System of Equations (Word Problems)

1. A language arts test is worth 100 points. There is a total of 26 questions. There are spelling word questions that are worth 2 points each and vocabulary word questions worth 5 points each. How many of each type of question are there?

2. Two numbers have a sum of 1,212 and a difference of 518. What are the two numbers?

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Let x represent the number of spelling word questions, and let y represent the number of vocabulary word questions.

$$\begin{cases} x + y = 26 \\ 2x + 5y = 100 \end{cases}$$

$$-2(x + y = 26)$$
$$-2x - 2y = -52$$

$$\begin{cases} -2x - 2y = -52 \\ 2x + 5y = 100 \end{cases}$$
$$2x - 2x + 5y - 2y = 100 - 52$$
$$3y = 48$$
$$y = 16$$

$$x + 16 = 26$$
$$x = 10$$

The solution is $(10, 16)$.

$$2(10) + 5(16) = 100$$
$$100 = 100$$

There are 10 spelling word questions and 16 vocabulary word questions.

2. Two numbers have a sum of 1,212 and a difference of 518. What are the two numbers?

Let x represent one number and y represent the other number.

$$\begin{cases} x + y = 1212 \\ x - y = 518 \end{cases}$$

$$x + y + x - y = 1212 + 518$$
$$2x = 1730$$
$$x = 865$$

$$865 + y = 1212$$
$$y = 347$$

The solution is $(865, 347)$.

$$865 - 347 = 518$$
$$518 = 518$$

The two numbers are 347 and 865.

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