# Problem of the Month

# Movin 'n Groovin

## Level A:

Maria and Tran each have a pet hamster.  They have a maze for the hamsters to run through.  Maria says she thinks her hamster can run through the maze faster that Tran's.  They each time their hamster as it runs through the maze.  It takes Maria's hamster 19 seconds to travel through the maze.  It takes Tran's hamster 15 seconds.

Which hamster is faster?  Explain how you know.

How much faster is the faster hamster compared to the slower hamster at running through the maze?  Explain your answer.

## Level B:

Lexie wanted to have a heel-toe race with her older brother, Josh, and her sister, Hannah. She said, "My feet are smaller, so I should only have to go a shorter distance than you two." Her sister said, "That makes sense - let's race our ages." They measured off 7 feet for Lexie's track, 16 feet for Josh's track and 10 feet for Hannah's track. "Now let's measure our shoes," said Josh. "My shoe is 1/2 of a foot," said Lexie. "Three of my shoes add up to 2 feet," said Hannah. Josh said his shoe was exactly a foot long.

Who needs to take the fewest steps to walk his or her track? Explain how you found your answer.

How many more steps do the two others need to take to finish their races?

Who do you think will win the race? Who will take the longest to finish? Explain your reasoning.

## Level C:

Courtney got a remote control car for her birthday.  It is metallic purple with chrome wheels that are 1 1/2 inches in diameter.

She said to her friend, Dylan, "My remote control car goes faster than my mom's car on the freeway."  "No way," said Dylan.  Courtney said, "I will prove it to you."

Courtney measured off a distance of 115 inches.  Dylan said, "Okay, I will time how long it takes your car to travel that distance. I have a stop watch feature on my watch." Courtney raced her remote control car over the 115-inch distance.  Dylan said, "Wow, that only took 3.21 seconds. That seems really fast."  "See, I told you," said Courtney. "But really how fast is it going?" answered Dylan.

Determine the speed of Courtney's remote control car and compare its speed to that of a regular car traveling on the freeway.  Explain how you found your solution.

Why might the manufacturer get away with advertising that the remote control car *Travels Faster Than Life*?

## Level D:

You are a highway patrol officer, seated on a motorcycle, on a curvy section of Highway 1. The posted speed limit is 45 miles per hour (mph) on this stretch of highway. You are monitoring traffic with a radar gun. The first exit is 3.6 miles up the road. Your radar picks up a speeding car averaging 68 mph. When you try to start your motorcycle to follow the car, it won't start. You try again and again, and soon you fear that you won't be able to catch the speeding car before it can turn off the highway. Finally, your motorcycle starts and you begin your pursuit 30 seconds after the speeding car has passed you on the roadside.

How fast do you need to go to catch up to the speeding car? What is your average speed in pursuit? Illustrate the speed of the speeding car as well as your own motorcycle during this pursuit.

Is your own speed reasonable and safe? Explain why this is or is not a good location at which to monitor traffic.

## Level E:

Suppose that every hour of every day an airplane leaves Los Angeles for New York City and at the same instant, an airplane leaves New York City for Los Angeles. Each flight takes 5 hours. In a single day, how many airplanes originating in New York City will pass airplanes originating in Los Angeles in the air?