SAT MATH SECTION

Triangles

The SAT Geometry has 3 interlinked chapters

1- Angles
2- Triangles
3 - Circles

Today we will tackle Triangles

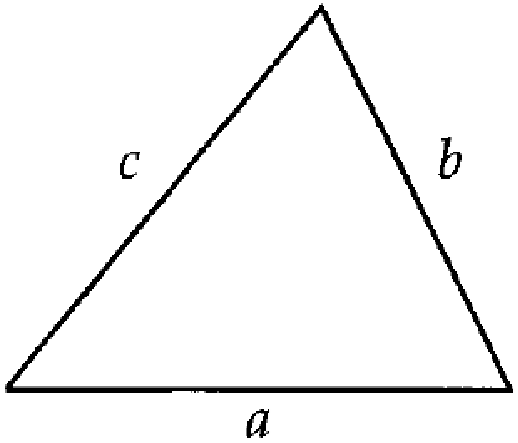
These modules will be helpful to understand circle over the next session

SCULA

Triangles

- Isosceles and Equilateral Triangles
- Right Triangles
- Special Right Triangles
- Similar Triangles

For any triangle, the sum of any two sides must be greater than the third.



$$a + b > c$$

$$b + c > a$$

$$a + c > b$$

Let’s consider that a triangle has three sides with the following lengths: .6 dna ,1 ,1

The two shortest sides will not connect. Thus, this will not be a triangle

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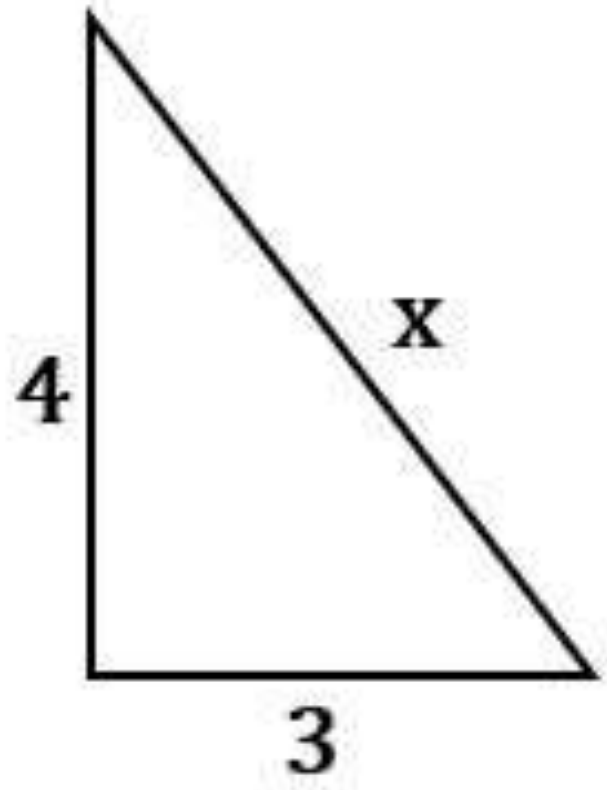
Example

In ABC, AB has a length of 3 and BC has a length of woH .4
?CA fo htgnel eht rof elbissop era seulav regetni ynam



In order for ABC to be a triangle:

$3 + 4 > x$

$3 + x > 4$

$4 + x > 3$

Using the aforementioned inequalities :

< 7x

x > 1

x > -1

Which means .7>x>1

x can be equal to .6 ,5 ,4 ,3 ,2

There 5 possible integer values of x .

