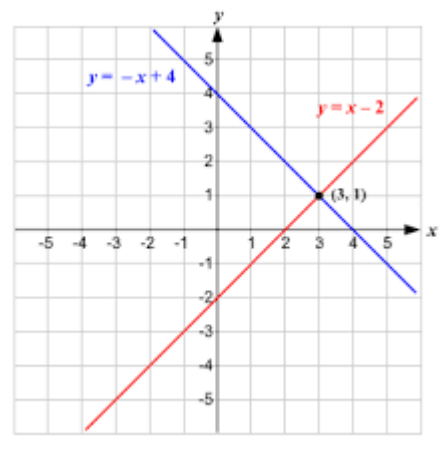
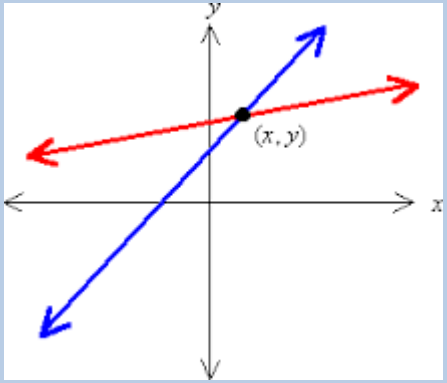
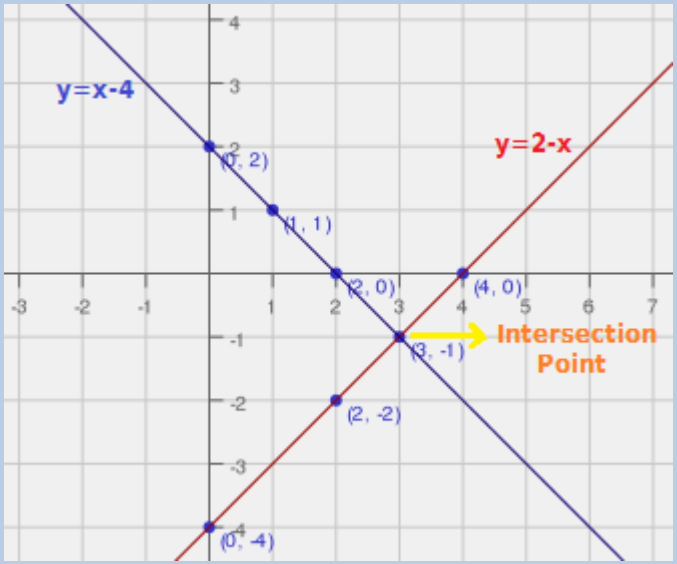






World 5

Systems of Equations

Essential Question:

How can we compare more than one linear situation?

January 5, 2016

Today we will solve systems of equations graphically.

So that we can determine the point of intersection of two lines.

Keys to Success:

- Graph two lines on the same plane (from words, table of values or an equation)
- Interpret the graph by determining the <u>coordinates</u> where the lines cross

GROUP WARM UP

A scientist is counting mosquito eggs in local lakes. The equations represent the total number of eggs counted (y) as a function of the number of days since the survey started (x).

a) Fill out the table of values

b) Identify the day when both lakes have the same number of mosquito eggs.

c) Which lake is most affected by mosquito eggs, and WHY?

GROUP 1:

Lake 1: $y = 40x + 200$

Lake 2: $y = 5x + 900$

GROUP 2:

Lake 1: $y = 15x + 400$

Lake 2: $y = 5x + 550$

	Day 0	Day 5	Day 10	Day 15	Day 20	Day 25
Lake 1						
Lake 2						

Lake 1: $y = 40x + 200$

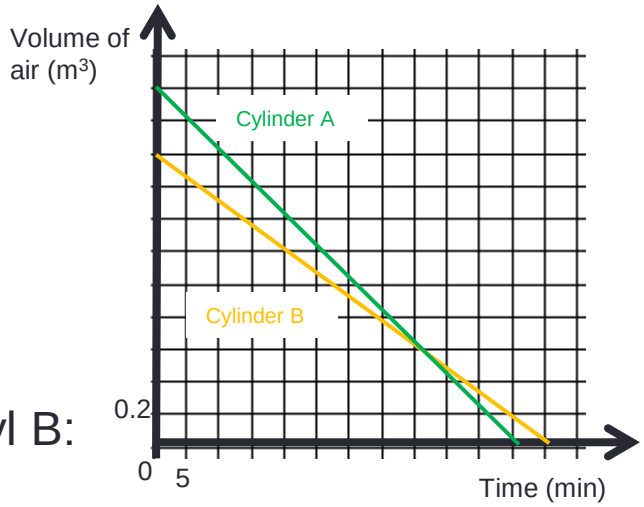
Lake 2: $y = 5x + 900$

	Day 0	Day 5	Day 10	Day 15	Day 20	Day 25
Lake 1	200	400	600	800	1000	1200
Lake 2	900	925	950	975	1000	1025

b) The lakes have the same amount of eggs on day 20.

c) Lake 1 is more affected after day 20 OR Lake 2 is more affected before the 20^{th} day

Volume of Cylinders



a) What was the volume of air in each cylinder before their use?
Answer: 2.2 m^3, and 1.8 m^3

b) For what time interval was the volume of air in Cyl B:
Less than Cyl A?
Answer: 40 min
More than Cyl A?
Answer: 20 min

c) When did the two cylinders have the same volume of air?
Answer: 40 min

d) What was this volume of air?
Answer: 0.6 m^3

e) What is the connection between the place where the two lines intersect, and the values from questions C and D?

f) Why did Cylinder A empty faster than Cylinder B?

Cyanobacteria

Lost Lake: n = 200d + 1200

Ant Lake: n = 300d + 400

Table of Values

# of days	0	2	4	6	8	10	12	14
Lost Lake	1200	1600	2000	2400	2800	3200	3600	4000
Ant Lake	400	1000	1600	2200	2800	3400	4000	4600

a) At what moment were the number of cyanobacteria the same?

Answer: at 8 days

b) What was the number of cyanobacteria per mL at that moment?

Answer: 2800

c) Which lake is more affected by cyanobacteria?

Answer: Ant Lake! The slope (or rate of change) is higher!

Tell Me 10 Things

About this Graph

GIZMO EXAMPLES

Cat and Mouse

https://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=623

Race Day

https://www.explorelearning.com/index.cfm?method=cResource.dspView&ResourceID=260

A *system of equations* is a set of two or more equations that are used to compare similar relationships.

The coordinate where the two equations cross on a graph is called the *solution.* **The solution is always written as a coordinate (x, y).**

You can find the solution by:

a) Examining a graph and finding the coordinate of intersection

b) Constructing a table of values using the two rules, and find the value of x where both values of y are identical. (see our bacteria example!)

c) Finding the system using algebra (next class!)

Example 1

Harvey the mouse started 18m ahead of Sharky the cat and is running at a rate of 2m/s. Sharky is very fast and runs/pounces at a rate of 6 metres each second.

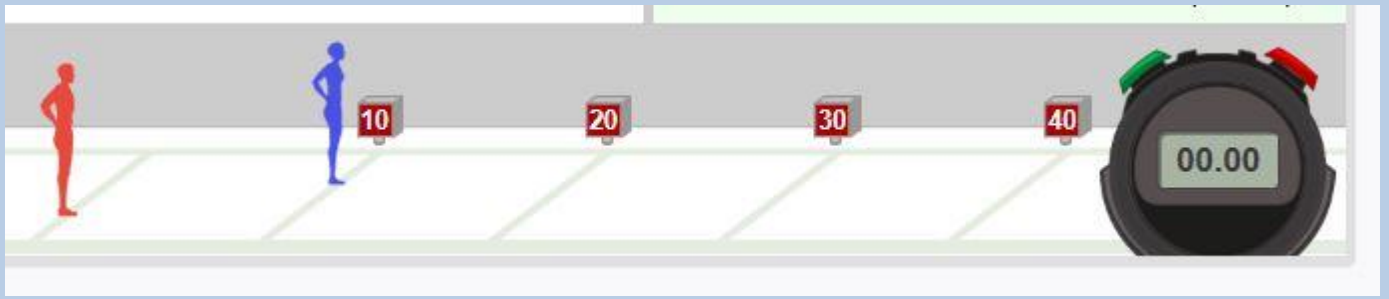
How long will it take and at how many metres will Sharky catch poor Harvey the mouse?

