Solving Systems of Equations

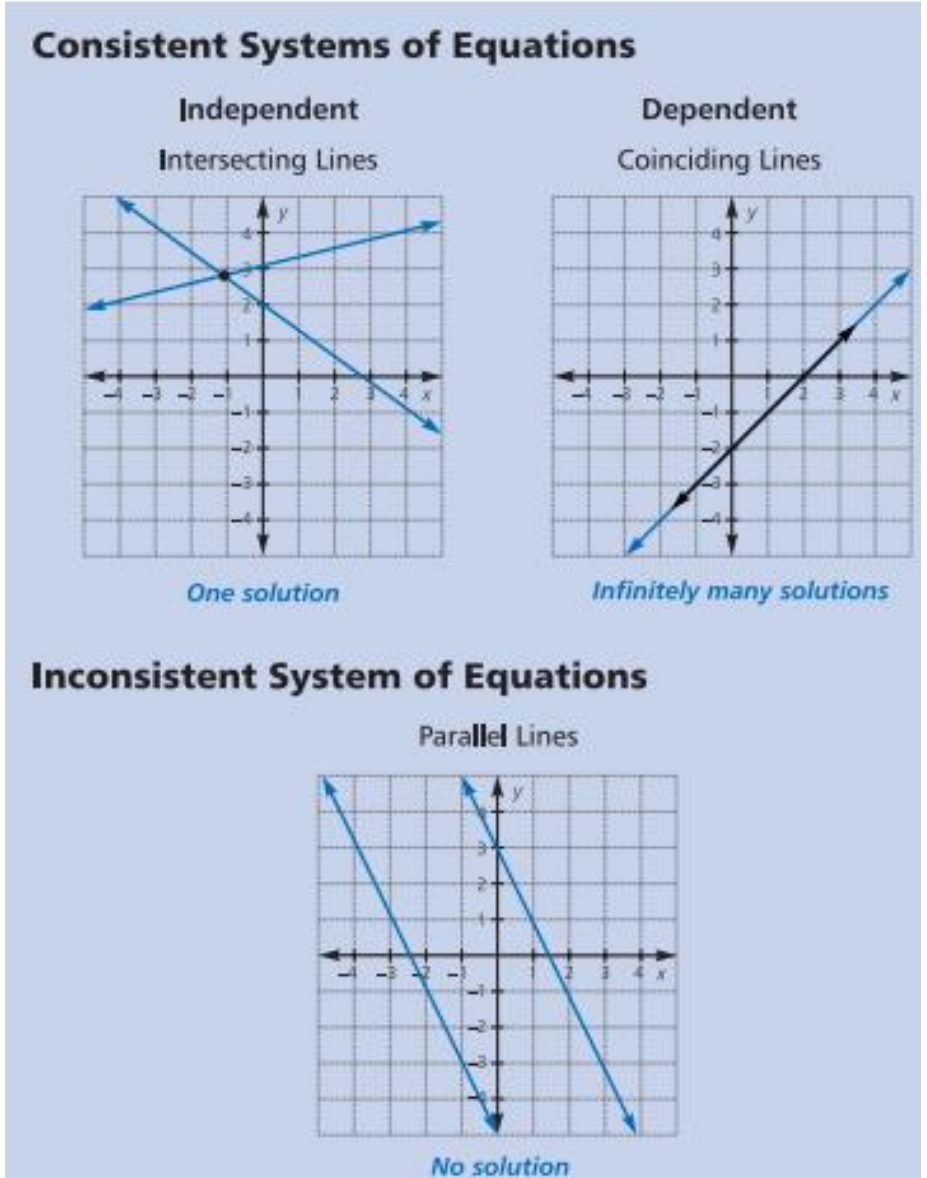
By Graphing

…but first

- Need more practice solving problems
- Those practice problems are going to be worth points
- The points are going to go into the projects category
- Sets of 5 problems worth either 5 or 10 points
- Small test every week or two - directly from the problems
- Tests will have no corrections since tests are open notes

Graphing systems of equations

- A system of equations is two or more equations
- (We will work with 2 mostly)
- Types of systems of equations
    - Dependent (infinite solutions)
    - Consistent (at least one solution)
    - Inconsistent (no solutions)



Graphing systems of equations - Dependent

- Types of systems of equations
  - Dependent (infinite solutions)

$6y + 12 = 3x$

$2y = x - 4$

where do these intersect? everywhere

slope-intercept

$6y + 12 = 3x$

$-12 \quad -12$

$\frac{6y}{6} = \frac{3x - 12}{6}$

$y = \frac{3x}{6} - \frac{12}{6}$

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

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

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

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

Graphing systems of equations - Dependent

- Types of systems of equations
  - Dependent (infinite solutions)

6y + 12 = 3x

2y = x - 4

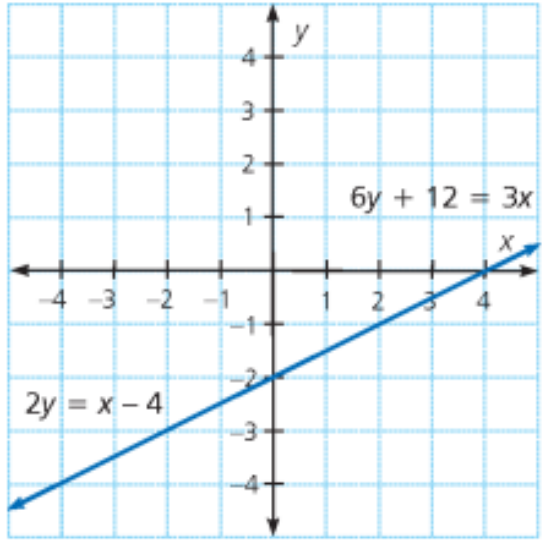
Solution

Write each equation in slope-intercept form.

$6y = 3x - 12$ $\qquad$ $2y = x - 4$

$y = 0.5x - 2$ $\qquad$ $y = 0.5x - 2$

Graph the system of equations. Notice the equations are equivalent.



The graphs coincide. The system is dependent.

Question: Do you remember how to graph?

- Types of systems of equations
  - Dependent (infinite solutions)

