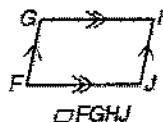Name _____ KEY _____ Date _____ Class _____

Reteach

Properties of Parallelograms

A parallelogram is a quadrilateral with two pairs of parallel sides.
All parallelograms, such as ▱FGHJ, have the following properties.

▱FGHJ

Properties of Parallelograms			
Opposite sides are congruent.	$\overline{FG} \cong \overline{HJ}$ $\overline{GH} \cong \overline{JF}$	Opposite angles are congruent.	$\angle F \cong \angle H$ $\angle G \cong \angle J$
Consecutive angles are supplementary.	$m\angle F + m\angle G = 180°$ $m\angle G + m\angle H = 180°$ $m\angle H + m\angle J = 180°$ $m\angle J + m\angle F = 180°$	The diagonals bisect each other.	$\overline{FP} \cong \overline{HP}$ $\overline{GP} \cong \overline{JP}$

Find each measure.

1. AB   14 cm

B ——→→— C
10 cm   10 cm
A ——→→— D
    14 cm

$AB = 10 \, cm$

2. m∠D

D —→→— C
70°   110°
A 110° —→→— B 70°

$m\angle D = 70°$

Find each measure in ▱LMNP.

3. ML   12 m

4. LP   10 m

5. m∠LPM   62°

6. LN $\overline{LQ} + \overline{QN} = 18 \, m$

7. m∠MLN   32°

8. QN   9 m

M ——10 m—— N
  62°   32°
    Q
      9 m   12 m
L 32° 9 m   62° P
    10 m

— Alt Int ∠s

Alt Int ∠s
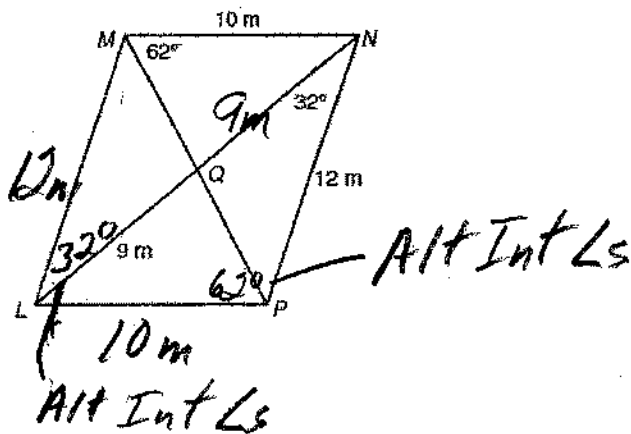
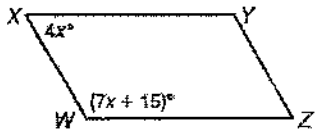## LESSON 6-2 Reteach

Properties of Parallelograms continued

You can use properties of parallelograms to find measures.

WXYZ is a parallelogram. Find m∠X.

|	
$m\angle W + m\angle X = 180°$	If a quadrilateral is a $\square$, then cons. $\angle$ are supp.
$(7x + 15) + 4x = 180°$	Substitute the given values.
$11x + 15 = 180$	Combine like terms.
$11x = 165$	Subtract 15° from both sides.
$x = 15$	Divide both sides by 11.

$m\angle X = (4x)° = [4(15)]° = 60°$

If you know the coordinates of three vertices of a parallelogram, you can use slope to find the coordinates of the fourth vertex.

Three vertices of $\square RSTV$ are $R(3, 1)$, $S(-1, 5)$, and $T(3, 6)$. Find the coordinates of V.
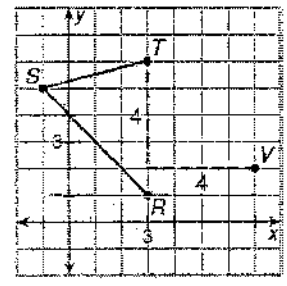
Since opposite sides must be parallel, the rise and the run from S to R must be the same as the rise and the run from T to V.

From S to R, you go down 4 units and right 4 units. So, from T to V, go down 4 units and right 4 units. Vertex V is at $V(7, 2)$.

You can use the slope formula to verify that $\overline{ST} \parallel \overline{RV}$.

