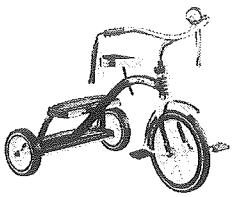
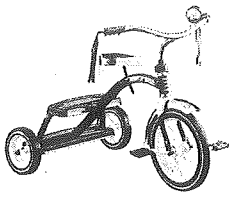
Algebra 1: Unit 8, lesson 1 Notes: Solving Systems of Equations by Graphing Name:



Trike Wars



Table

Who is your predicted winner: _____

Use the rate known to calculate how far the rider is after at a given time

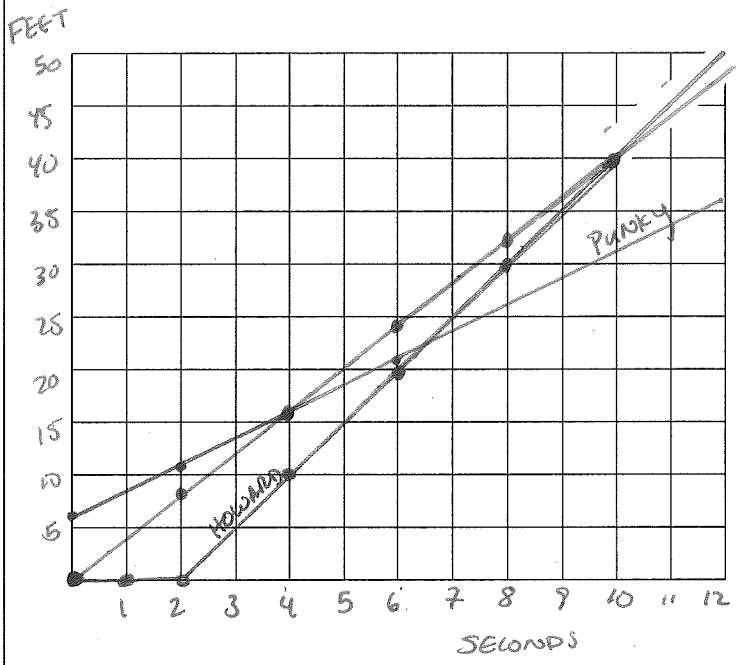
Punky Brewster				
Time (in seconds)	0	2	4	6
Feet	6	11	16	21

Bald Biker				
Time (in seconds)	0	2	4	6
Feet	0	8	16	24

Howard				
Time (in seconds)	0	2	4	6
Feet	0	0	10	20

Graph

Create and label axes; include units.



Rule

Write a rule to represent each rider. What does the slope and y-intercept represent:

FEET = SPEED • TIME + STARTING DISTANCE TRAVELED

Punky Brewster: $\frac{5\text{FT}}{2\text{SEC}} \cdot t + 6 = y$

$\frac{5}{2}x + 6 = y$

Bald Biker:

$\frac{4\text{FT}}{1\text{SEC}} \cdot t + 0 = y \Rightarrow$ $4x + 0 = y$

Howard:

$\frac{5\text{FT}}{1\text{SEC}} \cdot t - 10 = y \Rightarrow$ $5x - 10 = y$

↑ since he waited 2 seconds, he lost

Situation

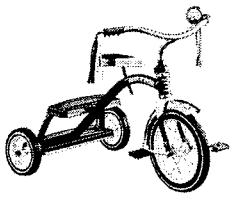
List the information you know about the race and riders

PUNKY: $\frac{10\text{FT}}{4\text{SEC}} \rightarrow \frac{5\text{FT}}{2\text{SEC}} \rightarrow \left(\frac{2.5\text{FT}}{1\text{SEC}}\right)$

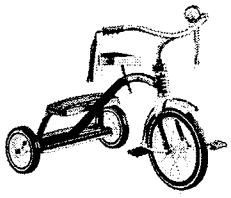
BIKER: $\frac{10\text{FT}}{2.5\text{SEC}} \rightarrow \frac{4\text{FT}}{1\text{SEC}}$

HOWARD: $\frac{10\text{FT}}{2\text{SEC}} \rightarrow \frac{5\text{FT}}{1\text{SEC}}$

- PUNKY HAD 6 FOOT START
- HOWARD TAKES 2 SECONDS TO START SINCE HE TURNS AROUND



Trike Wars



Who Wins the Race: **At what distance would the given rider be the winner (he/she is in the lead).**	**When are they even:** **At what distance would the given rider be at the same point as another rider.**
Punky Brewster:	Punky Brewster and Bald Biker:
Bald Biker:	Punky Brewster and Howard:
Howard:	Bald Biker and Howard:

System of linear equations:

- 2+ LINEAR EQUATIONS THAT USE THE SAME VARIABLES

Solution of a system of linear equations:

- AN ORDERED PAIR (x, y) THAT MAKES ALL OF THE EQUATIONS TRUE
- GRAPHICALLY, THE SOLUTION IS WHERE THE LINES MEET.

