Polygons, Quadrilaterals, and Special Parallelograms

Quadrilateral

Kite

Trapezoid

Parallelogram

Isosceles Trapezoid

Rhombus

Rectangle

Square
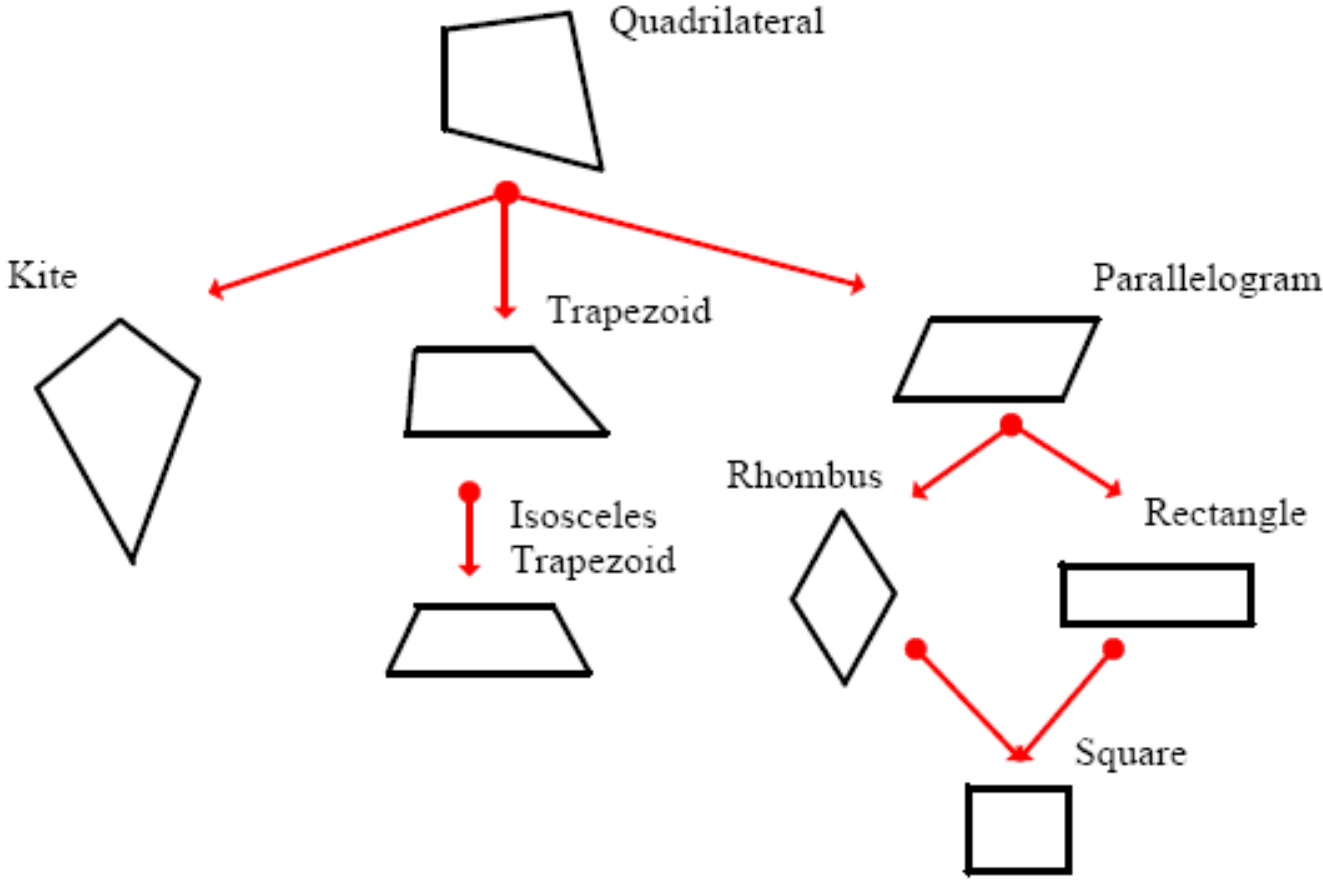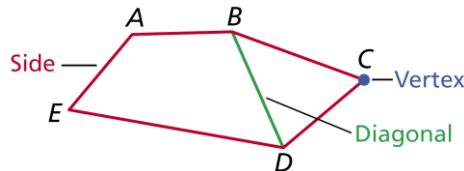
Chapter 6 (Section 1) – Day 1   Angles in polygons

A polygon is a closed plane figure formed by three or more segments that intersect only at their endpoints.
Each segment that forms a polygon is a **side of the polygon**. The common endpoint of two sides is a **vertex of the polygon**. A segment that connects any two nonconsecutive vertices is a **diagonal**.

You can name a polygon by the number of its sides.
The table shows the names of some common polygons.

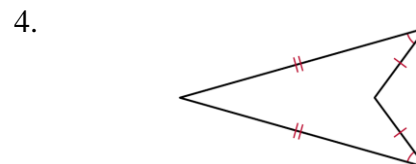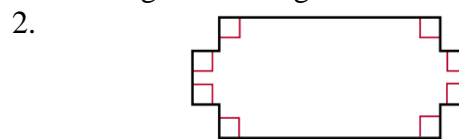| Number of Sides	Name of Polygon
3	Triangle
4	Quadrilateral
5	Pentagon
6	Hexagon
7	Heptagon
8	Octagon
9	Nonagon
10	Decagon
12	Dodecagon
n	n-gon

All the sides are congruent in an equilateral polygon. All the angles are congruent in an equiangular polygon. A **regular polygon** is one that is both equilateral and equiangular. If a polygon is not regular, it is called irregular.

A polygon is **concave** if any part of a diagonal contains points in the exterior of the polygon. If no diagonal contains points in the exterior, then the polygon is **convex**. A regular polygon is always convex.
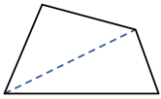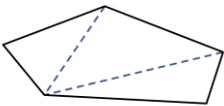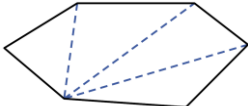
Convex
quadrilateral

Concave
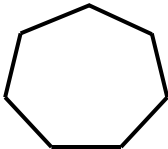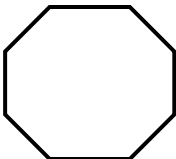quadrilateral
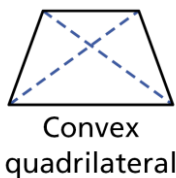
Warm – Up

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

1.

2.

3.

4.

Angles in Polygons

Fill in the accompanying table.