CDEF is a parallelogram. Find each measure.
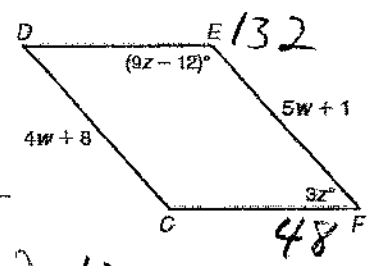
9. CD $4w + 8 = 5w + 1$
   $w = 7$
   $4(7) + 8 = $ ⓧ36

10. EF
   $5(7) + 1 = $ 36

11. m∠F
   $3z + 9z - 12 = 180$
   $12z = 192$
   $z = 16$
   $\angle F = 3(16) = 48$
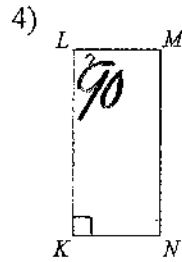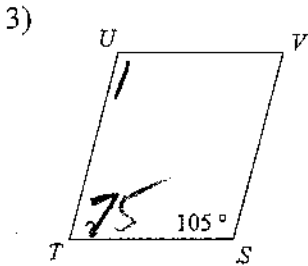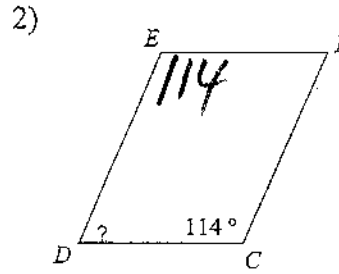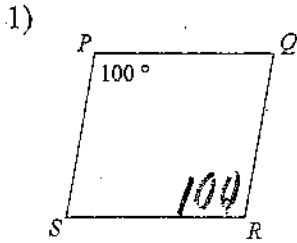
12. m∠E
   $9(16) - 12 =$
   132

The coordinates of three vertices of a parallelogram are given. Find the coordinates of the fourth vertex.

13. $\square ABCD$ with $A(0, 6)$, $B(5, 8)$, $C(5, 5)$

   $D = 0, 3$

14. $\square KLMN$ with $K(-4, 7)$, $L(3, 6)$, $M(5, 3)$
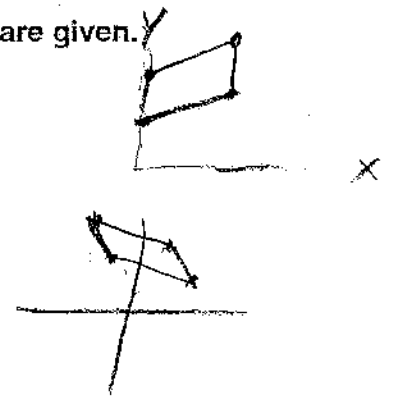
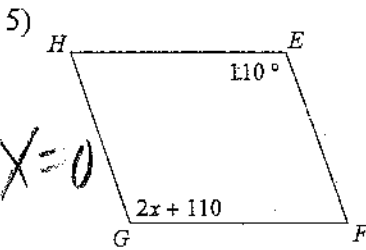
Holt Geometry

Geometry

Properties of Parallelograms

Name _**KEY**_

Date _____ Period ____

Find the measurement indicated in each parallelogram.

1)

P _____ Q
100°

100

S _____ R

2)

E _____ F
114

? 114°
D _____ C

3)

U _____ V
1

75 105°
T _____ S

4)

L _____ M
90

K _____ N

Solve for x. Each figure is a parallelogram.

5)

H _____ E
110°

X=0

2x + 110
G _____ F

6)

F _____ C
117°
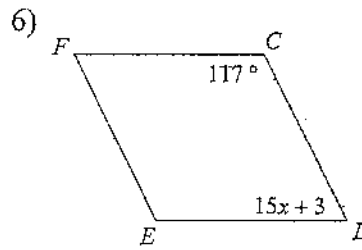
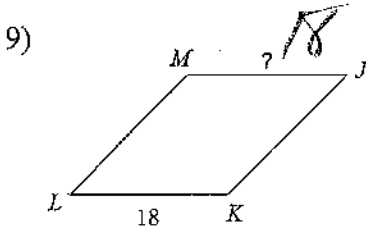15x + 3
E _____ D

$117 + 15x + 3 = 180$
$15x + 120 = 180$
$15x = 60$
$x = 4$

7)

W _____ Z
34 + x

2x + 34
X _____ Y

$34 + x = 2x + 34$
$0 = x$

8)

F _____ G
23x + 4

84°
E _____ H
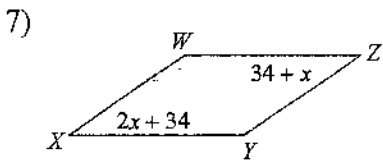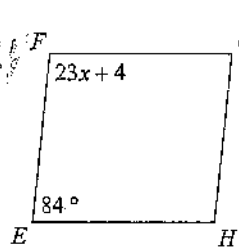
$23x + 4 + 84 = 180$
$23x + 88 = 180$
$23x = 92$
$x = 4$

Find the measurement indicated in each parallelogram.

