Activity 2 Number Sense

Objectives

- Develop an understanding of large numbers
- Use mathematics to evaluate media messages and gambling opportunities

Materials	paper, pencils, calculators
Time	45 minutes
Math Idea	Understanding mathematical and statistical concepts is vital to a wide range of topics, including personal finances, sports, insurance, risk/reward trade-off of everyday activities, diet and medical claims, and elections.

Prior Understanding

Students should know how to convert time units and use a calculator to add, subtract, multiply, and divide.

Introduction

General number sense is very helpful in evaluating gambling opportunities and media claims. For some students it is hard to distinguish between millions, billions, and trillions—making these numbers meaningless. Give students the following facts as an introduction to the activity.

- *In 1999, the federal government spent $1.72 trillion on public finance.*
- *In 1995, state lotteries produced more than $11 billion in revenues.*
- *According to a 1994 gambling study, as many as 1.3 million teenagers had some form of problem-gambling behavior.*

Discussion

Ask students to describe how long they think 1.72 **trillion** seconds is compared to 11 **billion** seconds or 1.3 million seconds. Have them calculate the number of centuries in 1.72 **trillion** seconds; the number of years in 11 **billion** seconds; and the number of days in 1.3 million seconds.

Putting the numbers into a context that students understand will help them get a better conceptual grasp of these large numbers:

- 1.3 million sec = 21666.67 min = 361.1 hr = 15.05 days
- 11 **billion** sec = 183333333.33 min = 3055555.56 hr = 127314.8 days = 348.8 years
- 1.72 **trillion** sec = 28666666666.667 min = 477777777.78 hr = 19907407.41 days = 54540.8 years = 545.4 centuries

Exercise 1

Distribute copies of BLM 2A "Number Sense" to students. Have them try to match the categories in column A with the appropriate values in column B.

Discussion

It is helpful for students to develop an awareness of some of the characteristics of their society and the world in a quantifiable way. By completing BLM 2A "Number Sense" students can evaluate their knowledge of large numbers and how these numbers related to different areas of society.

Exercise 2

Divide the class into groups. Distribute a copy of BLM 2B "Time Flies" to each group. Have students use the given information to estimate how much time a teenager who smokes would lose from his or her lifetime.

Discussion

The purpose of completing BLM 2B "Time Flies" is to give students the opportunity to see how different rates relate to each other and how a rate on one scale (daily rate) relates to the same rate on a larger scale (over a lifetime rate). When all the groups are finished, check to see if all have arrived at the same conclusion.

Activity 2 Number Sense Teacher Support

Vocabulary

billion one thousand million; 1,000,000,000

trillion one thousand billion; one million million; 1,000,000,000,0000

Ongoing Assessment

Have students find examples of large numbers used in newspaper or magazine articles. Have them convert the numbers to some meaningful frame of reference, such as days, weeks, years. Invite them to make bar graphs to illustrate their calculations. *(Examples and graphs will vary.)*

Added Practice 2 Number Sense

Name _____ **Date** _____

The following data represents population figures and lottery expenditures for the six New England States in 1997.

New England State	**Population**	**Lottery Expenditure** (dollars)	**Total Gambling Expenditure** (dollars)	**Lottery Expenditure** (per capita)	**Total Gambling Expenditure** (per capita)
Maine	1,242,000	185,000,000	260,000,000		
New Hampshire	1,173,000	176,655,620	550,000,000		
Vermont	589,000	77,323,314	78,500,000		
Massachusetts	6,118,000	3,100,000,000	3,800,000,000		
Rhode Island	987,000	548,715,864	600,000,000		
Connecticut	3,270,000	500,000,000	7,500,000,000		
Totals					

Round answers to the nearest hundredth where needed.

1. Fill in the Lottery Expenditure (per capita) column by calculating the mean amount spent per person on the Lottery for each of the six New England states listed in the table.

2. Calculate the total Population, the total amount spent on the Lottery, and the total amount spent on all types of gambling for these New England states. Write your answers in the table.

3. Calculate the per capita expenditure (mean amount spent per person) on the Lottery in New England for 1997. Write your answer in the table.

4. Rank the states from highest to lowest per capita Lottery expenditure. Why do you think the differences among the states are so big?

1. 4.

2. 5.

3. 6.

5. Fill in the Total Gambling Expenditure (per capita) column by calculating the mean amount spent per person on gambling for each New England state.

6. Calculate the per capita expenditure on gambling for New England. Write your answer in the table. How does this number compare to the per capita expenditure on the Lottery for New England?

7. Rank the states from highest to lowest total expenditures on gambling. How do these rankings compare to the per capita lottery rankings? What do you think accounts for the differences? Why might figures for state per capita expenditures on gambling may be misleading?

1. 4.

2. 5.

3. 6.

