

# Races

April 17, 2011

[Adapted from “Math Circle for grades 6 and 7” by A. Spivak (in Russian).]

1. Jinny’s mom is chasing Jinny. At first, the distance between them is 10 meters. Jinny’s mom runs at a speed of 8 meters per second. Jinny runs at 7 meters per second. After how long will Jinny’s mom catch up with Jinny?
2. Clint’s car is traveling at a speed of 60 miles per hour. Clint wants to save 1 minute per mile. How should he increase the speed of his car?
3. Two hikers are hiking from Los Angeles to San Francisco. The first one covers 40 miles each day. The second starts a day later than the first one and covers 45 miles each day. When will the second hiker catch up with the first one?



7. It takes the train 1 minute to cross the 450 meters long bridge. (Note: the clock starts as soon as any part of the train is on the bridge, and stops when the entire train is off the bridge.) It takes the train 30 seconds to pass a traffic light. Find the length of the train and its speed.
8. On a mountain road, the bus travels at a speed of 15 mph when going uphill and 30 mph going downhill. No part of the road is flat. What is the distance between the two villages on this mountain road if the round trip between them takes the bus 4 hours?
9. It takes a squirrel 20 minutes to leave her nest, get a nut and come back to her nest. When she is empty-handed, the squirrel runs at a speed of 5 m/s. When carrying a nut, she runs at 3m/s. How far is it from the squirrel's nest to the nut tree?

10. Patrick and Sean are out looking for four-leaf clovers. Starting at 12pm, Patrick heads west at a speed of 3 mph until he finds a clover, then turns back eastward at the same speed. At the same time, Sean walks east at 4 mph until he finds one, then heads back westward at the same speed. They meet each other at 2pm, at a location 2 miles east of where they started. What is the farthest apart they ever were, and at what time were they this distance apart?
11. Siwei's work is 2.4 miles away from his house, so he walks each day. One day he was halfway to his office when he realized he was running 10 minutes late, so he doubled his speed to a jog and arrived right on time. If Siwei leaves his house at the same time the following morning, how fast should he walk or jog in order to reach work on time (without changing speed)?