

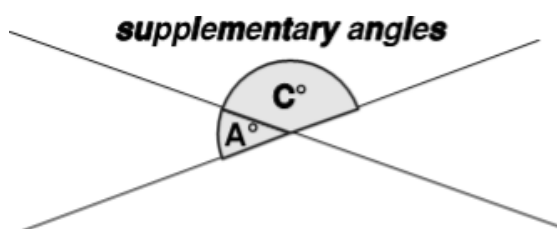
Review of Basic Angle Properties

Two angles are supplementary if they add to 180° .

Notice that together they make a straight angle.

Example:

$$A^\circ + C^\circ = 180^\circ$$



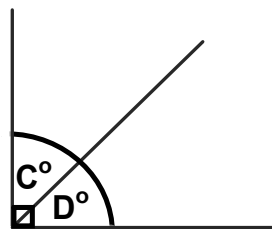
If two angles add to 180° , we say they "supplement" each other.

Two angles are complementary if they add to 90° .

Notice that together they make a right angle.

Example:

$$C^\circ + D^\circ = 90^\circ$$



If two angles add to 90° , we say they "complement" each other.

Vertically Opposite Angles

When two lines intersect, four angles are formed.

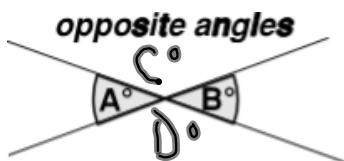
The angles that are directly opposite to each other are called vertically opposite angles.

Vertically opposite angles are always **EQUAL!!!**

Example:

$\angle A^\circ$ and $\angle B^\circ$ are opposite angles.

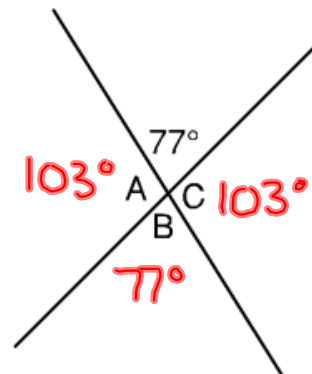
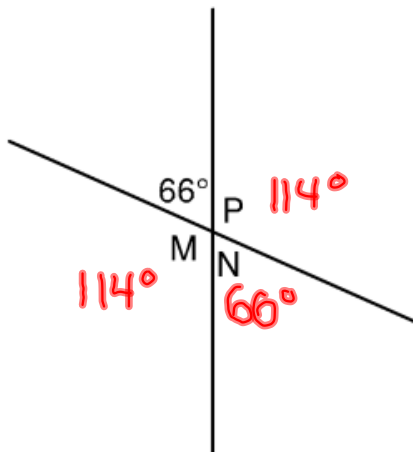
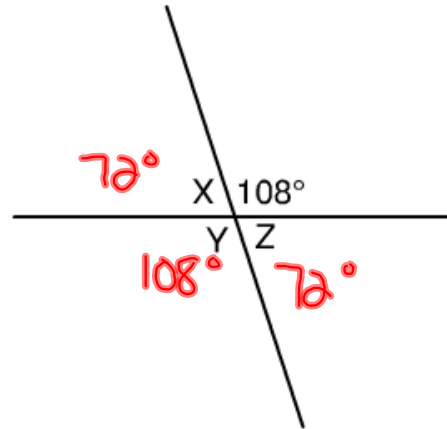
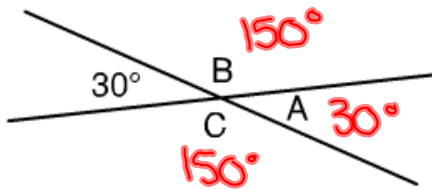
$$A^\circ = B^\circ$$



Angles and lines



Calculate the missing angles.
Hint - there are 180° in a straight angle and 360° in a full turn



TRIANGLES...

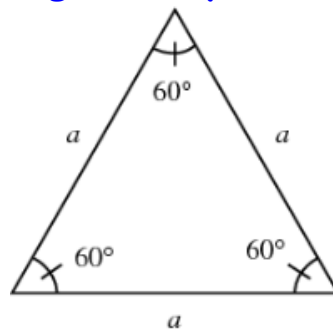
The three interior angles in a triangle always add up to 180° .