Polygon	Number of Sides	Number of Triangles	Sum of Interior Angle Measures
Triangle	3	1	180°
Quadrilateral	4	2	2 x 180 = 360°
Pentagon			
Hexagon			
Heptagon			
Octagon			

Look for a pattern in the table. Write a rule for finding the sum of the measures of the interior angles of a polygon with n sides.
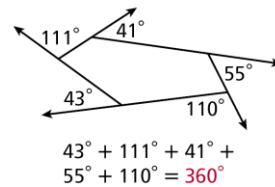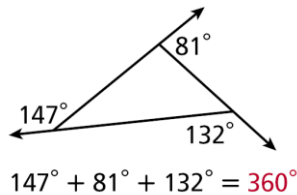
Examples:
1. Find the sum of the interior angles of a decagon.

2. What is the measure of each angle in a regular octagon?

Exterior Angles

Refer to the two polygons below. What do you notice about the exterior angles of any polygon?

$81°$

$147°$

$132°$

$147° + 81° + 132° = 360°$

$111°$ $41°$

$55°$

$43°$ $110°$

$43° + 111° + 41° + 55° + 110° = 360°$

Theorem 6.2 **Polygon Exterior Angles Sum**

For Your
FOLDABLE

The sum of the exterior angle measures of a convex polygon, one angle at each vertex, is 360.

Example
$m\angle 1 + m\angle 2 + m\angle 3 + m\angle 4 + m\angle 5 + m\angle 6 = 360$

6
1
5
2
4
3

$$\frac{e}{1} = \frac{360}{n}$$

Examples:

3. Find the measure of each exterior angle of a polygon with 18 sides.

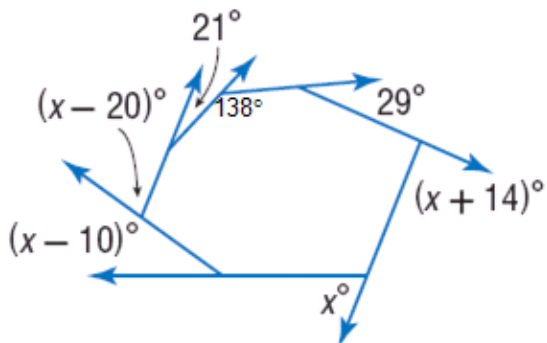4. The measure of an exterior angle of a convex regular polygon is 36°. Find the number of sides of the polygon.

5. How many sides does a regular polygon have if each interior angle measures 160°?

6. The sum of the interior angles of a convex regular polygon measure 1980°, how many sides does the polygon have?

7. Find the value of x.
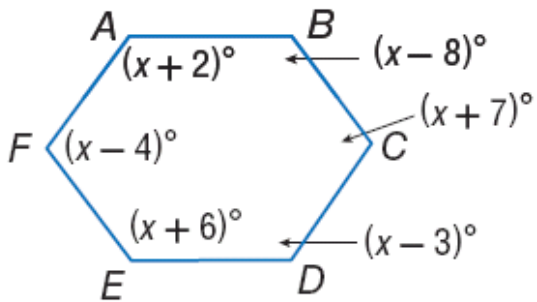
8. Find x:

Summary

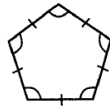## Properties and Attributes of Polygons — *Lesson 6-1*

Why? Understanding properties of polygons and their angle sums is fundamental to successful work with quadrilaterals.
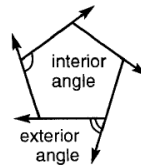
Remember

A polygon is *convex* if a segment connecting any two points in the interior of the polygon is completely in the interior.

A polygon that is not convex is *concave*.

A *regular* polygon is equilateral and equiangular.

interior angle

exterior angle

Theorem
The sum of the interior angle measures of a convex polygon with n sides

$$S_i = (n-2)180$$

Theorem
The sum of the exterior angle measures, one angle at each vertex, of a convex polygon is 360°.

$S_e = 360$ (always – no matter what the polygon)

Theorem
Interior Angle + Exterior Angle = 180°

Theorem

$$\frac{e}{1} = \frac{360}{n}$$

Homework

GUIDED PRACTICE

1. **Vocabulary** Explain why an equilateral polygon is not necessarily a *regular* polygon.

Tell whether each outlined shape is a polygon. If it is a polygon, name it by the number of its sides.
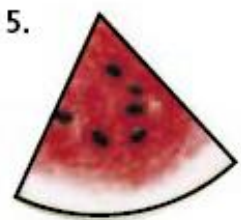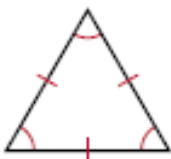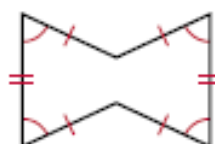
2.

3.

4.

5.

Tell whether each polygon is regular or irregular. Tell whether it is concave or convex.
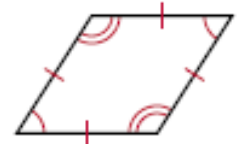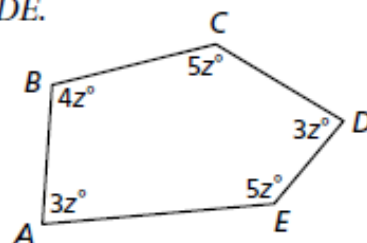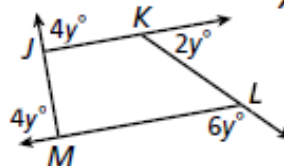
6.

7.

8.

9. Find the measure of each interior angle of pentagon *ABCDE*.

10. Find the measure of each interior angle of a regular dodecagon.

11. Find the sum of the interior angle measures of a convex 20-gon.
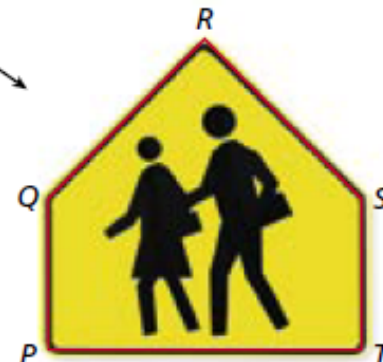
12. Find the value of *y* in polygon *JKLM*.

13. Find the measure of each exterior angle of a regular pentagon.
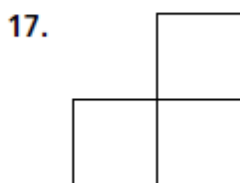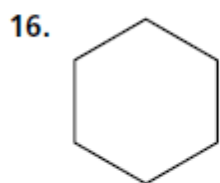
Safety Use the photograph of the traffic sign for Exercises 14 and 15.

14. Name the polygon by the number of its sides.

15. In the polygon, $\angle P$, $\angle R$, and $\angle T$ are right angles, and $\angle Q \cong \angle S$. What are $m\angle Q$ and $m\angle S$?
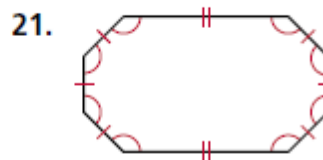
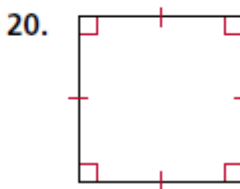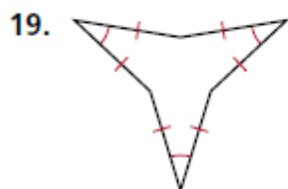## PRACTICE AND PROBLEM SOLVING

Tell whether each figure is a polygon. If it is a polygon, name it by the number of its sides.