8. How much does the average New England resident spend on the lottery *per day*?

9. How much does the average New England resident spend on gambling *per day*?

Answer Key Added Practice 2 Number Sense

1. Students should divide each state's Lottery expenditure by the state's population.

2. Students should add to find the totals for the first three columns.

3. Students should divide the total Lottery expenditure for New England by the total population for New England.

New England State	**Population**	**Lottery Expenditure** (dollars)	**Total Gambling Expenditure** (dollars)	**Lottery Expenditure** (per capita)	**Total Gambling Expenditure** (per capita)
Maine	1,242,000	185,000,000	260,000,000	$148.95	$209.34
New Hampshire	1,173,000	176,655,620	550,000,000	$150.60	$468.89
Vermont	589,000	77,323,314	78,500,000	$131.28	$115.45
Massachusetts	6,118,000	3,100,000,000	3,800,000,000	$506.70	$621.12
Rhode Island	987,000	548,715,864	600,000,000	$555.94	$607.91
Connecticut	3,270,000	500,000,000	7,500,000,000	$152.91	$2293.58
Totals	13,379,000	4,587,694,798	12,778,000,000	$342.90	$955.08

4. The states in order from highest to lowest per capita expenditure on the Lottery are:

1. Rhode Island
2. Massachusetts
3. Connecticut
4. New Hampshire
5. Maine
6. Vermont

The differences among the states could be attributable to the advertising budgets and techniques of the lotteries, the types of lottery games the states offer, how often

new games are introduced, the income levels of state residents, the general attitudes toward gambling in the different states, or other factors.

5. Students should divide each state's total gambling expenditure by the state's population.

6. Students should divide the total gambling expenditure for New England by the total New England population.

7. The states in order from highest to lowest per capita expenditure on gambling are:

1. Connecticut	4. New Hampshire
2. Massachusetts	5. Maine
3. Rhode Island	6. Vermont

Only Vermont has the same ranking (6th) in both per capita Lottery and per capita gambling expenditures. The most extreme difference between Lottery and overall gambling expenditures occurs in Connecticut: whereas Connecticut is third in Lottery expenditures, it is the highest in overall gambling expenditures, with more than three times the per capita expenditure as the second highest (Massachusetts). This state's high per capita gambling expenditure could be attributable to the presence of casinos and/or other types of gambling permitted in the state. A state's per capita gambling expenditure figure may be misleading because residents of any state can gamble there; in addition, a significant percentage of the expenditures could have come from people who are not residents of that state. Thus, the New England per capita expenditure on all gambling is probably a more accurate figure.

8. Students should divide the New England per capita expenditure on the Lottery by 365: $342.90/365 = $0.94 per day

9. Students should divide the New England per capita expenditure on the gambling by 365: $955.08/365 = $2.62 per day

Blackline Master 2A Number Sense

Name _____ **Date** _____

Match each category in column A with a value in column B.

Column A	Column B
_____ 1. The distance in miles from coast to coast in the contiguous United States	a. 4 million
_____ 2. The number of cigarettes smoked annually in the United States	b. 400,000
_____ 3. The population of the United States	c. 500 billion
_____ 4. The number of people that die on Earth each day	d. 275 million
_____ 5. The amount of money spent on legal gambling in the United States in one year	e. 2,840
_____ 6. The number of people who die as a result of smoking each year in the United States	f. 6 billion
_____ 7. The population of Louisiana	g. 5.6 billion
_____ 8. The amount of money in the United States (cash and checking accounts)	h. 250,000
_____ 9. The population of the world	i. 231 billion
_____10. The amount of money spent on movies in the United States in one year	j. 1.1 trillion

Note: All of the numbers provided are approximations.

Answer Key Blackline Master 2A

Column A	Column B
__e__ 1. The distance in miles from coast to coast in the contiguous United States	a. 4 million
__c__ 2. The number of cigarettes smoked annually in the United States	b. 400,000
__d__ 3. The population of the United States	c. 500 billion
__h__ 4. The number of people that die on Earth each day	d. 275 million
__i__ 5. The amount of money spent on legal gambling in the United States in one year	e. 2,840
__b__ 6. The number of people who die as a result of smoking each year in the United States	f. 6 billion
__a__ 7. The population of Louisiana	g. 5.6 billion
__j__ 8. The amount of money in the United States (cash and checking accounts)	h. 250,000
__f__ 9. The population of the world	i. 231 billion
__g__10. The amount of money spent on movies in the United States in one year	j. 1.1 trillion

Blackline Master 2B Time Flies

Name _____Date_____

Teenage Smoking Facts

• Statistically, each cigarette robs a regular smoker of 5.5 minutes of life.

• A teenager who smokes will smoke for an average of 25 years.

• A teenage smoker smokes about 0.6 pack per day.

Calculate each of the following. Use the result from question 1 to answer question 2; use the result from question 2 to answer question 3, and so on.

1. A pack of cigarettes has 20 cigarettes in it. How many cigarettes does a teenager smoke per day?
2. If a teenage smoker smokes _____ cigarettes a day, how many minutes of life would he or she lose per day?
3. If a teenage smoker loses _____ minutes of life per day, how many minutes of life would be lost per year?
4. If a teenager smoker loses _____ minutes per year, how many minutes would be lost in 25 years?
5. If a teenage smoker loses _____ minutes in 25 years, how many hours is that?
6. If a teenage smoker loses _____ hours in 25 years, how many days is that?
7. How many weeks of life does a teenage smoker lose who smokes for 25 years?
8. How many years of life does a teenage smoker lose who smokes for 25 years?

Answer Key Blackline Master 2B

1. $0.6 \times 20 = 12$ cigarettes/day
2. $12 \times 5.5 = 66$ minutes lost/day
3. $66 \times 365 = 24{,}090$ minutes lost/year
4. $24{,}090 \times 25 = 602{,}250$ minutes lost in 25 years
5. $602{,}250/60 = 10037.5$ hours
6. $10037.5/24 = 418.229$ days
7. $418.229/7 = 59.747$ weeks
8. $59.747/52 = 1.15$ years