Scientific research costs money! You have to find money to pay your salary to work 40-hours a week. You also have to get money to pay for the trips you take to observatories, scientific conferences, to pay for your healthcare, retirement plans, and the rental for your office and laboratory space. Here are some problems that help you see how this all works!

Problem 1 – Professor Quark is a senior astronomer at PDQ University who makes $50.00 an hour. If there are 2,000 work hours in a full year, what will be the astronomer's gross pay before taxes and other deductions, for the year?

Problem 2 – PDQ University charges each astronomer an additional 50% of the astronomer's salary to cover the rental of office space, medical benefits, and retirement benefits. How much extra money in addition to his salary will Prof. Quark have to pay PDQ University to conduct his research?

Problem 3 - Prof. Quark needs to buy a new computer 'work station' to conduct his research. He can choose System A for $5,000, which has 200 gigabytes of hard drive space, and operates at 5 megahertz, or he can buy a cheaper System B for $1,000, which has a 1,000 gigabyte hard drive and runs five times slower at 1 megahertz. Which system do you think he should buy? Why?

Problem 4 - Prof. Quark expects to take several trips each year to conferences in France, China and Canada. These trips will cost a total of $9,000. The university adds on an additional cost to this expense to cover their setting up the travel arrangements and handling all of the accounting. They charge the researcher 30% of the researcher's cost to do this. What is the total cost to the researcher for the travel expenses?

Problem 5 – Prof. Quark plans to support his research by applying to the Long-Term Space Astrophysics research grant program at NASA. What is the total amount of money he has to apply for if he wants to get fully supported for one year?

Problem 6 – PDQ University will support Prof. Quark for ¾ of his labor in Problem 2 if he agrees to teach college courses and train graduate students. He will have to get external support for the balance of his research support. How much money will he have to ask NASA for in a grant proposal to support all of his research for one year?

Problem 1 – Professor Quark is a senior astronomer at PDQ University who makes $50.00 an hour. If there are 2,000 work hours in a full year, what will be the astronomer's gross pay before taxes and other deductions, for the year?
Answer: 2,000 hours x $50.00/hour = **$100,000**

Problem 2 – PDQ University charges each astronomer an additional 50% of the astronomer's salary to cover the rental of office space, medical benefits, and retirement benefits. How much extra money in addition to his salary will Prof. Quark have to pay PDQ University to conduct his research?
Answer: $100,000 x 50%/100% = $50,000

Problem 3 - Prof. Quark needs to buy a new computer 'work station' to conduct his research. He can choose System A for $5,000, which has 200 gigabytes of hard drive space, and operates at 5 megaHertz, or he can buy a cheaper System B for $1,000, which has a 1,000 gigabyte hard drive and runs five times slower at 1 megahertz. Which system do you think he should buy? Why?
Answer: He should buy the faster, but more expensive, computer. His time is worth $50.00 an hour, so if he has to wait around for a slower computer to process data, over time, he will be wasting money.

Problem 4 - Prof. Quark expects to take several trips each year to conferences in France, China and Canada. These trips will cost a total of $9,000. The university adds on an additional cost to this expense to cover their setting up the travel arrangements and handling all of the accounting. They charge the researcher 30% of the researcher's cost to do this. What is the total cost to the researcher for the travel expenses?
Answer: $9,000 x 30%/100% = $2,700. His total Travel Expenses will be $9,000 + $2,700 = $11,700.

Problem 5 – Prof. Quark plans to support his research by applying to the Long-Term Space Astrophysics research grant program at NASA. What is the total amount of money he has to apply for if he wants to get fully supported for one year?
Answer: From the answers to the first four problems, his total budget will be $100,000 + $50,000 + $5,000 + $11,700 or $166,700.

Problem 6 – PDQ University will support Prof. Quark for ¾ of his labor in Problem 2 if he agrees to teach college courses and train graduate students. He will have to get external support for the balance of his research support. How much money will he have to ask NASA for in a grant proposal to support all of his research for one year?
Answer: ¾ x $150,000 = $100,000 then $166,700 - $100,000 so the amount he will need from the grant is **$66,700.**

Space Math   http://spacemath.gsfc.nasa.gov