16.

17.

18.

Tell whether each polygon is regular or irregular. Tell whether it is concave or convex.

19.

20.

21.

22. Find the measure of each interior angle of quadrilateral *RSTV*.

23. Find the measure of each interior angle of a regular 18-gon.

24. Find the sum of the interior angle measures of a convex heptagon.

25. Find the measure of each exterior angle of a regular nonagon.

26. A pentagon has exterior angle measures of $5a°$, $4a°$, $10a°$, $3a°$, and $8a°$. Find the value of *a*.
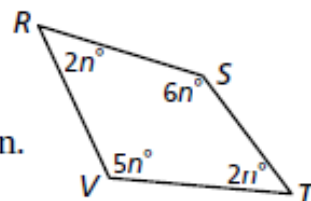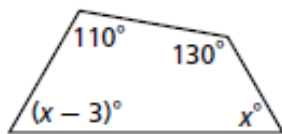

Crafts The folds on the lid of the gift box form a regular hexagon. Find each measure.

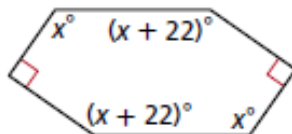**27.** m∠*JKM*

28. m∠*MKL*
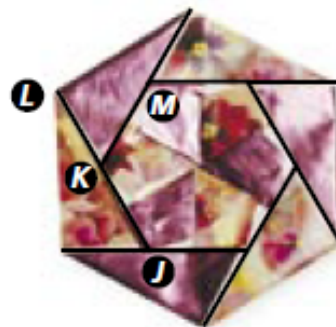
Algebra Find the value of *x* in each figure.

29.

30.

31.

Find the number of sides a regular polygon must have to meet each condition.

32. Each interior angle measure equals each exterior angle measure.

33. Each interior angle measure is four times the measure of each exterior angle.

34. Each exterior angle measure is one eighth the measure of each interior angle.

Name the convex polygon whose interior angle measures have each given sum.

35. 540°   **36.** 900°   **37.** 1800°   **38.** 2520°

Multi-Step An exterior angle measure of a regular polygon is given. Find the number of its sides and the measure of each interior angle.
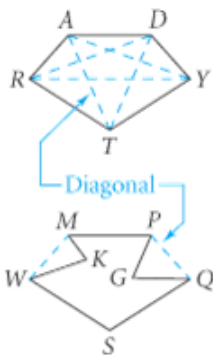
39. 120°   **40.** 72°   **41.** 36°   **42.** 24°

8

Polygons are classified as convex or concave.

A **convex polygon** has no diagonal with points outside the polygon.

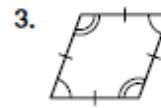A **concave polygon** has at least one diagonal with points outside the polygon.

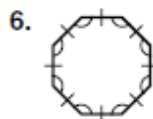| Number of Sides	Polygon
3	triangle
4	quadrilateral
5	pentagon
6	hexagon
7	heptagon
8	octagon
9	nonagon
10	decagon
12	dodecagon
n	n-gon

Tell whether each polygon is regular or irregular. Then tell whether it is concave or convex.

1.

_____

2.

_____

3.

_____
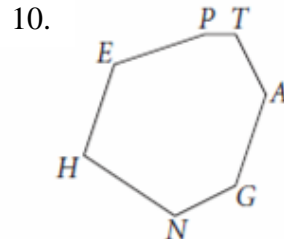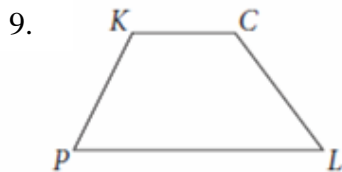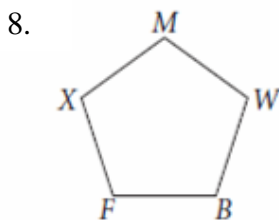
5.

_____

6.

_____

7.

_____
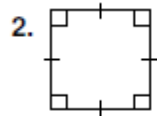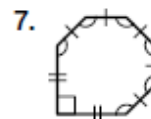
Name each polygon by its vertices.

8.

9.

10.

9

EXAMPLE **Finding a Polygon Angle Sum**

Find the sum of the measures of the angles of a 15-gon.

For a 15-gon, $n = 15$.

$$\text{Sum} = (n - 2)180 \quad \text{Polygon Angle-Sum Theorem}$$
$$= (15 - 2)180 \quad \text{Substitute.}$$
$$= 13 \cdot 180 \quad \text{Simplify.}$$
$$= 2340$$

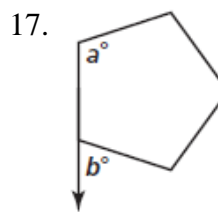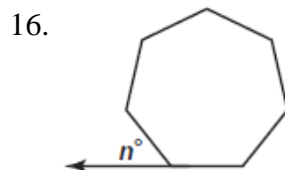The sum of the measures of the angles of a 15-gon is 2340.

Find the sum of the measures of the interior angles of each convex polygon.

11. 11-gon   12. 2. 14-gon   14. 3. 17-gon

Find the values of the variables for each polygon. Each is a regular polygon.

15.

16.

17.

Find the value of x.

18.

19.
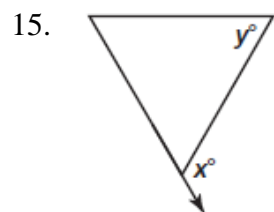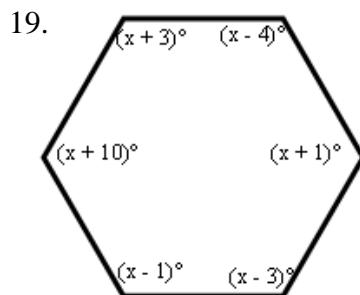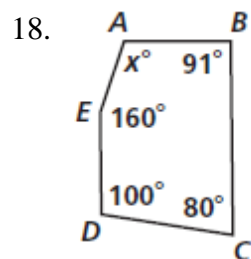
Not drawn to scale.

Find the measures of an exterior angle given the number of sides of each regular polygon.

20. 16   21. 24   23. 30

The measure of an interior angle of a regular polygon is given. Find the
number of sides in the polygon.

24. 144   25. 156   26. 160

The sum of the measures of the angles of a polygon with n sides is given. Find n.

