

Modeling Linear Systems

Common Math Words

+

Add
Sum
more than
Increase
Together

-

Subtract
Difference
Less Than
Decrease

x

Multiply
Product
Multiple
(double, triple)

÷

Divide
Quotient
Fraction
(half, third)

1) Numerical (non-unit)

Ex/ The larger of two numbers is four times the smaller and their sum is 85. Find the numbers.

let x = small #
 y = large #

$y = 4x$

$x + y = 85$
sum

↑
 2 variables
 = 2 equations

Ex/ The sum of two numbers is 39. Twice the first number plus 3 times the second number is 101. Find the two numbers.

let x = 1st #
 y = 2nd #

$x + y = 39$

$2x + 3y = 101$

2) Break Even

Ex/ Hank has two different job offers to sell furniture. The Brick is offering him \$280/week plus 4% commission and Reid's is offering him \$350/week plus 2.5% commission. Which offer should he take?

let x = sales
 y = earnings

B: $y = 280 + 0.04x$

R: $y = 350 + 0.025x$

* Both offers are for one week, so # of weeks are not a variable

3) Mixture Problems

Ex/ George has a total of \$155 consisting of \$2 and \$5 bills. If he has 40 bills in total, how many of each does he have?

let x = # of \$2 bills
 y = # of \$5 bills

$x + y = 40$

$2x + 5y = 155$ ← Total value

↑ value of each \$2 bill

↑ value of each \$5 bill

Ex/ Part of a \$2000 prize was invested at 9%, the rest at 10%. If the total interest received was \$191, how much was invested at each rate?

let x = amount (\$) at 9% $x + y = 2000$ $0.09x + 0.1y = 191$
 y = amount (\$) at 10%

Ex/ Pet's-R-Us sells premium dog food for \$15/kg and basic dry dog food for \$10/kg. How can they mix the two together to create a 100 kg mixture that can be sold for \$12/kg?

let x = premium kg $x + y = 100$ $15x + 10y = 12(100)$
 y = basic kg

\uparrow cost per kg \uparrow cost per kg cost of 100 kg

4) Rate Problems (Distance, Speed, Time)

Ex/ John travels from Detroit to London at a speed of 80 km/h. From London to Toronto John travels at a speed of 100 km/h. The whole trip is a distance of 600 km and takes 7 hours. Write two equations to represent the situation.

	Distance	Speed	Time
D → L	80x	80	x
L → T	100y	100	y
Total	600		7

Distance = Speed × Time

$x + y = 7$ $80x + 100y = 600$

Ex/ When Arthur goes fishing, he drives 393 km from Ottawa to a lodge near Temagami. He travels at an average speed of 70 km/h along the highway to North Bay and then at 50 km/h on the narrow road from North Bay to Temagami. Write two equations to represent the situation.

	D	S	T
Highway	70x	70	x
Narrow Road	50y	50	y
Total	393		393