Algebra in the real world and everyday life course work

Finance, Investment

1) Example (Every day business) Saving for the Future

You will graduate from high school in four years and go on to college. To help you pay for college books your grandparents put $1500 in a bank account paying 4. 5% simple interest. When you go to college the money will have been in the account for 12 years. How much money will you have?

Step 1. PVrt = INT where INT = Interest and PV = Present Value

Step 2. FV = PV + INT = PV(1 + rt) where FV = Future value, r = annual interest rate, and

t = years

Step 1. (1500)(. 045)(12) = $810 in interest

Step 2. $1500 + $810 = $2310

College costs are up and many people are paying off their educational loans for decades. It’s best to plan ahead algebra can help you decide how much you can expect to make in interest from your savings account.

2) Example (Every day business) Saving money on bills

Your water bill is very high and you want to calculate how much you can save if you use 400 gallons less of water per year. You pay $0. 44 per month for every 240 gallons of water you use.

Volume = V = 240 gallons/month*12 months/year so V/year = 2880 gallons/year

Expense = E

x= E/year

= x*E/year = 2880 gallons/year*$0. 44/gallon

so x= $1267. 20/year

Find Cost Savings

Step 1. 2880gallons/year – 400 gallons/year = 2480gallons/year

Step 2. 2480 gallons/year * $0. 44/month = $1091. 20

Step 3. $1267. 20/year - $1091. 20/year = $176. 00 savings/year

Algebra is a great way to help you figure out how to save money on bills so you have money to put into a savings account. Knowing how to read your bills and how to learn to save money by changing your use makes more of a difference than some people might expect.

3) Example (Every day business) Paying Taxes Form 1040

You are helping your mom do her income taxes. Her health care expenses must be over 7. 5% of her adjusted gross income ($25, 000) in order to be deductible. Deductions because her

Equation 1. AGI*7. 5% = ThME

Equaton 2. TIME/year – ThME = D

AGI = Adjusted Growth Income

(ThME) Threshhold Medical Expense

TME/year = Total Medical Expenses/ year

D = Deduction allowable

($25, 000)(7. 5%) = $1875

$2110 - $1875 = $235

One of the most important uses of algebra is when you are paying your taxes. The tax form looks easy but the instructions are pretty scary. I was happy to learn if I sat down and concentrated on one paragraph at a time the instructions weren't hard to understand. Also I took notes and wrote out all the symbols while I read. I think that helped more than anything. $235. 00 might not sound like much money for some but lots of people who are on a fixed income need to be able to figure their budget very carefully, especially since they need to keep money aside in case of emergencies.

4) Example (Every day business) – Quarterly compounded interest on savings

Ten years ago we inherited $3500 from a distant relative. Our bank deposited it for us in an account which will pay 3. 8% interest rate, compounded quarterly. Tomorrow we will withdraw the money from the account so we are figuring how much we can expect to receive.

A formula for calculating compound interest is

Where,

A = Final Balance, P = Initial Investment (principle), r = annual nominal interest rate, n = 4 (quarterly), and t = time in years

P = $3500 r = 3. 8/100 = 0. 038 n = 4 (quarterly) t = 10

A = $3500(1 + (0. 038/4)) 4*10 = $5108. 82 So, we can expect to withdraw about $5102.

Compounded interest sounded like a foreign language to me but now I am really glad to know how it works. I would not want to have a simple interest

savings account if compound interest which is also compounded quarterly is available. The difference is amazing!

5) Example –Loan with Compound Interest

EXAMPLE What is the Future Value of a $30, 000 loan with a simple interest rate of 5% over 10 years?

Equation 1. I = P*rt*T

Equation 2. FV = PV + I where

Interest = I, Present Valueloan = PV

Rate = rt = 0. 05,

Time = 10 years

Future Valueloan = FV

I = $30, 000 * 0. 05 * 10 years

= $15, 000

so

FV = $30, 000 + $15, 000 = $45, 000

A compounded savings account is great; but if you have a loan that charges compound interest -you better keep track of how much you need to payoff and how fast you can pay it off. Because loans like this one which was charge one half of the total amount of the principle! Too much money can be spent for nothing, except for being able to buy something before you have enough money to buy it. This loan was originally taken out at a bank and then moved to a VISA account. This is a very bad idea!

