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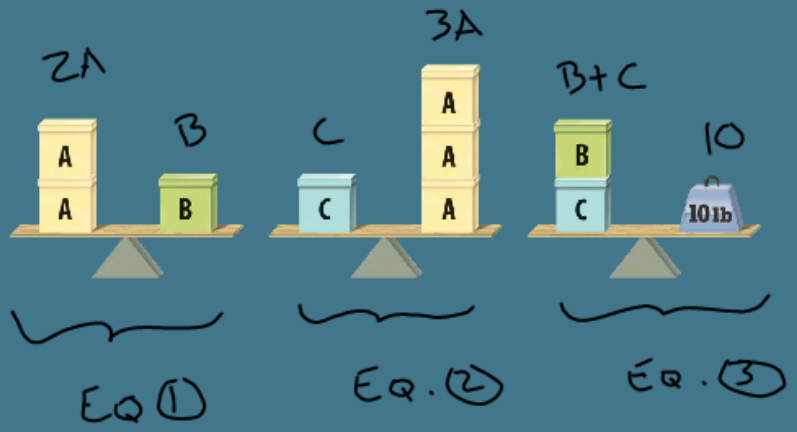
2-9: Systems With Three Variables — Warm ↑ 9|2|14

Launch — Instruction — Practice — Self Assessment

• Solve It!

Solve It: Getting Ready!

How much does each box weigh? Explain your reasoning.



Answer:

(2, 4, 6)

A B C

1 of 4

Solution:

(1) $2A = B$

(2) $C = 3A$

(3) $B + C = 10$

Use substitution method here!

Eq (3) becomes

$2A + 3A = 10$

$5A = 10$

$A = 2$

$B = 2A = 2(2) = 4$

$C = 3A = 3(2) = 6$

2.9. Honors Advanced Algebra DATE: 9/2

Guided Notes: Solving Systems of 3 Variables

Eliminate the variables in most efficient way.

Problem 1 Solving a System Using Elimination

What is the solution of the system? Use elimination. The equations are numbered to make the procedure easy to follow.

$$\begin{cases} 2x - y + z = 4 & (1)\\ x + 3y - z = 11 & (2)\\ 4x + y - z = 14 & (3) \end{cases}$$

(1) $2x - y + z = 4$
(2) $1x + 3y - z = 11$
(4) $3x + 2y = 15$

(1) $2x - y + z = 4$
(3) $4x + y - z = 14$
(5) $6x = 18$

To find z, substitute in (1), (2), or (3)

$2(3) - (3) + z = 4$
$6 - 3 + z = 4$
$3 + z = 4$
$z = 1$

$6x = 18 \Rightarrow x = 3$

(4) $3x + 2y = 15$
$3(3) + 2y = 15$
$9 + 2y = 15$
$-9 \quad -9$
$2y = 6$
$\Rightarrow y = 3$

(4) $3x + 2y = 15$
(5) $6x = 18$

Now Find x & y. Easy!

(3, 3, 1)

Got It?

What is the solution of the system? Use elimination.

$$\begin{cases} x - 2y + 3z = 12 & (1) \\ 2x - y - 2z = 5 & (2) \\ 2x + 2y - z = 4 & (3) \end{cases}$$

(1) $x - 2y + 3z = 12$

(3) $2x + 2y - z = 4$

(4) $3x + 2z = 16$

(2) $2(2x - y - 2z = 5)$

(3) $2x + 2y - z = 4$

(2) $4x - 2y - 4z = 10$

(3) $2x + 2y - z = 4$

(5) $6x - 5z = 14$

$(4, -1, 2)$

(4) $3x + 2z = 16$

(5) $6x - 5z = 14$

$-2(3x + 2z = 16)$

(4) $-6x - 4z = -32$

(5) $6x - 5z = 14$

$\frac{-9z}{-9} = \frac{-18}{-9}$

$z = 2$

(1) $x - 2y + 3z = 12$

$4 - 2y + 3(2) = 12$

$10 - 2y = 12 \Rightarrow -2y = 2 \Rightarrow y = -1$

$3x + 2z = 16$

$3x + 2(2) = 16$

$3x + 4 = 16$

$3x = 12$

$x = 4$

Problem 2 Solving an Equivalent System

What is the solution of the system? Use elimination.

$$\begin{cases} x + y + 2z = 3 & (1)\\ 2x + y + 3z = 7 & (2)\\ -x - 2y + z = 10 & (3)\end{cases}$$

(-7, 4, 3)

(1) $x + y + 2z = 3$

(3) $-x - 2y + z = 10$

(4) $-1y + 3z = 13$

(1) $-2(x + y + 2z = 3)$

(2) $2x + y + 3z = 7$

(1) $-2x - 2y - 4z = -6$

(2) $2x + y + 3z = 7$

(5) $-1y - 1z = 1$

(4) $-(-1y + 3z = 13)$

(5) $-1y - 1z = 1$

(3) $y - 3z = -13$

(5) $-x - z = 1$

$-4z = -12$

$\frac{-4z}{-4} = \frac{-12}{-4}$

$z = 3$

$-y + 3z = 13$

$-y + 3(3) = 13$

$-y + 9 = 13$

$-y = -4$

$y = 4$

(1) $x + y + 2z = 3$

$x + 4 + 2(3) = 3$

$x + 10 = 3$

$x = -7$

Got It?

What is the solution of the system? Use elimination. Check your answer in all three original equations.

Label

$$\begin{cases} x - y + z = -1 & (1)\\ x + y + 3z = -3 & (2)\\ 2x - y + 2z = 0 & (3)\end{cases}$$

(1) $x - y + z = -1$
(2) $x + y + 3z = -3$
(4) $2x + 4z = -4$

(2) $x + y + 3z = -3$
(3) $2x - y + 2z = 0$
(5) $3x + 5z = -3$

Can you find x and y?

$-3(2x + 4z = -4)$
$2(3x + 5z = -3)$

(4) $-6x - 12z = 12$
(5) $6x + 10z = -6$

$-2z = 6 \Rightarrow \boxed{z = -3}$