$6y + 12 = 3x$

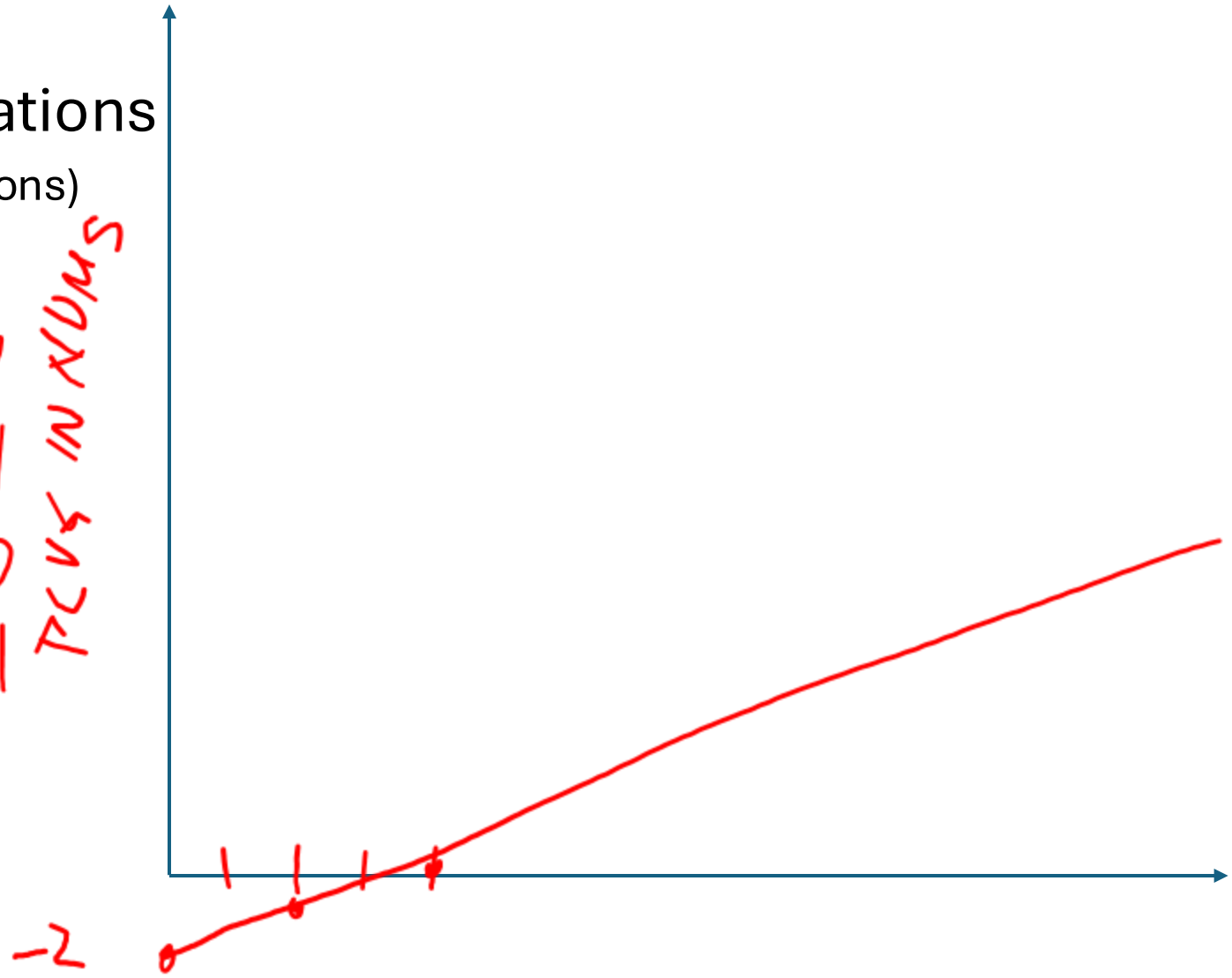
$2y = x - 4$

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

① SLOPE - INTERCEPT FORM

② PICK IN NUMS

x	y
0	-7
2	-1
4	D
6	+1



Graphing systems of equations - Consistent

- Types of systems of equations
  - Consistent (at least one solution)

ABC $120500 profit additional $8500 each year after

XYZ $75000 profit additional $15000 each year after

When will they make same profit?

$P_{ABC} = 120000 + 8500t$

$P_{XYZ} = 75000 + 15000t$

t = # years (start at 0)

Graphing systems of equations - Consistent

- Types of systems of equations
  - Consistent (at least one solution)

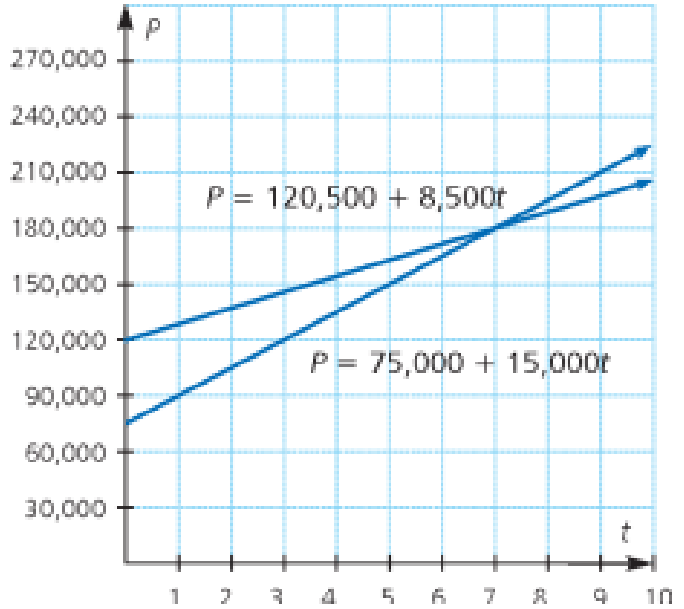
When will they make same profit?

$P_{ABC} = 120000 + 8500t$

$P_{XYZ} = 75000 + 15000t$

Graph the system of equations.

The lines intersect at (7, 180,000). The system is consistent. Company ABC and Company XYZ will earn the same amount in profit after 7 years.



Question: Do you remember how to graph?

- Types of systems of equations
  - Consistent (at least one solution)

When will they make same profit?