27. 2160°   28. 2880°   29. 5760°

Properties of Parallelograms   Lesson 6-2

Properties of Parallelograms

In a parallelogram,

1. The opposite sides are parallel by definition.
2. The opposite sides are congruent.
3. The opposite angles are congruent.
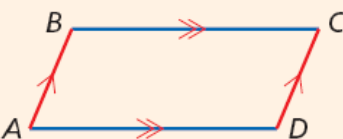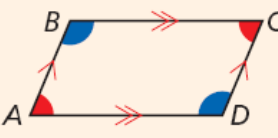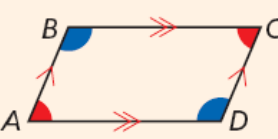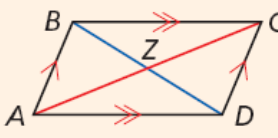4. The diagonals bisect each other.
5. Any pair of consecutive angles are supplementary.
6. Each diagonal separates it into two congruent triangles.

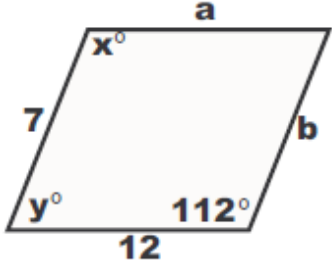**Theorem 6-2-1** (**Properties of Parallelograms**)

THEOREM	HYPOTHESIS	CONCLUSION
If a quadrilateral is a parallelogram, then its opposite sides are congruent. $(\square \rightarrow$ opp. sides $\cong)$		$\overline{AB} \cong \overline{CD}$ $\overline{BC} \cong \overline{DA}$
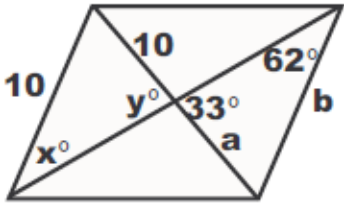
Theorems (**Properties of Parallelograms**)
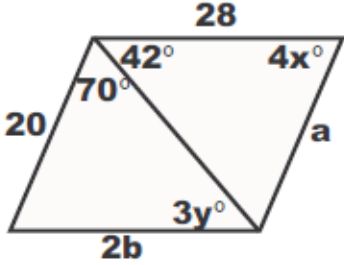
	THEOREM	HYPOTHESIS	CONCLUSION
6-2-2	If a quadrilateral is a parallelogram, then its opposite angles are congruent. $(\square \rightarrow$ opp. $\angle$s $\cong)$		$\angle A \cong \angle C$ $\angle B \cong \angle D$
6-2-3	If a quadrilateral is a parallelogram, then its consecutive angles are supplementary. $(\square \rightarrow$ cons. $\angle$s supp.$)$		$m\angle A + m\angle B = 180°$ $m\angle B + m\angle C = 180°$ $m\angle C + m\angle D = 180°$ $m\angle D + m\angle A = 180°$
6-2-4	If a quadrilateral is a parallelogram, then its diagonals bisect each other. $(\square \rightarrow$ diags. bisect each other$)$		$\overline{AZ} \cong \overline{CZ}$ $\overline{BZ} \cong \overline{DZ}$

12
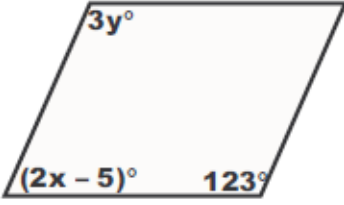
Level A:

In exercises 14 – 16, each quadrilateral is a parallelogram. Find the indicated values.
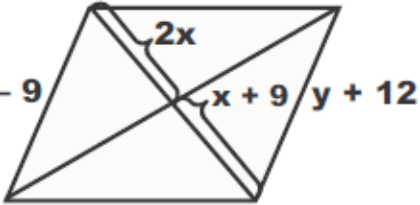
| 14. a = _____

 b = _____

 x = _____

 y = _____ | |

| 15. a = _____

 b = _____

 x = _____

 y = _____ | |

| 16. a = _____

 b = _____

 x = _____

 y = _____ | |

In exercises 17 – 19, what values must 'x' and 'y' have to make each quadrilateral a parallelogram?

| 17. x = _____

 y = _____ | |

| 18. x = _____

 y = _____ | |

| 19. x = _____

 y = _____ | |

Level B

20.

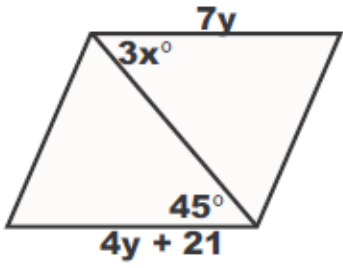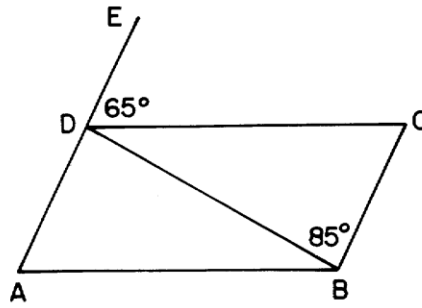In the accompanying diagram of parallelogram $ABCD$, side $\overline{AD}$ is extended through D to E and $\overline{DB}$ is a diagonal. If m$\angle EDC = 65$ and m$\angle CBD = 85$, find m$\angle CDB$.

21. In parallelogram $LMNO$, an exterior angle at vertex O measures $72°$. Find the measure, in degrees, of $\angle L$.

Summary

Properties of Parallelograms   Lesson 6-2

Why? The properties of parallelograms make these figures useful in mechanics and construction.
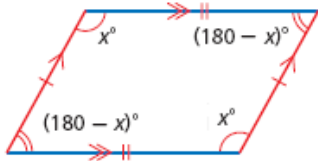
A quadrilateral is a parallelogram → all of these properties are true.

- Opposite sides are parallel.
- Opposite sides are congruent.
- Opposite angles are congruent.
- Consecutive angles are supplementary.
- Diagonals bisect each other.

$x°$ $(180 - x)°$
$(180 - x)°$ $x°$

Homework

Properties of Parallelograms
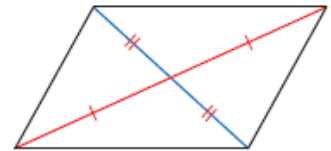
Parallelograms have all of these properties:
—both pairs of opposite sides parallel
—both pairs of opposite sides congruent
—both pairs of opposite angles congruent
—diagonals bisect each other

Shade the answers below to discover the corporation whose success is based on the invention of Chester Carlson.