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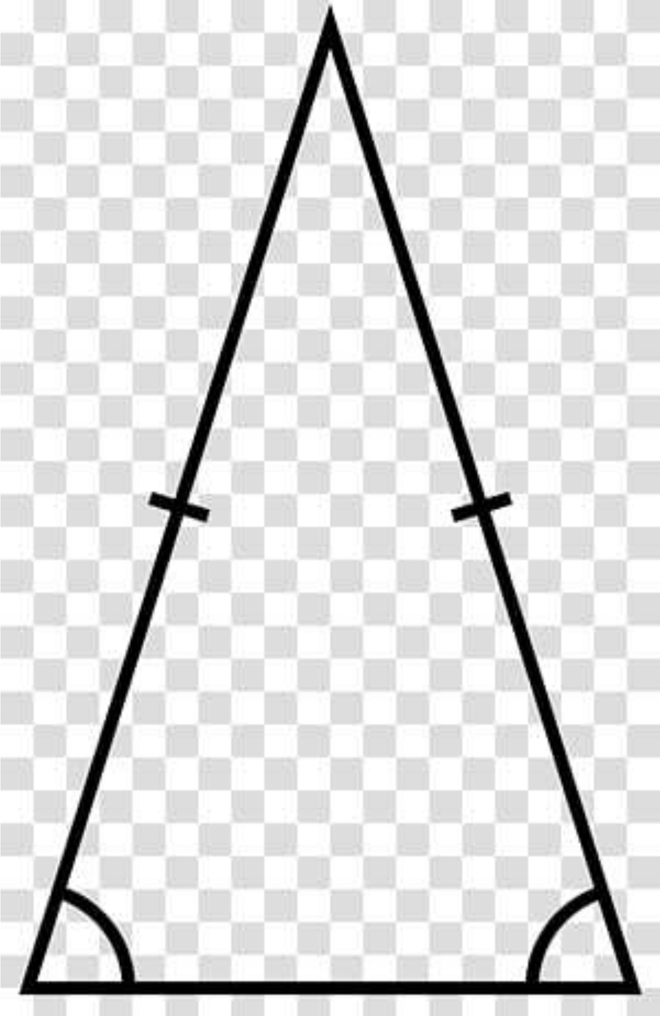
Isosceles Triangle :

An isosceles triangle has two sides of equal length .

Therefore, the angles opposites these sides are equal .



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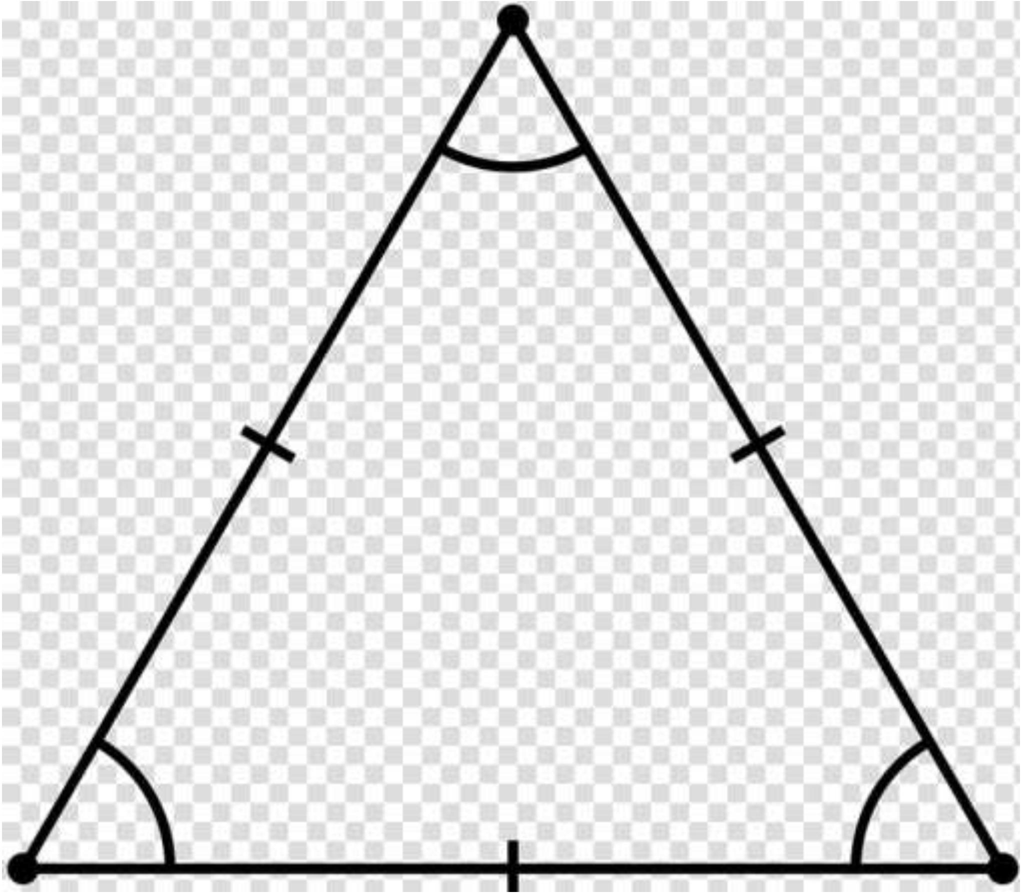
Equilateral Triangle :

