

## Special Parallelograms

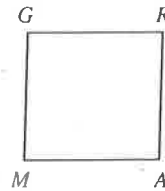
For use after Section 5-4

Classify each statement as true or false.

- Opposite sides of a rectangle must be parallel. True
- The diagonals of a rhombus must be perpendicular. True
- Consecutive angles of a rhombus are always complementary. False
- The diagonals of a rectangle are always perpendicular. False
- Opposite sides of a parallelogram must be congruent. True
- Each diagonal of a rectangle always bisects a pair of opposite angles. False

In Exercises 7-9 *GRAM* is a parallelogram.

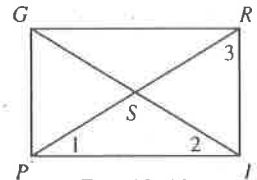
- If  $m\angle G = 90$ , then *GRAM* is a rectangle.
- If  $\overline{MA} \cong \overline{AR}$ , then *GRAM* is a rhombus.
- If  $\overline{GM} \perp \overline{GR}$  and  $\overline{GM} \cong \overline{GR}$ , then *GRAM* is a square.



Exs. 7-9

In Exercises 10-13 *GRIP* is a rectangle.

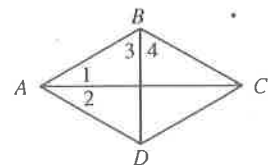
- If  $m\angle 1 = 20$ , then  $m\angle 2 =$  20.
- If  $GI = 15.2$ , then  $RS =$  7.6.
- If  $PS = 6x - 4$ , and  $GI = 28$ , then  $x =$  3.
- If  $m\angle 1 = 5t$ , and  $m\angle 3 = 8t - 1$ , then  $t =$  7.



Exs. 10-13

In Exercises 14-17 *ABCD* is a rhombus.

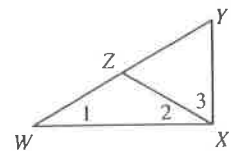
- If  $AB = 7.5$ , then  $BC =$  7.5.
- Name all angles congruent to  $\angle 1$ .  $\angle 2, \angle BCA, \angle DCA$
- If  $m\angle 1 = 40$ , then  $m\angle 3 =$  50.
- If  $m\angle 3 = 6x + 16$  and  $m\angle 4 = 8x$ , then  $x =$  8.



Exs. 14-17

In  $\triangle WYX$ ,  $\angle WXY$  is a right angle and  $\overline{XZ}$  is a median.

- If  $YZ = 8\frac{1}{4}$ ,  $XZ =$   $8\frac{1}{4}$ .
- If  $XZ = 12.5$ ,  $WY =$  25.
- If  $m\angle 1 = 30$ , then  $m\angle 2 =$  30 and  $m\angle 3 =$  60.



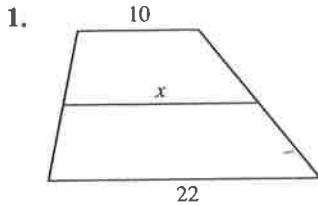
Exs. 18-20

NAME \_\_\_\_\_ DATE \_\_\_\_\_ SCORE \_\_\_\_\_

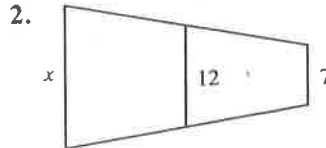
# Trapezoids

For use after Section 5-5

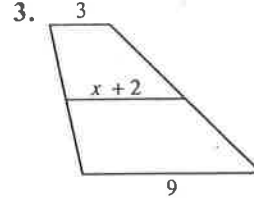
Each diagram shows a trapezoid and its median. Find the value of  $x$ .



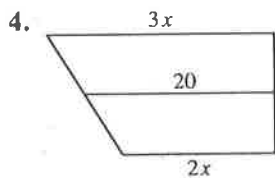
$x = \underline{16}$



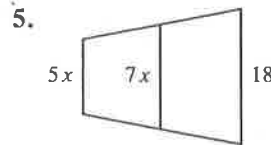
$x = \underline{17}$



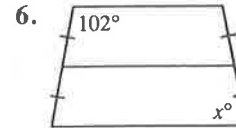
$x = \underline{4}$



$x = \underline{8}$



$x = \underline{2}$



$x = \underline{78}$

In Exercises 7-12  $\overline{EF}$  is the median of trapezoid  $ABCD$ . Complete.