1. If CA = 10, EK = _____ .
2. If CK = 18, CX = _____ .
3. If ∠CEK = 85°, ∠CAK = _____ .
4. If ∠ECA = 130°, ∠CAK = _____ .
5. If ∠1 = 40° and ∠2 = 65°, ∠EKA = _____ .
6. If EX = 15, EA = _____ .
7. If CE = 12, KA = _____ .
8. If ∠8 = 25° and ∠7 = 35°, ∠EKA = _____ .
9. If CX = 5x − 44 and XK = 2x + 25, then x = _____ .
10. If ∠7 = 30° and ∠4 = 40°, ∠EKA = _____ .
11. If CE = 3x + 5 and AK = 7x − 15, then x = _____ .
12. If ∠ECA = 6x − 20 and ∠EKA = 2x + 80, then x = _____ .
13. If ∠CAE = 35°, ∠AEK = _____ .
14. If ∠2 = 100° and ∠3 = 20°, ∠CXA = _____ .
15. If ∠CEK = 80°, ∠EKA = _____ .
16. ∠1 + ∠2 + ∠3 + ∠4 + ∠5 + ∠6 + ∠7 + ∠8 = _____ .
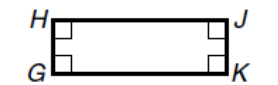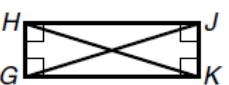
Rectangles

<u>Definition:</u> A **rectangle** is a parallelogram with one right angle.

Properties of a Rectangle

1. A rectangle has all the properties of a parallelogram.
2. A rectangle contains four right angles and is therefore equiangular.
3. The diagonals of a rectangle are congruent.

Properties of Rectangles	
GHJK is a parallelogram.	$\overline{GJ} \cong \overline{HK}$
If a quadrilateral is a rectangle, then it is a parallelogram.	If a parallelogram is a rectangle, then its diagonals are congruent.

Since a rectangle is a parallelogram, a rectangle also has all the properties of parallelograms.

PART 3. RECTANGLES
Quadrilateral WXYZ is a rectangle. Use this rectangle for problems 20 – 22.
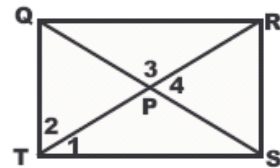
_____ 20.	If WY = 19, then ZX = ?	
_____ 21.	If WY = 19, then WT = ?	
_____ 22.	If TX = 4.5, then WY = ?	
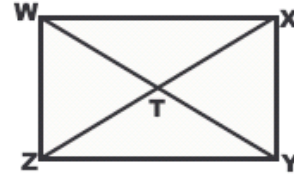
_____ 23.	Rectangle GALS has diagonals $\overline{GL}$ and $\overline{AS}$. If GL = 3a + 6 and AS = 5a – 18, then a = ?
_____ 24.	Rectangle BOYS has diagonals $\overline{BY}$ and $\overline{OS}$, which intersect at X. If m∠XOB = 70°, then m∠YSO = ? and m∠BSO = ?

Use rectangle QRST and the given information to solve problems 25 – 26.

_____ 25.	QP = 6, find RT.	
_____ 26.	QT = 8, find RS.	

Solve each of the following.

_____ 27.	In rectangle RAIN below, YR = 3x and NY = 18, find 'x'.
_____ 28.	m∠1 = 55°, **find the measures of <2, <3 and <4.**
_____ 29.	m∠3 = 110°, find the measures of ∠1, ∠2, and

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Practice Problems

a. If AE = 5, BC = 6, and DC = 8, find AC, BD, AD, and AB.

AC = _____

BD = _____

AD = _____

AB = _____
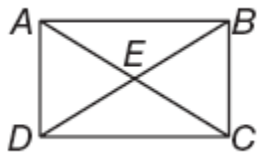
b. If BD = 3x − 7 and CA = x + 5, find BD, ED, CA, and AE.

BD = _____

ED = _____

CA = _____

AE = _____
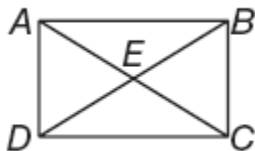
c. Find the measures of the numbered angles in each rectangle.

m ∠ 1 = _____°

m ∠ 2 = _____°

m ∠ 3 = _____°

m ∠ 1 = _____°

m ∠ 2 = _____°

m ∠ 3 = _____°

m ∠ 4 = _____°
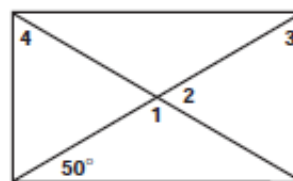
d.

If $m\angle DAC = 2x + 4$ and $m\angle BAC = 3x + 1$, find $m\angle BAC$.
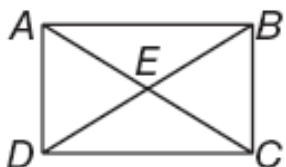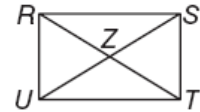
Homework

NAME _____ DATE _____ PERIOD _____
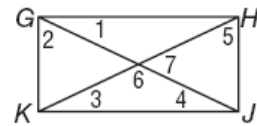
6-4 Practice

Rectangles

ALGEBRA Quadrilateral *RSTU* is a rectangle.

1. If $UZ = x + 21$ and $ZS = 3x - 15$, find US.

2. If $RZ = 3x + 8$ and $ZS = 6x - 28$, find UZ.

3. If $RT = 5x + 8$ and $RZ = 4x + 1$, find ZT.

4. If $m\angle SUT = 3x + 6$ and $m\angle RUS = 5x - 4$, find $m\angle SUT$.

5. If $m\angle SRT = x + 9$ and $m\angle UTR = 2x - 44$, find $m\angle UTR$.

6. If $m\angle RSU = x + 41$ and $m\angle TUS = 3x + 9$, find $m\angle RSU$.

Quadrilateral *GHJK* is a rectangle. Find each measure if $m\angle 1 = 37$.

7. $m\angle 2$ 8. $m\angle 3$

9. $m\angle 4$ 10. $m\angle 5$

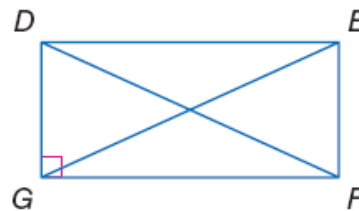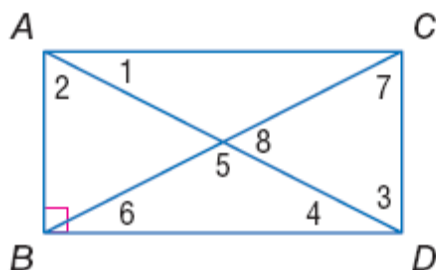11. $m\angle 6$ 12. $m\angle 7$

Warm - Up

1. Quadrilateral *DEFG* is a rectangle.
   If $FD = 3x - 7$ and $EG = x + 5$, find EG.

2. Quadrilateral *ABCD* is a rectangle. Find each
   measure if $m\angle 2 = 40$.

m $\angle$ 1 = _____°	m $\angle$ 5 = _____°
m $\angle$ 2 = 40°	m $\angle$ 6 = _____°
m $\angle$ 3 = _____°	m $\angle$ 7 = _____°
m $\angle$ 4 = _____°	m $\angle$ 8 = _____°

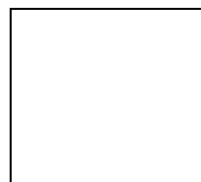| **Rhombus**	**Square**
Definition: A **rhombus** is a parallelogram with 2 congruent <u>consecutive</u> sides.	Definition: A **square** is a rectangle with 2 congruent <u>consecutive</u> sides.
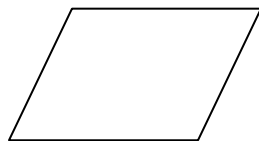
Properties of a Rhombus

1. A rhombus has all the properties of a parallelogram.
2. A rhombus is equilateral.
3. The diagonals of a rhombus are perpendicular to each other.
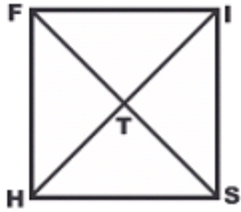4. The diagonals of a rhombus bisect its angles.

