #5) 3
- #6) 49
- #7)



- #9) True
- #11) (2, -3)
- #12) (1, 4)
- #13) Yes, because the diagonals have the same midpoint.
- #14) No, because the diagonals have different midpoints