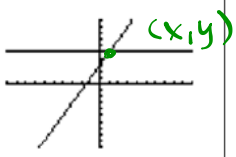
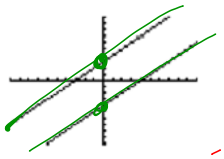
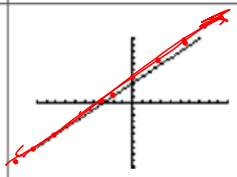
How Many Solutions to the System?

Method		One Solution	No Solutions	Infinite Solutions
Graphing	**Best to use when:** Both equations are in slope intercept form. (y = mx + b) EX: y = 3x – 1 y = -x + 4 Solutions are integer coordinate points (no decimals or fractions)	 Solution is the point of intersection. Different Slope Different y-intercept	 Lines are parallel and do not intersect. (Slopes are equal) Same Slope Different y-intercept	 Lines are identical and intersect at every point. Same Slope Same y-intercept (Same Equations)
Substitution	**Best to use when:** One equation has been solved for a variable or both equations are solved for the same variable. EX: y = 2x + 1 or y = 3x - 1 3x – 2y = 10 y = -x + 4	After substituting and simplifying, you will be left with: x = # y = # Solution will take the form of (x, y)	After substituting, variables will form **zero pairs** and you will be left with a **FALSE** equation. 3 ≠ 6	After substituting, variables will form **zero pairs** and will leave you with a **TRUE** equation. 4 = 4
Elimination	**Best to use when:** Both equations are in standard form. (Ax + By = C) Coefficients of variables are opposites. 3x + 6y = 5 -3x – 8y = 2 Equations can be easily made into opposites using multiplication. -2(4x + 2y = 5) 8x – 6y = -5	After eliminating and simplifying, you will be left with: x = # y = # Solution will take the form of (x, y)	After eliminating, variables will form **zero pairs** and you will be left with a **FALSE** equation. 0 ≠ 5	After eliminating, variables will form **zero pairs** and will leave you with a **TRUE** equation. 0 = 0

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Day 7 – Real World Applications of Systems

When to Use Slope Intercept Form (y = mx + b)

- **Rate** – the rate is your slope
  - This number is always related to the x value
  - Per or each is often associated with slope
- **Flat Fee/Starting Amount** – this is your y-intercept
  - This value is constant

1

begin.

When to Use Standard Form (Ax + By = C)

- **Two Numbers** – represent x and y
  - Numbers per x and numbers per y
  - Typically addition is involved
- **Total** – what equation is set equal to
- No beginning amount
- Neither variable is dependent on the other

2 rates

Scenario 1: The admission fee for the county fair includes parking, amusement rides, and admission to all commercial, agricultural, and judging exhibits. The cost for general admission is $7 and the price for children is $4. There were 449 people who attended the fair on Thursday. The admission fees collected amounted to $2768. How many children and adults attended the fair?

price of adm.: $7x$ (gen) + $4y$ (child) = 2768 (total)

# of ppl: x (gen) + y (child) = 449 (total)

x = # of gen.

y = # of child

$7x+4y=2768 \Rightarrow 7x+4y=2768$

$x+y=449 \Rightarrow -7x-7y=-3143$

$-3y=-375$, -3, $y=125$

$x+y=449$

$x+125=449$, $-125\ -125$

$x=324$

$(324, 125)$

Scenario 2: Ms. Ross told her class that tomorrow's math test will have 20 questions and be worth 100 points. The multiple choice questions will be 3 points each and the open ended response questions will be 8 points each. Determine how many multiple choice and open ended response questions are on the test.

Scenario 3: Serena is ordering lunch from Tony's Pizza Parlor. John told her that when he ordered from Tony's last week, he paid $34 for two 16 inch pizzas and two drinks. Jodi told Serena when she ordered one 16 inch pizza and three drinks, it cost $23. What is the cost of one 16 inch pizza and one drink?

