**Drag Racing**

The race car drivers of a 2004 Dodge Ram pickup truck and a 1965 Ford Mustang are scheduled to race at the NY International Raceway Park. On a typical straight-line race track, the average speed of the Pickup is 30 meters per second and the Mustang is 45 meters per second. Because the Mustang is so much faster than the pickup, the drivers agree that the pickup will start 120 meters closer to the finish line, as shown below.



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| --- | --- | --- | --- | --- | --- |
| 0 m | 120m |  |  |  | Finish |

|  |  |  |
| --- | --- | --- |
| Time (*t*)  in sec | Distance (*d*) in meters from the start point | |
|  | **Mustang** | **Pickup** |
| 0 |  |  |
| 2 |  |  |
| 4 |  |  |
| 6 |  |  |
| 8 |  |  |
| 10 |  |  |
| 12 |  |  |

1. Create a table of values for the time in seconds (*t*) and distance from the starting line in meters (*d*) for every two seconds. Assume that both are traveling at a constant rate, the vehicles do not speed up or slow down.
2. For the data in the table, write two equations in slope intercept form (*y = mx + b*) that relate distance from the zero meter mark to the time spent running.
3. The equation for the Mustang’s distance as it relates to time is:
4. The equation for the pickup’s distance as it relates to time is:



1. Graph each of the equations on the same coordinate axes.
2. Label each line and axes appropriately.
3. Solve the system of equations from (1) and (2) using substitution.
4. How long must the track be for the pickup to win the race?

Answer the following questions using complete sentences and show your work.

1. If the track is 600 meters long, which vehicle will win the race?

Describe how you can determine the answer to question 3:

a. from a table

b. from a graph

c. from a system of equations

1. If the Mustang gives the pickup a 210-meter head-start, which vehicle would win the race? (Assume the same track as in Question 3.)

Show how you can answer this question three different ways:

a. Use a table. b. Draw a graph.

|  |  |  |
| --- | --- | --- |
| Time  (sec) | Distance  (m) | |
|  | **Mustang** | **Pickup** |
|  |  |  |
|  |  |  |
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|  |  |  |
|  |  |  |
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c. Solve a system of equations.

1. If the Mustang and Pickup could race forever at the same speed, will the Mustang eventually overtake the pickup, no matter how much of a head-start the pickup receives? What part of the linear equations tells you? (Assume that you are not confined to a 600 meter race.)