$P_{ABC} = 120000 + 8500t$

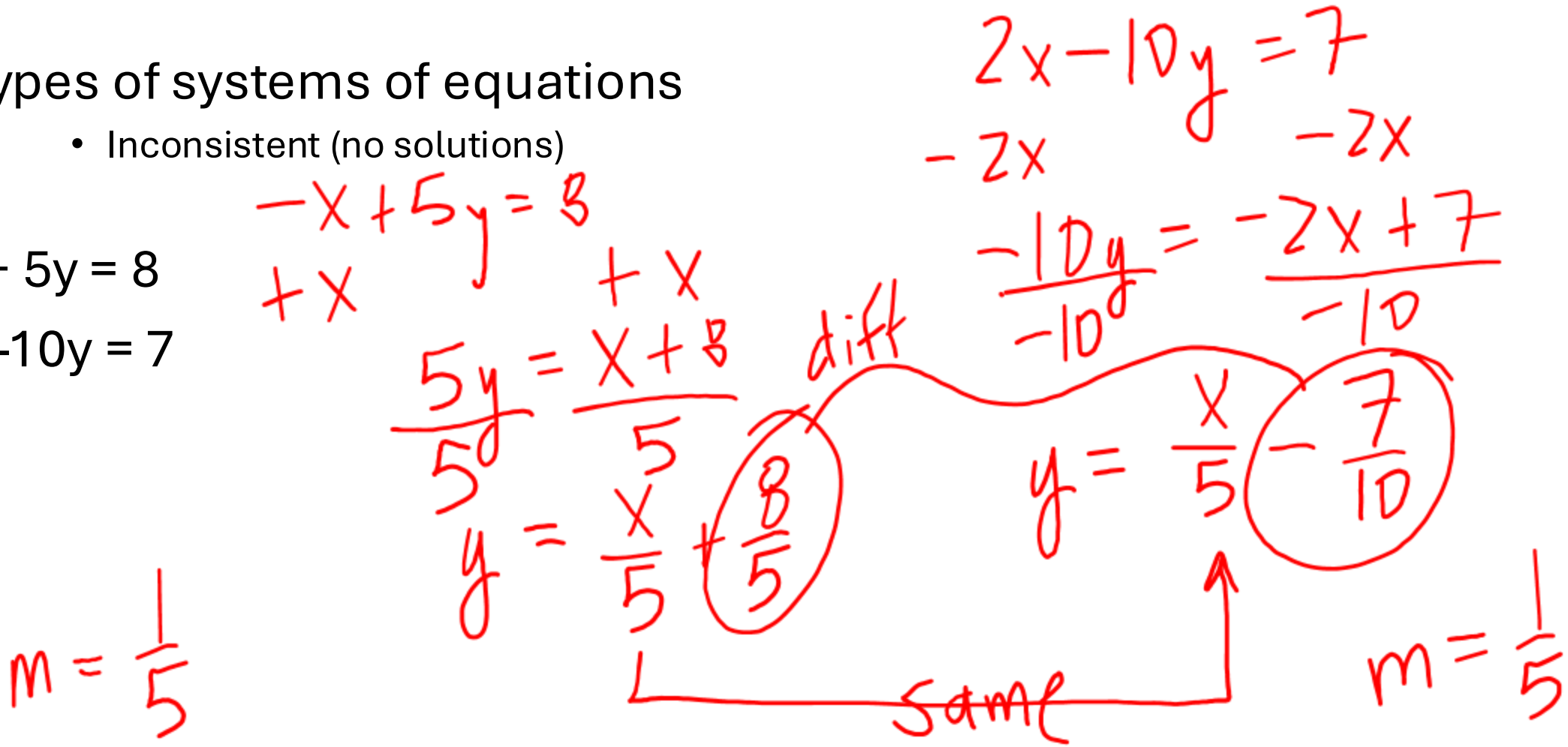
$P_{XYZ} = 75000 + 15000t$

Graphing systems of equations - Inconsistent

- Types of systems of equations
  - Inconsistent (no solutions)

-x + 5y = 8

2x -10y = 7



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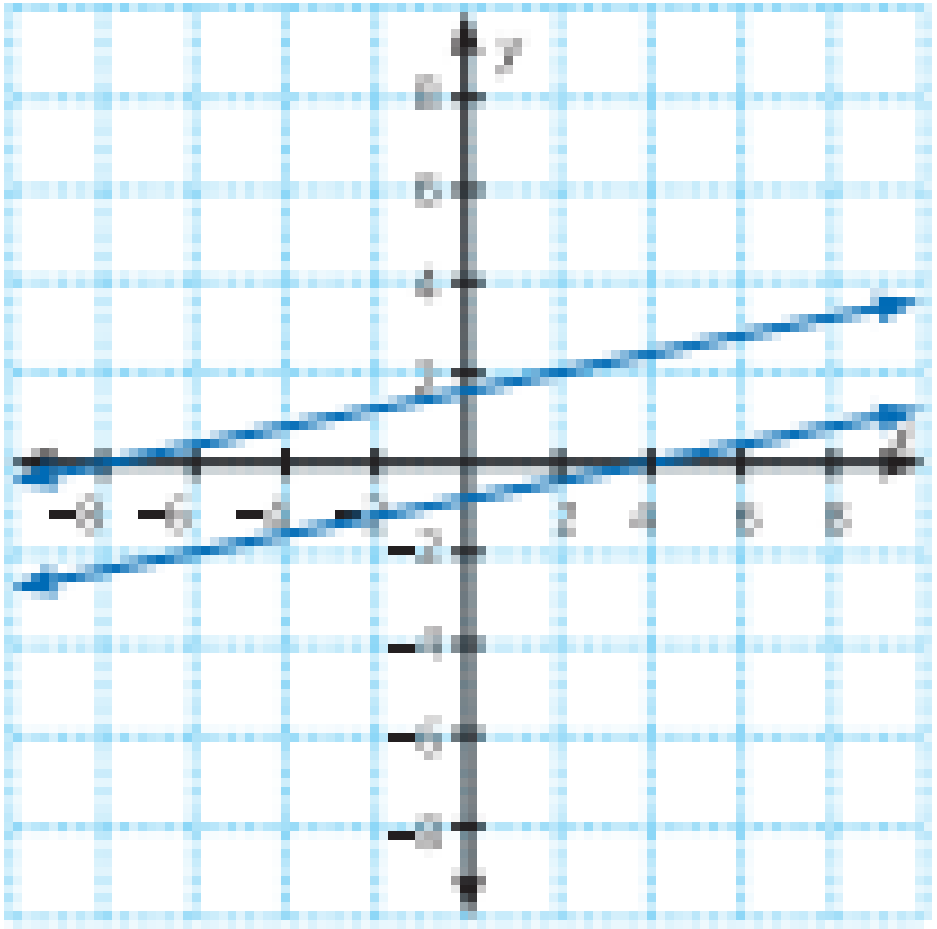
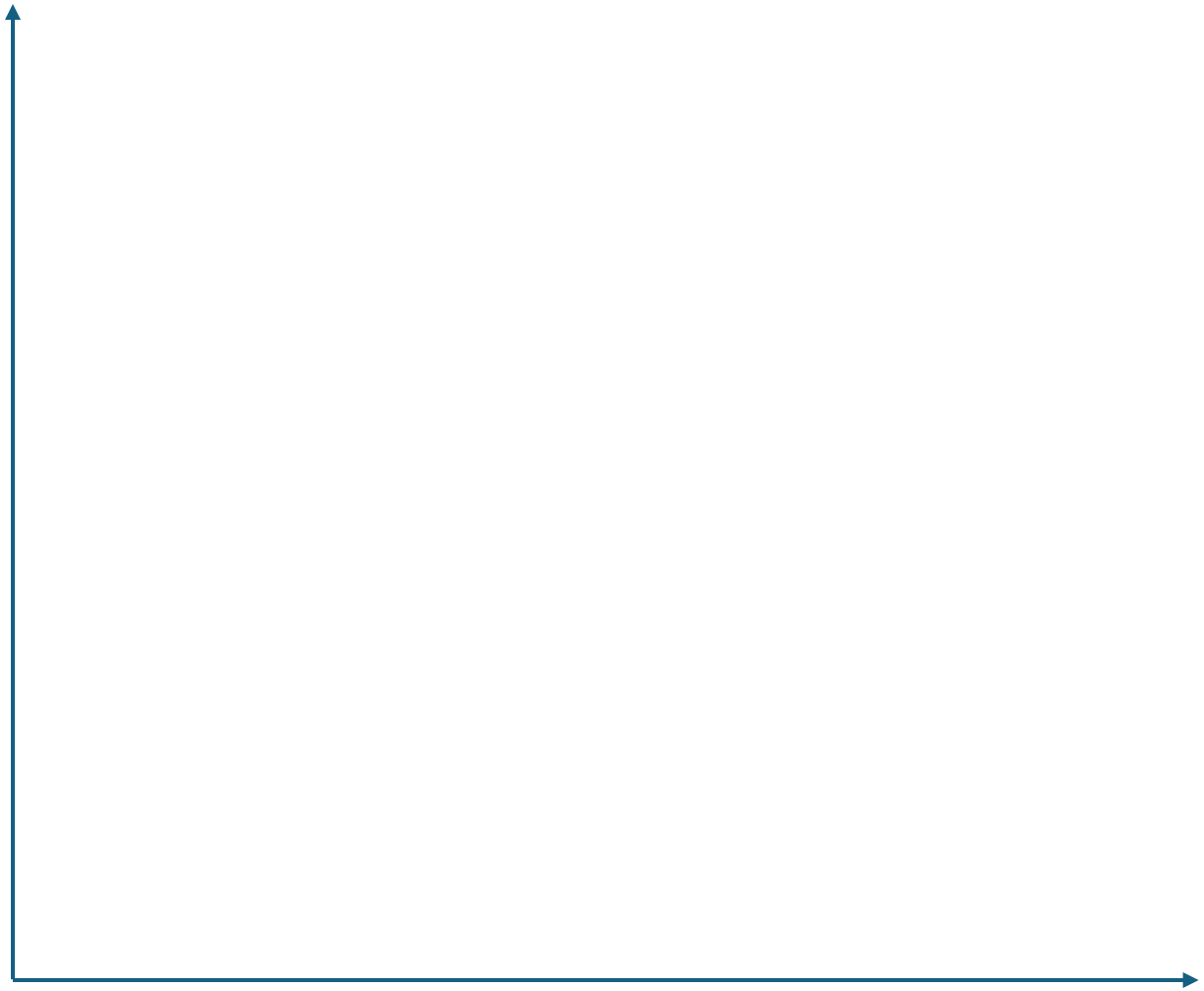


Question: Do you remember how to graph?