In an equilateral triangle, all sides have the same length.

Therefore, all angles are equal .

Each angle measures 60°

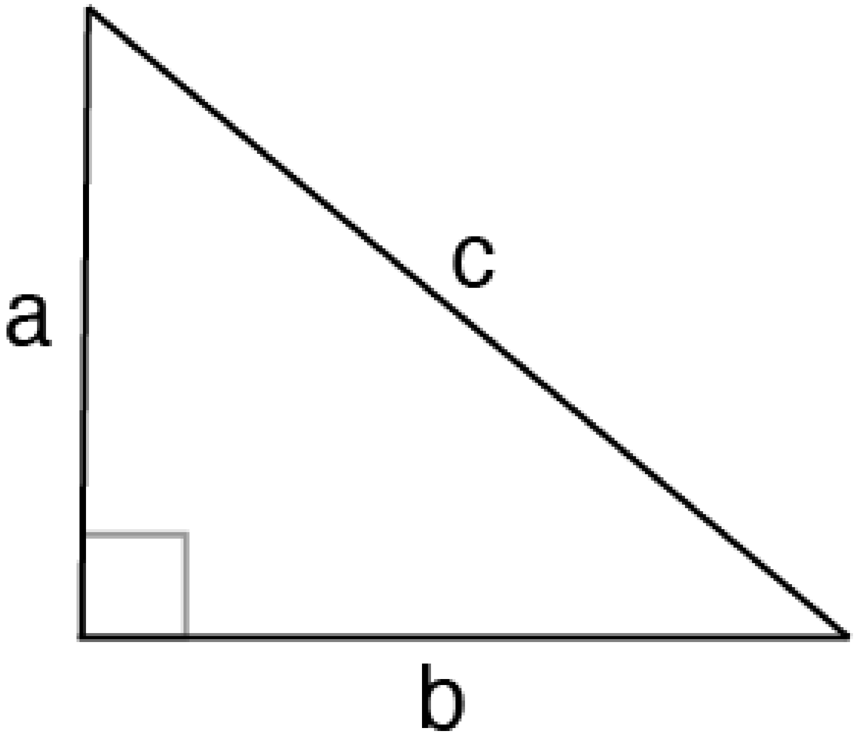


Right Triangles:

A right triangle is called right because it has a right angle. The measure of a right angle is 90°.

Every right triangle obeys to the pythagorean theorem

$$a^2 + b^2 = c^2$$



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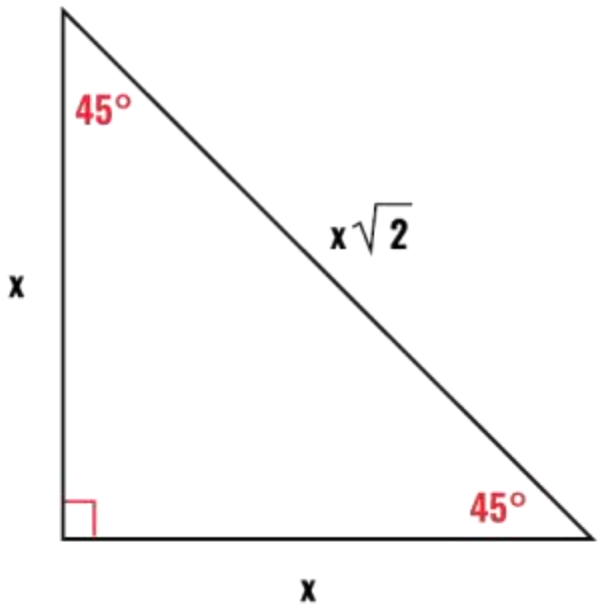
Special Right Triangles :

The first type of special right triangles is the isosceles right triangle. It has a right angle and two equal sides (equal side angles).



