



Supplementary Angles

If the measure of two angles add up to 180 degrees the angles are called "supplementary angles".

For example,

$$A = 30^\circ \text{ and } B = 150^\circ$$

Since the sum of the measures of angles A and B are 180° , A and B are supplementary.

Example,

$$R = 97^\circ \text{ and } S = 83^\circ$$

The sum of the measures of angles R and S are 180° , so R and S are supplementary angles.

Angle A and its Supplement

Consider two supplementary angles: A and another angle.

$$A \text{ and } (\text{Another Angle})$$

Since they are supplementary, they add up to 180 degrees.

$$A + (\text{Another Angle}) = 180$$

Notice that we call angle A by its name: "A".

It is implied that we mean "the measure of angle A" when we just write "A".

What shall we call the other angle?

Since the two angles are supplements of each other, let's call the other angle "**The supplement of A**".

Thus, we know

$$(A) + (\text{The supplement of } A) = 180^\circ$$

If we solve the last equation by subtracting " A " from both sides, we obtain:

$$\begin{array}{r} A + (\text{The supplement of } A) = 180 \\ -A \quad \underline{\hspace{10em}} \quad -A \end{array}$$

$$(\text{The supplement of } A) = 180 - A$$

Thus, if we are working with an angle A the supplement of A is written as (180 - A).

This means that whenever you see the word "supplement", you can replace it with the mathematical expression " (180 - A) ".

Word Problems

What is the measure of an angle, if three is subtracted from twice the supplement and the result is 297 degrees?

Solution:

Translate the problem slowly; phrase by phrase:

"What is the measure of an angle"...

This means we define A. A is the measure of an angle

"if three is subtracted from"...

Think of subtracting 3 from a number like, say, 5.

You'd write 5 - 3.

This suggests that the phrase

" 3 is subtracted from"

would be written as " something - 3 ".

"three is subtracted from twice"...

We are taking 3 away from something being multiplied by 2.

We write: 2() - 3.

Use parentheses because we don't know what is being multiplied by 2.

"twice the supplement"...

We learned above that (180 - A) is the supplement of angle A.

Thus,

"three is subtracted from twice the supplement "

would be written as 2(180 - A) - 3

"and the result is 297"...

This is a fancy way of saying "equals" 297

This is what we have: $2(180 - A) - 3 = 297$

Solving this equation:

$$2(180) - 2A - 3 = 297$$

$$360 - 2A - 3 = 297$$

$$-2A + 357 = 297$$

$$-2A = 297 - 357$$

$$-2A = -60$$

$$\frac{-2A}{-2} = \frac{-60}{-2}$$

$$A = 30$$

The measure of angle A is 30 degrees.