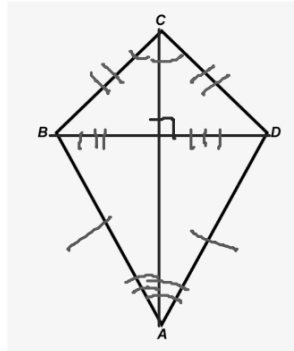Kite - Quadrilateral with 2 pairs of consectutive sides congruent but opposite sides are not congruent.

$\angle A \neq \angle C$ Vertex Angles

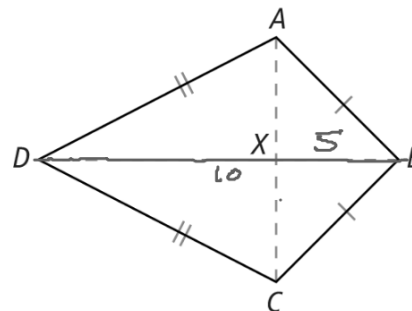$\angle B \neq \angle D$ Non-Vertex Angles

Properties of a Kite

- Diagonals are perpendicular. Exactly one diagonal bisects the other.
- Exactly one pair of opposite angles are congruent

  ↳ Non-Vertex Angles $\cong$.

1. a. What is the measure of $\angle AXB$? $\approx 90^\circ$

Enter your answer.

CHECK ANSWER

b. If $AX = 3.8$, what is AC? $= 7.6$

Enter your answer.

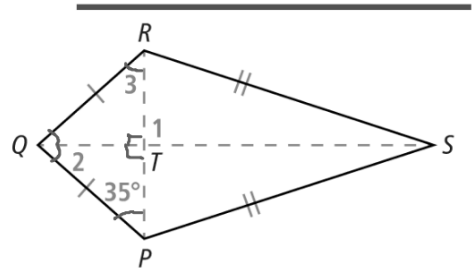**c.** If $BD = 10$, does $BX = 5$? Explain.

Enter your answer.

Quadrilateral *PQRS* is a kite with diagonals $\overline{QS}$ and $\overline{PR}$.

A. What is *m∠1*? $= 90°$

SOLUTION

B. What is *m∠2*? $= 55°$

C. What is *m∠3*? $= 35°$

2. Quadrilateral *WXYZ* is a kite.

a. What is *m∠1*? $= 58°$

Enter your answer.

CHECK ANSWER

b. What is *m∠2*? $= 32°$
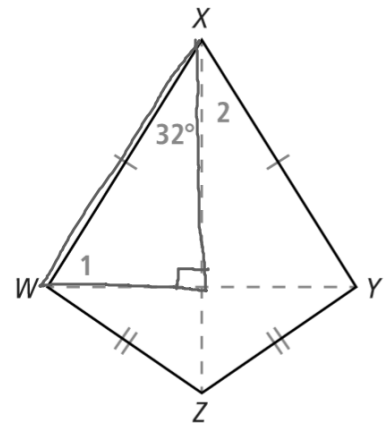
In kite WXYZ, m∠WXY = 104°, and m∠VYZ = 49°. Find each measure.

1. m∠VZY = _____

2. m∠VXW = _____

3. m∠XWZ = _____
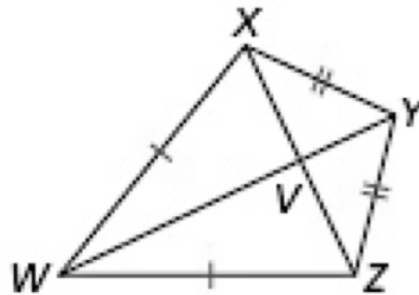
In kite ABCD, m∠DAX = 32°, and m∠XDC = 64°. Find each measure.

4. m∠XDA = _____

5. m∠ABC = _____

6. m∠BCD = _____

Find the value of x.

Diagram 1 (Kite ABCD with center O):

