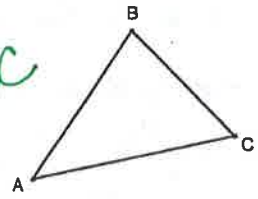
Classify Triangles

Triangles are named by using its vertices.

For example, we can call the following triangle:



$\triangle ABC$

1

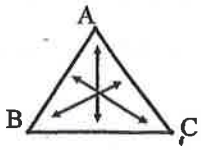
Opposite Sides and Angles

Opposite Sides:

Side opposite to $\angle A$: $\overline{BC}$

Side opposite to $\angle B$: $\overline{AC}$

Side opposite to $\angle C$: $\overline{AB}$



Opposite Angles:

Angle opposite to $\overline{BC}$: $\angle A$

Angle opposite to $\overline{AC}$: $\angle B$

Angle opposite to $\overline{AB}$: $\angle C$

2

Two ways to Classify Triangles

By the angles

A) Right

B) Acute

C) obtuse

D) equiangular

By the sides

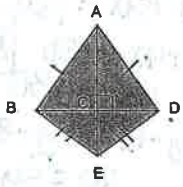
A) equilateral - all same

B) isosceles - 2 same

C) scalene - no same

3

Identify the indicated type of triangle in the figure.



A) Isosceles triangle

$\triangle ABD$, $\triangle BED$

B) Scalene triangle

$\triangle ABE$

C) Right triangle

$\triangle ACD$

4

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Find the measures of the sides of $\triangle ABC$ and classify the triangle by its sides.

- A(2, 2), B(3, 9), and C(-5, 3)

$AB = \sqrt{(3-2)^2 + (9-2)^2} = \sqrt{50} = 5\sqrt{2}$

$BC = \sqrt{(-5-3)^2 + (3-9)^2} = \sqrt{100} = 10$

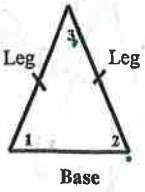
$AC = \sqrt{(-5-2)^2 + (3-2)^2} = \sqrt{50} = 5\sqrt{2}$

Isosceles

5

Parts of an Isosceles Triangle

- An isosceles triangle is a triangle with two congruent sides.
- The congruent sides are called legs and the third side is called the base.



$\angle 1$ and $\angle 2$ are base angles

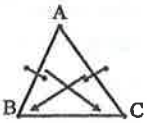
$\angle 3$ is the vertex angle

: Isosceles Triangle 6

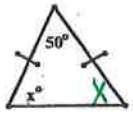
Isosceles Triangle Theorems

If two sides of a triangle are congruent, then the angles opposite those sides are congruent.

If $\overline{AB} \cong \overline{AC}$, *then* $\angle B \cong \angle C$.



Example: Find the value of x.



$50 + x + x = 180$

$50 + 2x = 180$

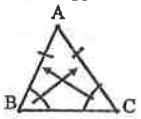
$2x = 130$

$x = 65°$

Isosceles Triangle Theorems

If two angles of a triangle are congruent, then the sides opposite those angles are congruent.

If $\angle B \cong \angle C$, *then* $\overline{AB} \cong \overline{AC}$.



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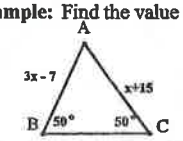


$3x - 7 = x + 15$

$2x = 22$

$x = 11$

Side lengths = 26

Find x and y.

$50 + 2x + 2x = 180$

$50 + 4x = 180$

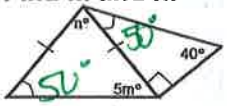
$4x = 130$

$x = 32.5$

$3y - 10 = 8y - 30$

$y = 4$

Find m and n.



$90 + 40 + x = 180$

$x = 50$

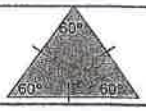
$5m = 50$

$m = 10$

$50 + 50 + n = 180$

$n = 80$

Equilateral Triangles – Corollaries-



- A triangle is equilateral if and only if it is equiangular.
- Each angle of an equilateral triangle measures 60°.
- *Find x and y.*

$3x - 1 = 4x - 12$

$x = 11$

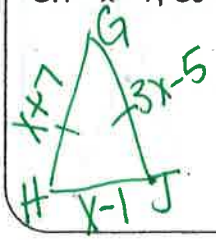
$3(4y) = 180$

$12y = 180$

$y = 15$

Find x and the measure of each side of the triangle.

ΔGHJ is isosceles; ∠G is the vertex angle, GH = x + 7, GJ = 3x – 5, and HJ = x – 1



$x + 7 = 3x - 5$

$12 = 2x$

$x = 6$

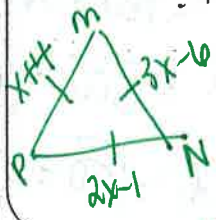
$GH = 6 + 7 = 13$

$GJ = 13$

$HJ = 6 - 1 = 5$

Find x and the measure of each side of the triangle.

Δ MPN is equilateral with MN = 3x – 6, MP = x + 4, and NP = 2x -1.



$3x - 6 = x + 4$

$2x = 10$

$x = 5$

$MN = 9$ $MP = 9$

$NP = 9$