$-x + 5y = 8$

$2x - 10y = 7$



Problems (project section)

12, 13, 14, 15, 16
18, 19, 26, 27, 29

] Section 8.1

When it says to use a graphing calculator, use desmos.

https://www.desmos.com/calculator

Copy the graph onto a piece of graph paper. Make sure to use the correct notation of numbers on the graph.

When the problem says check algebraically, put your answer into each equation to see if you get the correct answer(s).

Problems (suggestions)

12, 13, 14, 15, 16

Graph using point intercept form or by making a table and plugging in different values of x and solving for y.

18, 19, 26, 27, 29

18 and 19, use desmos as your graphing calculator (or your own graphing calculator)

26, 27, 29 the key is to find the equations you are supposed to graph.

8.1 problem 12

① slope intercept form ② graph ③ find intersection

$2x + y = -2$

$x - 2y = 19$

$2x + y = -2$

$-2x \quad -2x$

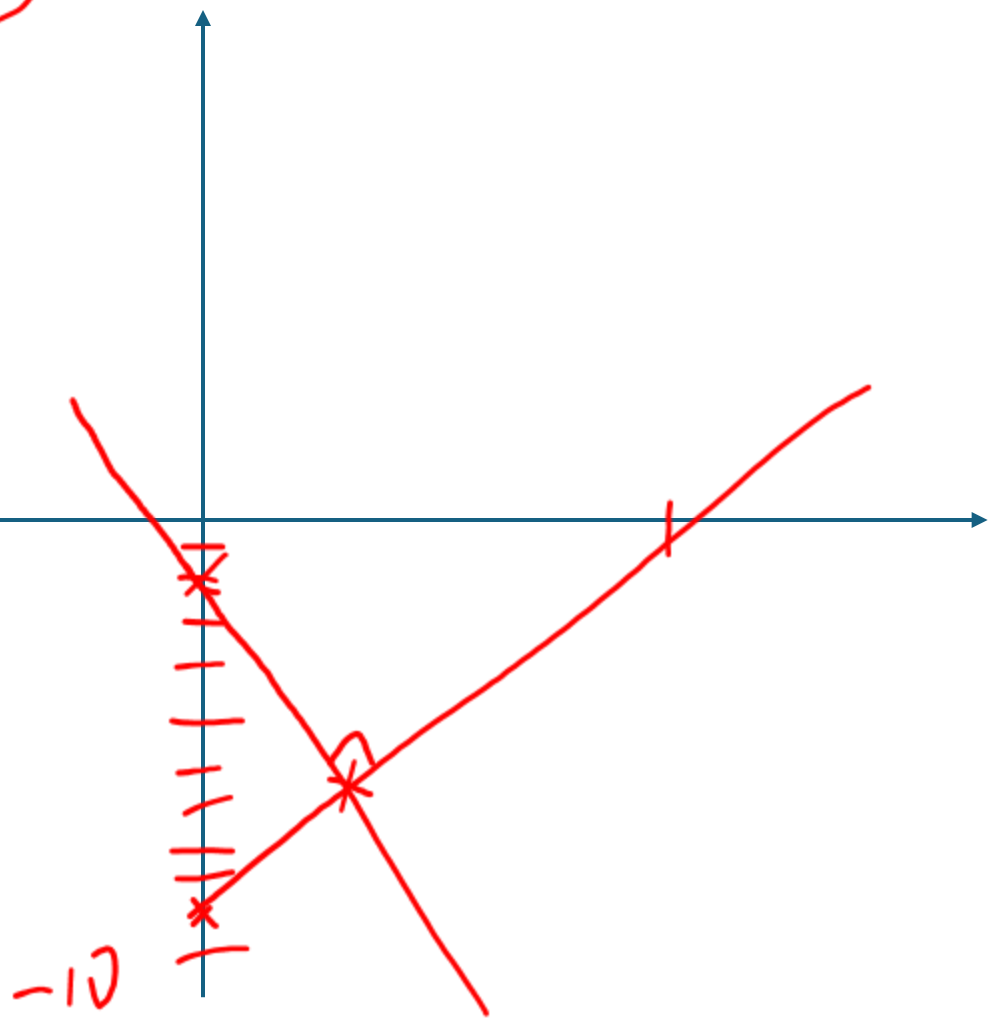
$y = -2x - 2$

$x - 2y = 19$

$-x \quad -x$

$\frac{-2y}{-2} = \frac{-x + 19}{-2}$

$y = \frac{+x}{2} - \frac{19}{2}$



Coefficient of x

slope

constant → y-intercept

8.1 problem 12

$2x + y = -2 \rightarrow y = -2x - 2$

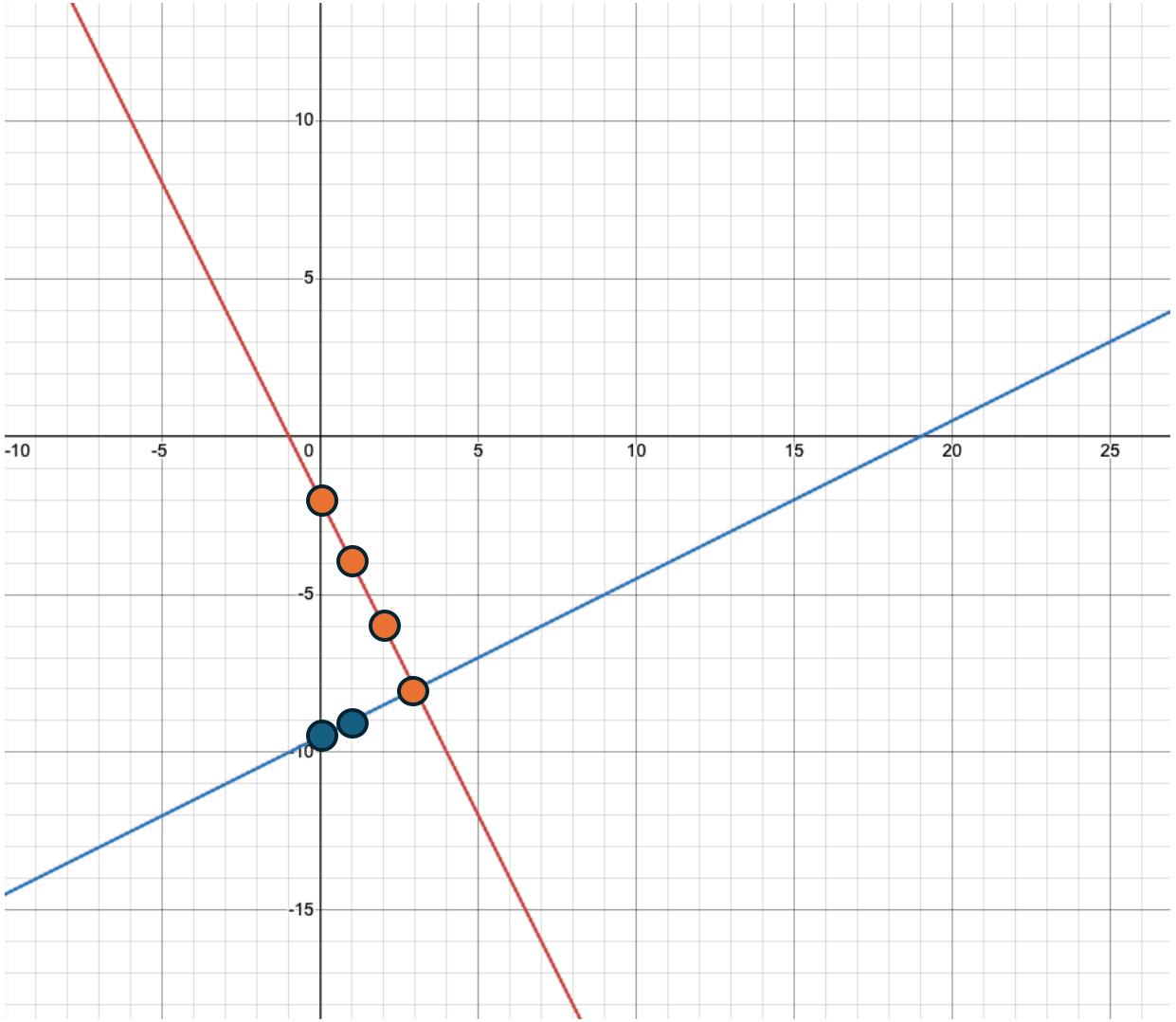
$x - 2y = 19 \rightarrow y = x/2 - 19/2$

