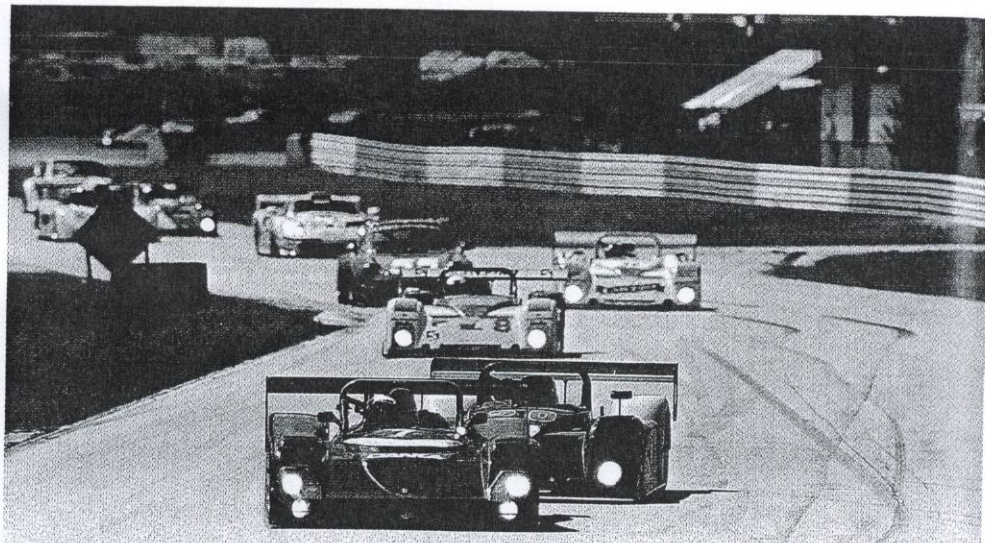


# The Substitution Method

## Objective

- Find an exact solution to a system of linear equations by using the substitution method.



## Why

*Systems of equations often require exact solutions. In order to make a profit, the owner of a small business at the auto race track must know the exact amount to charge for each of her two products.*

*The 12 Hours at Sebring automobile race is an endurance test. Two or more drivers for each racing team take turns driving in the race, which covers more than 1800 miles.*

You can find an exact solution to a system of linear equations without graphing. One method of doing this is to use substitution.

## Activity

### Exploring Substitution

#### APPLICATION AUTO RACING

Two drivers on a team at the 12 Hours at Sebring automobile race drive for a total of 157 laps. Driver two drives 21 laps less than driver one. How many laps did each driver drive?

1. First use equations to model the problem.  
Let  $x$  represent the number of laps for driver one.  
Let  $y$  represent the number of laps for driver two.

Then  $\begin{cases} x + y = 157 \\ y = x - 21 \end{cases}$  is the system that models the problem.

#### PROBLEM SOLVING

2. Use the **guess-and-check** method to find the values for  $x$  and  $y$  that solve the system.
3. Look at the second equation in the system,  $y = x - 21$ . How can this information about  $y$  be used in the first equation?
4. Because  $y = x - 21$ , substitute  $x - 21$  in place of  $y$  in the first equation. Solve the new equation for  $x$ .
5. Substitute this value of  $x$  into the second equation to find  $y$ .
6. Compare the values for  $x$  and  $y$  with the answer you found by using guess-and-check. Are they the same?

#### CHECKPOINT ✓