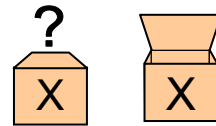


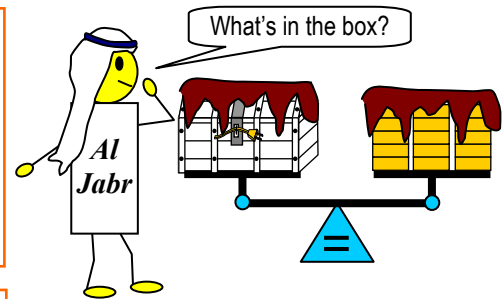
Equation Ops

WAC Golden Plug! 



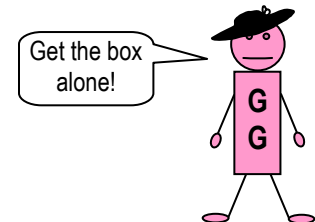
What?

Al Jabr is presented with a treasure box that is sealed shut with a golden plug and covered in mud. It is balanced on a scale with mud-covered coins on the opposite side. His task is to find out *what* is in the treasure box *without opening it!* You'll use similar steps to find the hidden contents of an equation's variable "box."



Alone!

Not sure what to do, he asks his friend Greta G. (a famous movie star who shunned publicity with her accented lament: *I vant to be alone!*). She tells Al Jabr that he must *get the box alone!* It must be free of mud and balanced only by coins on the opposite side of the scale.

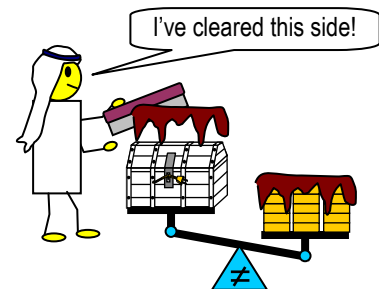


Clear!

Clearly Opposite

To get the box alone, Al Jabr must clear the mud (numbers) away from it with an opposite (inverse) operation. In other words:

- If a number is *added* to the box, he must *subtract* that number.
- If a number is *subtracted* from the box, he must *add* that number.
- If the box is *multiplied* by a number, he must *divide* by that number.
- If the box is *divided* by a number, he must *multiply* by that number.



Clear A/S M/D

If the box is surrounded by more than one operator (+ - × ÷), it's not always clear what to do first. In fact, it's as "*clear as mud*," which of course is not clear at all. Clear A/S M/D means that Al Jabr should proceed in reverse PEMDAS (SADMEP) order:

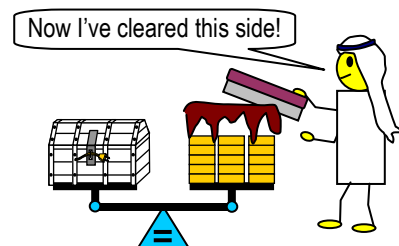
- First clear Addition or Subtraction (A/S).
- Next clear Multiplication or Division (M/D).

Exception: Throw M/D!

If an equation contains fractions or coefficients with common factors, it may be simpler to "Throw M/D" (Multiply/Divide) at it *before* clearing Addition/Subtraction.

Golden!

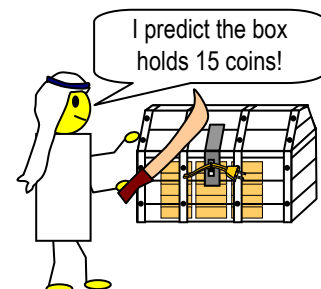
To rebalance the scale, Al Jabr follows the *Golden Rule of Equations*: "Whatever you do to one side, do to the other." After clearing both sides, the box will be balanced by the same number of coins it holds. [In this story, we must pretend that the treasure box itself is weightless!]



Plug!

Finally, Al Jabr uses a sword to "WAC" the golden plug holding the box shut then counts the coins inside to confirm his prediction. To check your answer, you'll "plug in" or substitute the calculated value into the original equation. You'll "feed" the box to *evaluate* (equation value ate) the original equation. If the results are equal, you've succeeded!

Important: When checking an equation, follow standard *PEMDAS* order!





Your Turn!



Use WAC Golden Plug to solve for x (left equation) and check your results (right equation).

<p>1. Addition (Clearly Opposite)</p> $x + 2 = 3$ $x + 2 = 3$	<p>2. Subtraction (Clearly Opposite)</p> $x - 2 = 3$ $x - 2 = 3$
<p>3. Multiplication (Clearly Opposite)</p> $2x = 4$ $2x = 4$	<p>4. Division (Clearly Opposite)</p> $\frac{x}{2} = 3$ $\frac{x}{2} = 3$
<p>5. Multiple Operators (Clear A/S M/D)</p> $3x + 1 = 7$ $3x + 1 = 7$	<p>6. Clear Denominators (Throw M/D)</p> $\frac{2x}{3} - \frac{1}{3} = 1$ $\frac{2x}{3} - \frac{1}{3} = 1$

Answers: 1-1, 2-5, 3-2, 4-6, 5-2, 6-2