Algebra 9.2 Systems of Linear Equations in Two Variables

Solving by elimination - multiply one or both equations by any number that will eliminate either x or y, when both equations are added together.

① $\begin{cases} 5x-8y=11 \\ x+8y=7 \end{cases}$

$6x+0=18$

$6x=18$

$x=3$ → $x+8y=7$ $3+8y=7$ $8y=4$ $y=\frac{4}{8}=\frac{1}{2}$

Luckily, the $-8y$ and the $+8y$ eliminate each other, when adding the equations together.

$\boxed{(3, \frac{1}{2})}$

② $\begin{cases} 6x-7y=22 \\ 2x-8y=-4 \end{cases}$ ← multiply by -3 to cancel x's

$6x-7y=22$

$-6x+24y=12$

$17y=34$

$y=2$

$2x-8(-2)=-4$

$2x-16=-4$

$2x=12$

$x=6$

$\boxed{(6,2)}$

③ $\begin{cases} 5x-6y=10 \\ 2x+7y=1 \end{cases}$ ← mult 2, ← mult -5

$10x-12y=20$

$-10x-35y=-5$

$-47y=15$

$y=-\frac{15}{47}$

$2x+7(-\frac{15}{47})=1$

$2x-\frac{105}{47}=1$

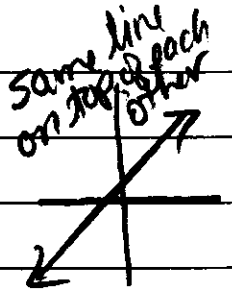
$2x=1+\frac{105}{47}$

$2x=\frac{152}{47}$

$x=\frac{76}{47}$

$\boxed{(\frac{76}{47}, -\frac{15}{47})}$

Algebra 9.2 cont



④ $\begin{cases} 6a-7b=-11 \\ -18a+21b=33 \end{cases}$ ← mult by 3 $18a-21b=-33$

$-18a+21b=33$

$0=0$ True

for ilm: dependent

$\mathbb{R}$ or infinitely many solutions

⑤ $\begin{cases} 9x-24y=15 \\ -3x+8y=7 \end{cases}$ $9x-24y=15$

(mult by 3) $-9x+24y=21$

$0=36$ False

two parallel lines, no intersection or

$\emptyset$ or no solution

for ilm: inconsistant

Applied Problems

A factory makes desks and chairs. Each desk takes 12 hours to make, and each chair takes 5 hours to make. A desk cost #175 each, and a chair costs #95 each. If their is #5085 and 329 labor hours available how much of each can be made to use the full amount of hours & money.

let d = # of desks

let c = # of chairs

hours: $12d+5c=329$ (mult by -15) $-228d-95c=-6251$

money: $175d+95c=5085$ $175d+95c=5085$

$-53d=-1166$

$d=22$

$12(22)+5c=329$

$264+5c=329$

$5c=65$

$c=13$

22 desks & 13 chairs

Algebra 9.2 cont

Two bleach solutions have been made, one with 15% bleach, another with 25% bleach. How much should be combined from each to have 20 gallons of 22% solution?

let a = amt of 15% solution
let b = amt of 25% solution

$$\begin{cases} a+b=20 \\ .15a+.25b=.22(20) \end{cases}$$

$a+b=20$ → $a+14=20$ → $a=6$

mult line by -15 → $-15a-15b=-30$

multiply line by 100 to remove decimal → $15a+25b=440$

$10b=140$

$b=14$

14 gallons of 25% solution, 6 gallons of 15% solution

A witch plumping up children for eating & giving out chocolates & cream puffs. The chocolates has 34 grams of sugar & 17 grams of fat. The cream puffs has 27 grams of sugar & 16 grams of fat. How many of each should she feed the kids so that they consume 1668 grams of sugar and 849 grams of fat.

let c = # of chocolates
let p = # of puffs

sugar: $34c+27p=1668$
fat: $17c+16p=849$

$17c+16p=849$
$17c+16(24)=849$
$17c+384=849$
$17c=510$
$c=30$

$34c+27p=1668$
$-34c-32p=-1788$
$-5p=-120$
$p=24$

24 cream puffs, 30 chocolates