1. Identify x and y
2. Write the two equations for this situation
3. Make a table of values
4. Graph the situations

Example 2

Francis and Jordan are racing. Jordan gets a head-start of 15 metres while Francis is tying his shoelace, and runs 5m/s. Once Francis takes off, he runs at a rate of 10m/s.

How long will it take for Francis to catch up to Jordan?



Practice

Workbook, page 82-84

(a, b, c for each)

January 7, 2016

Today we will solve systems of equations using algebra, tables of values and graphs.

So that we can determine the point of intersection of two lines.

Keys to Success:

- Make the two equations equal to each other and solve for x
- Substitute x back into one equation and solve for y
- Interpret the solution

How Can we Solve a System of Equations?

Graph
Table of Values
Comparison Method (ALGEBRA)

Systems of Equations…Part 2!

Example 1: Solve the following system of equations:

$y = 8x - 5$
$y = 7x - 3$

Steps:
1) Set equations equal to each other
2) solve for x using algebra
3) Plug value of x back into ONE of the original equations
4) Solve for y
5) CHECK with 2nd equation
5) write your solution as a coordinate (x, y)

$8x - 5 = 7x - 3$
$-7x \quad -7x$
$x - 5 = -3$
$+5 \quad +5$
$\underline{\mathbf{x = 2}}$

$y = 8x - 5$
$y = 8(2) - 5$
$y = 16 - 5$
$\underline{\mathbf{y = 11}}$

Check:
$y = 7x - 3$
$y = 7(2) - 3$
$y = 14 - 3$
$\underline{\mathbf{y = 11}}$

Solution: (2, 11)

Example 2: Solve the following system of equations:

$y = 30x + 10$
$y = 15x - 50$

$30x + 10 = 15x - 50$
$-15x \qquad -15x$
$15x + 10 = -50$
$-10 \quad -10$
$\frac{15x}{15} = \frac{-60}{15}$

$x = -4$

$y = 30x + 10$
$y = 30(-4) + 10$
$y = -120 + 10$
$y = -110$

Check:
$y = 15x - 50$
$y = 15(-4) - 50$
$y = -60 - 50$
$y = -110$

Solution: (-4, -110)

JANUARY 11TH

Today we will continue to explore various ways to solve a system of equations.

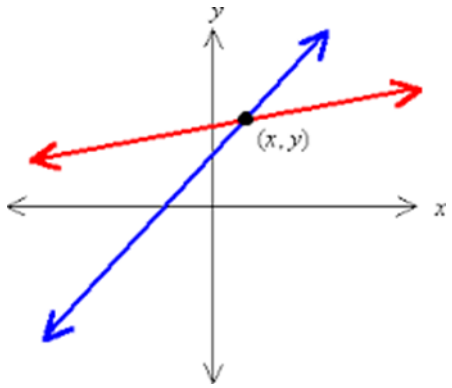
So that we can identify where two situations are THE SAME.

Keys to Success:

Through your Destination Check, you will show

I can solve a system of equations

- A graph
- A table of values
- The comparison method



AGENDA

This Week:

- **Tuesday: Math Help**
- **Thursday: Situational Problem in class**
- **Friday: Systems of Equations Quiz**