7. If  $m\angle A = 63$ , then  $m\angle DEF = \underline{63}$  and  $m\angle D = \underline{117}$ .

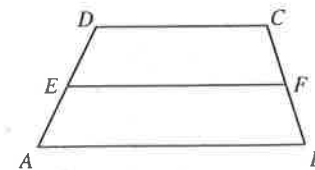
8. If  $m\angle CFE = 72$ , then  $m\angle B = \underline{72}$  and  $m\angle C = \underline{108}$ .

9. If  $AB = 16$  and  $DC = 10$ , then  $EF = \underline{13}$ .

10. If  $AB = 21$  and  $EF = 18$ , then  $DC = \underline{15}$ .

11. If  $ABCD$  is isosceles and  $m\angle B = 65$ , then  $m\angle A = \underline{65}$ ,  $m\angle D = \underline{115}$ , and  $m\angle C = \underline{115}$ .

12. If  $ABCD$  is isosceles, name all angles congruent to  $\angle A$ .  $\angle B, \angle CFE, \angle DEF$



Exs. 7-12

In Exercises 13-17  $IJ = JL = LG$  and  $IK = KM = MH$ .

13. If  $JK = 5$ , then  $LM = \underline{10}$  and  $GH = \underline{15}$ .

14. If  $LM = 12$ , then  $JK = \underline{6}$  and  $GH = \underline{18}$ .

15. If  $JK = 10$  and  $LM = x + 8$ , then  $x = \underline{12}$ .

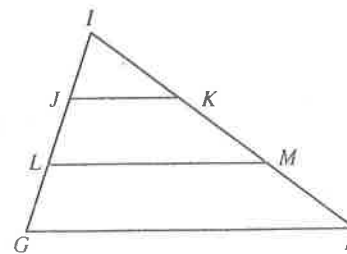
16. If  $GH = 36$ , then  $LM = \underline{24}$  and  $JK = \underline{12}$ .

17. If  $LM = 4x$  and  $GH = x + 6$ , write  $JK$  in terms of  $x$ .

$JK = \underline{2x}$ . Then  $x = \underline{1.2}$ .

or  $7x - 6$

or  $\frac{x}{3} + 2$



Exs. 13-17

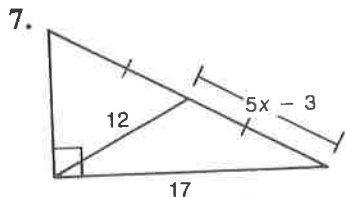
# Practice 19

## Special Quadrilaterals

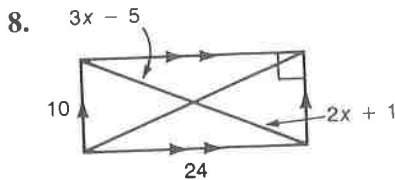
Classify each statement as *always*, *sometimes*, or *never* true.

1. A parallelogram contains exactly two right angles. N
2. Each diagonal of a parallelogram bisects two angles of the parallelogram. S
3. A rhombus with no right angles has congruent diagonals. N
4. The diagonals of a rhombus are perpendicular. A
5. A rectangle that is not a square has perpendicular diagonals. N
6. A quadrilateral with diagonals that are perpendicular is a parallelogram. S

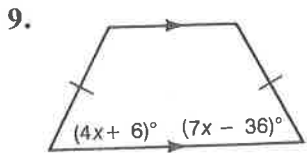
Find the value of  $x$ .



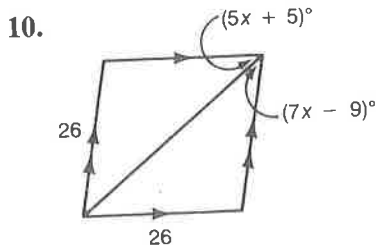
$x = \underline{3}$



$x = \underline{6}$



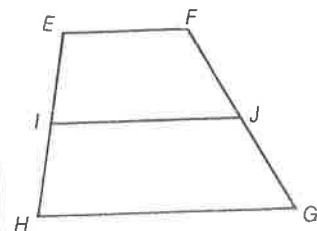
$x = \underline{14}$



$x = \underline{7}$

$\overline{IJ}$  is the median of trapezoid  $EFGH$ . Find the value of  $x$ .

|     | $EF$           | $HG$    | $IJ$           | $x$  |
|-----|----------------|---------|----------------|------|
| 11. | 7              | 13      | $x$            | 10   |
| 12. | $3\frac{1}{2}$ | $x$     | $5\frac{1}{4}$ | 7    |
| 13. | 18.3           | $x$     | 21.2           | 24.1 |
| 14. | 9              | $x + 8$ | $x$            | 17   |



Exs. 11-14

Give the most descriptive name for quad.  $ABCD$ .

