Problem Solving

How many solutions can a problem have?
- One.
- Many.
- None.

Give an example of each.

How is this significant for you as a problem solver?

1) The worst things you can do when faced with a problem:
   a. Panic
   b. Guessing
   c. Random calculation

Can you think of any possible exceptions?

2) How to solve problems:
- Read the problem
- Understand the problem
   - Words (example: #6)
   - Questions (example: #21)
- Find the relevant information (example: #20)
- Relate the relevant information to the question (example #1, #4)
- Compose the solution
   - Understand what's involved (operations or knowledge, example #10, #22)
   - Set up the calculation (#22)
   - Solve the problem (#22)
- Ask yourself: does this answer make sense? (#22, #4, #3, #17)

3) Five things to do when you're stuck:
- Approach the problem from a different angle.
- Ask yourself relevant questions.
- Take a break.
- Discuss the problem with others.
- Try to simplify the problem.
- Try to restate the problem.
- See http://www.une.edu.au/psychology/staff/malouff/problem.htm for many other additional suggestions.

4) Note on Brute-force Problem Solving

Brute-force problem solving usually involves considering or working out problems in all their possibilities, and then choosing the right solution out of all the answers.

Example: you forgot your computer password, so you attempt to login by trying every possible password. Assuming you only remember that your password is a 6 digit number,

you will have to try 1 million passwords! (000000 to 999999). If you try 30 passwords a minute, in the worst case (what is the worst case?), you will have to work non-stop for more than 3 weeks to find your password! (how did I calculate this number?)
Can you think of any problems with this approach?
Can you think of times when this approach may be the right one?

"Can we use calculators?"

Fact: you do not need to use calculators for at least 90% of the problems you encounter.

Examples: #1, #2, #3, # 17…etc.

You need to focus on *understanding*, not calculation.

Exercise #1: Replace each of the letters with one of the digits from 0 to 9. Arrange the digits such that AxBxC equals BxGxE equals DxExF. You may use each digit only once.

A   D
B   G   E
C   F

Hint #1: don't waste your time using calculators! Follow the proper steps. If you're stuck, try the suggestions listed under section 3.

Hint #2: You may wish to ask yourself:
- How many digits will I be using?
- Can I eliminate any redundant digits?
- Can I state the remaining digits in another form?

Exercise #2: How would you solve the problem using the brute-force approach? Is this an appropriate way to solve this problem?