John: $2x$ (pizza) + $2y$ (drink) = 34 (total)

Jodi: $1x + 3y = 23$

x: cost of pizza

y: cost of drinks

$2x+2y=34 \Rightarrow 2x+2y=34$

$x+3y=23 \Rightarrow -2x-6y=-46$

$-4y=-12$, $y=3$

$x+3y=23$

$x+3(3)=23$

$x+9=23$, $-9\ -9$

$x=14$

$(14, 3)$ — 14 pizza, 3 drinks

Scenario 4: The Strauss family is deciding between two lawn care services. Green Lawn charges a $49 startup fee, plus $29 per month. Grass Team charges a $25 startup fee, plus $37 per month.

a. In how many months will both lawn care services costs the same? What will that cost be?

b. If the family will use the service for only 6 months, which is the better option? Explain.

Scenario 5: Jenna is deciding between two cell phone plans. The first plan has a $50 signup fee and costs $20 per month. The second plan has a $40 signup fee and costs $25 per month.

$y = mx + b$

a. After how many months will the total costs be the same? What will the cost be?

First plan: $y = 20x + 50$

Second plan: $y = 25x + 40$

x: # of months

y: total price

$25x + 40 = 20x + 50$

$-20x \quad -20x$

$5x + 40 = 50$

$-40 \quad -40$

$5x = 10$

$x = 2$

$y = 25x + 40$

$y = 25(2) + 40$

$y = 50 + 40$

$y = 90$

(2, 90)

mo. $ total

b. If Jenna has to sign a one year contract, which plan will be cheaper?

$x = 12$ months

$y = 20(12) + 50$

$y = 240 + 50$

$y = 290$

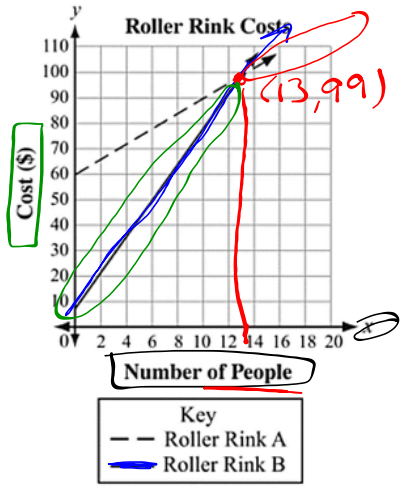
$<$

$y = 25(12) + 40$

$y = 300 + 40$

$y = 340$

Scenario 6: The following graph shows the cost for going to two different skating rinks.



a. When is it cheaper to go to Roller Rink A?

When you have more than 13 people

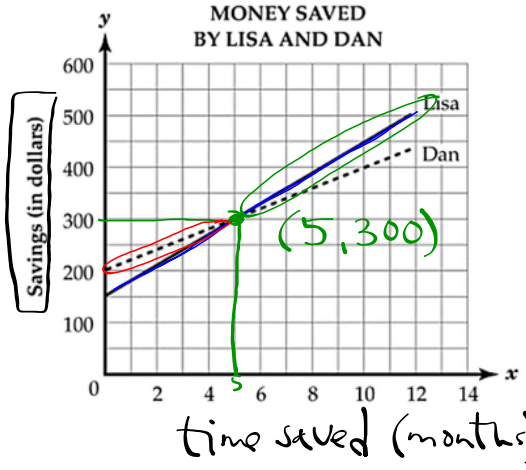
b. When it is cheaper to go to Roller Rink B?

When you have less than 13 people

c. When does it cost the same to go to either roller rink?

When you have 13 people

Scenario 7: The graph below shows the money saved by Lisa and Dan over the summer.



a. How long did it take for them to save the same amount of money? How much money did they both save?

5 months $300 (5, 300)

b. When did Lisa have more money saved?

After 5 months, Lisa had more money

c. When did Dan have more money saved?

Before 5 months, Dan had more money