$y = -2x - 2$

x	y
0	-2
1	-4
2	-6
3	-8

$y = x/2 - 19/2$

x	y
0	-19/2 = -9.5
1	-18/2 = -9
3	-16/2 = -8



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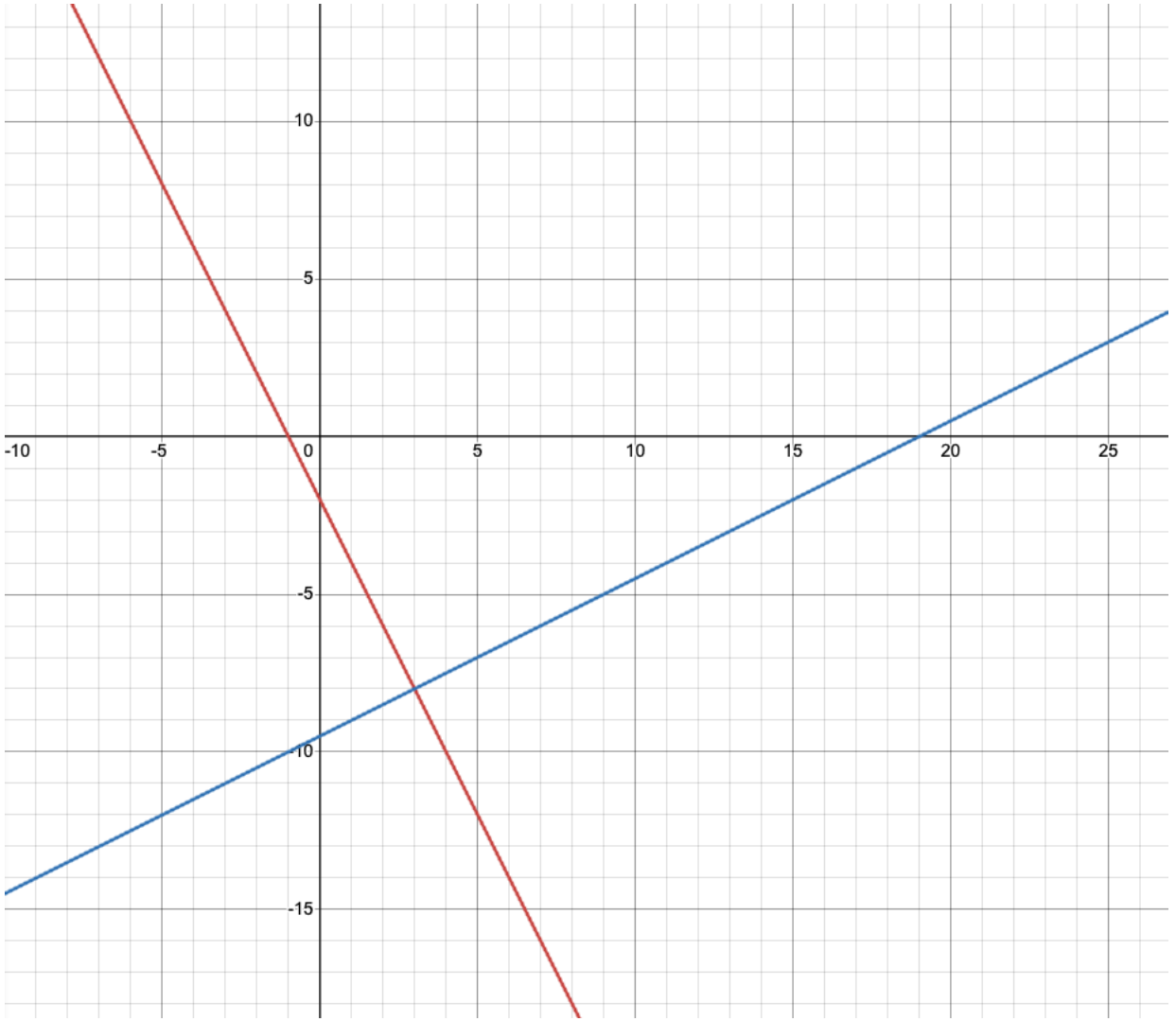


