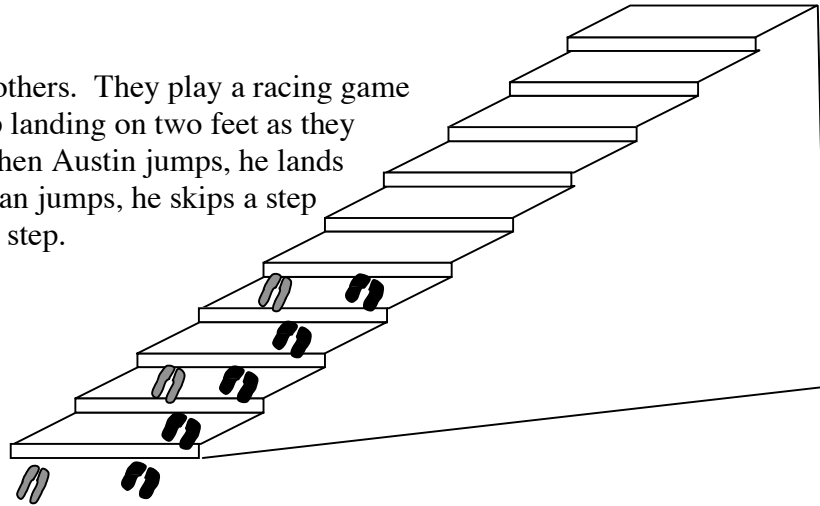


Problem of the Month

First Rate

Level A

Dylan and Austin are brothers. They play a racing game up the stairs. They jump landing on two feet as they race up the staircase. When Austin jumps, he lands on each step. When Dylan jumps, he skips a step and lands on every other step.



1. Who has to take more jumps to get to the top of the stairs?
2. When Dylan jumps up the staircase, how many jumps does he make?
3. When Austin jumps up the staircase, how many jumps does he make?
4. If Austin and Dylan each took 5 jumps, who would be farthest up the stairs?
5. At the end of the race who took less jumps?
6. Who do you think won the race? Explain your answer.

Level B

Tom and Diane start to race. Tom took 4 seconds to run 6 yards. Diane ran 5 yards in 3 seconds.



If they continued to run at the same speeds, who would get to 30 yards first? Show how you figured out.

Who runs faster? How can you compare their speeds?

Level C

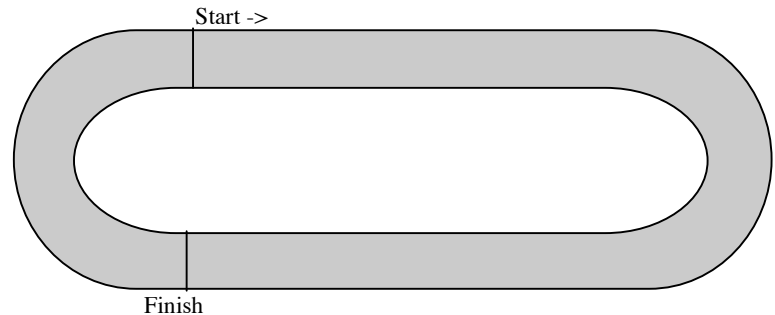
The Environmental Club at school attends an annual community clean-up event. They have recycling games. A team is assigned an area of land that is scattered with litter. The goal is for a pair of participants to clean up the area in the fastest time possible.



Tammy, working alone, could clean one-half the area in one hour. Her partner Melissa, working alone, could clean one-third of the area in one hour. During the contest when they work together, how long will it take them to clean the area? Explain how you found your solution.

Level D

You are an Olympic runner. You have just qualified to be in the finals of the 1,500-meter race. The track is 400 meters in an oval shape. The race is three and three-fourth laps around the track.



