

Pre-Calculus Notes

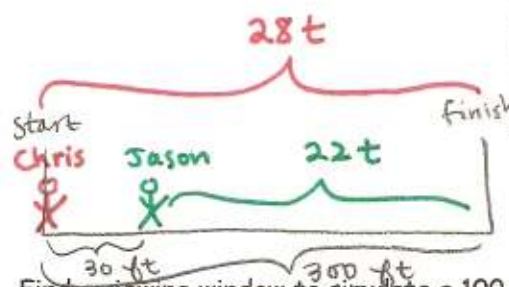
Name: key

Parametrics - DAY TWO (Application)

We will now work some problems involving the APPLICATION of Parametric Equations.

Example 1: Chris can sprint at 28 feet per second. Jason sprints at 22 feet per second. Chris gives Jason a 30-foot head start.

a. Write a pair of parametric equations to represent EACH runner. Remember, $d = rt$.



CHRIS: $x_1 = 28t$ and $y_1 = 3$

JASON: $x_2 = 22t + 30$ and $y_2 = 5$

Jason runs 22t on own given 30ft

no impact on problem
→ make different so can "see" the race

b. Find a viewing window to simulate a 100-yard dash. WATCH YOUR UNITS.

$t_{\min} = 0$ $t_{\max} = 20$ $t_{\text{step}} = .5$
 $x_{\min} = 0$ $x_{\max} = 300$ $x_{\text{step}} = 1$
 $y_{\min} = 0$ $y_{\max} = 6$ $y_{\text{step}} = 1$

c. Who is ahead after 3 seconds? Who is ahead after 5 seconds? Who wins the race? What was the winner's time?

t	3 seconds	5 seconds	
Chris	84	140	winner
Jason	96	140	loser

Jason is ahead after 3 seconds.
 at 5 seconds, they are tied.
 1st to reach 300 ft wins,

so...
 Chris: $28t = 300$
 $t \approx 10.71$

Jason
 $22t + 30 = 300$
 $22t = 270$
 $t \approx 12.27$

Chris wins race @ 10.71 seconds.

Example 2: Anytown High School is planning a play. The script calls for two characters to meet on stage. Lauren starts at the point (0 feet, 7 feet) and travels 2 feet horizontally and 1 foot vertically every second. Alex starts at the point (4 feet, 0 feet) and travels vertically at the rate of 2 feet per second. If Alex and Lauren start walking at the same time, will they meet?

a. Use the GRID to graph each walk.

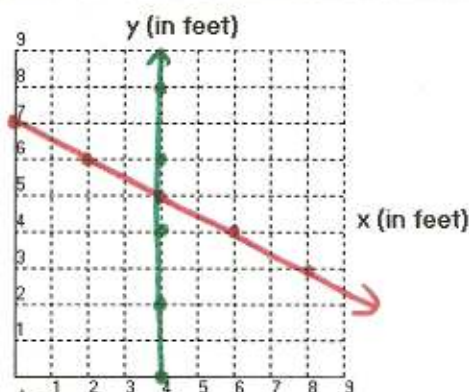
Lauren - orange
 Alex - green

b. From the graph in part (a), can you determine if Alex and Lauren meet? EXPLAIN YOUR ANSWER.

→ not precisely, unless I look @ points I plotted for each second

→ not accurate method

→ what if meet @ fraction of second?



c. Complete the table of values for Lauren and Alex.

Lauren		
Time (s)	x (horizontal)	y (vertical)
0	0	7
1	2	6
2	4	5
3	6	4
4	8	3
5	10	2
6	12	1
7	14	0
t	$2t$	$7-t$

Alex		
Time (s)	x (horizontal)	y (vertical)
0	4	0
1	4	2
2	4	4
3	4	6
4	4	8
5	4	10
6	4	12
7	4	14
t	4	$2t$

d. Can you tell from the table if Lauren and Alex meet? Explain your answer.

not accurately \rightarrow table only accounts for time in EXACT seconds. Again, they could meet @ fraction of a second.

e. Write a pair of equations for Lauren's horizontal and vertical position in terms of the third variable, or parameter, time.

$$x_1 = 2t \quad \text{and} \quad y_1 = 7-t$$

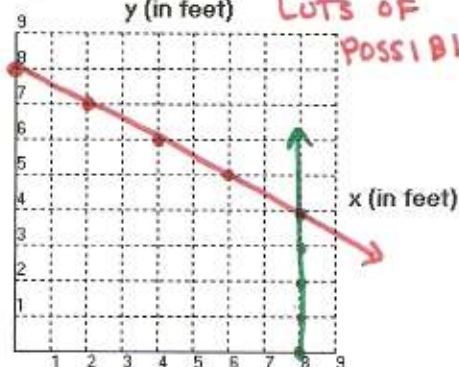
f. Write a pair of parametric equations for Alex's horizontal and vertical position in terms of the third variable, or parameter, time.

$$x_2 = 4 \quad \text{and} \quad y_2 = 2t$$

g. The script is incorrect since Alex and Lauren do not meet on stage at the same time. The director of the play decided that Lauren and Alex should meet after 4 seconds. Write a new pair of parametric equations that will produce this result.

~~no exact answer~~ LOTS OF POSSIBILITIES!

LAUREN: $x_1 = 2t$ and $y_1 = 8-t$
 ALEX: $x_2 = 8$ and $y_2 = t$



\Rightarrow now meet up @ (8, 4) and 4 seconds

* can also change starting positions

graph and see if meet in same place @ same time
 Answer: No.