8.1 problem 13

y = 4x + 1

-8x + 2y = 2

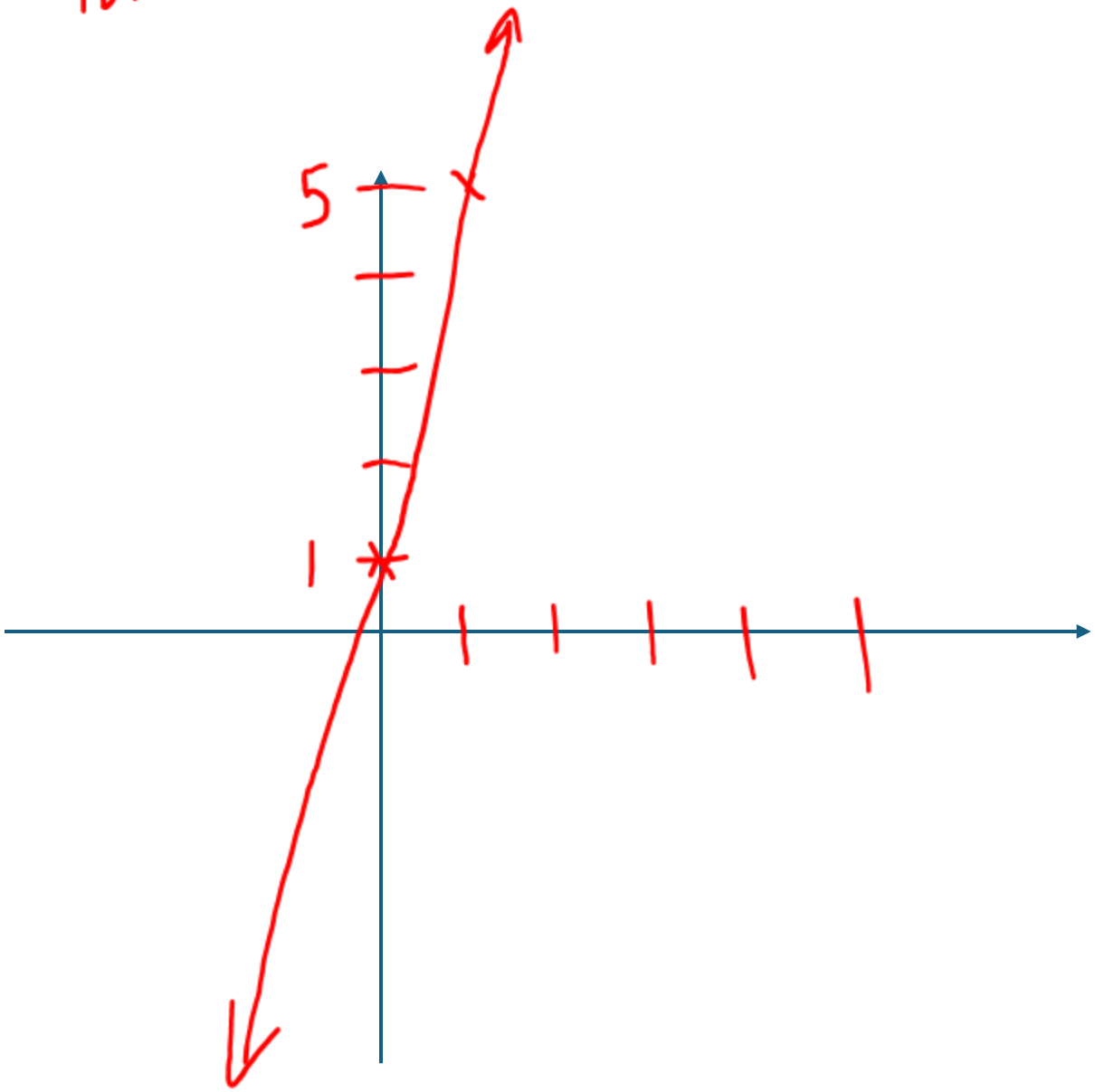
① slope intercept form

$-8x + 2y = 2$

$+8x \qquad +8x$

$\frac{2y}{2} = \frac{8x + 2}{2}$

$y = 4x + 1$

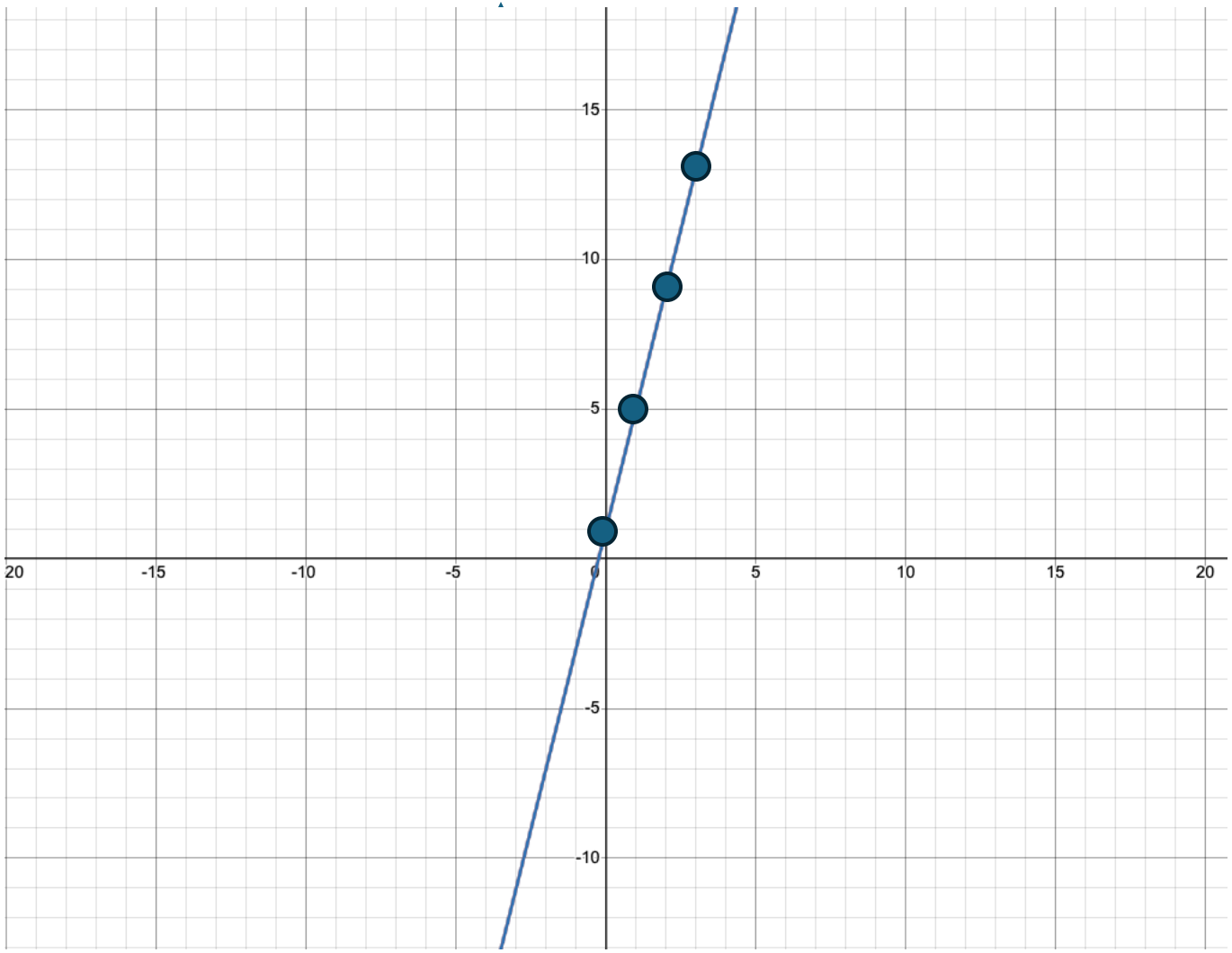


8.1 problem 13

$y = 4x + 1$

$-8x + 2y = 2$

$y = 4x + 1$	$y = 4x + 1$
x | y	x | y
0 | 1	0 | 1
1 | 5	1 | 5
2 | 9	2 | 9
3 | 13	3 | 13