Properties of a Square

1. A square has all the properties of a rectangle.
2. A square has all the properties of a rhombus.

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## PART 4. SQUARES & RHOMBI
Find the indicated measure.

_____ 30.	FISH is a square with IT = 6. Find IH and IS.	
_____ 31.	If MNOP is a square, what is m∠MNP?	

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

_____ 32.	If m∠AEB = $(3x)°$, find 'x'.
_____ 33.	If m∠BAC = $(9x)°$, find 'x'.
_____ 34.	If AB = 2x + 4 and CD = 3x − 5 , find BC. Find BC and BD.
_____ a.	The perimeter of the square is 32 cm. Find the length of diagonal DB.
_____ b.	DE = 10, find AD.
_____ c.	The area of the square is 16. Find EC.

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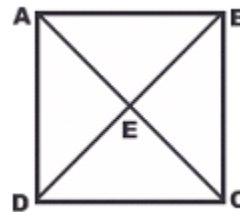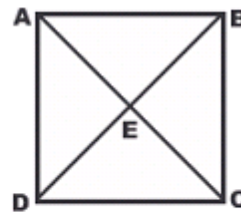
Find the indicated value.
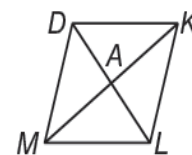
_____35.		ACKJ is a rhombus. AC = 6y + 4, CK = 5y + 8, and KJ = 3y + 16. Find the value of 'y'.

_____ a.		**Quadrilateral *DKLM* is a rhombus.** If $DK = 8$, find KL.
_____ b.		Quadrilateral *DKLM* is a rhombus. If $DA = 4x$ and $AL = 5x - 3$, find DL.

_____ c.	The diagonals of a Rhombus are 10, and 24 cm. Find the length of the side of the rhombus.

m∠1 =_____° m∠2 =_____° m∠3 =_____° m∠4 =_____°	**Find the measures of the numbered angles in each rhombus.**
m∠1 =_____° m∠2 =_____° m∠3 =_____° m∠4 =_____°	**Find the measures of the numbered angles in each rhombus.**

Properties of the Rectangle, Rhombus, and Square

| **Rectangle**	**Rhombus**
all properties of parallelograms	all properties of parallelograms
plus	plus
—all diagonals are congruent	—all sides are congruent
—all angles measure 90°	—all diagonals are perpendicular
	—all diagonals bisect opposite angles

Square
all properties of
—parallelogram
—rectangle
—rhombus

Use the properties to solve for the missing measures in the diagrams.
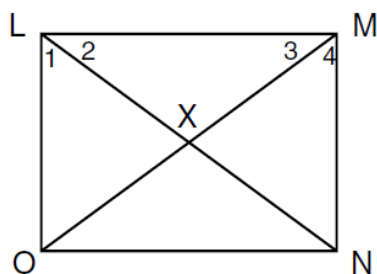
1. LMNO is a rectangle. If LM = 16, MN = 12, and ∠1 = 60°, find the following:

   a. ON = _____   d. LX = _____   g. OX = _____
   b. OL = _____   e. ∠LON = _____   h. ∠3 = _____
   c. LN = _____   f. ∠2 = _____   i. ∠4 = _____

2. WXYZ is a rhombus. If WX = 4 and ∠WXY = 60°, find the following:

   a. XY = _____   d. ∠2 = _____   g. WO = _____
   b. ∠ZWX = _____   e. ∠3 = _____   h. OX = _____
   c. ∠1 = _____   f. ∠4 = _____   i. WY = _____
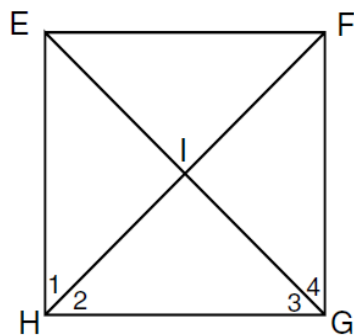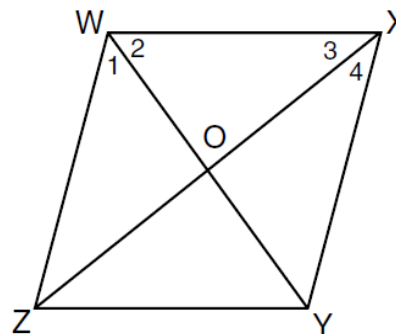
3. EFGH is a square. If EF = 10, find the following:

   a. FG = _____   d. EI = _____   g. ∠1 = _____
   b. ∠EFG = _____   e. IF = _____   h. ∠3 = _____
   c. EG = _____   f. ∠EIF = _____   i. HF = _____

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Chapter 6 (Section 6) – Day 6   Trapezoids

Warm - Up
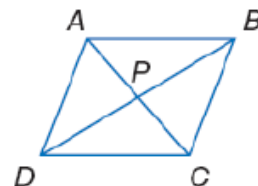
1. *ABCD* is a rhombus. If $PB = 12$, $AB = 15$, and $m\angle ABD = 24$, find each measure.

   23 *AP*   **24.** *CP*
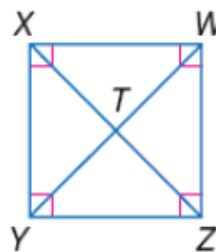
   25. $m\angle BDA$ **26.** $m\angle ACB$

2. *WXYZ* is a square. If $WT = 3$, find each measure.

   27. *ZX*   **28.** *XY*
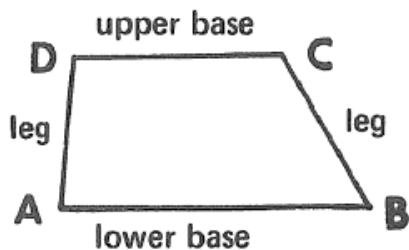
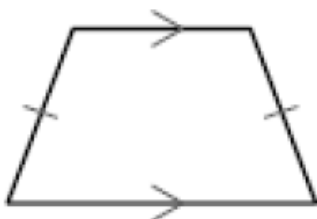   **29.** $m\angle WTZ$ **30.** $m\angle WYX$

<u>Definition:</u> A **trapezoid** is a quadrilateral with one pair of parallel sides.

