Using Algebra Setting Goals Profit and Loss

Algebra to Solve Business Problems

- What do I know?
- How do the parts of the issue relate to each other?
- What do I need to know?

Problem 1

- You make gadgets at a rate of 500 per year
- You plan to expand to 1200 gadgets a year
- You expect to be able to increase your gadget production by 75 gadgets a year
- You will take out a 10 year loan to add infrastructure to your gadget making facility
- You want to know if it is reasonable to believe you may hit the planned production before the loan is paid off

Problem 1

Let x be the number of years needed to reach 1200 gadgets a year

$500 + 75x = 1200$

$75x = 700$

$x = 9\ 1/3$

That may not be the exact solution! It assumes you will expand your gadget production smoothly, by a fraction of a gadget a minute. Production will probably increase by jumps—as new machines and/or new employees are added

The result needs to be treated as what it is: a good, quick approximation.

Problem 2

- You have received an order for as many widgets as you can supply quickly
- Other than materials you keep in abundant supply, each widget requires a widget frame, on which George attaches one thingie to the bottom and Carol attaches two thingies on top.
- You have 84 thingies
- How many thingies will George need, how many will Carol need, and how many widget frames do you need?

Problem 2

Let's say George's thingie supply is t

That means *Carol's* thingie supply has to be 2t

We have 84 thingies

$t + 2t = 84$

$3t = 84$

$t = 28$

George needs 28 thingies, Carol needs 56 thingies, and you have to order 28 thingie frames

Problem 3

Jim farms 120 acres, growing corn and soybeans

Jim has $1310 for buying and planting seed

Corn costs $15 to plant an acre, and yields $24 profit per acre

Soybeans cost $8 to plant an acre, but yields $13 profit per acre

How much corn and soybeans should Jim plant?

What will Jim's profit be?

Problem 3

Let S = acres of soybeans

Let C = acres of corn

$S + C = 120$

$8S + 15C = 1310$

$S = 120 – C$

$8(120-C) +15C = 1310$

$960 – 8C + 15C = 1310$

$7C = 350$

$C = 50$

$S = 120 – 50 = 70$

Profit = 50*24 + 14*70 = 1200 + 980 = $2180

More on Personal Finance

- Get rid of the clutter
- Be truthful in filing taxes
- Stay legal, insofar as it does not require disobeying the Scriptures
- Family comes before finance
- Have a significant emergency fund

Counting the Cost

Fixed Costs

- Facility rental—rent on where you have your business
- Cost buying tools
- Vehicle payments
- Insurance—on your property and on liability
- Wages—if you have employees
- Some Utilities—telephone, internet provider, cable, etc.
- Licenses for the business

Counting the Cost

Variable Costs

- Some utilities: electricity, natural gas, etc.
- Fuel for vehicles
- Material for making the product(s) sold
- Supplies for providing the service
- Office supplies
- Postage

Counting the Cost

Break Even Cost

- Let's say you expect to sell n of whatever you sell
- Break even cost per unit = (fixed costs)/n + variable costs
- Your income could be considered part of the fixed costs

Example of Counting the Cost

The Taco Shop

- Rental of space: $20/month
- Part time employee: $150/month
- Expect to sell 20 tacos a day, 5 days a week
- Assume 4 weeks a month, so 400 tacos/month

Example of Counting the Cost

The Taco Shop

- Hamburger, at $1.50 per pound *makes 6 tacos*
- Taco Shells at $2.40 a dozen *makes 12 tacos*
- Lettuce at $0.96 a head *makes enough shredded lettuce for 12 tacos*
- Tomatoes at $1.28/lb. *makes enough chopped tomatoes for 32 tacos*
- Onions at $0.84/lb. *makes chopped onions for 14 tacos*
- Taco seasoning at $0.90 a package *seasons one pound of hamburger*

Example of Counting the Cost
The Taco Shop

Cost per Taco

• Hamburger	$0.25
• Taco Shell	$0.20
• Lettuce	$0.08
• Tomato	$0.04
• Onion	$0.06
• Spice	$0.15
• Total	$0.78

Example of Counting the Cost
The Taco Shop

Costs per Month for 400 Tacos

- Variable Costs for 400 Tacos $312
- Rent $ 20
- Employee $150
- Total $482

Break Even Per Taco: $482/400 = $1.205 = $1.21

Example of Counting the Cost
The Taco Shop

- This is where you do market research—find out what other places are charging for tacos
- If they are charging $1.00 per taco, you probably won't do well
- If they're charging $1.50 per taco, you're going to have a slim profit
- If they're charging $2.00 per taco, you can charge $1.75 each, make a good profit, and probably do a lot more tacos a month

Example of Counting the Cost
The Taco Shop

Costs per Month for 600 Tacos

- Variable Costs for 400 Tacos $468
- Rent $ 20
- Employee $150
- Total $638

Break Even Per Taco: $638/400 = $1.06333 = ~$1.06

At $1.75, that takes in $1050 for a net profit of $412