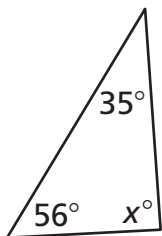## 5.4 Start Thinking

In a coordinate plane, draw square $ABCD$ with side length 2 units. Draw diagonal $\overline{BD}$ to create $\triangle ABD$ and $\triangle CBD$. Are the two triangles congruent? What is the length of $\overline{BD}$?

Draw square $EFGH$ with any side length. Draw a diagonal to make two triangles. Are these triangles congruent?
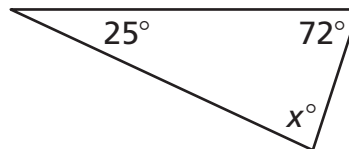
5.4 Warm Up
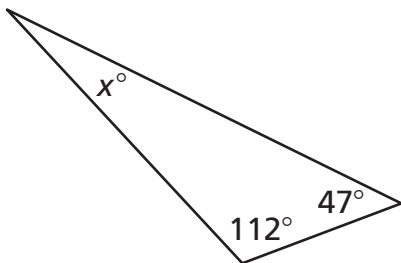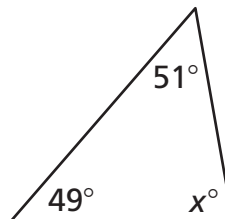
Find the missing angle measure.

1.

35°

56° $x°$

2.

25°   72°

$x°$

3.

$x°$

112°   47°

4.

51°

49° $x°$

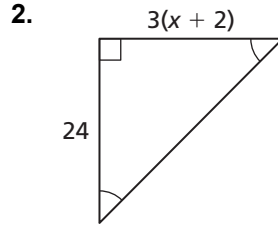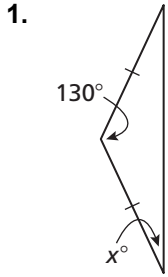## 5.4 Cumulative Review Warm Up

Rewrite the definition of the term as a biconditional statement.

1. In an isosceles triangle, the legs are of equal length.

2. A tangram is a Chinese puzzle made up of seven pieces.

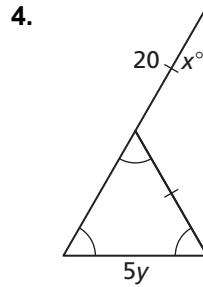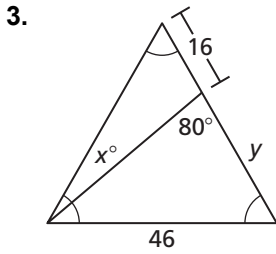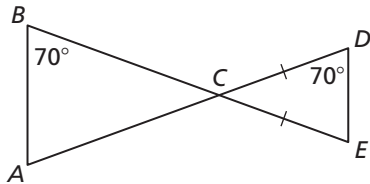3. A rectangle is a parallelogram that has four right angles.

5.4 Practice A

In Exercises 1 and 2, find the value of *x*.

1.

130°

$x°$

2.

$3(x + 2)$

24

In Exercises 3 and 4, find the values of *x* and *y*.

3.

16

80°

$x°$

y

46

4.

20   $x°$

$5y$

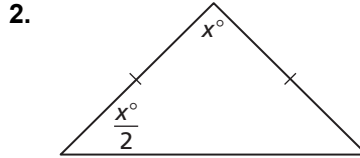**5.** Explain why $\triangle ABC$ is isosceles.

B
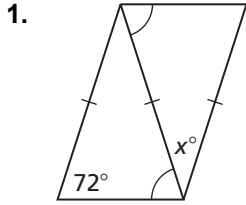
70°

C

D

70°

A

E

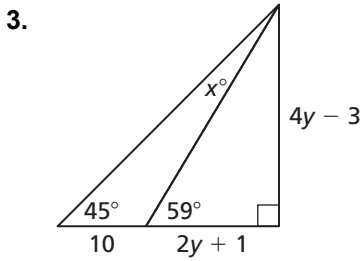**6.** Can an isosceles triangle be an obtuse triangle? Explain.

5.4 Practice B

In Exercises 1 and 2, find the value of *x*.

1.

72°
$x°$

2.

$x°$

$\dfrac{x°}{2}$

In Exercises 3 and 4, find the values of *x* and *y*.

3.

$x°$
$4y - 3$
45° 59°
10 $2y + 1$

4.

