Activity 11 Realities of Winning the Lottery

Objectives

- Understand applications of probability to social contexts
- Determine the effect of taxes and inflation rates on the income from lottery winnings
- Calculate annual interest
- Use logical reasoning to make informed decisions

Materials	paper, pencils, calculators
Time	45–60 minutes
Math Idea	States pour large sums of money into advertising the lottery—promoting quick money, instant wealth, and the end of poverty and anxiety about money and the future. Although many think about how picking the “lucky” combination will change their lives, few understand the financial and mathematical realities of winning the lottery.

Prior Understanding

Students should know how to work and calculate with percents and decimals, as well as use and evaluate expressions involving exponents.

Introduction: Gambling Connection

Pose the following question to students and discuss their opinions. After they do the activity, ask the question again.

Suppose you did win a $1 million lottery jackpot, are you really set for the rest of your life?

Discussion

To introduce the problem, have students complete the following sentence: "If I won the lottery, I would…." Keep track of some of the students' ideas on the board. Have students re-evaluate their answers after they have completed the activity. Some other questions students might consider include: If you won the lottery, would you still want to pursue a career? Could you be happy without a job for the next twenty years? What would happen after twenty years when the payments stopped?

Exercise 1

Explain that few states pay out lottery winnings in a lump sum. Most distribute the winnings in the form of an **annuity** that pays the winner a fixed amount a year over a span of 20 years (sometimes longer). Have students use mental math to determine the amount of money they would receive each year if they won $1,000,000.

Then have students assume that the annual payment would place them in the 35% tax bracket and that this tax rate would stay the same for the entire 20-year period. Have them calculate their net annual income—how much they would have left each year after taxes, and how much of the $1 million they would they receive in all.

Discussion

Before taxes, students would receive 1,000,000/20 = $50,000 a year. Point out that although they won $1 million, they cannot invest that much at once, nor can they accumulate interest on that amount; in the meantime, the state *is* earning interest on the remaining $950,000.

At the 35% tax rate, students would pay (0.35)(50,000) = $17,500 in taxes each year, leaving them with 50,000 – 17,500 = $32,500 net income. Over 20 years, they would net (20)(32,500) = $650,000. Since lottery winnings are taxed on both federal and state levels, this number would be considerably less.

Exercise 2

Have students assume a steady inflation rate of 4% each year. Explain that this means each subsequent year the buying power of $1.00 decreases by 4%: if you have $1.00 to spend this year, you'll have the equivalent of $0.96 to spend next year, and so on. Have students calculate what their after-tax lottery income would be worth each year for the 20-year period. Then have them calculate the total worth of that income after the full payment has been made and find the average yearly amount.

Discussion

With a 4% annual rate of **inflation**, after the first year, each dollar is worth the equivalent of $0.96. So after taxes, students would get $32,500 the first year. However, the next year, that $32,500 would only be worth (32,500)(0.96) = $31,200. This amount would be worth (31,200)(0.96) = $(32,500)(0.96)^2$ = $29,952 the third year; $(32,500)(0.96)^3$ = about $28,754 the fourth year, and so on. In 17 years, the actual value of the lottery income would be $(32,500)(0.96)^{16}$ = $16,237 or just about half the value of the income the first year. In the final year, they would receive the equivalent of $14,964. Over the 20-payment period (19 years) they would have collected the equivalent of $453,373—much less than the $650,000 expected after taxes. This averages out to 453,373/20 = $22,669 a year over the 20 years.

Exercise 3

Have students assume that the average person spends $9.00 each week on lottery tickets. Have them calculate the total amount of money spent for lottery tickets for one year and over the course of 30 years. Discuss the likelihood that they would break even in that amount of time.

Discussion

If they spend $9 a week for lottery tickets, they would have spent 9×52 = $468 in one year and 468×30 = $14,040 over 30 years. Although it is possible that they might make some of this money back over the 30-year period, it is not likely that they will break even, and highly unlikely that they would win more (based on the results of Activity 6 Winning and Losing the Lottery).

