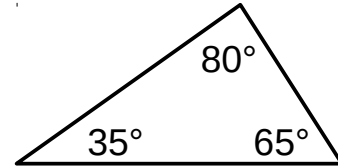


## Angle Properties of Triangles and Parallel Lines

### 1. Interior Angles of a Triangle

The interior (inside) angles of a triangle have a sum of  $180^\circ$ .



### 2. Angle Theorems Involving Parallel Lines

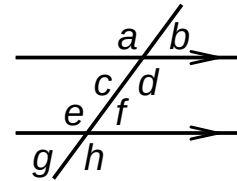
Opposite angles are equal ( $a$  and  $d$ ).

Corresponding angles are equal ( $a$  and  $e$ ) – “F” pattern.

Alternate angles are equal ( $c$  and  $f$ ) – “Z” pattern.

Co-interior angles have a sum of  $180^\circ$  ( $d$  and  $f$ ) – “C” pattern.

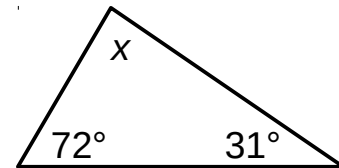
Supplementary angles have a sum of  $180^\circ$  ( $g$  and  $h$ ).



### 3. Examples

#### A. Determine the value of $x$ .

Since the sum of the interior angles is  $180^\circ$ ,  $x = 180 - 72 - 31 = 77^\circ$ .

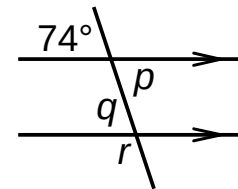


#### B. Determine the values of $p$ , $q$ and $r$ .

$p$  is opposite the  $74^\circ$  angle, so  $p$  is also  $74^\circ$ .

$q$  is alternate with  $p$ , so  $q$  is also  $74^\circ$ .

$q$  and  $r$  are supplementary, so  $q = 180 - 74 = 106^\circ$ .



#### C. Determine the value of $x$ .

Since the two angles are opposite, they are equal to each other.

$$3x + 12 = 5x - 18$$

$$3x - 5x = -18 - 12$$

$$-2x = -30$$

$$\frac{-2x}{-2} = \frac{-30}{-2}$$

$$x = 15$$

Therefore,  $x = 15$ , and the measure of the angles is  $3(15) + 12 = 57^\circ$ .

To check, note that  $5(15) - 18 = 57^\circ$  as well.

