Using Math to Understand Our World
Project 4
Can You Save Tom's Marriage?

One day, a few years ago, Wendy Hines received the following somewhat desperate email from her friend Tom.

Dear Wendy,

VCR tape will record 120 minutes in LP mode: it will record (3X) 360 minutes in EP mode. We frequently record tapes for later viewing. If a movie is e.g. 137 minutes, it obviously will not fit on the tape in LP mode (17 minutes short). If I want to record most of the movie in the best quality mode (i.e. LP = 60 min. of recording per hour) then I must record some portion in the slower EP mode (120 min. per hour) in order to get most of the movie recorded in the better quality LP (60 min. per hr.) mode. With my inadequate and antiquated memory of math, I often guess at the necessary mix of recording speeds. Unfortunately, I sometimes estimate wrongly-resulting in missing the last few minutes of a movie....very frustrating!!! Intuitively, I know there must be an algebraic formula to indicate how much EP and LP recording time must be allocated....but I cannot come up with a successful formula........Your challenge: is there such a formula that can be relied upon that is better than my "guessing" and prevent "short" taping incidences. If there is such a formula..it could save my marriage.

Thanks for listening,
Tom

Here are a few useful pieces of information that we are able to glean from Tom's email:

- LP recording mode is high quality and EP recording mode is low quality, so Tom wants to record in LP mode as much as possible.

- If you record in LP mode the whole time, you can only record for two hours, but if you record in EP mode the whole time, you can record three times as much; i.e., 6 hours.

- Another way of looking at this is: if you record a 2 hour movie, it takes the whole tape in LP mode, but only a third of the tape in EP mode.

- Tom's wife's patience is running thin!

Here are some questions to help you get a handle on the problem (in real life, you'd have to come up with these questions yourself). You might want to use a table to keep track of your answers.

- If Tom records 110 minutes in LP mode, how many minutes can he record in EP mode? How long of a movie can he record this way?

- What if Tom records 70 minutes in LP mode?

- If Tom wants to record a 160 minute movie what should he do to maximize his time in LP mode?

Now let's go for the real question. **Can you find a formula that Tom can use? Your formula should be written so that he can plug in the total time of his movie (call it T) and get out the time he should record in LP mode (call it L). It must be easy to use; although he's intelligent, Tom is not a math person.**

Can you think of any other real-life situations that are similar to Tom's?

Remark: This is a great problem because it is asked by a regular person in "regular person" words. If the question had been written for a mathematics book, it would be much easier to understand. But real-life is not a mathematics book. In real life, mathematicians must be able to communicate with non-mathematicians, understand their problems, figure out how to use mathematics to solve these problems, and communicate the solution back to the non-mathematician.