Since all ____ lines didn't meet there is ____ a solution to this system of 3 equations with 2 variables.

But ____ lines did meet so there ____ a solution to this system when just looking at 2 equations with 2 variables.

What are the solutions?

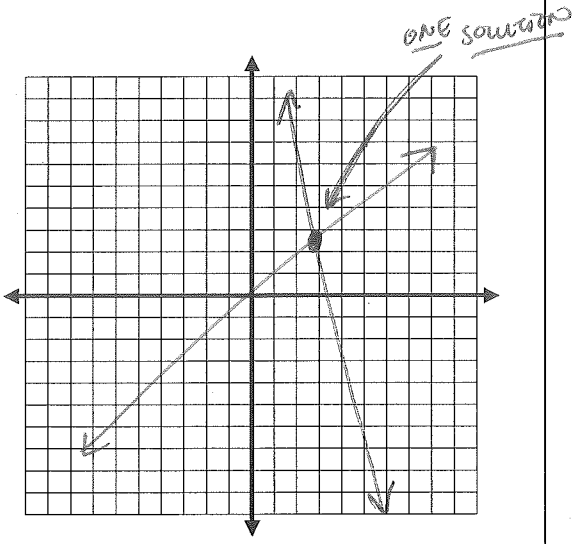
Punky Brewster and Bald Biker	Punky Brewster and Howard	Bald Biker and Howard
(4, 16) ↑ ↑ AT 4 SEC, THEY'RE TIED AT 16 FT	(16.5, 23) ? ESTIMATE	(10, 40)

Algebra 1: Unit 8, lesson 1 Notes: Solving Systems of Equations by Graphing Name:

These 3 systems above are examples of a _____ system and an _____ system.

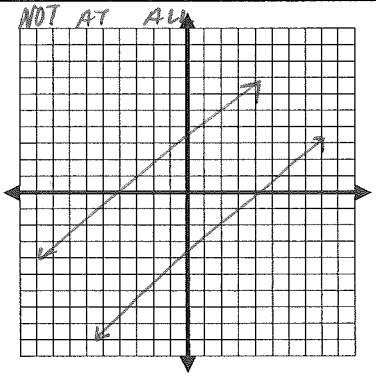
Consistent system: A LINEAR SYSTEM THAT HAS AT LEAST ONE SOLUTION
- THE LINES INTERSECT AT LEAST ONCE

Independent system:
- A LINEAR SYSTEM THAT HAS EXACTLY ONE SOLUTION
- THE LINES INTERSECT EXACTLY ONCE



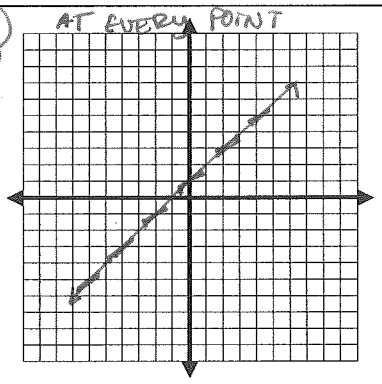
In Trike Wars we had lines that _____ and therefore we had _____ solution for each pair of 2 lines. What else could have happened...?

HOW ELSE COULD LINES INTERSECT?



PARALLEL LINES

NO SOLUTION



SAME LINES

INFINITELY MANY SOLUTIONS

If there are Consistent systems then there must also be INCONSISTENT Systems:
A LINEAR SYSTEM THAT HAS NO SOLUTION (DO NOT INTERSECT WHEN GRAPHED)

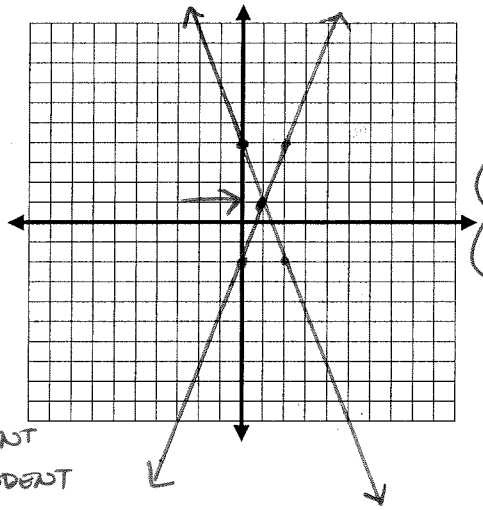
And if there are Independent systems then there must also be DEPENDENT Systems:
A LINEAR SYSTEM THAT HAS INFINITELY MANY SOLUTIONS (WHEN GRAPHED, ITS SAME LINE)

Graphs of Equations	Number of Solutions	Type of System
INTERSECTING LINES	1: intersect once	• CONSISTENT • INDEPENDENT
PARALLEL LINES	0: don't intersect at all	• NOT CONSISTENT → INCONSISTENT • NOT INDEPENDENT NOR DEPENDENT
SAME LINE	INFINITE: lines intersect at every point	• CONSISTENT

Algebra 1: Unit 8, lesson 1 Notes: Solving Systems of Equations by Graphing Name:

Solve the system of linear equations by graphing. Check your answer and state the type of system.

