

Tax Collector

Tax Collector is played like this: Start with a collection of paychecks, from \$1 to \$12. You can choose any paycheck to keep. Once you choose, the tax collector gets all paychecks remaining that are factors of the number you chose. The tax collector must receive payment after every move. If you have no moves that give the tax collector a paycheck, then the game is over and the tax collector gets all the remaining paychecks. The goal is to beat the tax collector.

Example:

- Turn 1: Take \$8. The tax collector gets \$1, \$2 and \$4.
- Turn 2: Take \$12. The tax collector gets \$3 and \$6 (the other factors have already been taken).
- Turn 3: Take \$10. The tax collector gets \$5.

You have no more legal moves, so the game is over, and the tax collector gets \$7, \$9 and \$11, the remaining paychecks.

Total Scores:

- You: $\$8 + \$12 + \$10 = \30 .
- Tax Collector: $\$1 + \$2 + \$3 + \$4 + \$5 + \$6 + \$7 + \$9 + \$11 = \48 .

Questions:

- Is it possible to beat the tax collector in this \$12 game? If so, how? What is the maximum score you can get?
- What if you played the game with paychecks from \$1 to \$24? How about \$1 to \$48?
- What strategies do you need to use to win this game? What patterns exist?

The Answers Are

Make equations that have the answers shown using these rules:

- You may use these numbers once each: 1 2 3 4 5 6 7 8 9 10
- You may use these symbols once each: + - * /. Use one symbol twice.

For example:

- $1+2=3$
- $10/5=2$
- $7-6=1$
- $8*4=32$
- $9/3=3$ (second use of /)

Answers are:

- 17, 2, 21, 3, 2
- 10, 14, 1, 20, 16
- 3, 3, 3, 3, 24
- 2, 2, 2, 2, 9
- 5, 8, 13, 24, 20
- 2, 3, 7, 7, 7
- 1, 2, 3, 4, 5