TYPES OF TRIANGLES

Equilateral Triangle

Three equal sides

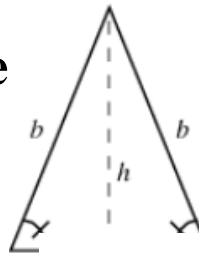
Three equal angles, always 60°



Isosceles Triangle

Two equal sides

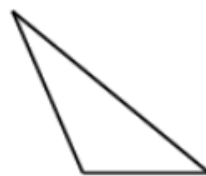
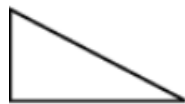
Two equal angles



Scalene Triangle

No equal sides

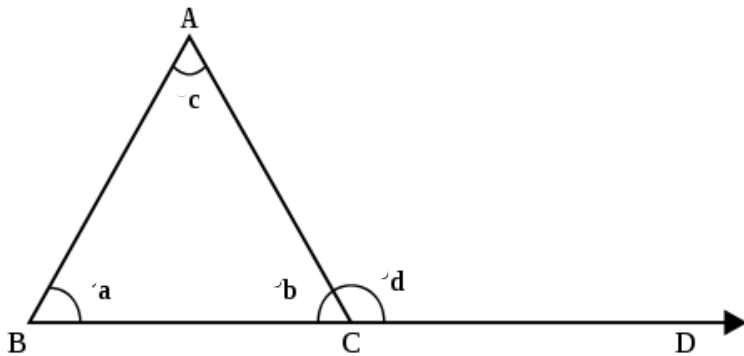
No equal angles



scalene triangles

Exterior Angle of a Triangle

In the diagram below, angle "d" is an exterior angle.

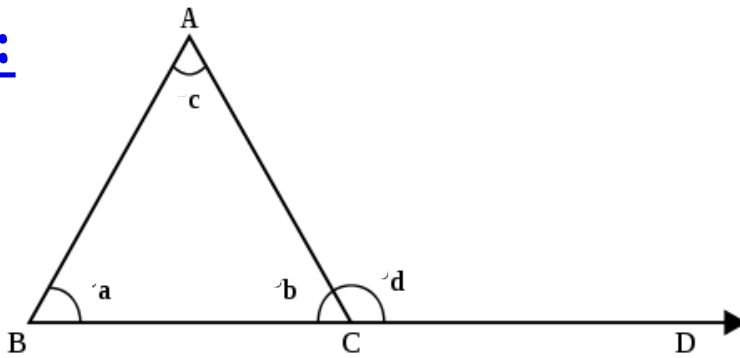


adding

The exterior angle of a triangle is equal to the sum of the opposite two interior angles.

Therefore in the diagram above, $d = a + c$.

Proof:



The angles in a triangle add up to 180° . So $a + b + c = 180^\circ$.¹

The angles on a straight line add up to 180° . So $b + d = 180^\circ$.²

Using ² $b + d = 180^\circ$, $b = 180^\circ - d$.

Sub.into, ¹ $a + b + c = 180^\circ$ becomes $a + (180^\circ - d) + c = 180^\circ$.

$$a + c = \cancel{180^\circ} - \cancel{180^\circ} + d$$

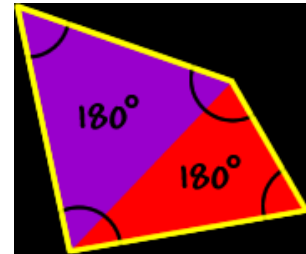
Therefore, $a + c = d$

Angle Sum of a Quadrilateral

A quadrilateral is a 4 sided polygon.

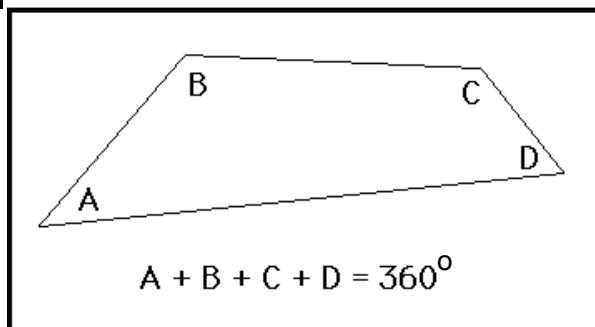
Now that we know the sum of the angles in a triangle, we can work out the sum of the angles in a quadrilateral.

For any quadrilateral, we can draw a diagonal line to divide it into two triangles. Each triangle has an angle sum of 180° .