24
$x°$
$(9y + 5)°$
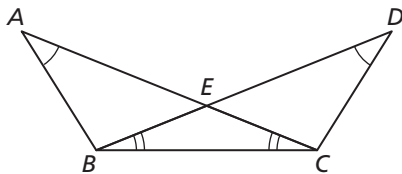$x°$
3y
24
5y
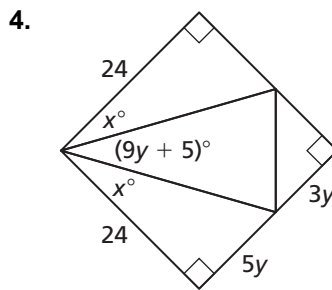
5. **Given:** $\angle CBD \cong \angle CDB,\ \angle BAE \cong \angle DEA$

   Prove: $\overline{AD} \cong \overline{EB}$

C
B D
A E
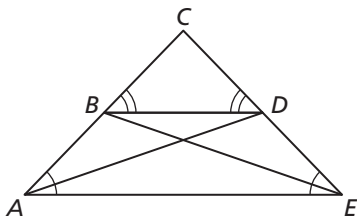
6. **Given:** $\angle EBC \cong \angle ECB,\ \overline{AE} \cong \overline{DE}$

   Prove: $\overline{AB} \cong \overline{DC}$
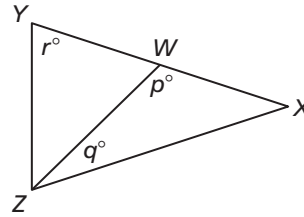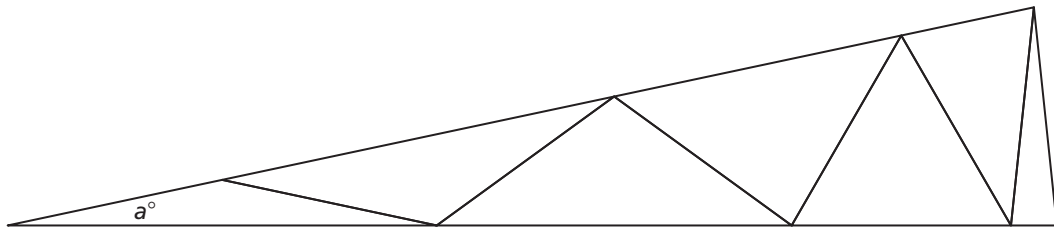

A D
E
B C

5.4 Enrichment and Extension

Isosceles Triangles

1. In the diagram to the right, $\triangle XYZ$ is isosceles, with $XY = XZ$. What is the value of r in terms of p and q?

2. In the diagram below, the seven inner triangles in the picture are isosceles. The larger, outer triangle is also isosceles. What is the value of each angle in the picture in terms of a?

In Exercises 3 and 4, find the values of *x* and *y*. Round your answers to the nearest tenth, if necessary.

3.

4.
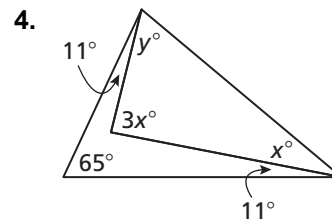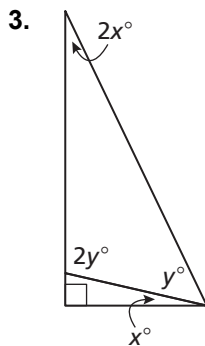
5. Is it possible to partition an arbitrary right triangle into isosceles triangles? Justify your answer.

5.4 Puzzle Time

Which Hand Is It Better To Write With?

A	B	C	D	E	F
G	H				

Complete each exercise. Find the answer in the answer column. Write the word under the answer in the box containing the exercise letter.

45° FROM
equiangular WRITE
perfect RIGHT
60° A
bottom FUN
vertex IT'S
complementary THE
13 PEN

Complete the statement.

A. When an isosceles triangle has exactly two congruent sides, these two sides are the _____.

B. The angle formed by the legs of an isosceles triangle is the _____ angle.

C. The third side of the isosceles triangle is the _____.

D. If two angles of a triangle are congruent, then the sides opposite them are _____.

E. If a triangle is equilateral, then it is _____.

Find the indicated value using the diagram.

F. $XY = 8$, find ZY.

G. $m\angle Y = 60°$, find $m\angle Z$.

H. $YX = 13$, find XZ.
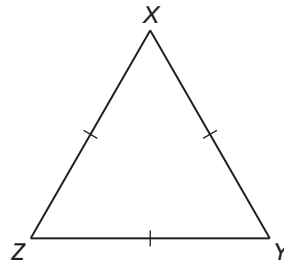
7 LEFT
congruent TO
arms WANTED
8 WITH
legs NEITHER
acute WHEN
base BEST
15 HOLD