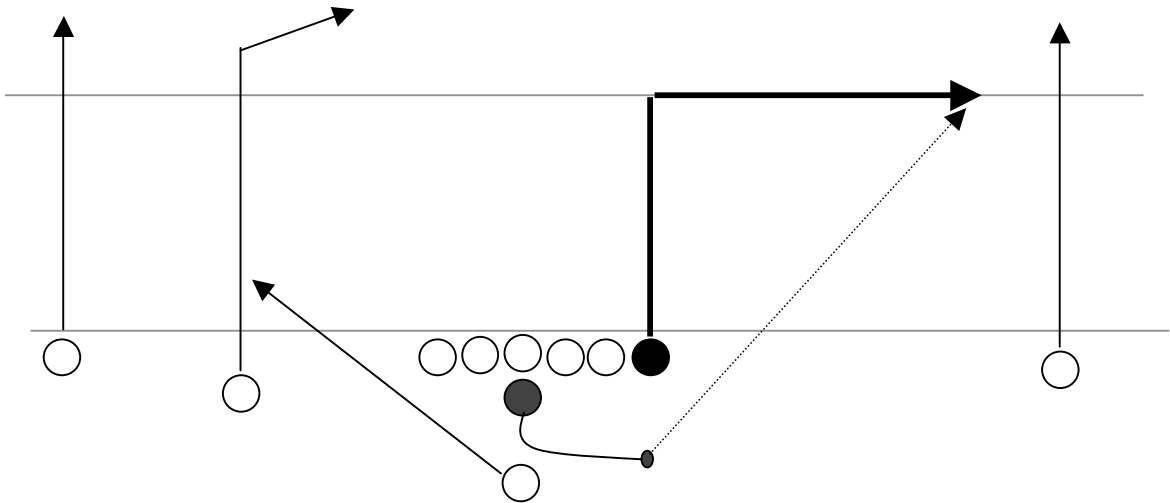
The favorite to win the race is a Kenyan, who holds the current best time, which is 3 minutes 29.4 seconds. The Kenyan runs a very steady race. Each of the Kenyan's lap times (400 meters) are within a second of each other.

You run a completely different type of race. You have a very strong kick, which means you usually lag behind for the first three laps to save energy and then when the leader has 300 meters to go you pour it on to win at the tape. You like to save energy in the first three laps, but you don't want to be more than 50 meters behind when you start your kick to the finish line.

Determine your strategy to win this race. What is the average speed you need to run the first part of the race? What is the average speed you need to run during your kick to win the race? How might your race change if the Kenyan runs two seconds faster?

Level E

It is third down, ten yards to go for a first down. The quarterback calls his favorite play, a roll out to the right and a square out pass to his tight end. See the diagram of the play below:



On the snap from center, the tight end runs straight ahead for ten yards, makes a sharp right turn and runs towards the side lines. The quarterback rolls to his right and stops directly behind where the tight end began, but six yards behind the line of scrimmage. The quarterback does not make the pass until after the tight end makes his break towards the sidelines. The tight end is running towards the sideline at a speed of 8 yards/sec. The quarterback tracks the receiver deciding when to throw the pass and the flight path of the ball. If the tight end makes the catch 12 yards after the break, how far does the quarterback throw the pass (in straight line) and at what rate is the distance between the receiver and quarterback changing?

Suppose the quarterback threw the pass sooner, and the receiver is running at the same speed. The distance the ball traveled was 17.3 yards. How many yards after the break was the ball caught and at what rate is the distance between the receiver and quarterback changing?

Given the constant speed of the receiver, consider several locations where the square out pass could be completed. Explain the relationship between the spot of the completion, the distance of the pass and at what rate is the distance between the receiver and quarterback changing?

Problem of the Month

First Rate

Primary Version Level A

Materials: A picture of the staircase with footprints, tape, measuring tape, paper and pencil.

