

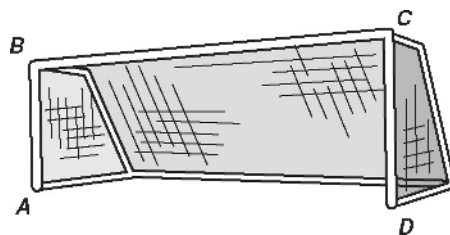
**LESSON**  
**7-3**

**Problem Solving**

**Properties of Special Parallelograms**

Use the diagram for Exercises 1 and 2.

The soccer goalposts determine rectangle  $ABCD$ .



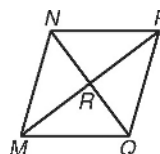
- The distance between goalposts,  $BC$ , is three times the distance from the top of the goalpost to the ground. If the perimeter of  $ABCD$  is  $21\frac{1}{3}$  yards, what is the length of  $\overline{BC}$ ?

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- The distance from  $B$  to  $D$  is approximately  $(x + 10)$  feet, and the distance from  $A$  to  $C$  is approximately  $(2x - 5.3)$  feet. What is the approximate distance from  $A$  to  $C$ ?

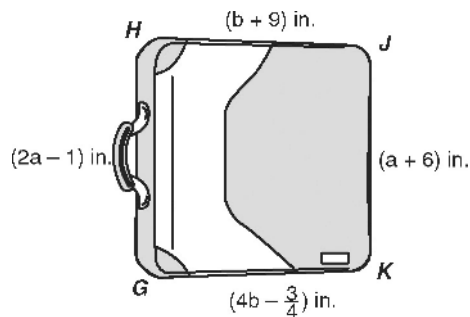
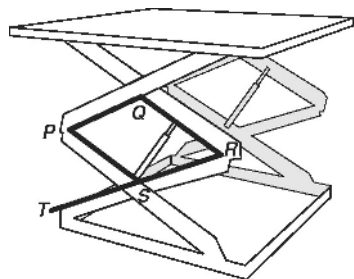
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- $MNPQ$  is a rhombus. The measure of  $\angle MRQ$  is  $(13t - 1)^\circ$ , and the measure of  $\angle PQR$  is  $(7t + 4)^\circ$ . What is the measure of  $\angle PQM$ ?



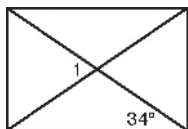
- The scissor lift forms rhombus  $PQRS$  with  $PQ = (7b - 5)$  meters and  $QR = (2b - 0.5)$  meters. If  $S$  is the midpoint of  $\overline{RT}$ , what is the length of  $\overline{RT}$ ?

- The diagram shows the lid of a rectangular case that holds 80 CDs. What are the dimensions of the case?



Choose the best answer.

- What is the measure of  $\angle 1$  in the rectangle?



- |              |               |
|--------------|---------------|
| A $34^\circ$ | C $90^\circ$  |
| B $68^\circ$ | D $146^\circ$ |

- A square graphed on the coordinate plane has a diagonal with endpoints  $E(2, 3)$  and  $F(0, -3)$ . What are the coordinates of the endpoints of the other diagonal?

- |                           |
|---------------------------|
| F $(4, -1)$ and $(-2, 1)$ |
| G $(4, 0)$ and $(-2, 1)$  |
| H $(4, -1)$ and $(-3, 1)$ |
| J $(3, -1)$ and $(-2, 1)$ |

## Challenge

1.

| Number of tans | Square | Rectangle (not square) | Isosceles trapezoid | Trapezoid (not isosceles) | Rhombus (not square) | Parallelogram (not rhombus or rectangle) |
|----------------|--------|------------------------|---------------------|---------------------------|----------------------|--|
| 2              |        | ✗                      |                     |                           | ✗                    |  |
| 3              |        |                        |                     |                           | ✗                    |  |
| 4              |        |                        |                     |                           | ✗                    |  |
| 5              |        |                        |                     |                           | ✗                    |  |
| 6              | ✗      |                        |                     |                           | ✗                    | ✗  |
| 7              |        |                        |                     |                           | ✗                    |  |

## Problem Solving

- 8 yd
- 25.3 ft
- 106°
- 2.6 m
- 13 in. by  $12\frac{1}{4}$  in.
- B
- F

## Reading Strategies

- no
- yes
- yes
- no
- no
- They are all polygons, and they all have 4 sides.
- All 4 angles would have to be right angles.
- All 4 sides would have to be congruent.

## 7-4 CONDITIONS FOR SPECIAL PARALLELOGRAMS

### Practice A

- rhombus
- perpendicular
- rectangle; rhombus
- diagonals
- rhombus
- rectangle
- sides
- congruent
- parallelogram
- rectangle
- rhombus
- rectangle; rhombus

## Practice B

- Possible answer: To know that the reflecting pool is a parallelogram, the congruent sides must be opposite each other. If this is true, then knowing that one angle in the pool is a right angle or that the diagonals are congruent proves that the pool is a rectangle.
- Not valid; possible answer: you need to know that  $\overline{AC} \perp \overline{BD}$ .
- possible answer: you need to know that  $\overline{AC}$  and  $\overline{BD}$  bisect each other.
- valid
- Not valid; possible answer: you need to know that  $\overline{AD} \parallel \overline{BC}$ .
- rectangle, rhombus, square  
 $\sqrt{26}$ ;  $\sqrt{26}$   
 $-5$ ;  $\frac{1}{5}$
- rhombus  
 $\sqrt{2}$ ;  $3\sqrt{2}$   
 $1$ ;  $-1$

## Practice C

- Parallelogram and rhombus; possible answer: in a square or a rectangle, the interior angles must measure  $90^\circ$ . Therefore the longest side of the triangle formed by two sides and a diagonal must be the diagonal.
- rhombus
- $x\sqrt{3}$
- $60^\circ$  and  $120^\circ$
- 3
- 1
- 1
- 1
- an infinite number
- 3
- 4
- 3
- $(1, -1)$ ,  $(5, 1)$ ,  $(3, 7)$