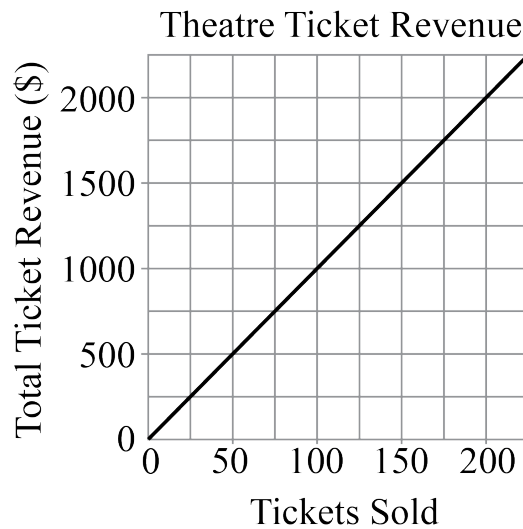# Problem of the Week
Problem B and Solution
Let's Go to the Movies

Problem

At a movie theatre, all tickets are the same price. The *ticket revenue* is the money the theatre gets from customers when they buy tickets. The line graph shows the total ticket revenue when different amounts of tickets are sold.

(a) What is the total ticket revenue when 100 tickets are sold?

(b) How much does one ticket cost?

(c) The theatre has 250 seats in total. What is the total ticket revenue if they sell out?

(d) The theatre is planning an open air movie for which they will charge the same price per ticket. If the open air space can hold 600 people, what is the maximum total ticket revenue for that show?

(e) How can you tell from the graph that all tickets are the same price? Explain.

Solution

(a) If 100 tickets are sold, then we can use the graph to determine that the total ticket revenue will be $1000.

(b) The cost for 1 ticket is the same as the total ticket revenue for 1 ticket. We can't easily read the revenue from the graph when 1 ticket is sold. However, we determined in (a) that the revenue for 100 tickets is $1000. Since all tickets are the same price, then 1 ticket costs $1000 \div 100 = \$10$.

(c) Since we determined in (b) that one ticket costs $10, then 250 tickets cost $250 \times \$10 = \$2500$. So the total ticket revenue will be $2500 if they sell out.

Alternatively, we can extend the graph to 250 tickets sold by adding one more gridline to the right. When we extend the diagonal line, we will find that we also need to add one more gridline to the top, and that when we reach 250 tickets sold, the total ticket revenue will be $2500.

(d) The total ticket revenue will be at its maximum when all 600 tickets are sold. Since we determined in (b) that one ticket costs $10, then 600 tickets cost $600 \times \$10 = \$6000$. So the maximum total ticket revenue is $6000.

Alternatively, we can use the graph to determine that when 200 tickets are sold, the total ticket revenue will be $2000. Since $600 = 3 \times 200$, then the total ticket revenue when 600 tickets are sold is $3 \times \$2000 = \$6000$.

(e) The graph is a straight line, which means that as the number of tickets sold increases, the total ticket revenue increases at a constant rate. This means that each ticket must be the same price.