

## Graphing Mathematics

1. Two runners in a 1609 m race (one mile) finish with times of 3:52.46 ( 3 minutes and 52.46 seconds) and 3:52.72. Assuming that both run at their average speeds during the entire race, what distance separates them at the end of the race?
2. Two soccer players start from rest, 48 m apart. They run directly towards each other, both players accelerating. The first player has an acceleration of  $0.50 \text{ m/s}^2$ . The second player has a acceleration has a magnitude of  $0.30 \text{ m/s}^2$ . a) How much time passes before they collide? b) At the instant they collide, how far has the first player run? c) what are their velocities when they run into each other.
3. A car is traveling at a constant speed of  $27 \text{ m/s}$  on a highway. At the instant this car passes an entrance ramp, a second car enters the highway from the ramp. The second car starts from rest and has a constant acceleration of  $5 \text{ m/s}^2$ . a) How long does it take for the second car to catch up with the first? b) how far have they traveled? c) How fast is the second car going when they catch up?
4. A speeder passes a parked police car at  $30.0 \text{ m/s}$ . The police car starts from rest with a uniform acceleration of  $2.44 \text{ m/s}^2$ . a) How much time passes before the speeder is overtaken by the police car? b) How far does the speeder get before being overtaken by the police car?
5. A sports car enthusiast buys a super deluxe machine that can accelerate at  $16 \text{ ft/s}^2$ . She decides to test her car in a drag race with another speedster in a souped-up stock car. Both start from rest, but the experienced stock car driver leaves  $1.0 \text{ s}$  before the driver of the sports car. The stock car moves with a constant acceleration of  $+12 \text{ ft/s}^2$ . Find (a) the time it takes the sports car to overtake it, (b) the distance the two travel before they are side by side, and (c) the velocities of both cars at the instant they are side by side.
6. A hockey player is standing on his skates on a frozen pond when an opposing player, moving with a uniform speed of  $12 \text{ m/s}$ , skates by with the puck. After 3 seconds, the first player makes up his mind to chase his opponent. If he accelerates uniformly at  $4.0 \text{ m/s}^2$ , (a) how long does it take him to catch his opponent, and (b) how far has he traveled in this time? (Assume the player with the puck remains in motion at a constant speed.)
7. Two friends are having a race. When the first car begins the race, he is travelling at  $22 \text{ m/s}$ . His friend pulls up beside him doing  $25 \text{ m/s}$ . The first car accelerates at  $8 \text{ m/s}^2$  and the second accelerates at  $6 \text{ m/s}^2$ . (a) How long before the first car overtakes the second? (b) How far do they travel? (c) What is the final velocity of each of the cars at this point?