Solving Applications with 3 Equations

	x Corn	y Soybeans	z Cottonseed	Total
Protein	.25	.4	.2	22
Fat	.4	.2	.3	28
Fiber	.3	.2	.1	18

How many units of each ingredient should be used to make a feed that contains 22 units of protein, 28 of fat, 18 of fiber.

x = # units of corn
y = # units of Soybeans
z = # units of cottonseed

$100(.25x + .4y + .2z = 22) \rightarrow 4(25x + 40y + 20z = 2200)$
$10(.4x + .2y + .3z = 28) \rightarrow -\frac{3}{2}(4x + 2y + 3z = 280)$
$10(.3x + .2y + .1z = 18) \rightarrow -4(3x + 2y + 1z = 180)$

$100x + 160y + 80z = 8800$
$-100x - 50y - 75z = -7000$
$110y + 5z = 1800$

$12x + 6y + 9z = 840$
$-12x - 8y - 4z = -720$
$-2y + 5z = 120$

$2\,(110y + 5z = 1800) \rightarrow 220y + 10z = 3600$

$110\,(-2y + 5z = 120) \rightarrow -220y + 550z = 13{,}200$

$560z = 16{,}800$

$\boxed{z = 30}$

$-2y + 5(30) = 120$

$-2y + 150 = 120$

$-150 \quad -150$

$\frac{-2y}{-2} = \frac{-30}{-2}$

$\boxed{y = 15}$

$3x + 2y + 1z = 180$

$3x + 2(15) + 30 = 180$

$3x + 30 + 30 = 180$

$3x + 60 = 180$

$-60 \quad -60$

$\frac{3x}{3} = \frac{120}{3}$

$\boxed{x = 40}$

40 units Corn

15 units Soybeans

30 units Cottonseed