

Question 1:

Answer the following True/False questions (**Assume [East] is positive**)

1. A runner completes a 100 m sprint at an average speed of 50 m/s.
 - (a) The time it took to complete the race was 10 s. (T / F)
 - (b) If the runner wishes to complete a 1 km race in the same amount of time as he completed the 100 m race, his average speed must be 500 m/s. (T / F)
2. The position v. time plot of a vehicle over the highway was similar to the plot $y = x$.
 - (a) The vehicle experienced uniform motion (T / F)
 - (b) The average velocity was positive (T / F)
3. The position v. time plot of a vehicle over the highway was similar to the plot $y = -4$
 - (a) The vehicle experienced uniform motion (T / F)
 - (b) The vehicle is [East] of the reference point (T / F)
4. Two runners compete in a race starting from (0, 0), runner X and runner Y . Runner X has a Pos v. Time plot similar to $y = 4x$ and Runner Y has a Pos v. Time plot similar to $y = x$.
 - (a) Runner Y won the race (T / F)
 - (b) If the race lasted 4 seconds, then final position vector of Runner X was $\vec{d}_X = 12 \text{ m[East]}$ (T / F)

Question 2:

Using the x -dimensional coordinate system, and choosing $(x \rightarrow)$ as the positive direction, I decided to track my tour around the area the other day. All position vectors are recorded relative to $(0, 0)$. I began my journey at $d_1 = +5 \text{ m}$, then,

- $\vec{d}_2 = +7 \text{ m}$
- $\vec{d}_3 = -18 \text{ m}$
- $\vec{d}_4 = +11 \text{ m}$

If the tour lasted for 10 min, determine my average velocity as well as my average speed over the tour.

Question 3:

A tourist traverses 412 km[W] to the Canada starting from UK. From Canada, he traverses 805 km[E] to Egypt. Finally, from Egypt he traverses 98 km[E] to Saudi Arabia. If the journey took 2 h, determine his average velocity as well as his average speed.

Question 4:

Racer X , Racer Y and Racer Z compete in the Grand Motor Sport. Below is position v. time plot for each of the racers, Racer X , Racer Y , Racer Z . Prove that Racer Z won the race. (Assume that the race lasted for 5 seconds)

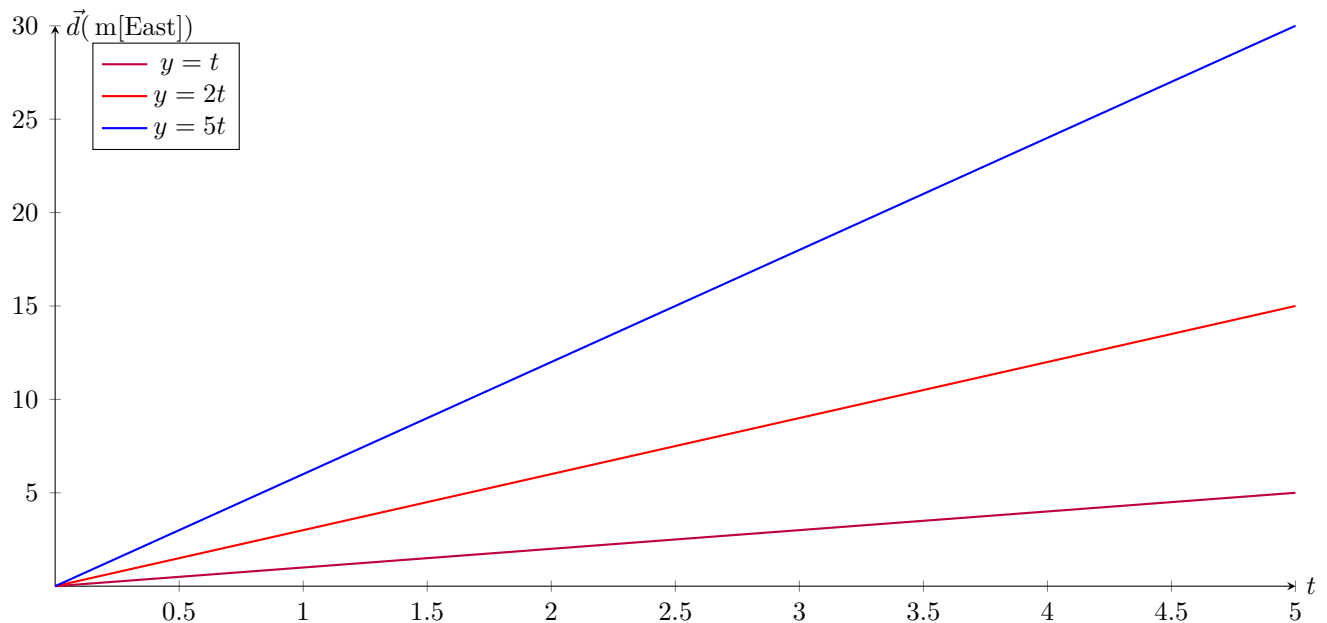


Figure 4.1: Pos V. Time

Question 5:

A ball is dropped from a cliff 20 m[North] relative to the ground. The ball bounces off the ground and reaches a final position 15 m[South] relative to the cliff. The entire trip took 12 seconds. Determine,

- (a) The average velocity of the ball
- (b) The average speed of the ball
- (c) The Pos v. Time plot of the ball

Question 6:

A sprinter completes a sprint (returning back to his starting position) in 30 seconds around a circular track with radius 15 m. Compute the sprinters,

- (a) Average speed
- (b) Average velocity

Question 7:

Car A and Car B are about to race each other, however Car B wants to challenge himself by letting car A have a 3 second head start. If car A has an average speed of 120 m/s , at what average speed must Car B race at in order to tie the race? The length of the race track is 4.2 km .

Question 8:

The Robetson's Family are interested in doing business with a particular salesmen. They decide to drive over to Toronto to catch him at his bus stop before he departs. Let us suppose that this bus stop is located at $(0, 0)$. The Roberston's mistakenly passed this bus stop, not knowing that the salesmen was at this particular one, and only realized they missed him after having traveled to a position $\vec{d} = +100\text{ m}$ relative to the bus stop, at an average speed of 60 m/s . The exact moment they passed him was the moment that his bus started to travel in a direction [West] relative to the bust stop at an average velocity of 50 m/s [West]. If at the exact moment the Robertson's had reached the position $\vec{d} = +100\text{ m}$, the salesmen got off at his next stop, at what speed must the Roberston's travel at in order to catch up to him within 30 seconds?