Therefore the total sum of any quadrilateral is $180^\circ + 180^\circ = 360^\circ$

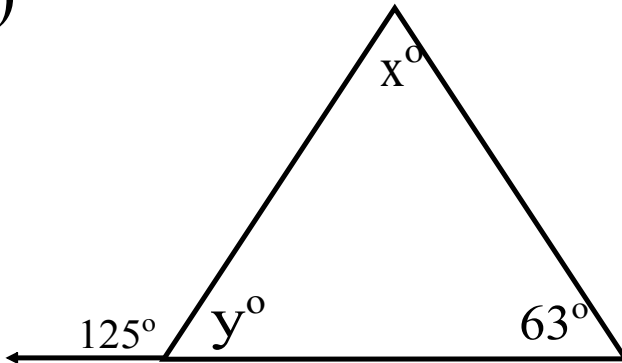
In other words...



Practice

Find the value of each variable in the following diagrams.

a)



$$\begin{aligned} \textcircled{1} \quad 125^\circ + y &= 180^\circ \\ y &= 180^\circ - 125^\circ \\ \boxed{y = 55^\circ} \end{aligned}$$

$$\textcircled{2} \quad x + y + 63^\circ = 180^\circ$$

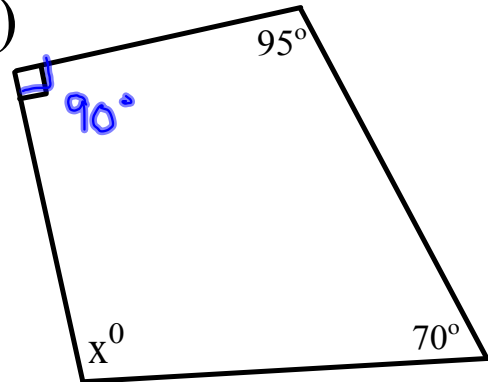
$$x + 55^\circ + 63^\circ = 180^\circ$$

$$x + 118^\circ = 180^\circ$$

$$x = 180^\circ - 118^\circ$$

$$\boxed{x = 62^\circ}$$

b)



$$x + 70^\circ + 95^\circ + 90^\circ = 360^\circ$$

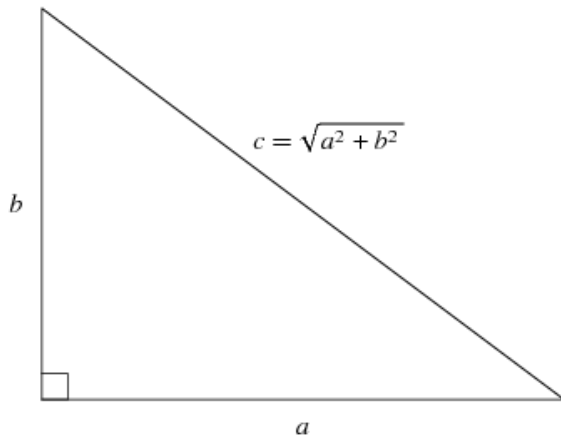
$$x + 255^\circ = 360^\circ - 255^\circ$$

$$\boxed{x = 105^\circ}$$

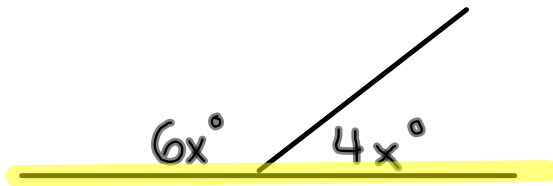
Pythagorean Theorem

Don't forget: $c^2 = a^2 + b^2$

↑
hypotenuse



①



$$x^\circ = \underline{18^\circ}$$

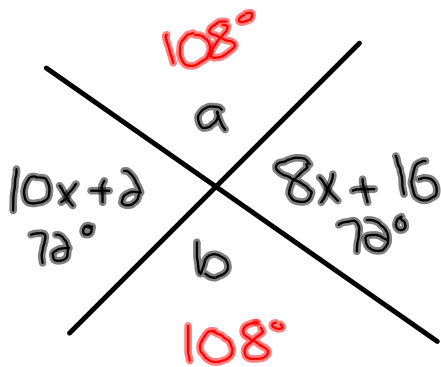
$$4x^\circ = \underline{4(18) = 72^\circ}$$

$$6x^\circ = \underline{6(18) = 108^\circ}$$

$$6x + 4x = 180^\circ$$

$$10x = 180^\circ$$

$$x = 18^\circ$$



$$10x + 2 = 8x + 16$$

$$10x - 8x = 16 - 2$$

$$2x = 14$$

$$\underline{x = 7}$$

$$10x + 2 = \underline{72^\circ}$$