Solutions to Real Life Math Problems Using Arithmetic

1. You own two cars and drive them each the same number of miles each week. One car gets 10 mpg and the other gets 25 mpg. A genie offers to double the gas mileage of either car. Which do you choose?

    a. 10 mpg to 20 mpg
    b. 25 mpg to 50 mpg

Solution: Suppose you drive each car 100 miles a week.

The car that gets 10 mpg uses 10 gallons of gas.
The car that gets 25 mpg uses 4 gallons of gas.

If you double the gas mileage of the first car from 10 mpg to 20 mpg, it will use 5 gallons of gas to go 100 miles.
If you double the gas mileage of the first car from 25 mpg to 50 mpg, it will use 2 gallons of gas to go 100 miles.

So a change from 10 mpg to 20 mpg reduces that car's weekly gas usage from 10 to 5 gallons; a savings of 5 gallons.
A change from 25 mpg to 50 mpg reduces that car's weekly gas usage from 4 to 2 gallons; a savings of 2 gallons.

So ask the genie to double the gas mileage of the car that gets 10 mpg.

2. You decide to buy your dream house. Since you can only afford a mortgage payment of $2000 a month, you get a mortgage that starts at 4% interest for the first two years where you pay interest only. After two years, it resets and the interest rate can increase by as much as 2%. At that time you start paying principal too. If it does goes up this much, what will your new monthly payment be?

    a. Between $2000 and 2200
    b. Between $2201 and 2500
    c. Between $2501 and 3000
    d. More than $3000

Solution: For the first two years you are only paying interest on your loan. A 4% interest rate corresponds to $2000 in interest each month. So a 2% interest rate corresponds to $1000 in interest each month. If the interest rate goes up 2%, the interest you pay goes up $1000 to $3000. Since you are now also paying back part of your principal, your monthly payment will be more than $3000.