$5 = 8 + x$
$-8 \quad -8$
$-3 = x$

OB = (8 + x) in ; OD = 5 in

$x =$ _____

Diagram 2 (Kite with vertices M, N, K, L and center O):
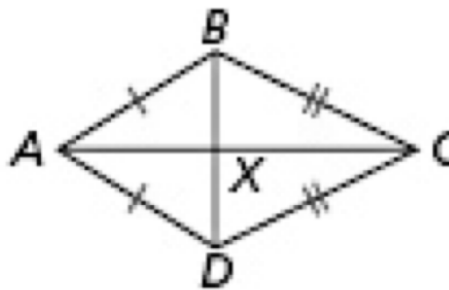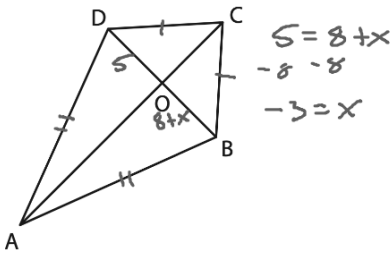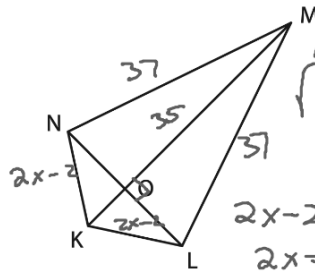
$35^2 + (2x-2)^2 = 37^2$
$1225 + (2x-2)^2 = 1369$
$\sqrt{(2x-2)^2} = \sqrt{144}$
$2x - 2 = \pm 12$

$2x - 2 = 12$
$2x = 14$
$x = 7$

$2x - 2 = -12$
$2x = -10$
$\cancel{x = -5}$

OL = (2x – 2) ft ; OM = 35 ft; MN = 37 ft

$x =$ _____

Diagram 3 (Kite with vertices R, Q, P, S and center O):

$(7x)^2 + 33^2 = 65^2$
$49x^2 + 1089 = 4$
$\dfrac{49x^2}{49} =$
$x^2 =$
$\times$

OQ = 33 yd ; RS = 65 yd ; OR = (7x) yd

$x =$ _____

Diagram 4 (Kite with vertices Z, Y, X, W and center O):

OY = 7 in ; WZ = (4x + 5) in ; OZ = 24 in

$x =$ _____

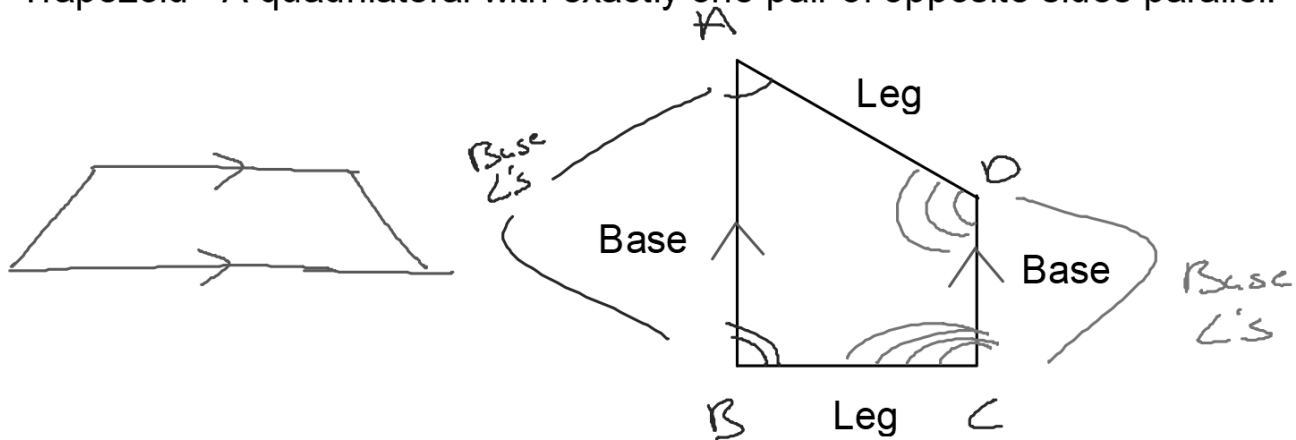**Diagram 5 (Kite with vertices V, S, U, T and center O):**
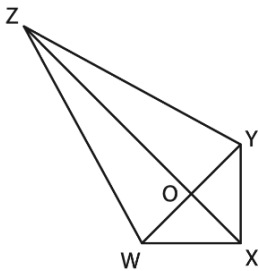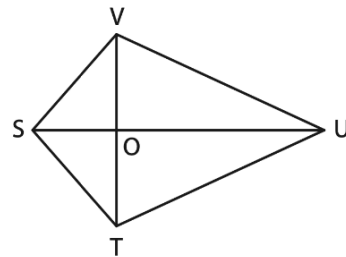
VT = 8 yd ; OV = (–2 – 3x) yd

$x =$ _____

Trapezoid - A quadrilateral with exactly one pair of opposite sides parallel.

