CONCERT TICKETS

78
60
101
132
112
144
130
205
187
217
262
283
294
299
279
300

Figure This!
Math Challenges for Families

How **long** do you have to stand in line??

Figure This! How long do you think you would have to wait in this line if you hold number 300?

No. 300

Hint: Estimate the amount of time it would take for one person to buy a ticket. Use this estimate to find the amount of time you will have to wait in line.

Estimation and measurement of time are basic skills for all. Businesses such as banks, fast-food restaurants, ski areas, and airports need efficient ways to minimize time spent waiting in line.

Answer:
Assuming that it takes about 30 seconds to buy a ticket, you would wait about 2 1/2 hours.

FigureThis!

Get Started:
Pretend you are buying a ticket. How long would it take?

Complete Solution:
If each person takes 30 seconds to buy a ticket, then the 299 people in front will take about 30 x 299 or 8970 seconds about 150 minutes. That's 2 1/2 hours.

Another way to estimate this is to recognize that if it takes 30 seconds for one person to buy a ticket, then 2 people can buy a ticket in 1 minute. Thus, it takes 300 ÷ 2 or about 150 minutes for your turn to arrive. That's about a 2 1/2 hour wait.

Try This:
Go to a fast-food restaurant, supermarket, or someplace where people wait in line. Find the average number of people in line and the average amount of time they have to wait. Do different kinds of lines make a difference in waiting time? For example, is the express line really faster?

Additional Challenges:
1. If you expect 600 people to buy tickets to a rock concert at your school and the box-office opens one-half hour before the show, how many ticket sellers do you need?

2. If there are 300 people ahead of you in line to buy a ticket, about how many feet back are you?

Things to Think About:
- Do lines move faster at movies or at concerts?

- What factors would make the time for purchasing a ticket longer or shorter?

Did You Know That?
- The 1993 *Guinness Book of World Records* reported that the longest line of coins ever created was 34.57 miles long. It had 2,367,234 coins and was in Kuala Lumpur, Malaysia.

- The 1993 World Record for the most valuable line of coins was 1,724,000 quarters. The line was 25.9 miles long in Atlanta, GA.

- On April 21, 1990, an estimated 180,000 people in Maracana Stadium in Rio de Janeiro, Brazil, paid to hear Paul McCartney.

- At the London opening of *The Phantom Menace*, 11,500 tickets were sold in just 30 minutes on June 12, 1999.

- Queuing theory deals with wait times in lines.

Resources:
Book:

Matthews, Peter, ed. *The Guinness Book of World Records 1993*. New York: Bantam Books, 1993.

Website:

"Does this line ever move?" *Informs*
mie.eng.wayne.edu/faculty/chelst/informs

Answers to Additional Challenges:

(1.)
If each ticket purchase takes 30 seconds, it would take 5 hours for one person to sell 600 tickets. Since you only have one-half hour to sell the tickets, you would need 10 ticket sellers.

(2.)
If each person requires about 2 feet of space along the ground, then you are about 300 x 2, or 600 feet back in the line.