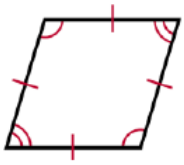
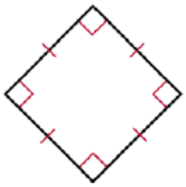
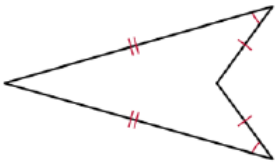
Tell whether the following polygons are concave or convex and regular or irregular.

1.  : _____ : _____

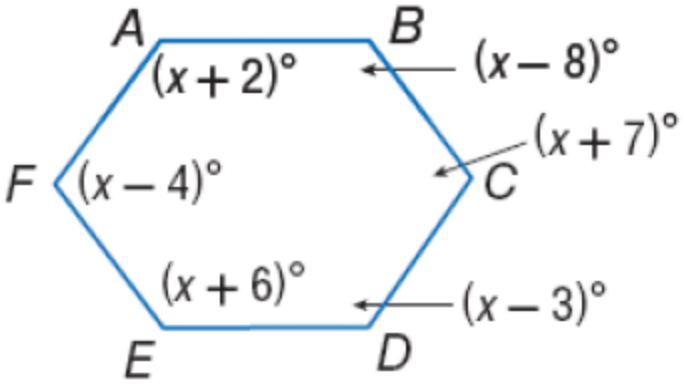
2.  : _____ : _____

3.  : _____ : _____

4.  : _____ : _____

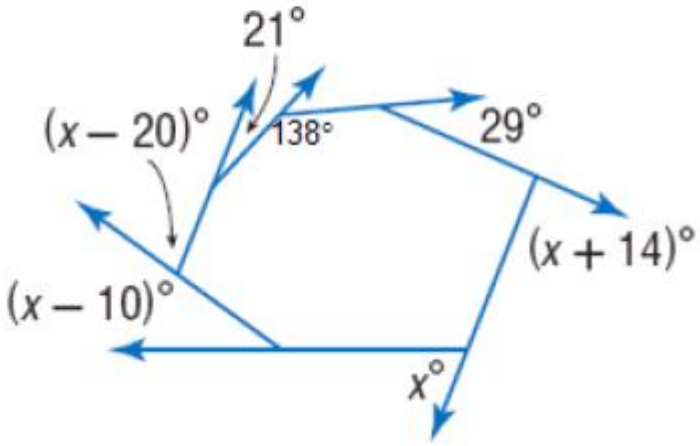
Solving Algebraic Problems

Find the value of x.



Solving Algebraic Problems

Find x:



Number of Diagonals in a Polygon

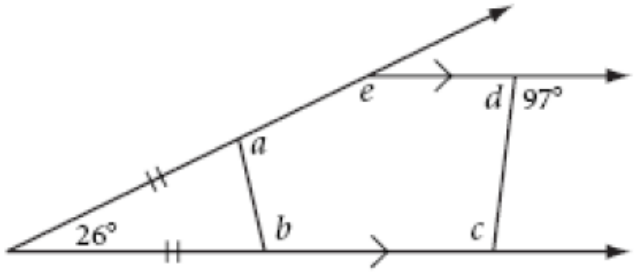
$$d = \frac{n(n-3)}{2}$$

1. Find the number of diagonals in a pentadecagon.

2. What is the name of the polygon with 14 diagonals?

Challenge

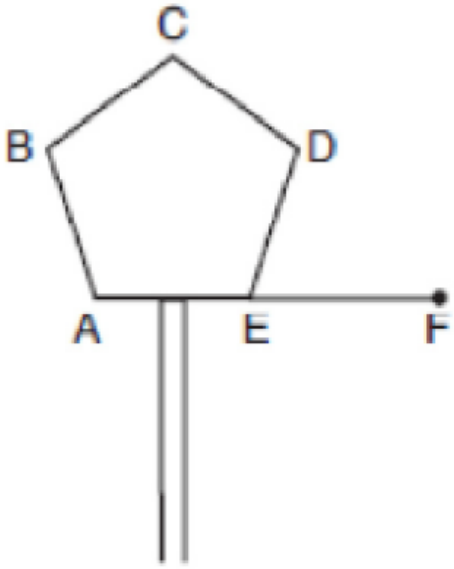
In Exercises 1, find each lettered angle measure.



$a =$ _____, $b =$ _____, $c =$ _____,

$d =$ _____, $e =$ _____

One piece of the birdhouse that Natalie is building is shaped like a regular pentagon, as shown in the accompanying diagram.



If side *AE* is extended to point *F*, what is the measure of exterior angle *DEF*?