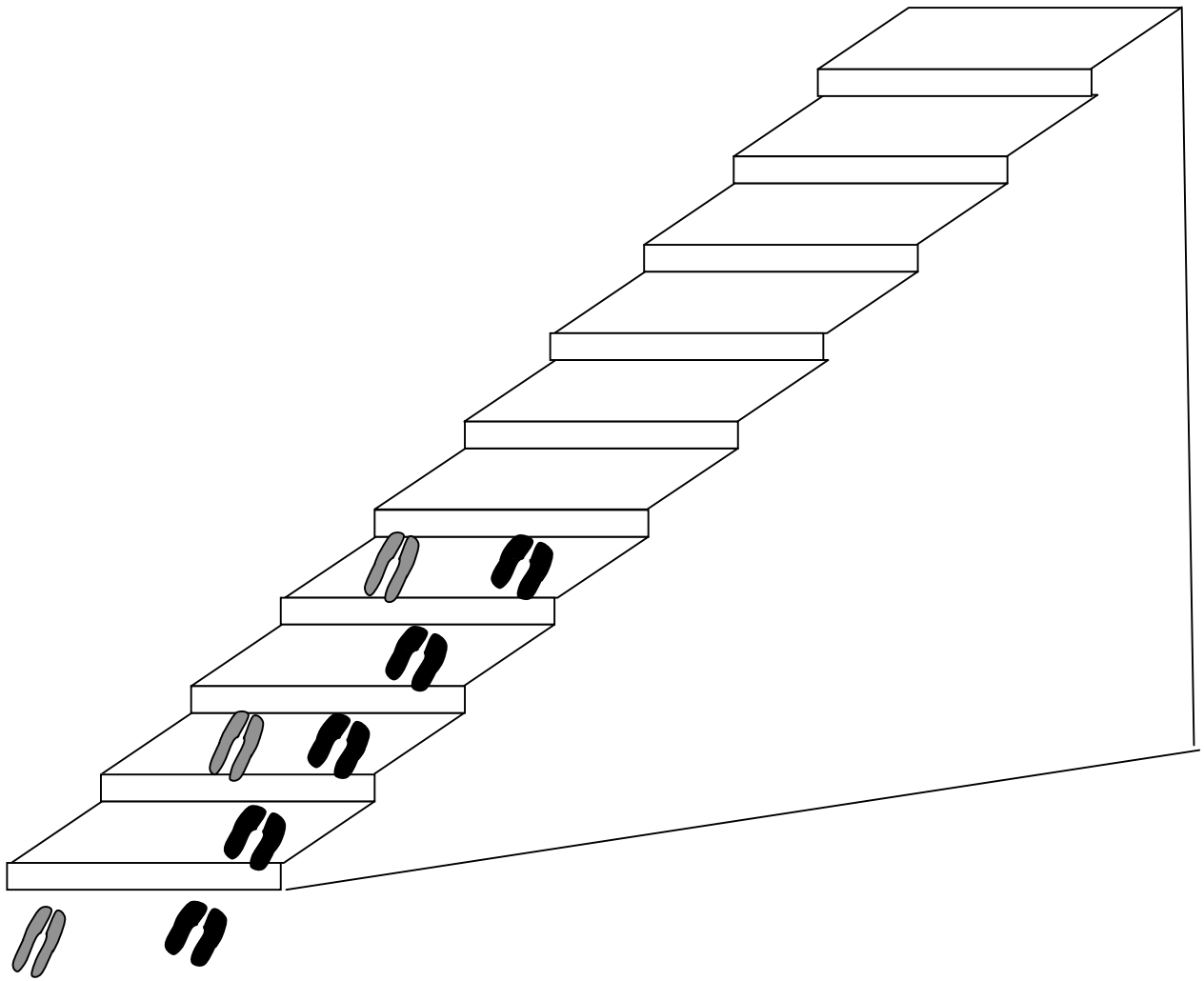
Discussion on the rug: (Teacher makes a mark with tape on the floor about five yards apart. The teacher chooses two classmates to start at one mark and make one jump toward other mark with both feet together.) (Students jump) "Who jumped farther?" (The teacher asks) (One at a time, the students jump until they reach second mark as class counts.) (Teacher asks) "Who took the most jumps?" (Teacher holds up the pictures of the staircase and the wet footprints) "Who can tell me what they see in this picture?" (Students respond) "This is a picture of a jumping race up the stairs. Two boys, both with wet feet race up the stairs. They jump landing on two feet as they race up the staircase. When the first boy jumps, he lands on each step. When the second boy jumps, he skips a step and lands on every other step.

In small groups: Each student has access to the picture of the staircase, paper and pencil. The teacher explains that they need to think about the jumping race up the stairs. Teacher asks the following questions.)

Who jumps farther? Who takes more jumps?

How many jumps does the first boy take?

Who do you think won the race? (At the end of the investigation have students either discuss or dictate a response to the prompt: "Tell me how you know, who won the race.")



Second **First**
Boy **Boy**