9)

M ? 18 J

18

L _____ K

10)

V ? 20 S

U 20 T

11)

D ? 17 G

E 17 F

12)

B _____ C

16 ? 16

E _____ D

-1-
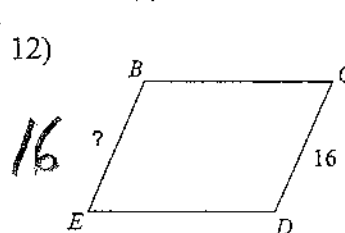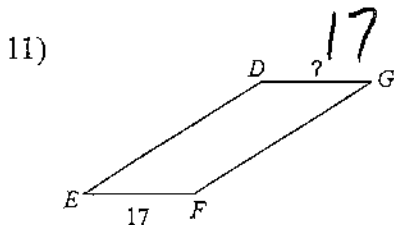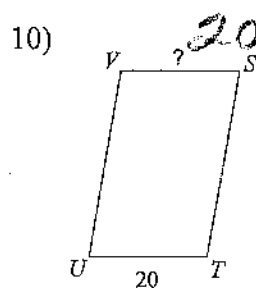
Solve for *x*. Each figure is a parallelogram.   KEY

13)
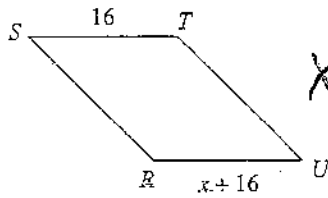
$x + 16 = 16$
$x = 0$

14)
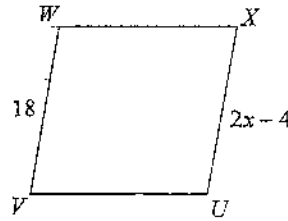
$2x - 4 = 18$
$2x = 22$
$x = 11$

15)
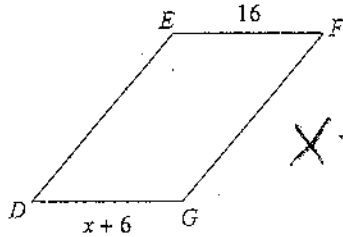
$x + 6 = 16$
$x = 10$

16)
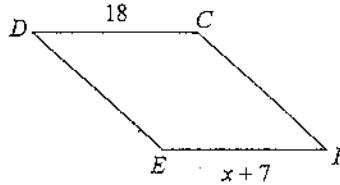
$x + 7 = 18$
$x = 11$
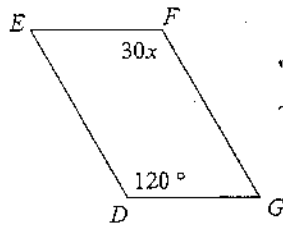
17)
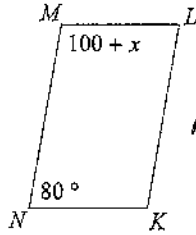
$100 + x + 80 = 180$
$x = 0$

18)
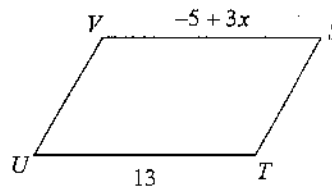
$-5 + 3x = 13$
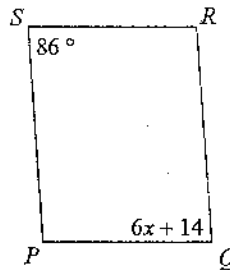$3x = 18$
$x = 6$

19)

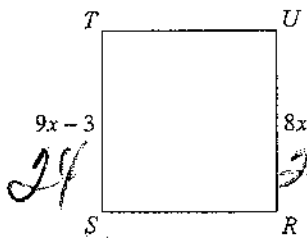$30x = 120$
$x = 4$

20)

$6x + 14 = 86$
$6x = 72$
$x = 12$

Find the measurement indicated in each parallelogram.
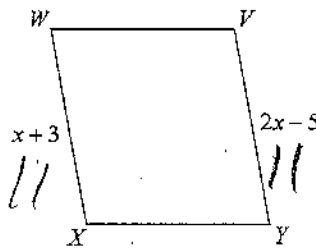
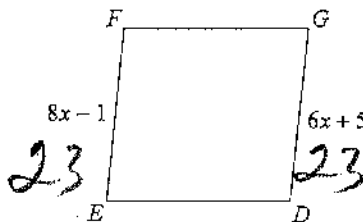21) Find *ST*

$9x - 3 = 8x$
$x = 3$

24   24

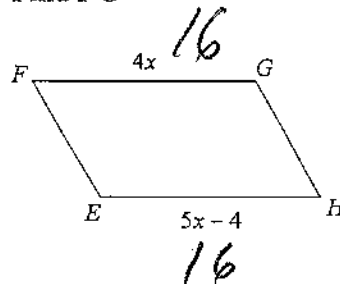22) Find *XW*

$x + 3 = 2x - 5$
$8 = x$

11   11

23) Find *EF*

$8x - 1 = 6x + 5$
$2x = 6$
$x = 3$

23   23

24) Find *FG*

$4x = 5x - 4$
$-x = -4$
$x = 4$

16   16

16

-2-