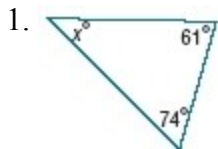


10-3 Triangles

Find the value of x in the triangle. Then classify each triangle by its angles and by its sides.



SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$x + 61 + 74 = 180$$

$$x + 135 = 180$$

$$x + 135 - 135 = 180 - 135$$

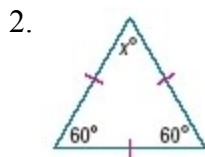
$$x = 45$$

The measure of the angle is 45° .

Angles: The triangle has all acute angles.

Sides: The triangle has no congruent sides.

The triangle is an acute scalene triangle.



SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$x + 60 + 60 = 180$$

$$x + 120 = 180$$

$$x + 120 - 120 = 180 - 120$$

$$x = 60$$

The measure of the angle is 60° .

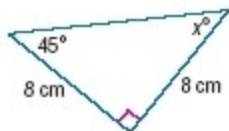
Angles: The triangle has all acute angles.

Sides: The triangle has three congruent sides.

The triangle is an acute equilateral triangle.

10-3 Triangles

3.



SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$x + 45 + 90 = 180$$

$$x + 135 = 180$$

$$x + 135 - 135 = 180 - 135$$

$$x = 45$$

The measure of the angle is 45° .

Angles: The triangle has a right angle.

Sides: The triangle has two congruent sides.

The triangle is a right isosceles triangle.

4. The measures of the angles of a triangle are in the ratio 2:3:5. What are the measures of the angles?

SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$2x + 3x + 5x = 180$$

$$10x = 180$$

$$\frac{10x}{10} = \frac{180}{10}$$

$$x = 18$$

$$2x = 2 \cdot 18 \text{ or } 36$$

$$3x = 3 \cdot 18 \text{ or } 54$$

$$5x = 5 \cdot 18 \text{ or } 90$$

The measures of the angles are 36° , 54° , and 90° .

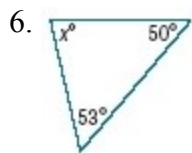
5. **ANIMALS** A hippopotamus can open its jaws to an angle of about 180° . What type of angle is formed by the jaws of a hippo?

SOLUTION:

A straight angle has a measure of 180° . So, the jaws of the hippo form a straight angle.

10-3 Triangles

Find the value of x in the triangle. Then classify each triangle by its angles and by its sides.



SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$x + 50 + 53 = 180$$

$$x + 103 = 180$$

$$x + 103 - 103 = 180 - 103$$

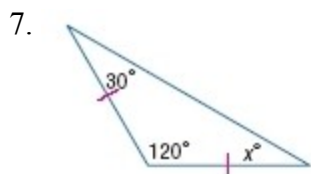
$$x = 77$$

The measure of the angle is 77° .

Angles: The triangle has all acute angles.

Sides: The triangle has no congruent sides.

The triangle is an acute scalene triangle.



SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$x + 30 + 120 = 180$$

$$x + 150 = 180$$

$$x + 150 - 150 = 180 - 150$$

$$x = 30$$

The measure of the angle is 30° .

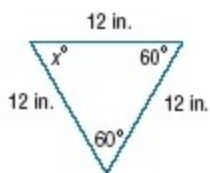
Angles: The triangle has an obtuse angle.

Sides: The triangle has two congruent sides.

The triangle is an obtuse isosceles triangle.

10-3 Triangles

8.



SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$x + 60 + 60 = 180$$

$$x + 120 = 180$$

$$x + 120 - 120 = 180 - 120$$

$$x = 60$$

The measure of the angle is 60° .

Angles: The triangle has all acute angles.

Sides: The triangle has three congruent sides.

The triangle is an acute equilateral triangle.

9.



SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$x + 15 + 90 = 180$$

$$x + 105 = 180$$

$$x + 105 - 105 = 180 - 105$$

$$x = 75$$

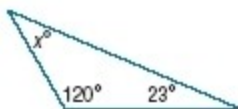
The measure of the angle is 75° .

Angles: The triangle has a right angle.

Sides: The triangle has no congruent sides.

The triangle is a right scalene triangle.

10.



SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$x + 120 + 23 = 180$$

$$x + 143 = 180$$

$$x + 143 - 143 = 180 - 143$$

$$x = 37$$

The measure of the angle is 37° .

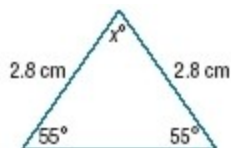
Angles: The triangle has an obtuse angle.

Sides: The triangle has no congruent sides.

The triangle is an obtuse scalene triangle.

10-3 Triangles

11.



SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$x + 55 + 55 = 180$$

$$x + 110 = 180$$

$$x + 110 - 110 = 180 - 110$$

$$x = 70$$

The measure of the angle is 70° .

Angles: The triangle has all acute angles.

Sides: The triangle has two congruent sides.

The triangle is an acute isosceles triangle.

12. Determine the measures of the angles of $\triangle ABC$ if the measures of the angles are in the ratio 1:1:16.

SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$x + x + 16x = 180$$

$$18x = 180$$

$$\frac{18x}{18} = \frac{180}{18}$$

$$x = 10$$

$$16x = 16 \cdot 10 \text{ or } 160$$

The measures of the angles are 10° , 10° , and 160° .

13. Determine the measures of the angles of $\triangle TUV$ if the measures of the angles are in the ratio 1:6:8.

SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$x + 6x + 8x = 180$$

$$15x = 180$$

$$\frac{15x}{15} = \frac{180}{15}$$

$$x = 12$$

$$6x = 6 \cdot 12 \text{ or } 72$$

$$8x = 8 \cdot 12 \text{ or } 96$$

The measures of the angles are 12° , 72° , and 96° .

TIME What type of angle is formed by the hands on a clock at the time?

14. 3:00

SOLUTION:

At 3:00, the minute hand is pointing straight up, and the hour hand is pointing to the right. There are 90° between the hands, so the angle formed is a right angle.

10-3 Triangles

15. 6:00

SOLUTION:

At 6:00, the minute hand is pointing straight up, and the hour hand is pointing straight down. There are 180° between the hands, so the angle formed is a straight angle.

16. 10:30

SOLUTION:

At 10:30, the minute hand is pointing straight down, and the hour hand is pointing up and to the left. There are more than 90° between the hands. The angle formed by the hands is an obtuse angle.

17. 4:30

SOLUTION:

At 4:30, the minute hand is pointing straight down, and the hour hand is pointing down and to the right. There are less than 90° between the hands. The angle formed by the hands is an acute angle.

Classify the angle as *acute*, *obtuse*, *right*, or *straight*.

18. 30°

SOLUTION:

An angle with a measure less than 90° is an acute angle.

19. 86°

SOLUTION:

An angle with a measure less than 90° is an acute angle.

20. 90°

SOLUTION:

An angle with a measure of 90° is a right angle.

21. 145°

SOLUTION:

An angle with a measure greater than 90° is an obtuse angle.

22. 116°

SOLUTION:

An angle with a measure greater than 90° is an obtuse angle.

23. 55°

SOLUTION:

An angle with a measure less than 90° is an acute angle.

24. 42°

SOLUTION:

An angle with a measure less than 90° is an acute angle.

10-3 Triangles

25. 125°

SOLUTION:

An angle with a measure greater than 90° is an obtuse angle.

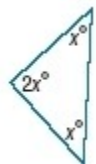
26. 92°

SOLUTION:

An angle with a measure greater than 90° is an obtuse angle.

ALGEBRA Find the measures of the angles in the triangle.

29.



SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$2x + x + x = 180$$

$$4x = 180$$

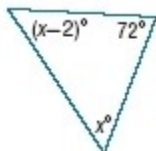
$$\frac{4x}{4} = \frac{180}{4}$$

$$x = 45$$

$$2x = 2 \cdot 45 \text{ or } 90$$

The measures of the angles are 45° , 45° , and 90° .

30.



SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$x + (x - 2) + 72 = 180$$

$$2x + 70 = 180$$

$$2x + 70 - 70 = 180 - 70$$

$$2x = 110$$

$$\frac{2x}{2} = \frac{110}{2}$$

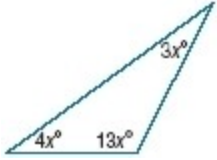
$$x = 55$$

$$x - 2 = 55 - 2 \text{ or } 53$$

The measures of the angles are 53° , 55° , and 72° .

10-3 Triangles

31.



SOLUTION:

The sum of the measures of the angles of a triangle is 180° .

$$3x + 4x + 13x = 180$$

$$20x = 180$$

$$\frac{20x}{20} = \frac{180}{20}$$

$$x = 9$$

$$3x = 3 \cdot 9 \text{ or } 27$$

$$4x = 4 \cdot 9 \text{ or } 36$$

$$13x = 13 \cdot 9 \text{ or } 117$$

The measures of the angles are 27° , 36° , and 117° .

ALGEBRA The measures of the sides of a triangle are given. Classify the triangle by its sides.

32. $2x$, $3x$, $4x$

SOLUTION:

Because the triangle has no congruent sides, it is a scalene triangle.