- The bases are the parallel sides
- Legs are the non parallel sides
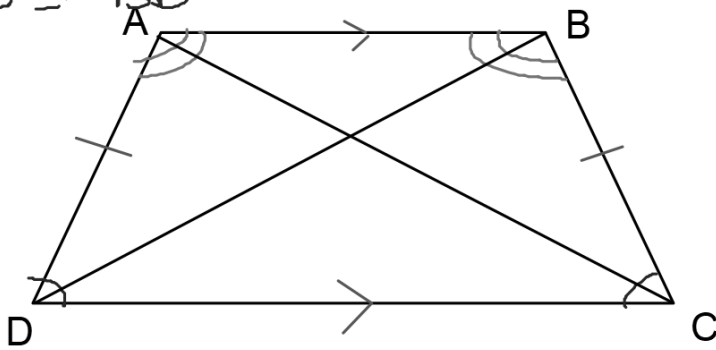- 2 pairs of base angles

Isosceles Trapezoid

- Legs are congruent
- Both pairs of base angles are congruent $\qquad \angle A \cong \angle B$
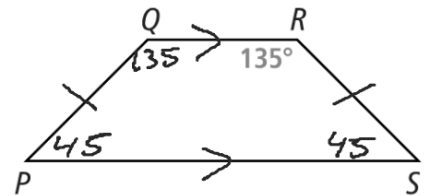- Diagonals are congruent $\qquad\qquad\qquad \angle C \cong \angle D$

$\overline{AC} \cong \overline{BD}$

3. a. Given isosceles trapezoid *PQRS*, what are *m∠P*, *m∠Q*, and *m∠S*?

Enter your answer.

Q   R
135   135°
45   45
P   S

3. b. Given $\overline{ST} \parallel \overline{RU}$, what is the measure of ∠*TUR*? = 133°

Enter your answer.

S   T
47°   133   x°
      R   U

180−47
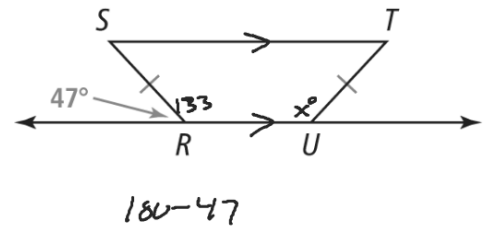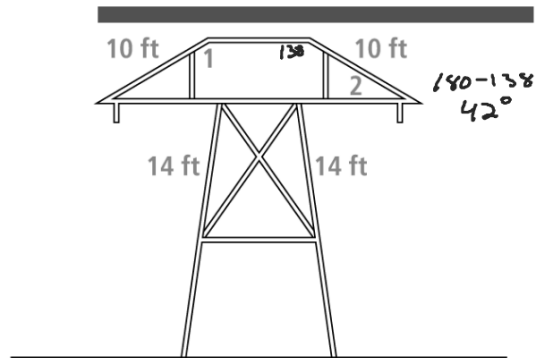
All horizontal beams of the high-voltage transmission tower are parallel to the ground. The top section is an isosceles trapezoid. The center section is an isosceles trapezoid.

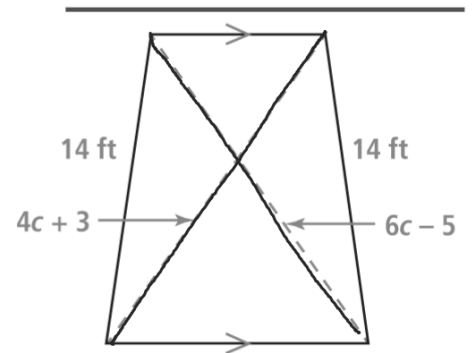A. If $m\angle 1 = 138$, what is $m\angle 2$?

SOLUTION

10 ft   1   138   10 ft
180−138
42°
2
14 ft   14 ft

B. One cross support in the center of the tower measures $4c + 3$, and the other measures $6c - 5$. What is the length of each cross support? $= 19 \text{ ft}$

$4c + 3 = 6c - 5$

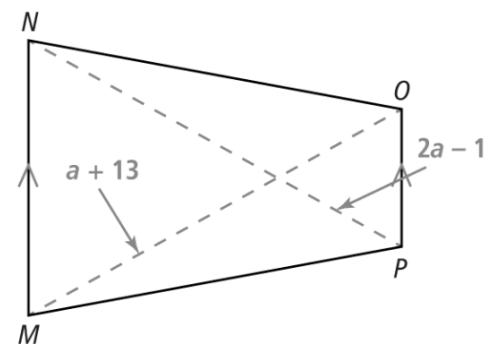$3 = 2c - 5$

$8 = 2c$

$c = 4$

SOLUTION

4. Given isosceles trapezoid *MNOP* where the given expressions represent the measures of the diagonals, what is the value of *a*?