<u>Definition:</u> An **Isosceles trapezoid** is a trapezoid with non parallel sides congruent.

- In an isosceles trapezoid, each pair of base angles is congruent.
- If a trapezoid has one pair of congruent base angles, then it is isosceles.
- A trapezoid is isosceles if and only if its diagonals are congruent.

Theorems — Isosceles Trapezoids
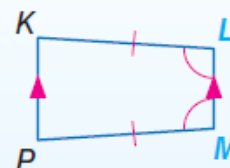
For Your FOLDABLE

6.21 If a trapezoid is isosceles, then each pair of base angles is congruent.

Example If trapezoid *FGHJ* is isosceles, then
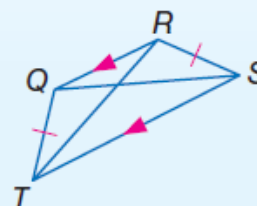$\angle G \cong \angle H$ and $\angle F \cong \angle J$.

6.22 If a trapezoid has one pair of congruent base angles, then it is an isosceles trapezoid.

Example If $\angle L \cong \angle M$, then trapezoid *KLMP* is isosceles.

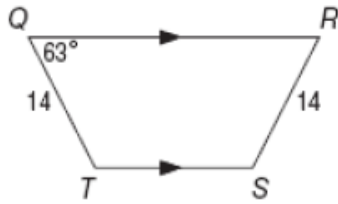**6.23** A trapezoid is isosceles if and only if its diagonals are congruent.

Example If trapezoid *QRST* is isosceles, then
$\overline{QS} \cong \overline{RT}$. Likewise, if $\overline{QS} \cong \overline{RT}$, then trapezoid *QRST* is isosceles.
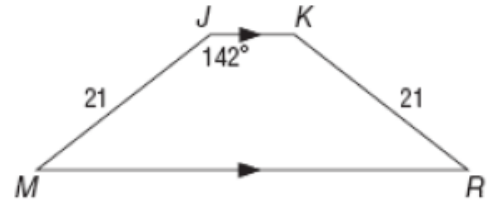
25

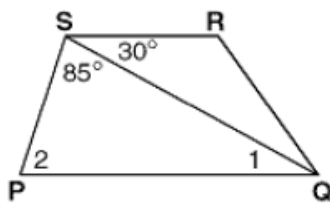# Practice Problems
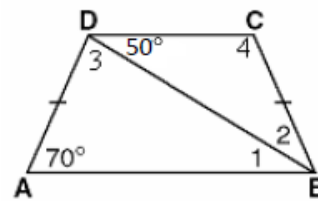
ALGEBRA Find each measure.

1. $m\angle S$

2. $m\angle M$

3. Trapezoid PQRS. Find the m∠1 and ∠2.

$$m\angle 1 = \underline{\quad\quad}°$$

$$m\angle 2 = \underline{\quad\quad}°$$

4. Isosceles Trapezoid ABCD.

$$m\angle 1 = \underline{\quad\quad}°$$

$$m\angle 2 = \underline{\quad\quad}°$$

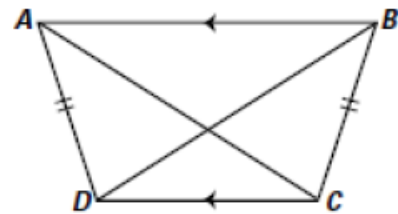$$m\angle 3 = \underline{\quad\quad}°$$

$$m\angle 4 = \underline{\quad\quad}°$$
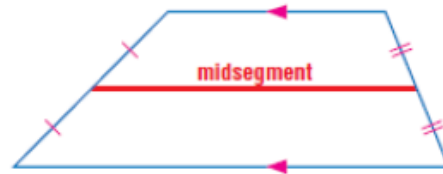
5. Find the values of the variables.

$$DF = 4x, EG = 2x + 16$$
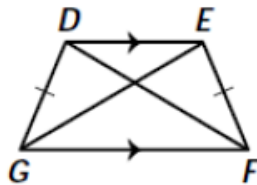
6. $AC = 7x - 15,\ BD = 4x + 15$

The **midsegment of a trapezoid** is the segment that connects the midpoints of the legs of the trapezoid. The theorem below relates the midsegment and the bases of a trapezoid.
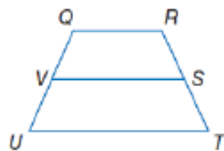

$$2m = b_1 + b_2$$

- The midsegment of a trapezoid is parallel to each base. $\overline{AB} \parallel \overline{MN}$ and $\overline{AB} \parallel \overline{LP}$

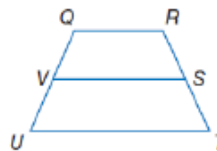- The length of the midsegment is one-half the sum of the length of the bases.
$AB = \frac{1}{2}(MN + LP)$

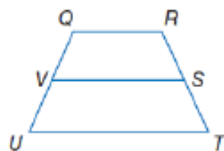## For trapezoid $QRTU$, V and S are midpoints of the legs.

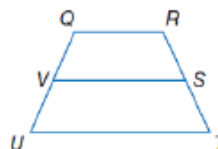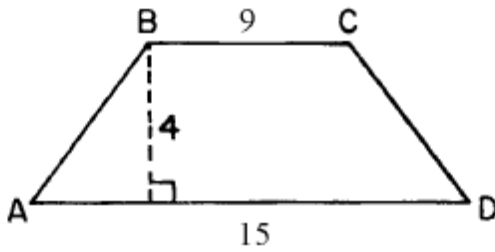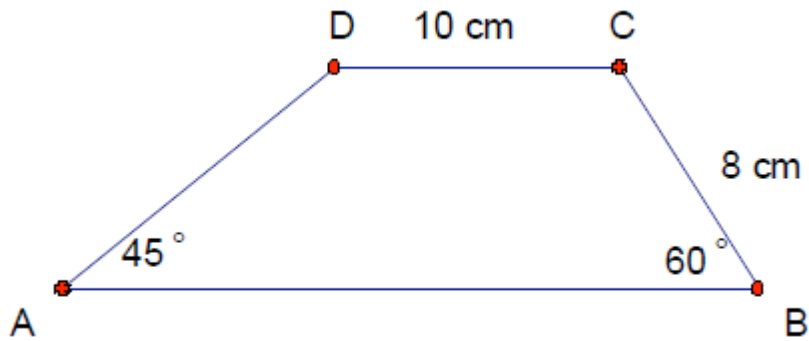|	
7. If $QR = 12$ and $UT = 22$, find VS. 	8. If $QR = 4$ and $UT = 16$, find VS.
9. If $VS = 9$ and $UT = 12$, find QR. 	10. If RQ = 3x - 3 , UT = 4x +2, and VS = 10, find VS.