1) 36°
2) 72°
3) 108°
4) 144°

The number of sides of a convex polygon is given.
Find the sum of the measures of the interior angles of each polygon.

1) 8

2) 12

The sum of the measures of the interior angles of a convex polygon is given. Find the number of sides of each polygon.

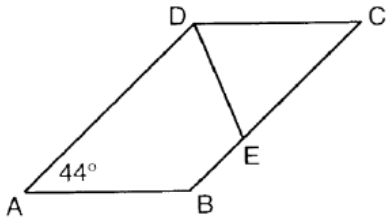
6) 7020°

7) 1980°

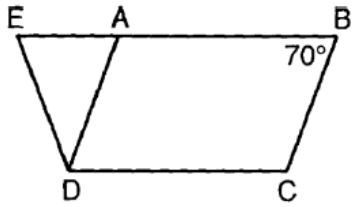
Which statement is *not* always true about a parallelogram?

1) The diagonals are congruent.
2) The opposite sides are congruent.
3) The opposite angles are congruent.
4) The opposite sides are parallel.

1. In the accompanying diagram of parallelogram $ABCD$, $\overline{DE}$ bisects $\angle ADC$ and $m\angle A = 44$. Find $m\angle CDE$.

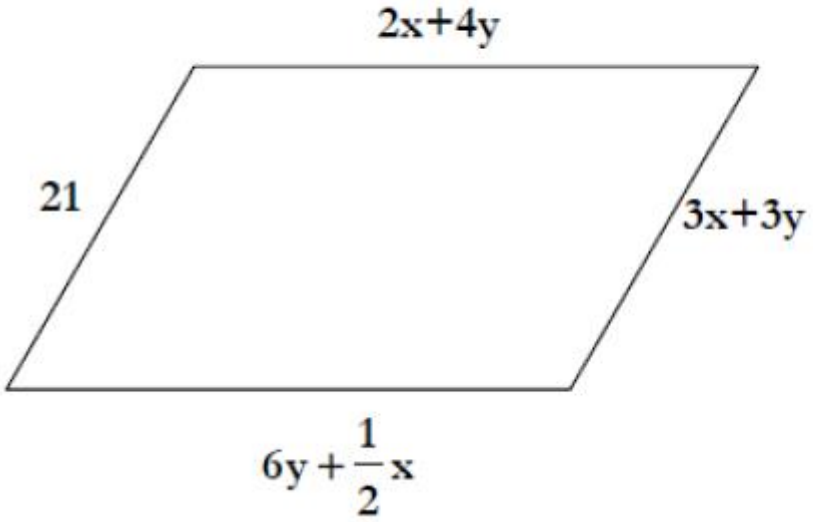


2. In the accompanying diagram, $ABCD$ is a parallelogram, $\overline{DA} \cong \overline{DE}$, and $m\angle B = 70$. Find $m\angle E$.



3. The measures of angles A and B of parallelogram $ABCD$ are in the ratio 2:7. Find the degree measure of angle A.

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



x = _____

y = _____

5. ABCD is a parallelogram. AB = 2x, AD = 4y - 6, BC = 3x. If the perimeter of $\square$ABCD is 180, find the values of x and y.

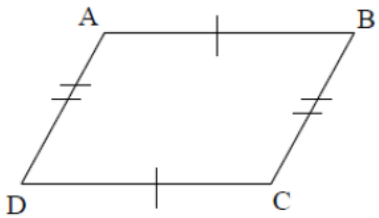
x = _____

y = _____

6. Let E be intersection of $\overline{AC}$ and $\overline{DB}$

$AE = 2x$; $EC = y + 7$

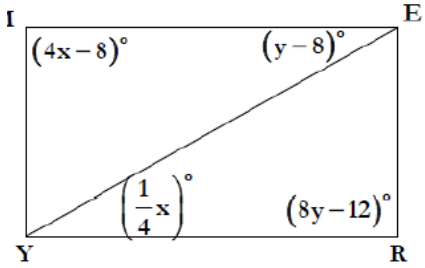
$DE = x$; $DB = 31 - 7y$



x = _____

y = _____

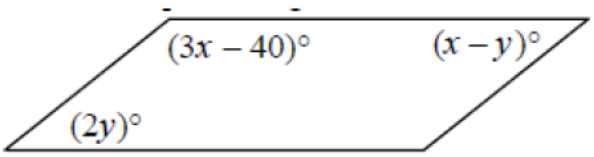
7. **MERY is a parallelogram. Find the value of x and y.**



