Name Ms. Kresovic

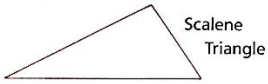
Advanced Geometry – 3.6: Types of Triangles Date

Objective

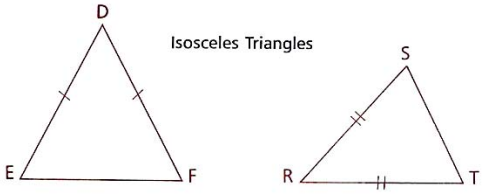
After studying this section, you will be able to

- Name the various types of triangles and their parts

Definition A ***scalene triangle*** is a triangle in which no two sides are congruent.

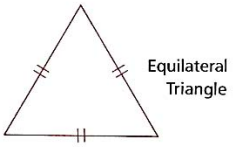


Definition An ***isosceles triangle*** is a triangle in which at least two sides are congruent.



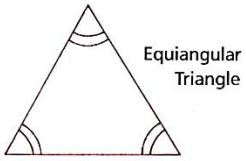
In $\triangle DEF$ above, $\overline{DE} \cong \overline{DF}$. $\overline{DE}$ and $\overline{DF}$ are called ***legs*** of the isosceles triangle, $\overline{EF}$ is called the ***base,*** $\angle E$ and $\angle F$ are called ***base angles,*** and $\angle D$ is called the ***vertex angle.*** Can you name these parts in $\triangle RST$?

Definition An ***equilateral triangle*** is a triangle in which all sides are congruent.



The word *equilateral* can be applied to any figure in which all sides are congruent.

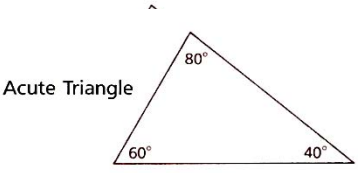
Definition An ***equiangular triangle*** is a triangle in which all angles are congruent.



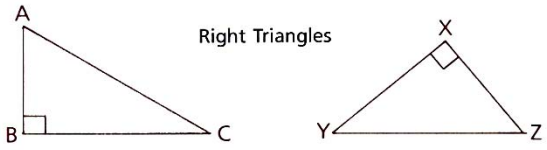
The word *equiangular* can be applied to any figure in which all angles are congruent.

Looking at the diagrams, you may wonder if there is any real difference between an equilateral triangle and an equiangular triangle. You will find out in Section 3.7, where you will also learn whether any differences exist between equilateral and equiangular figures of other numbers of sides.

Definition An ***acute triangle*** is a triangle in which all angles are acute.

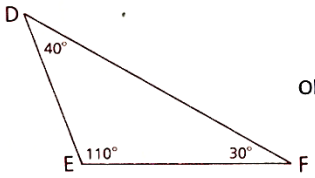


Definition A ***right triangle*** is a triangle in which one of the angles is a right angle. (The side opposite the right angle is called the ***hypotenuse.*** The sides that form the right angle are called ***legs.***)



In △ABC above, $\overline{AB}$ and $\overline{BC}$ are the legs, and $\overline{AC}$ is the hypotenuse. Can you name these parts in △XYZ?

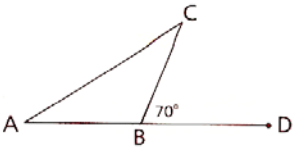
Definition An ***obtuse triangle*** is a triangle in which one of the angles is an obtuse angle.



Obtuse Triangle

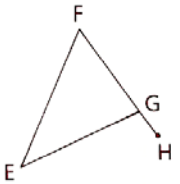
Part Two: Sample Problems

Problem 1 Given: ∠CBD = 70°
Prove: △ABC *is obtuse.*



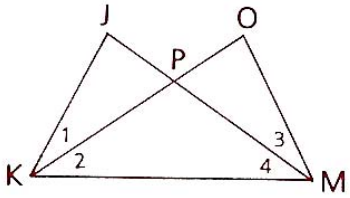
Proof ∠CBD = 70° and ∠ABD is a straight angle, so ∠ABC = 110°. Since △ABC contains an obtuse angle, it is an obtuse triangle.

Problem 2 Given: EG = FH,
EF > EG
Prove: △EFG *is scalene.*



Proof Since EG = FH and $\overline{FH}$ is clearly longer than $\overline{FG}$, $\overline{EG}$ is also longer than $\overline{FG}$. It is given that EF > EG, so $\overline{EF}$ is also longer than $\overline{FG}$. Since no two sides of △EFG are congruent, the triangle is scalene.

