18) Question: For the system of equations given below,

$$a + b = 10$$
$$a + 3b = 24$$

Find the value of "a".

For speed, *while solving something similar, only THINK the words in blue;* WRITE only the words in other COLORS.

Solution:

Given   1) $a + b = 10$
*   2) $a + 3b = 24$*
Find the value of "a".

Road Map *of Solution:*
First,   *Subtract the given first equation from the second.*
Second,   *Simplify the result to find the value of "a".*

Given
1st statement $a + b =   10$ . . . .   equation # 1
2nd statement $a + 3b =   24$ . . . .   equation # 2
Before we can subtract equation #1 from 2, we will rewrite equation#1 such that after subtraction, all "b" are eliminated.
Multiply both sides of eq#1 with 3

$$(3) \times \{a + b\} = \{10\} \times (3)$$
$$3a + 3b =   30   \text{. . . . .}   equation \# 1b$$

First *Step: equation#2 – equation#1*
*   equation#2 – equation#1b*

$$a + 3b =   24   \text{. . . . .}   equation \# 2$$
$$(-1) \times \{ 3a + 3b\} = \{30\} \times (-1)   \text{. . . . .}   equation \# 1b   \times (-1)$$
$$\{- 3a - 3b\} = \{-30\}$$
$$- 3a - 3b = -30   \text{. . . . .}   equation \# 1c$$

From equation#2 & 1c above, we get;

$$-2a   =   -6$$
$$\{-2a\} \times \left(\tfrac{1}{2}\right) = \{-6\} \times \left(\tfrac{1}{2}\right)$$
$$\{-2a\} \times \left(\tfrac{1}{2}\right) = \{-6\} \times \left(\tfrac{1}{2}\right)$$
$$\{-1a\} \times \left(\tfrac{1}{1}\right) = \{-3\} \times \left(\tfrac{1}{1}\right)$$
$$\{- a\}   = \{-3\}$$

a	$=$	3	. . . . Answer