Enter your answer
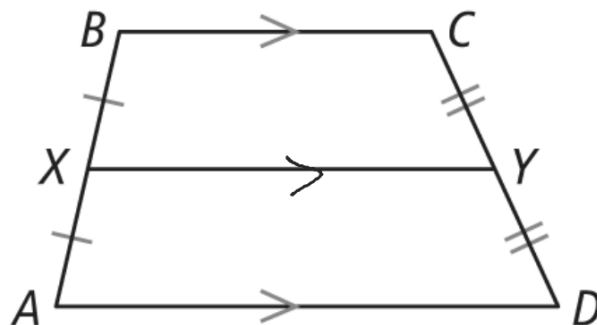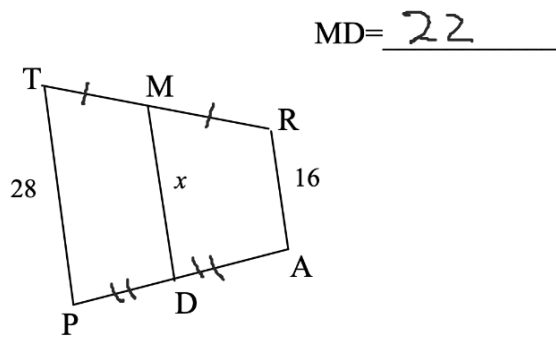$$2a - 1 = a + 13$$
$$a - 1 = 13$$
$$a = 14$$

Midsegment of a Trapeziod

In a trapezoid, the segment containing the
midpoints of the two legs is parallel to the bases,
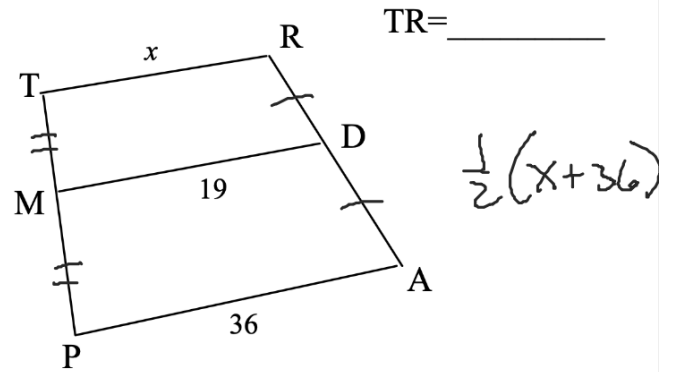and its length is half the sum of the lengths of
the bases.   Average

$\overline{XY} \parallel \overline{AD}, \overline{XY} \parallel \overline{BC},$

and $XY = \frac{1}{2}(AD + BC)$

MD= 22
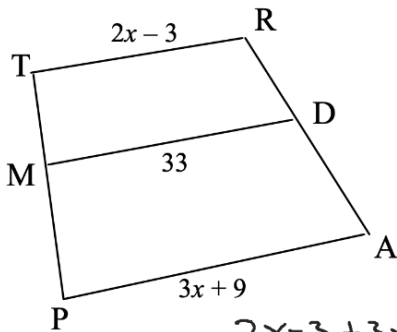
T   M   R

28   x 16

P   D   A

$$X = \frac{1}{2}(16 + 28)$$
$$= \frac{1}{2}(44)$$
$$= 22$$

TR=_____

T x R

M   19   D

P   36   A

$$\frac{1}{2}(x+36)$$

$$2\left(\frac{x+36}{2}\right) = (19)2$$

$$x + 36 = 38$$

$$x = 2$$

Left figure:

Trapezoid with vertices T, R (top), M, D (middle), P, A (bottom).

Top side TR = $2x - 3$
Middle MD = 33
Bottom PA = $3x + 9$

$x=$ __12__

TR= __21__

PA= __45__

$$\frac{2x-3+3x+9}{2} = 33$$

$$2\left(\frac{5x+6}{2}\right) = (33)2$$

$$5x+6 = 66$$

$$5x = 60$$

$$x = 12$$

$$24x+66 = 40x+8$$

Right figure:

Trapezoid with vertices P, A (top), M, D (middle), T, R (bottom).

Top side PA = 10
Middle MD = $20x + 4$
Bottom TR = $24x + 6$
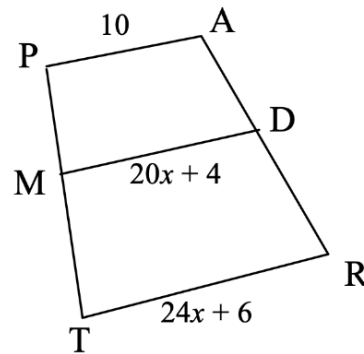
$x=$ __$\frac{1}{2}$__

TR= __18__

MD= __14__

$$\frac{10+24x+6}{2} = 20x+4$$

$$\frac{24x+16}{2} = 20x+4$$

$$12x+8 = 20x+4$$

$$8 = 8x+4$$

$$4 = 8x$$

$$x = \frac{1}{2}$$