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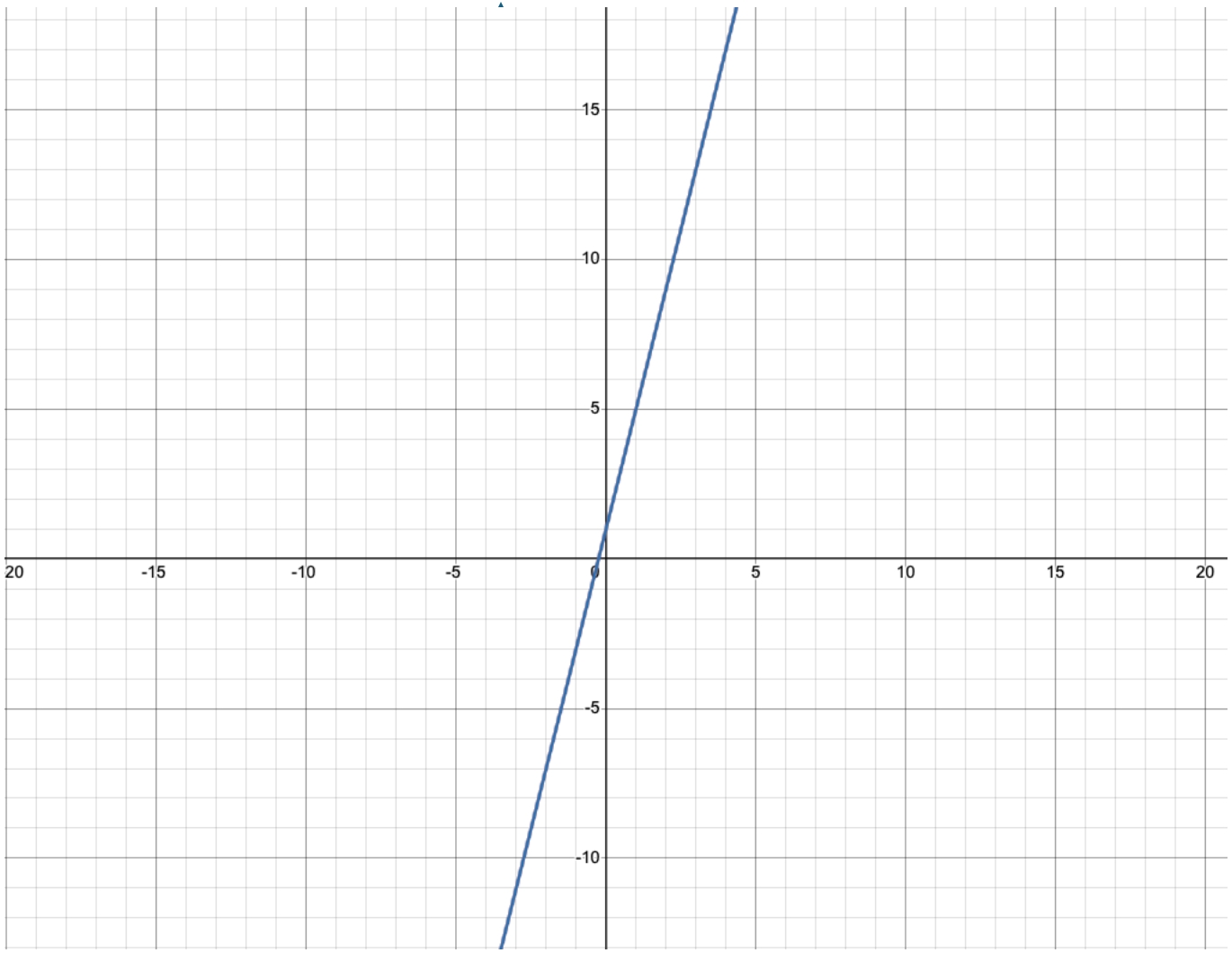