1) $\begin{cases} y = -3x + 4 \\ y = 3x - 2 \end{cases}$



Solution: (1, 1)

Type:
- Consistent
- Independent

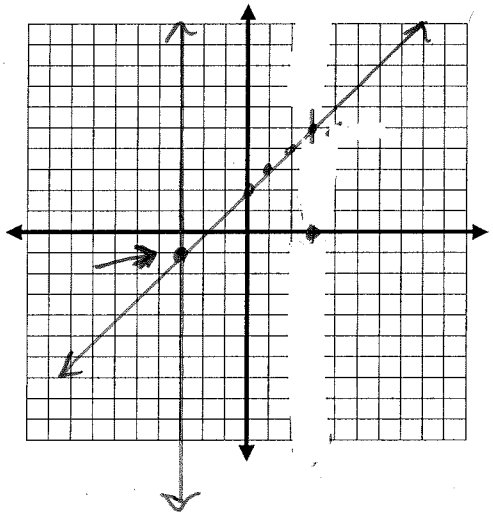
Check:

$1 \stackrel{?}{=} -3(1) + 4$ $\quad$ $1 = 3(1) - 2$

$1 = -3 + 4$ $\quad$ $1 = 3 - 2$

✓ ✓

2) $\begin{cases} y = x + 2 \\ x = -3 \end{cases}$



Solution: (-3, -1)

Type:
Consistent
Independent

Check:

$-1 = -3 + 2$ $\quad$ $x = -3$

$-1 = -1$ ✓ $\quad$ $-3 = -3$ ✓

3) $\begin{cases} y = 2x - 3 \\ 4x - 2y = 6 \end{cases}$

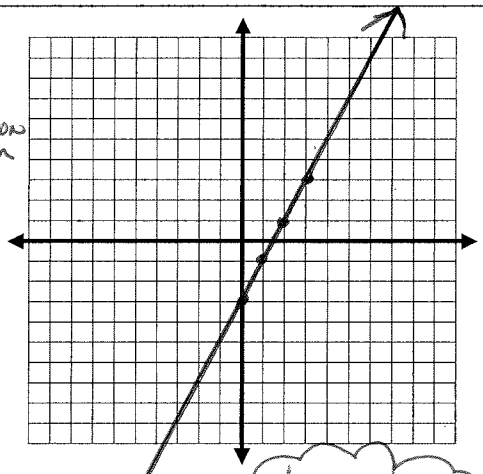
Rewrite in function form

$4x - 2y = 6$

$-4x \quad -4x$

$\frac{-2y}{-2} = \frac{-4x}{-2} + \frac{6}{-2}$

$y = 2x - 3$



Same line

Infinitely many solutions

Type:
- Consistent System
- Dependent System

Check:

4) $\begin{cases} 2y = x - 2 \\ 2x = 4y - 12 \end{cases}$

Rewrite in function form

$\frac{2y}{2} = \frac{x}{2} - \frac{2}{2}$

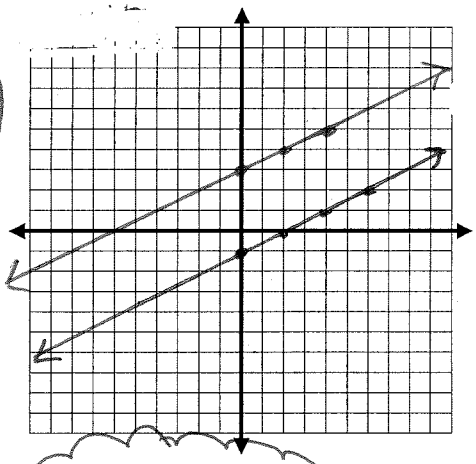
$y = \frac{1}{2}x - 1$

$2x = 4y - 12$

$+12 \quad +12$

$\frac{2x + 12}{4} = \frac{4y}{4}$

$\frac{1}{2}x + 3 = y$



No Solution

Type:
Parallel lines: Inconsistent System

Check:

Ticket out the Door

In Trike Wars find a length the race would need to be for the Rider you picked to be the winner.