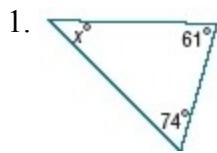


10-3 Triangles

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° .

$$x + 61 + 74 = 180$$

$$x + 135 = 180$$

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

$$x = 45$$

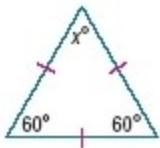
The measure of the angle is 45° .

Angles: The triangle has all acute angles.

Sides: The triangle has no congruent sides.

The triangle is an acute scalene triangle.

2.



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° .

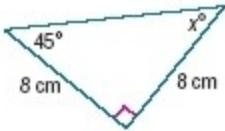
Angles: The triangle has all acute angles.

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° .

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

$$10x = 180$$

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

$$x = 18$$

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

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

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

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

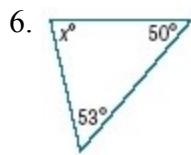
5. **ANIMALS** A hippopotamus can open its jaws to an angle of about 180° . What type of angle is formed by the jaws of a hippo?

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° .

$$x + 50 + 53 = 180$$

$$x + 103 = 180$$

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

$$x = 77$$

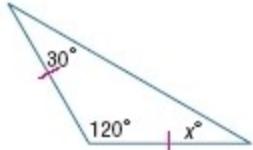
The measure of the angle is 77° .

Angles: The triangle has all acute angles.

Sides: The triangle has no congruent sides.

The triangle is an acute scalene triangle.

7.



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° .

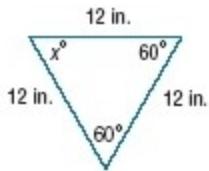
Angles: The triangle has an obtuse angle.

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°.

$$x + 60 + 60 = 180$$

$$x + 120 = 180$$

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

$$x = 60$$

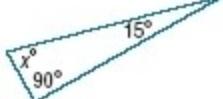
The measure of the angle is 60°.

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°.

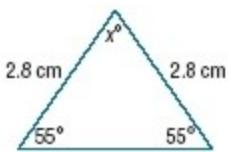
Angles: The triangle has an obtuse angle.

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 ΔABC 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 ΔTUV 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.

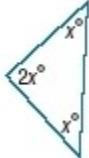
26. 92°

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° .

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

$$4x = 180$$

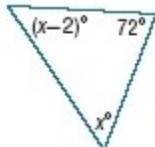
$$\frac{4x}{4} = \frac{180}{4}$$

$$x = 45$$

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

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° .

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

$$2x + 70 = 180$$

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

$$2x = 110$$

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

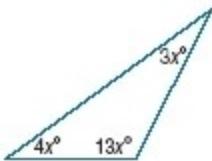
$$x = 55$$

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

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.