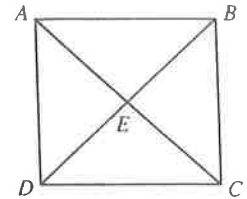
15.  $\angle A \cong \angle C$  and  $\angle B \cong \angle D$  □
16.  $\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{DA}$  and  $\angle A \cong \angle B$  Square
17.  $\overline{AB} \parallel \overline{DC}$ ,  $\overline{AD} \cong \overline{BC}$ , and  $DC > AB$  Isosceles Trapezoid

# Quadrilaterals

For use after Chapter 5

In Exercises 1-6  $ABCD$  is a parallelogram. Complete.

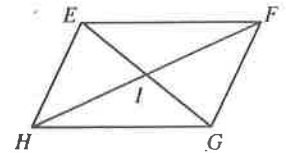
- If  $m\angle ADC = 92$ , then  $m\angle ABC = \underline{92}$  and  $m\angle DAB = \underline{88}$ .
- If  $BD = 20$ , then  $BE = \underline{10}$ .
- If  $AB = 9x - 2$  and  $DC = 6x + 4$ , then  $x = \underline{2}$ .
- If  $AE = 9$  and  $AC = 5x + 3$ , then  $x = \underline{3}$ .
- If  $ABCD$  is a rectangle and  $DE = 13.4$ , then  $AE = \underline{13.4}$ .
- If  $ABCD$  is a rhombus, then  $m\angle AED = \underline{90}$ .



Exs. 1-6

In Exercises 7-10 information is given about quadrilateral  $EFGH$ . What additional information is needed to prove  $EFGH$  is a parallelogram?

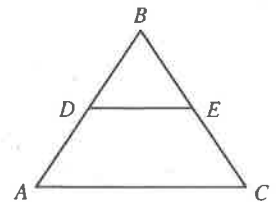
- $\angle EHG \cong \angle EFG$   $\angle HEF \cong \angle HGF$
- $\overline{EH} \parallel \overline{FG}$   $\overline{EF} \parallel \overline{HG}$  or  $\overline{EH} \cong \overline{FG}$
- $\overline{EF} \cong \overline{HG}$   $\overline{EF} \parallel \overline{HG}$  or  $\overline{EH} \cong \overline{FG}$
- $I$  is the midpoint of  $\overline{EG}$ .  $I$  is the midpoint of  $\overline{HF}$ .



Exs. 7-10

In Exercises 11-13,  $D$  is the midpoint of  $\overline{AB}$ . Complete.

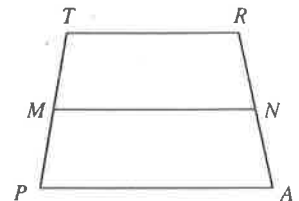
- If  $E$  is the midpoint of  $\overline{BC}$  and  $AC = 26$ , then  $\angle BDE \cong \angle \underline{A}$  and  $DE = \underline{13}$ .
- If  $\overline{DE} \parallel \overline{AC}$  and  $BE = 12$ , then  $BC = \underline{24}$ .
- If  $\overline{BE} \cong \overline{EC}$ , then  $ADEC$  is a(n) trapezoid.



Exs. 11-13

In Exercises 14-17,  $M$  and  $N$  are the midpoints of  $\overline{TP}$  and  $\overline{RA}$ , respectively, and  $TRAP$  is a trapezoid. Complete.

- $\overline{MN}$  is the median of  $TRAP$ .
- If  $\overline{TP} \cong \overline{RA}$ , then  $TRAP$  is a(n) isosceles trapezoid.
- If  $MN = 16$  and  $TR = 14$ , then  $PA = \underline{18}$ .
- If  $\overline{TP} \cong \overline{RA}$  and  $m\angle P = 80$ , then  $m\angle A = \underline{80}$  and  $m\angle TMN = \underline{80}$ .



Exs. 14-17

Give the most descriptive name for quadrilateral  $QUAD$ .

- $\overline{QU} \parallel \overline{DA}$ ;  $\overline{QD} \parallel \overline{UA}$ ;  $\overline{QD} \perp \overline{DA}$  rectangle
- $\overline{QU} \parallel \overline{DA}$ ;  $\overline{QU} \cong \overline{UA} \cong \overline{DA}$  rhombus
- $\overline{QU} \parallel \overline{DA}$ ;  $\overline{QD} \cong \overline{UA}$ ;  $m\angle Q = m\angle U = 115$  isosceles trapezoid