$leg = side\ opposite\ 45°$

$45°$-$45°$-$90°$

$1 : 1 : \sqrt{2}$

$1x : 1x : \sqrt{2}x$

$1(leg) : 1(leg) : \sqrt{2}(leg)$

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Angles :

We know that the sum of the interior angles is .180°

a+b+c = 180° and a is the right angle.

b + c = 90° =90° -180°

The triangle is isosceles. Therefore, b = c .

2b = 90°

b= c = 45°

We call this the 90 -45 -45 triangle.

Sides Length :

The triangle is isosceles. AB = x and AC = x .

This triangle is right. To find BC, we will apply the pythagorean theorem .

$BC^2BA +^2 CA =^2$

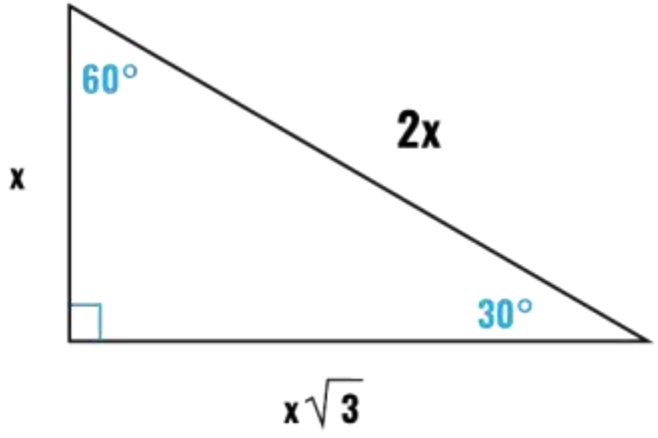
$BC^2x +^2 x =^2$

$BC2 =^2 x^2$

BC =x 2√

Special Right Triangles :

The second type of special right triangles is the equilateral right triangle. Its angles are equal to :
30° dna -60° -90°



