Horse Racing

Horse racing is a sport with a long history of attracting the interest of gamblers and gangsters. Some gangsters want to gain an advantage for betting on an upcoming race, so they organized an unofficial, secret race the week before to get some information about the horses' performance.

False starts are a regular problem in such secret races because officials do not always have the proper equipment. A horse can have a head start, a running start, or even a running head start. The unofficial race was stopped after only 5 s because of a false start. One of the officials leaked the results, but the data were incomplete.

1. Based on the results, which horse would you bet on to win the official race next week?

Table 1 Race results for four horses

Rennpferd

Time (s)	Velocity (m/s)	Displacement (m)
0.00	0.00	0.00
1.00	5.00	2.50
2.00	10.00	
3.00		22.50
4.00	20.00	
5.00	25.00	62.50

Caballo rápido

Time (s)	Velocity (m/s)	Displacement (m)
0.00	0.00	31.25
1.00	2.50	3250
2.00	5.00	
3.00		42.50
4.00	10.00	
5.00	12.50	62.50

Yarış

Time (s)	Velocity (m/s)	Displacement (m)
0.00	6.25	0.00
1.00	8.75	7.50
2.00	11.25	
3.00		30.00
4.00	16.25	
5.00	18.75	62.50

Dogbiscuit

Time (s)	Velocity (m/s)	Displacement (m)
0.00	6.25	31.25
1.00	8.75	38.75
2.00	11.25	
3.00		61.25
4.00	16.25	
5.00	18.75	93.75

2. Complete Table 1.

3. Draw a position-time graph and velocity-time graph for each horse.

4. Which horse was guilty of the false start? Justify your response.

5. Which horse(s) started properly? Justify your response.

6. a) Use the data to explain whether speed was constant for all horses.

b) Use the data to explain whether acceleration was constant for all horses.

7. Now that you have done the analysis, which horse would you bet on to win the official race next week?