Problem 3 Given: ∠1 ≅ ∠3,
∠2 ≅ ∠4,
$\overline{JP} \cong \overline{PO}$
Prove: △KPM *is isosceles.*

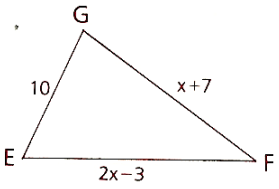


Proof

Statements	Reasons
1 ∠1 ≅ ∠3	1
2 ∠2 ≅ ∠4	2
3 ∠JKM ≅ ∠OMK	3
4 $\overline{KM} \cong \overline{KM}$	4
5 △JKM ≅ △OMK	5
6 $\overline{JM} \cong \overline{KO}$	6
7 $\overline{JP} \cong \overline{PO}$	7
8 $\overline{KP} \cong \overline{MP}$	8
9 △KPM is isosceles.	9

Problem 4

If the perimeter of △EFG is 32, is △EFG scalene, isosceles, or equilateral?



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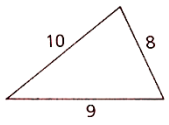
Advanced Geometry – 3.6: Types of Triangles Date

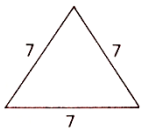
3.6 Homework

2 Classify each of the triangles as scalene, isosceles, or equilateral.

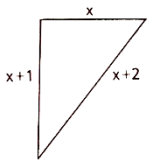
a



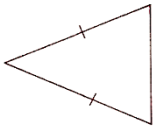
c



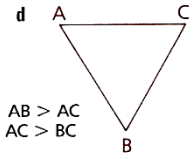
e



b

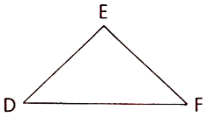


d



AB > AC
AC > BC

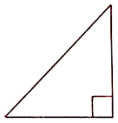
f



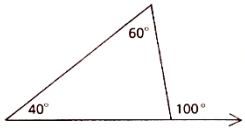
DE < DF
EF = DE

3 Classify each of the triangles as acute, right, or obtuse.

a



d



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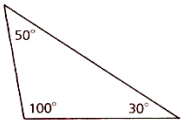
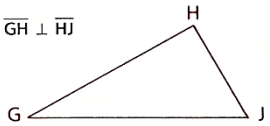


e $\overline{GH} \perp \overline{HJ}$



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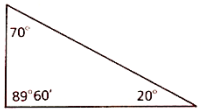
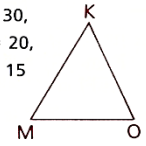
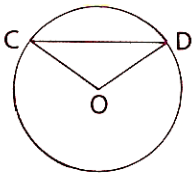


f $\frac{1}{2}(m\angle K) = 30$,
$\frac{1}{3}(m\angle M) = 20$,
$\frac{1}{4}(m\angle O) = 15$

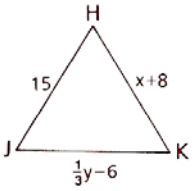


5 Given: $\odot O$

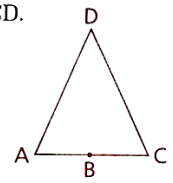
Prove: $\triangle COD$ is isosceles.



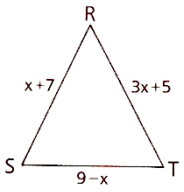
6 If $\triangle HJK$ is equilateral, what are the values of x and y?



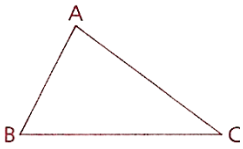
7 Given: $\overline{AD}$ and $\overline{CD}$ are legs of isosceles $\triangle ACD$.
B is the midpt. of $\overline{AC}$.
Prove: $\angle A \cong \angle C$



10 In $\triangle RST$, $RS = x + 7$, $RT = 3x + 5$, and $ST = 9 - x$. If $\triangle RST$ is isosceles, is it also equilateral?



12 Given: $AB = x + 3$,
$AC = 3x + 2$,
$BC = 2x + 3$;
Perimeter of $\triangle ABC = 20$.
Show that $\triangle ABC$ is scalene.



14 Given: $\overline{AB}$ and $\overline{AC}$ are the legs of isosceles $\triangle ABC$.
$m\angle 1 = 5x$,
$m\angle 3 = 2x + 12$
Find: $m\angle 2$