Together

1. **Warm-Up (IXL)**
2. **Correct Homework (page 85 and 82)**

In pairs

3. Work Period:

Workbook, pages 83, 84 and 86

Finished Early? Page 87 and 88

Solo

4. Destination Check – What do we know?

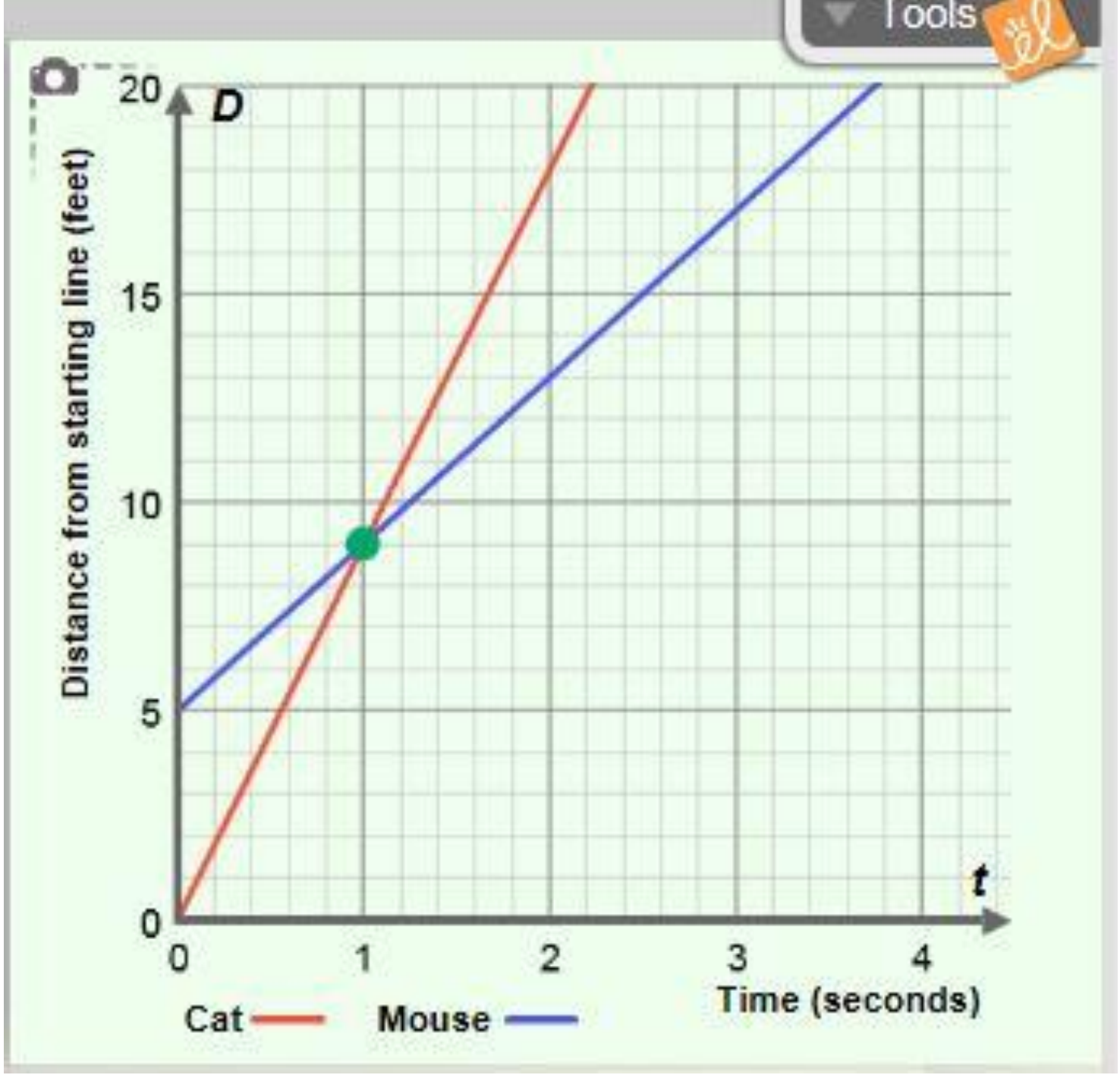
JANUARY 12TH

Today we will solve word problems using our knowledge of Linear Equations (y = ax+b in World 4) and Systems of Equations (World 5).

So that we can interpret a system of equations.

Keys to Success:

- **I can write a system of equations and use it solve the system using a graph, table of values and comparison method (algebra)**
- **I can interpret what information has been given and use it with my equations to solve a given problem.**


Tools
D
20
15
10
5
0
Distance from starting line (feet)
t
0
1
2
3
4
Time (seconds)
Cat
Mouse