$leg = side\ opposite\ 30°$

30°-60°-90°

$1 : \sqrt{3} : 2$

$1x : \sqrt{3}x : 2x$

$1(leg) : \sqrt{3}(leg) : 2(leg)$

SCULA

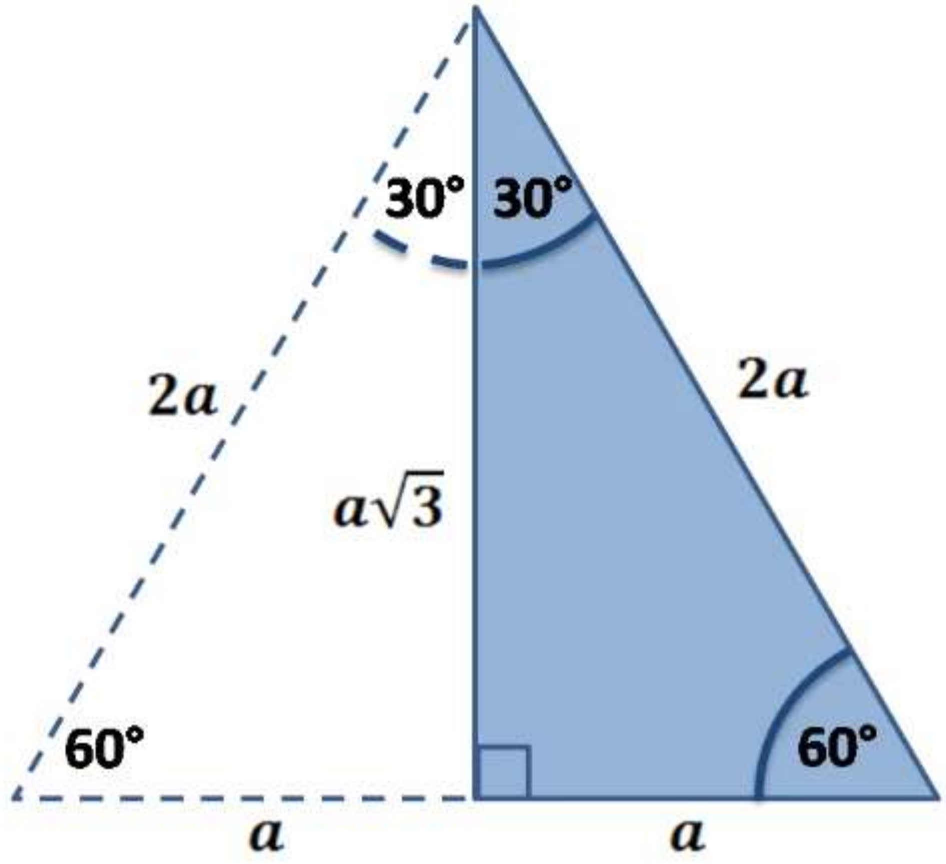
DEMONSTRATION

Special Right Triangles
:

Let's consider the triangle ABC .

Drawing a line down the middle from A to BC creates two 90-60-30 triangles and intersect BC in D .

Because the triangle is symmetrical, the line cuts BC to half. BD = DC = a



Special Right Triangles

:

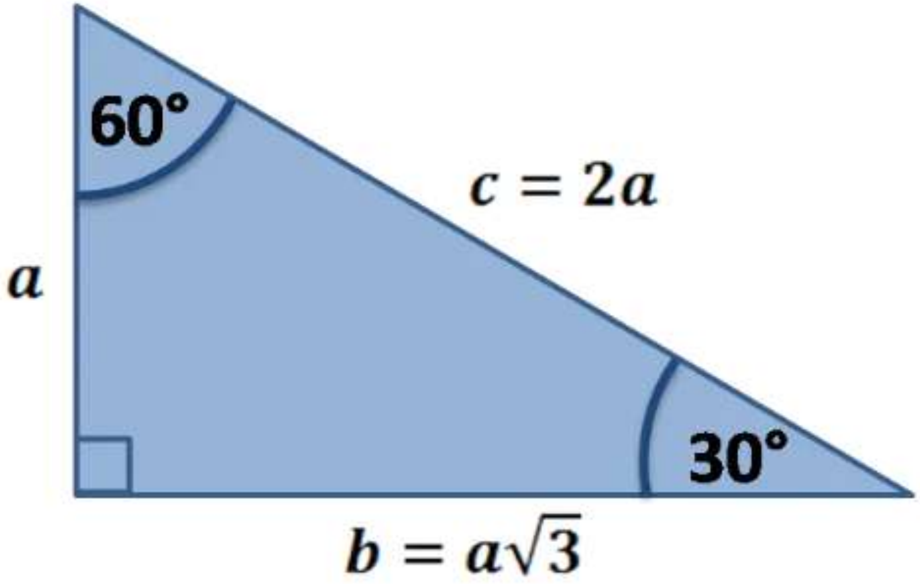
Applying the pythagorean theorem to find the length of AD.