6) Example (Every day science) Traveling armed with good info on Temperature

Temperatures in other countries are most often reported in Celsius. You want to be able to convert to Fahrenheit so you can better understand how warm or cold it will be tomorrow. Here is an easy way to convert Celsius to Farenheit using algebra. (Tc x 1. 8) + 32 = Tf

You are taking a summer vacation but there is a report of a heat wave. You need to know just how hot it will be outdoors so you can prepare. The TV weather map in you hotel TV says the high temperature for tomorrow will be 32° C. Is that too hot for a day in the sun?

Temperature in Celsius = Tc = °C + 32°C. (From the TV weather report.)
Temperature in Fahrenheit degrees = Tf = x°F (We must calculate.) So
(Tc x 1. 8) + 32 = Tf = x°F
(Tc x 1. 8) + 32 = x°F

= (32 x 1. 8) + 32
= 57. 6 + 32 = 103. 7 °F

Knowing how to convert between different kinds of temperature is one of the most practical ways to use algebra. Above is the conversion so you can be prepared for the weather but in Europe you also need to know the conversion to be able to use an oven. In science converting to a different temperature (such as Kelvin as well as Celsius) is very important. If the wrong temperature or the wrong conversion is used for temperature an experiment will be ruined.

7) Example (Every day science) Community recycling

You have volunteered to be on the city's committee for the solid waste department. You have been asked to figure out whether recycling cardboard boxes will help the town create more space in the landfill. You know that every 1 ton of cardboard saves 9 cubic yards of landfill space and that your town adds 2. 5 tons of cardboard everyday to the landfill.

The conversion from weight to volumes is 100 pounds cardboard/cubic yard (weight) = 20 cubic yards/ton (volume) and we know that every ton weighs 2000 pounds.

x = unused volume per day by recycling cardboard instead of adding it to the landfill.

Step 1. x (1 ton/2000 lbs) = 2. 5 tons/day x 9 cubic yards/ton x 1 ton/20cubic yards

Step 2. x = 2. 5 tons/day x 9 cubic yards/ton x 1 ton/20 cubic yard x 2000 lbs/ton x 20 cubic yards/100 lbs cardboard so,

x = 450 yards cubed/ day saved in volume left unused due to recycling cardboard

Recycling is a very complicated process for city planners for many reasons. The example using cardboard shows how much volume a city can save by recycling cardboard. You can add to that the amount of money made by selling the recycled cardboard to a paper mill. And you can also add to that the amount of money you can save because the landfill will be in use longer because more space for trash is available.

8) Example (Every day biology) Losing weight

Metabolism = BMR + Calories Used + Thermic Effect

BMR = Basal Metabolic Rate

= Energy for body systems to function (60 to 70% of calorie intake per day needed)

For Women: BMR = 655 + 4. 35*W + 4. 7*H - 4. 7*A

W = Weight in pounds = 130 pounds

H = Height in inches = 5 feet 8 inches = 68 inches

A = Age = 24 years

BMR = 655 + 565. 5 + 319. 60 – 112. 8 = 1427. 3 BMR

Calories Used = Total calories used for energy during the day in activities

= BMR x 1. 375

(Note: Doing light exercise/sports 1-3 days/week equals then use factor 1. 375)

Calories used = 1727. 3*1. 375 = 2375 calories

Thermic Effect (TE) is how much energy used in digestion

TE = Calories*10%

TE = 2375*10% = 237. 5 calories

Metabolism = BMR + Calories Used + Thermic Effect

Metabolism = 1427 + 2375 + 237. 5 = 4039. 5 calories

Here you have one of the most used ways people use algebra . . . and they don’t even know it! Losing weight means making calculations for your body so you eat a bit less than your body uses in energy. That’s the way to lose weight. I couldn’t believe all the equations needed to figure out how many calories you would want to eat to lose weight.

Citations

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