

 **STUDENT PROJECT****Heating and Cooling Your Home**

Reducing energy use in your home is an important consideration for everyone. People with STEM background and training conduct research and develop systems to help reduce that energy use. Heating and cooling your home requires about half of the total energy used in your home, according to Energy Star (<http://www.energystar.gov>).

An HVAC technician is a professional who works in the field of heating, ventilation, air conditioning service and support. By keeping those systems in good working order, energy is saved resulting in dollars saved for the homeowner and energy saved for the environment.

**Project**

HVAC technicians charge customers based on a constant charge plus a variable cost. Assume that you own your own company, HVAC Tech. The following problems relate to issues you might encounter while dealing with costs and charges to customers:

1. If your company, HVAC Tech, charges a fee of \$40 for “showing up,” plus a fee of \$45 per hour, write an equation of the cost as a function of time.
2. Using the function from number 1, if one of your employees was at a job for 3 1/2 hours, how much should your employee charge the customer?
3. Using the function from number 1, if one of your employees says that a customer was charged \$321.25 for a recent job, how long did that job take to complete?
4. Another company, HVAC INC., charges a rate of \$55 per hour. How long must a job take for your cost to be less than HVAC INC.’s cost?
5. Create a different billing plan that can compete with HVAC INC. still using a constant fee plus a variable fee. Write a memo to all of your employees showing your new idea and mathematically justifying the changes.
6. Graph each of the functions you have come up with, including your competitor’s, using time (t) as the horizontal axis and cost (c) as the vertical axis. Discuss how the slope and y-intercept affect the total amount of money you make. Is it better for business if you have more slope or less? Explain.
7. Challenge: The total profit for your business in May was 20 percent higher than it was in April. The total profit for the two months was \$157,498. Find the profit for each month.