

ACTIVITY 1

The Tax Collector

Materials:

- paper
- transparency of activity master

Overview:

This is a fun activity that reinforces factor concepts as it pits the student taxpayers against you, the tax collector! A game lasts about ten minutes. It can be used as a beginning or end-of-class filler. Be forewarned that if you begin your class with it, the taxpayers may revolt and demand that you keep playing until they beat you!

Vocabulary: factor, prime number, composite number

PROCEDURE

Skills:

- Learning factors
- Recognizing prime and composite numbers
- Problem solving

tax payer	tax collector
20	10, 5, 4, 2, 1

tax payer	tax collector
20	10, 5, 4, 2, 1
18	9, 6, 3

tax payer	tax collector
20	10, 5, 4, 2, 1
9	3
18	6

1. Have the students (the tax payers) copy the t-chart and factor bank onto a sheet of paper as you (the tax collector) write it on the board, or use a copy of the activity master.
2. Tell them here are three rules to this game:
 1. You (the tax payer) can choose any number you want to add to your score. I (the tax collector) get to add all the factors of your number to my score.
 2. You cannot take a number without paying taxes.
 3. The tax collector gets any numbers you don't take.
3. The students will best learn the strategies of this game by playing it. Let a tax payer choose a number. Most often, they will choose 20. Cross 20 off the list in the factor bank. This means you get its factors. Ask them, "What do I get?" Some may say you get 4 or 5. According to rule 1, you get 10, 5, 4, 2, and 1. Cross these numbers off the factor bank. They will be disappointed when they see that you are ahead 22 to 20.
4. Ask the students to make the next move. Likely, 19 will be chosen. Before you cross it off, ask them what you will get. A student will say you get one. Rule 2 implies that they cannot take 19; since one has been taken, 19 is no longer available. Their disappointment will increase! A student may choose 18. Cross it off, and ask what you get. You get 9, 6, and 3. Cross these off. The score is now 38 to 40 in favor of the tax collector.

Someone may have noticed that if nine had been chosen, you would have gotten only three. Then when 18 was taken, you would have gotten only 6. Then the score would be 47 to 31 in favor of the tax payer!

5. Soon the students will not be able to choose any more numbers since there are no more factors to pay to the tax collector. At this point, rule three goes into effect and you get all remaining numbers to add to your score! The tax collector usually wins the first game so handily that the students are left believing there is no way for them to win this game. However, assure them that there are many ways for the taxpayer to win, and ask them to play another game. In the margin is shown one way to win this game.

tax payer	tax collector
19	1
9	3
15	5
10	2
20	4
18	6
14	7
16	8
	11, 12, 13, 17
121	89



Journal Prompts:



If your factor bank includes the numbers one through twenty-four, what would be a good first choice? Why?
What strategies would you suggest to a beginner of this game?

Homework:



Have students find different ways to win the game. Record the moves using a t-chart.

Taking a Closer Look:



Have the students try to find as many ways as possible to win this game. What is the highest possible score? Can a tie occur?
Assign a factor bank of 12, 24, 50, or 100 numbers. How does this change the strategy of the game?

Assessment:



Students should note in their journals that the first move should always be the largest available prime number. They should also see that the tax collector will get all other primes. You will be able to tell which students are learning the strategies by the factors they choose.
If you assign homework, have students check the results of other students to see if the solutions are valid.

Good Tip!



Students can also play this game in groups of two. Or they can play in groups of four by working in teams of two against two.

The Tax Collector

Rules:

1. You (the taxpayer) can choose any number you want and add it to your score. I (the tax collector) get to add all the factors of your number to my score.
2. You cannot take a number out of the bank without paying taxes.
3. The tax collector gets any numbers you don't take.

taxpayer	tax collector
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totals

Factor Bank			
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20