$AD^2 BA +^2 CA =^2$

$AD2 =^2 a^2 a +^2$

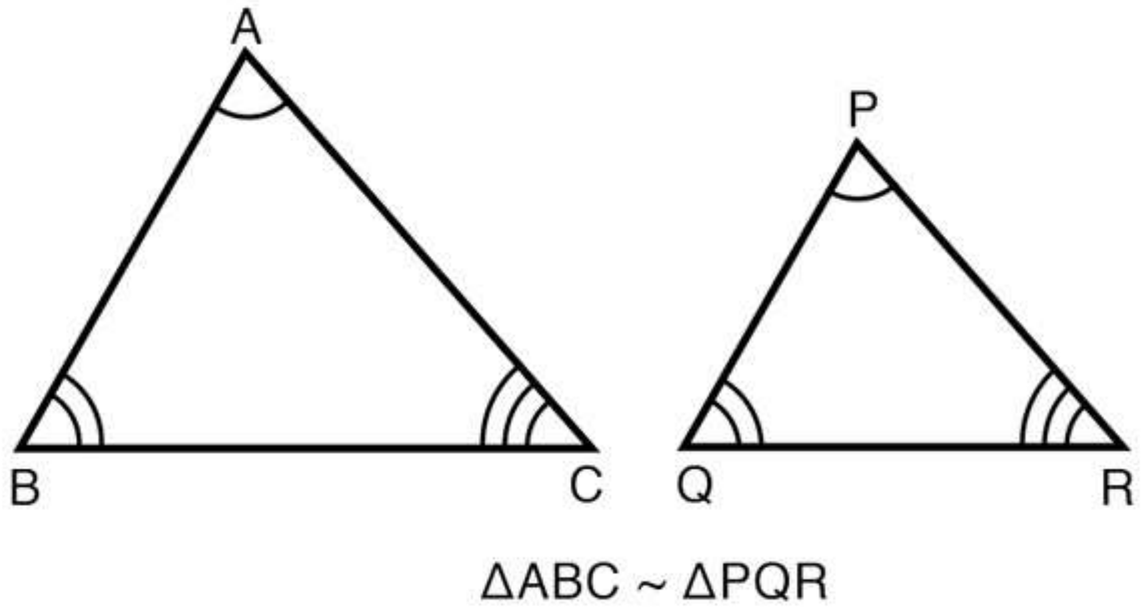
$AD3 =^2 a^2$

$AD = \sqrt{3}a$



Similar Triangles :

When two triangles have the same angle measures, their sides are proportional .



$$\frac{AB}{PQ} = \frac{AC}{PR} = \frac{BC}{QR}$$

OR

$$\frac{PQ}{AB} = \frac{PR}{AC} = \frac{QR}{BC}$$

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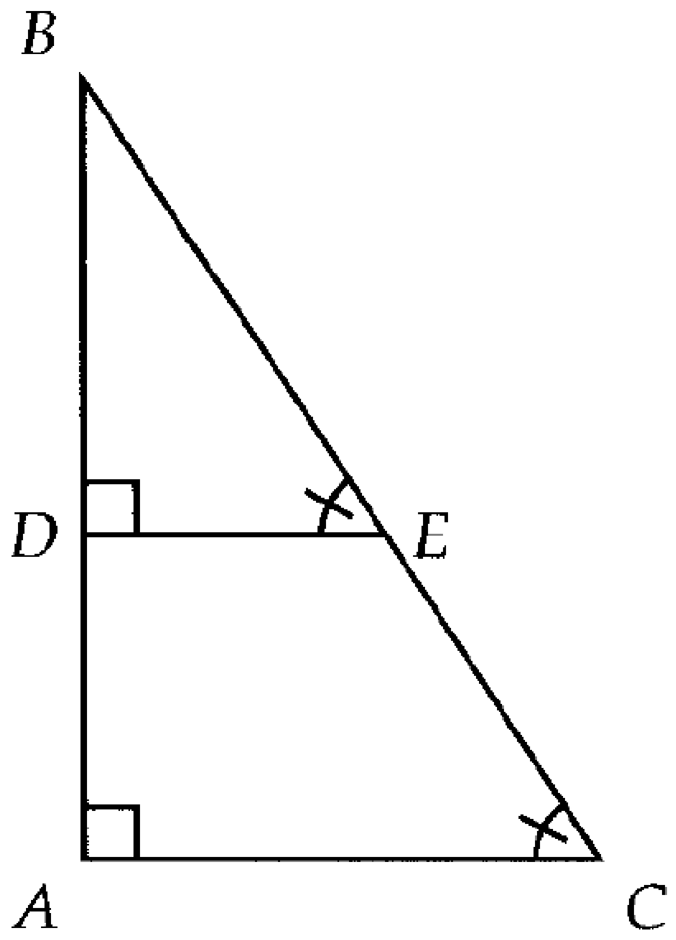
Similar Triangles :

Similar triangles can also have one common vertex. In this case, the same rule of proportionality applies .



THANK YOU!

DO YOU HAVE ANY QUESTIONS?