Algebraic Method 3: Elimination (Addition)

Best when both equations are in general form.

example: $1x + 3y = 5$

$7x + 6y = 20$

1) Choose one of the variables to eliminate (x or y).

LCM (1,7) = 7

make -7

$(x + 3y = 5) \times -7$

$+7x + 6y = 20$

$-7x - 21y = -35$

$7x + 6y = 20$

2) Multiply (if necessary) each equation by the values that will make the coefficients of the chosen variable opposites in each equation.

$$\begin{array}{r} -7x-21y=-35 \\ +\ 7x+6y=20 \\ \hline \end{array}$$

0x ⇒ x eliminated

3) Add the resulting equations together.

$$-15y=-15$$

÷ -15 ÷ -15

$$y=1$$

4) Solve the equation for the remaining variable.

$$7x+6(1)=20$$
$$7x+6=20$$
$$7x=14$$
$$x=2$$

5) Take one of the original equations, replace the variable, and solve for the other variable.

Solution: $(2,1)$

example: $-6x-5y+3=0$

$8x+7y=14$

LCM $-5, 7$

35 ±

$\Rightarrow (-6x-5y=-3)\cdot 7$

$(8x+7y=14)\cdot 5$

$+\quad -42x-35y=-21$

$\quad 40x+35y=70$

$\frac{-2x}{-2} = \frac{49}{-2}$

$x=-24.5$

$8(-24.5)+7y=14$

$-196+7y=14$

$7y=210$

$y=30$

check: $-6(-24.5)-5(30)+3=0$

$+147-150+3=0$

$0=0$

$(-24.5, 30)$

example: $13x + 18y = -273$

$(5x + 9y = -186) \cdot -2$

13, 5
LCM = 65

9, 18
LCM = 18

$+13x + 18y = -273$

$-10x - 18y = 372$

$\frac{3x}{3} = \frac{99}{3}$

$x = 33$

$5(33) + 9y = -186$

$165 + 9y = -186$

$9y = -351$

$y = -39$

$(33, -39)$

Solve each system.

1. $2x+3y=13$

$-2\cdot(x-2y=-4)$

$2x+3y=13$

$+\ -2x+4y=8$

$7y=21$

$y=3$

$2x+9=13$

$2x=4$

$x=2$

$(2,3)$

2. $(3x+4y=29)\cdot 5$

$(2x-5y=-19)\cdot 4$

$15x+20y=145$

$+\ 8x-20y=-76$

$23x=69$

$x=3$

$9+4y=29$

$4y=20$

$y=5$

$(3,5)$

Example: Daisy buys 2 scarves and 3 pairs of jeans for $219.

Mable pays $301 at the same store for 3 scarves and 4 pairs of jeans.

What will Sadie pay for 5 scarves and one pair of jeans?

① Variables: price of a pair of jeans: y price of a scarf: x

② System:

$$2x + 3y = 219$$
$$3x + 4y = 301$$

③ Solve the system

$$4 \cdot (2x + 3y = 219)$$
$$-3 \cdot (3x + 4y = 301)$$
$$8x + 12y = 876$$
$$+ \quad -9x - 12y = -903$$
$$-x = -27$$
$$x = 27$$

$2(27) + 3y = 219$
$54 + 3y = 219$
$3y = 165$
$y = 55$

$3(27) + 4(55) = 301$
$81 + 220 = 301$ ✓

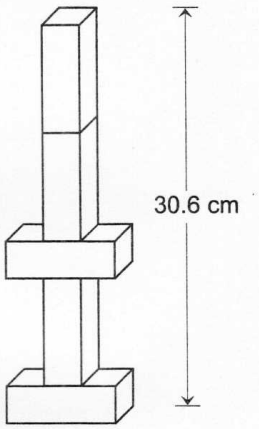
④ $5(27) + 55$
$= 135 + 55$
$= \$190$

TOY BLOCKS

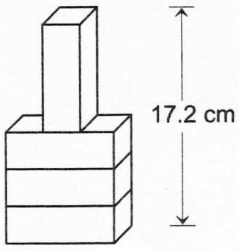
A set of blocks contains several congruent blocks. Each block is a right prism with a square base. These blocks can be stacked horizontally or vertically.

The diagrams below show three stacks of blocks. In addition, the heights of Stack A and Stack B are indicated

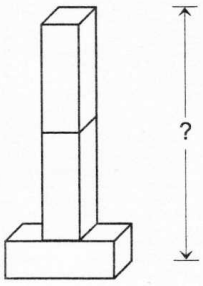
STACK A



STACK B



STACK C

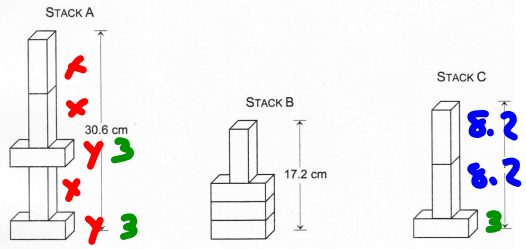


What is the height of Stack C?

Toy Blocks

A set of blocks contains several congruent blocks. Each block is a right prism with a square base. These blocks can be stacked horizontally or vertically.

The diagrams below show three stacks of blocks. In addition, the heights of Stack A and Stack B are indicated



What is the height of Stack C?

x: length y: width

$3x + 2y = 30.6$

$-3(x + 3y = 17.2)$

$+ \quad 3x + 2y = 30.6$

$\quad -3x - 9y = -51.6$

$-7y = -21$

$y = 3$

$x + 9 = 17.2$

$x = 8.2$

Answer: Stack C

$2(8.2) + 3$

$16.4 + 3$

19.4 cm

$3(8.2) + 2(3) = 30.6$

$24.6 + 6 = 30.6$

$30.6 = 30.6$