11. In the accompanying figure, isosceles trapezoid
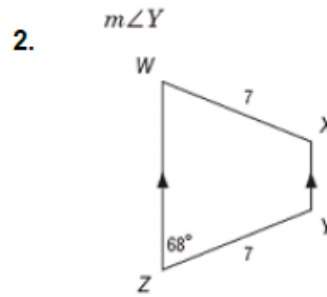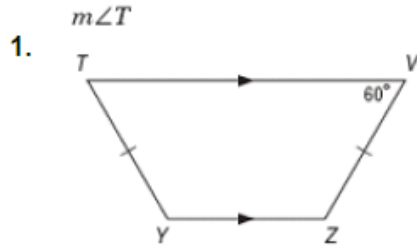   ABCD has bases of lengths 9 and 15 and an
   altitude of length 4. Find AB.

12. Find the length of base $\overline{AB}$ of trapezoid ABCD.

Homework – Trapezoids

Find each measure.

1. $m\angle T$

2. $m\angle Y$

3. Trapezoid PQRS. Find the m∠1 and ∠2.
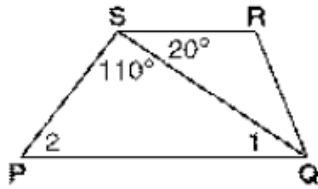
4. ABCD is an isosceles trapezoid. Find the m∠1 and ∠2.
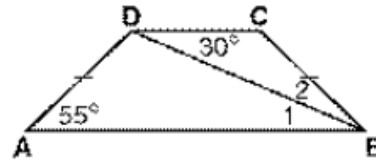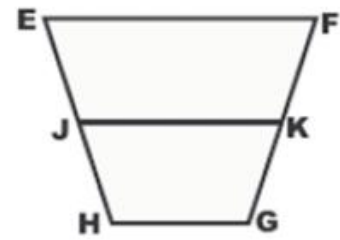

5. MATH is an isosceles trapezoid with $\overline{AT} \parallel \overline{MH}$. If m∠M = $(3x - 9)°$ and m∠H = $(x + 3)°$, find the value of 'x'.

6. Let AC = 25 and DB = 5x.
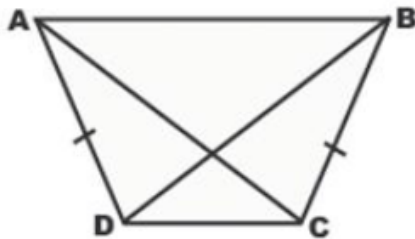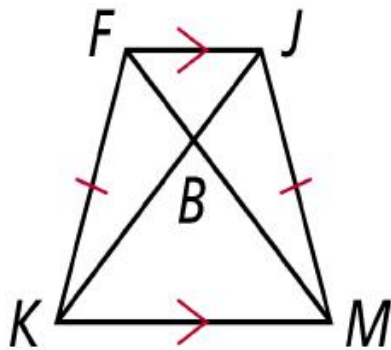
7. If EH = FG, and m∠E = 65°, then m∠G = ?
and m∠GKJ = ?

8. *KB* = *12* and *MF* = 30. Find *FB*.

9. *JN* = 10, and *NL* = 14. Find *KM*.
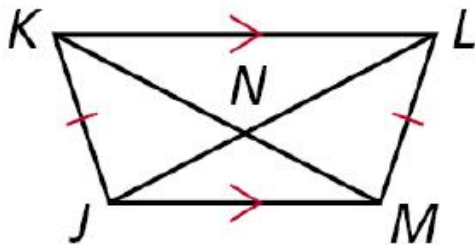
10. Find the value of x.

$2x - 7$

$x + 1$

$x - 3$
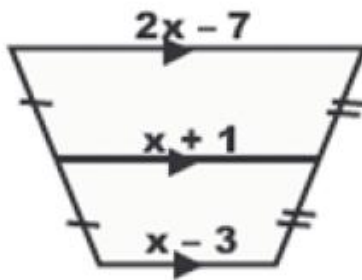
11. The cross section of an attic is in the shape of an isosceles trapezoid, as shown in the accompanying figure. If the height of the attic is 9 feet, $BC = 12$ feet, and $AD = 28$ feet, find the length of $\overline{AB}$ to the *nearest foot*.
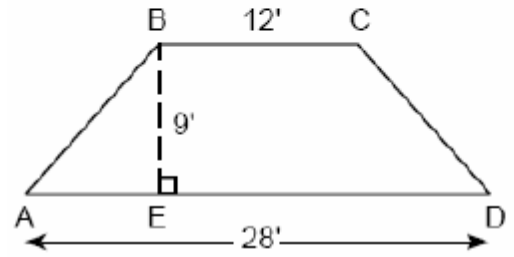
12. The accompanying diagram shows ramp $\overline{RA}$ leading to level platform $\overline{AM}$, forming an angle of 45° with level ground. If platform $\overline{AM}$ measures 2 feet and is 6 feet above the ground. Find RA.
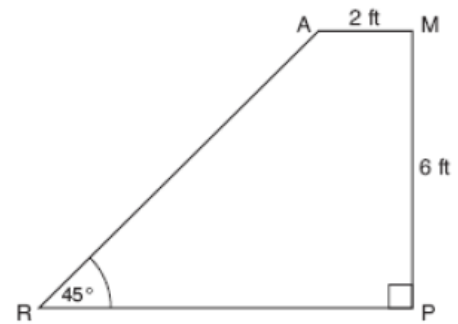
13. If PQ = 15, and SR = 9, find ST and PS.
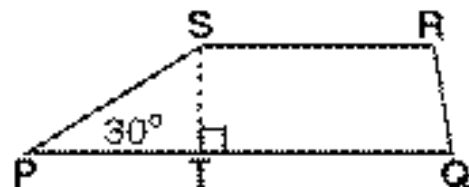
The Quadrilateral Family

Quadrilateral
1. four sided polygon
2. sum of interior angles is 360°

Trapezoid
1. quad with only one pair of parallel sides
2. median is parallel to bases and ½ sum of bases

Isosceles Trapezoid
1. trapezoid
2. non-parallel sides (legs) ≅
3. base angles ≅
4. diagonals ≅
5. opposite angles supplementary

Kite
1. quad with 2 pair adjacent sides ≅
2. diagonals perpendicular
3. 1 diagonal forms 2 isosceles triangles
4. other diagonal forms 2 congruent triangles

Parallelogram
SIDES:
1. opposite sides parallel
2. opposite sides ≅
ANGLES:
3. opposite angles ≅
4. consecutive angles supplementary
DIAGONALS:
5. diagonals bisect each other
6. diagonals form ≅ triangles

Rectangle
1. parallelogram
2. 4 right angles
3. diagonals ≅

Rhombus
1. parallelogram
2. 4 ≅ sides
3. diagonals bisect angles
4. diagonals perpendicular

Square
1. parallelogram
2. rectangle
3. rhombus