Exercise 4

Have students suppose they invested the same yearly amount of money at 6% interest for 30 years. Ask them to find the total after 30 years and compare it to the amount spent on lottery tickets.

Discussion

Calculate the total yield from an initial investment of $468 at 6% annual interest for a period of 30 years.

If students invest the initial $468 at 6%, they would earn (468)(.06) = $28.08 and would then have

468 + (468)(.06) = 468(1 + .06) = 468(1.06) = \$496.08 at the end of the first year. To this they would add \$468 (the annual amount they would have spent on lottery tickets) and invest the total \$468 + \$496.08 = \$964.08 at 6%. At the end of the second year, they would have (468 + 496.08)(1.06) = \$1021.92 to which they would add \$468 and invest the total at 6%. If they continue the pattern of adding \$468 and multiplying the total by 1.06 for 30 years, they would have about \$39,219.

By this time students should realize that even if they won a \$1 million lottery, after taxes and accounting for **inflation** they certainly would not have enough money to live a life of leisure.

Activity 11 Realities of Winning the Lottery Teacher Support

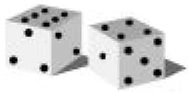
Vocabulary

annuity an investment that guarantees the owner a fixed payment each year for a specific number of years

inflation a decline in the value of money in relation to the goods and services it will buy

Ongoing Assessment

Suppose you had the option to have your $1 million prize as a lump sum or as payments of $50,000 over 20 years. Which would you choose? Why? *(Some students will realize that they could take the $1 million and invest it at 6% annual interest, giving them an income of $60,000 a year while still preserving the original $1 million. They would still have to pay taxes on the winnings the first year and on the interest income earned each year, but with wise investments at the end of 20 years, they would have more than the original million. Of course, they could also impulsively spend the money in the first few years and have nothing left. Some students may see the advantage of having smaller, but consistent payments over 20 years.)*



Added Practice 11 Realities of Winning the Lottery

Name ________________________________Date________________________

1. Susan will never forget the day her family and friends threw a big party celebrating the wonderfully unexpected event of her widowed mother winning the $35 million jackpot. Everyone seemed perfectly happy with the idea of her receiving a payment each year over the next 20 years, which was the arrangement set by the Lottery Commission. Two years later, Susan's mother was tragically killed in a car accident. As the next-of-kin, Susan receives a letter from the Internal Revenue Service letting her know that she owes 26% estate taxes on the rest of the money that was due her mother. How much money is this?

2. Five years ago you won $5 million, to be paid out over the next 20 years. This year you have spent a lot of money supporting your new passion for skiing and have had extremely high medical expenses. Stone Street Capital offers to buy your lottery annuity and give you a lump sum at the rate of 40¢ on the dollar. How much cash will you receive now and how does it compare with what you would receive if you continued to get some of your winnings every year? What are the advantages of choosing this option?

3. John won a $3 million lottery jackpot, which will be paid out over 20 years. The first year's after-tax payment totals $97,500. What percentage of his winnings is he paying in taxes?

Answer Key Added Practice 11 Realities of Winning the Lottery

1. Susan's mother would receive $35,000,000/20 = $1,750,000 a year. Assume that her mother collected 2 payments, or $3,500,000, before she died. There would be $35,000,000 – $3,500,000 = $31,500,000 remaining. At a tax rate of 26%, Susan would owe $31,500,000 × 0.26 = $8,190,000.

2. Your yearly payments are $5,000,000/20 = $250,000. You've already collected 5 payments or $1,250,000; 15 payments remain for a total of $3,750,000. If Stone Street Capital buys this remaining amount at 40 cents on the dollar, you will receive 0.40 × $3,750,000 = $1,500,000. It becomes a choice of having $1,500,000 now or $250,000 a year for the next 15 years. Selling the annuity to a company for one lump sum would provide a lottery winner with more money in the present but a smaller amount in the long run. This option would be advisable only if the lottery winner needed money immediately to pay off debts.

3. The pre-tax payment would be $3 million/20 = $150,000. Since John got $97,500, $150,000 – $97,500 = $52,500 was deducted in taxes; $52,500/$150,000 = .35 or 35%.