Mystery Angles

KEY

Note: We will be using the facts below to help us set up and solve the problems.

- A triangle is a 3-sided polygon. The angles in a triangle add up to 180 degrees.
- A quadrilateral is a 4-sided polygon. The angles in a quadrilateral add up to 360 degrees.
- Complementary angles are a pair of angles that have a sum of 90 degrees.
- Supplementary angles are a pair of angles that have a sum of 180 degrees.
- Vertical angles are formed by intersecting lines and they are congruent.
- Adjacent angles share a common side but have no common interior points.

Examples:

1) A quadrilateral has angles that measure 70°, 80°, and 50°. What is the measure of the fourth angle?

Let x = the measure of the fourth angle

$70 + 80 + 50 + x = 360$

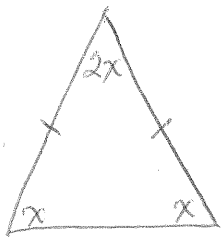
$200 + x = 360$

$-200 \quad -200$

$x = 160$

The fourth angle measures 160°.

2) The vertex angle in an isosceles triangle measures twice each of the base angles. Find the measure of each of the base angles.



Let x = the measure of each base angle

$x + x + 2x = 180$

$\frac{4x}{4} = \frac{180}{4}$

$x = 45$

The measure of each base angle is 45°.

3) Angles A and B are supplementary. One of the angles measures 140°. Find the measure of its supplement.

Let x = the measure of its supplement

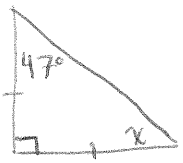
$x + 140 = 180$

$-140 \quad -140$

$x = 40$

The measure of its supplement is 40°.

4) In a right triangle, the two acute angles are complementary. One of the acute angles is 47°. What is the measure of the other acute angle?



Let x = the measure of the other acute angle

$x + 47 = 90$

$-47 \quad -47$

$x = 43$

The other acute angle is 43°.

5) The measure of the largest angle in a quadrilateral is four times the measure of the smallest angle. The two middle angles are each 15 degrees more than three times the measure of the smallest angle. What are the measures of each of the angles of the quadrilateral?

Let x = the measure of the smallest $\angle$

$4x$ = the measure of the largest $\angle$

$3x+15$ = the measure of each middle $\angle$

$x + 4x + (3x+15) + (3x+15) = 360$

$11x + 30 = 360$

$-30 \quad -30$

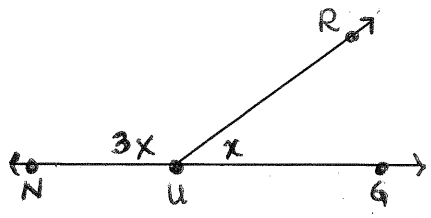
$\frac{11x}{11} = \frac{330}{11}$

$x = 30$

The angle measures are 30°, 4(30), and 3(30)+15...

30°, 120°, 105°, 105°

6) Adjacent angles RUN and RUG form a straight line, which means they are also supplementary. Find the value of x and the value of angles RUN and CAB.



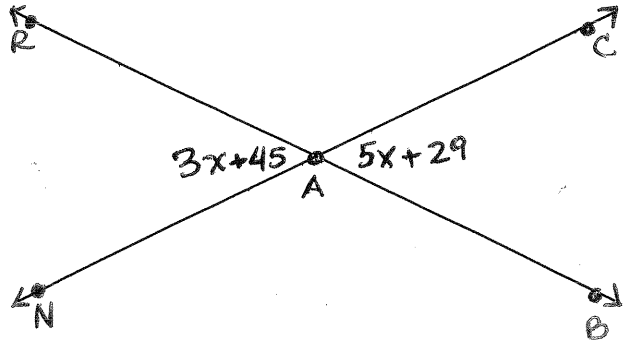
$3x + x = 180$

$\frac{4x}{4} = \frac{180}{4}$

$x = 45$

The angles are $3(45) = 135°$ & $45°$.

7) Find the measure of x and the measure of the vertical angles RAN and CAB.



$3x + 45 = 5x + 29$

$-3x \quad -3x$

$45 = 2x + 29$

$-29 \quad -29$

$\frac{16}{2} = \frac{2x}{2}$

$8 = x$

$\angle RAN = 3x+45 = 3(8)+45 = 24+45 = 69°$

$\angle CAB = 5x+29 = 5(8)+29 = 40+29 = 69$ ✓