x = _____

y = _____

8. Determine the values of x and y for which $ABCD$ is a parallelogram.

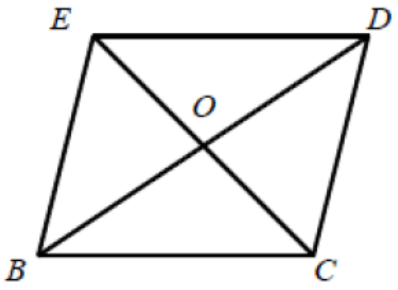


x = _____

y = _____

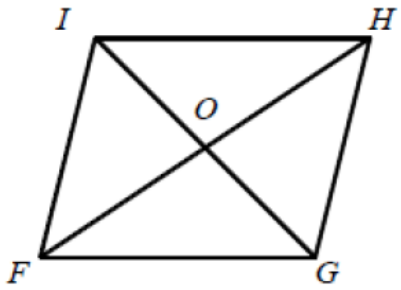
9. Complete the statement for parallelogram *BCDE*. Then state a definition or theorem as the reason.

$\overline{BC} \parallel$ _____



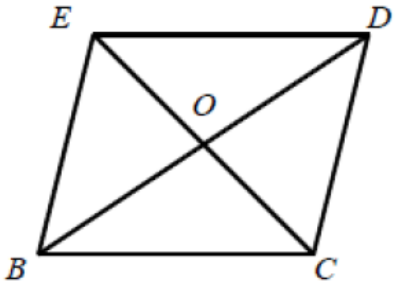
10. Complete the statement for parallelogram *FGHI*. Then state a definition or theorem as the reason.

$\overline{FO} \cong$ _____



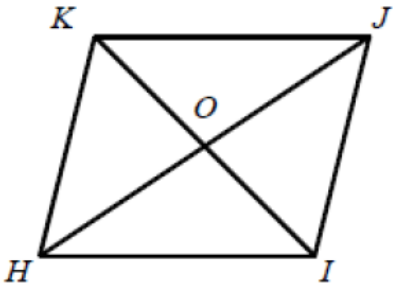
11. Complete the statement for parallelogram *BCDE*. Then state a definition or theorem as the reason.

$\overline{CD} \cong$ _____

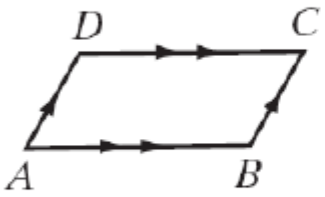


12. Complete the statement for parallelogram HIJK. Then state a definition or theorem as the reason.

$\measuredangle K \cong$ _____

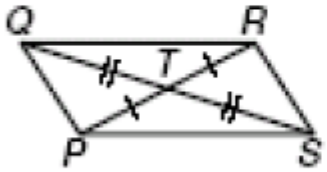


In (a) to (e), the given is marked on the figure.
Tell why each quadrilateral ABCD is a parallelogram.

a. 

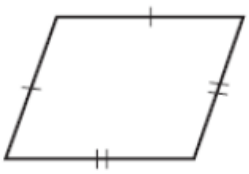
b. 

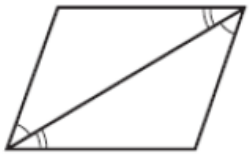
c. 

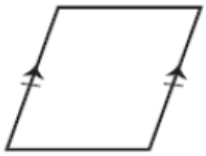
d. 

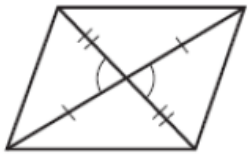
e. 

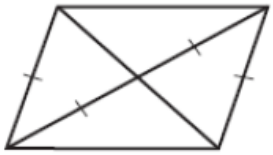
Based on the markings, decide if each figure is a parallelogram.
Justify your answer.

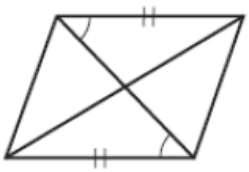
2. 

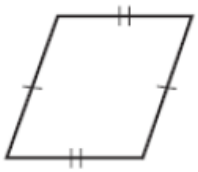
3. 

4. 

5. 

6. 

7. 

8. 

9. 

State whether the information given about quadrilateral $RAND$ is sufficient to determine that it is a parallelogram.

10. $\angle RDC \cong \angle NAC, \angle ARC \cong \angle DNC$

11. $\overline{RD} \cong \overline{AN}, \overline{RN} \cong \overline{RA}$

12. $\angle ACN \cong \angle RCD, \angle RCA \cong \angle DCN$

13. $\overline{RD} \cong \overline{AN}, \overline{RA} \cong \overline{DN}$