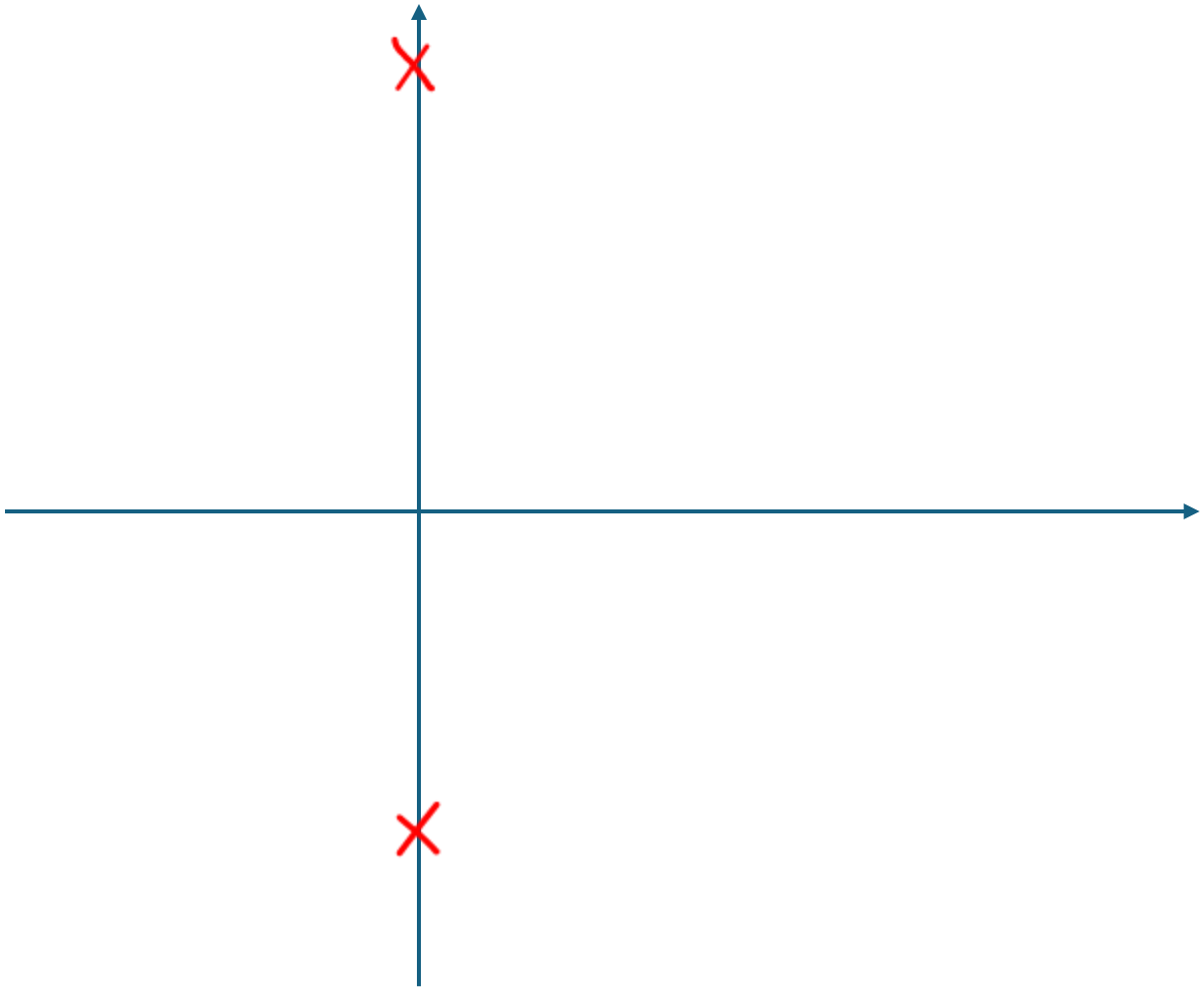
8.1 problem 18

① slope intercept
② graph ③ intersection

$y = \frac{1}{2}x - 4$

$(-1)\ -y = \left(\frac{1}{2}x - 6\right)(-1)$

$y = -\frac{1}{2}x + 6$



8.1 problem 18

$y = \frac{1}{2}x - 4$

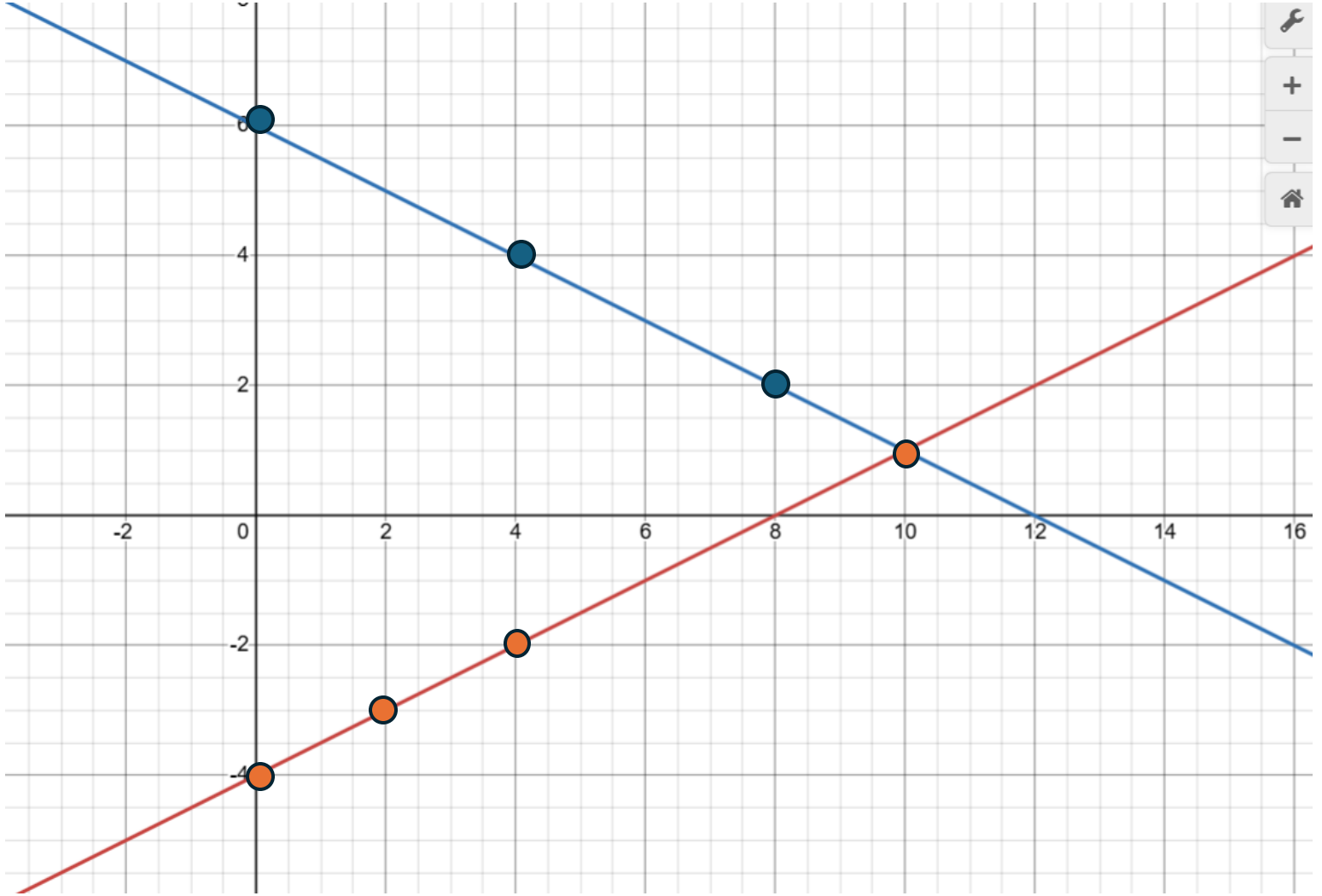
$-y = \frac{1}{2}x - 6$

$y = \frac{1}{2}x - 4$

x	y
0	-4
2	-3
4	-2
10	1

$y = -\frac{1}{2}x + 6$

x	y
0	6
4	4
8	2
10	1

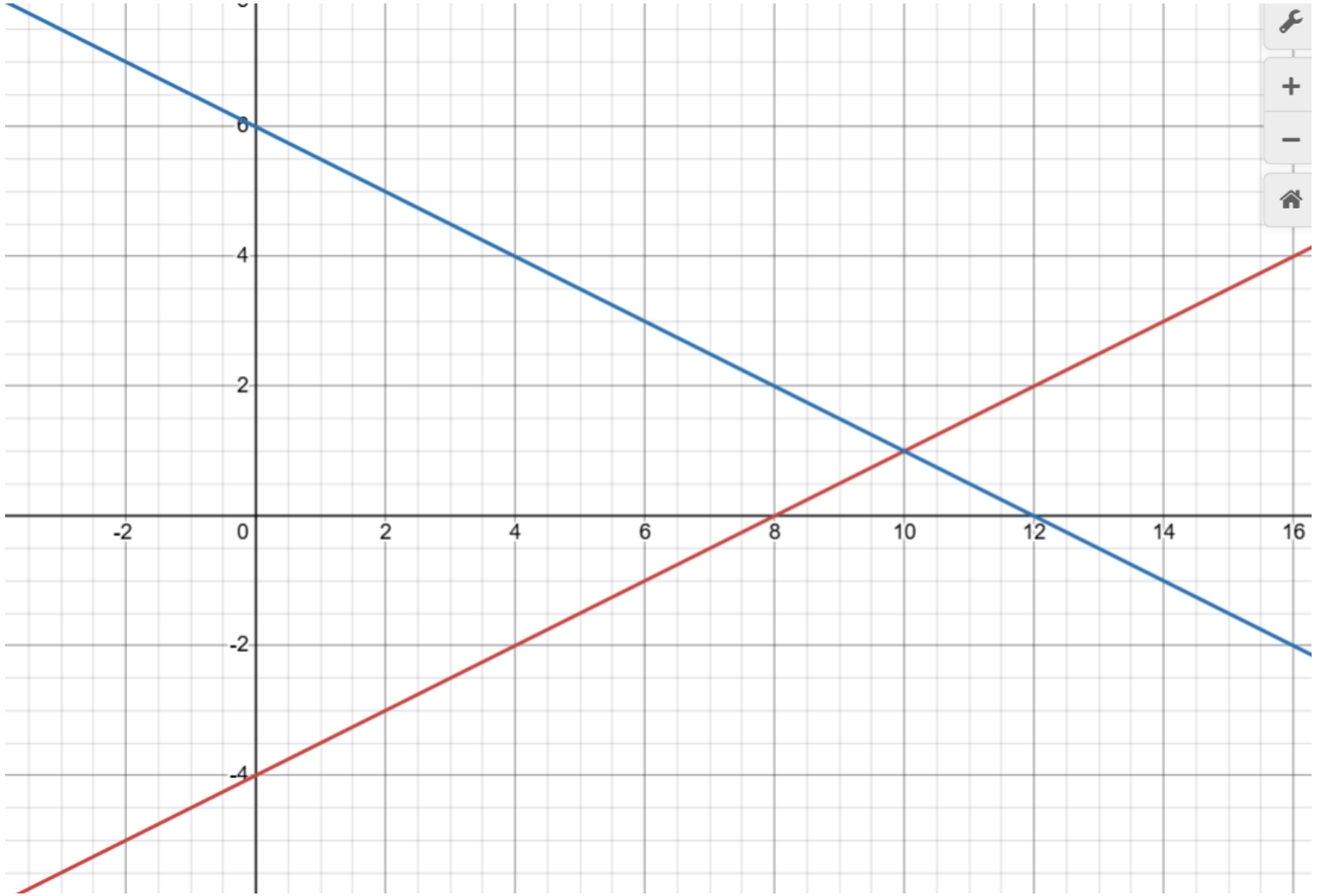


8.1 problem 18

$y = \frac{1}{2}x - 4$

$-y = \frac{1}{2}x - 6$

$y = \frac{1}{2}x - 4 \qquad y = -\frac{1}{2}x + 6$



8.1 problem 26

x time lt
y time ill

A youth group takes a 5-hour trip to a sports complex. Laser tag is $8/hr and ice skating is $6/hr. Total budget for each person is $34. How many hours should each person spend on each activity. (Spend it all)

$x + y = 5$

$-x \quad -x$

$y = -x + 5$

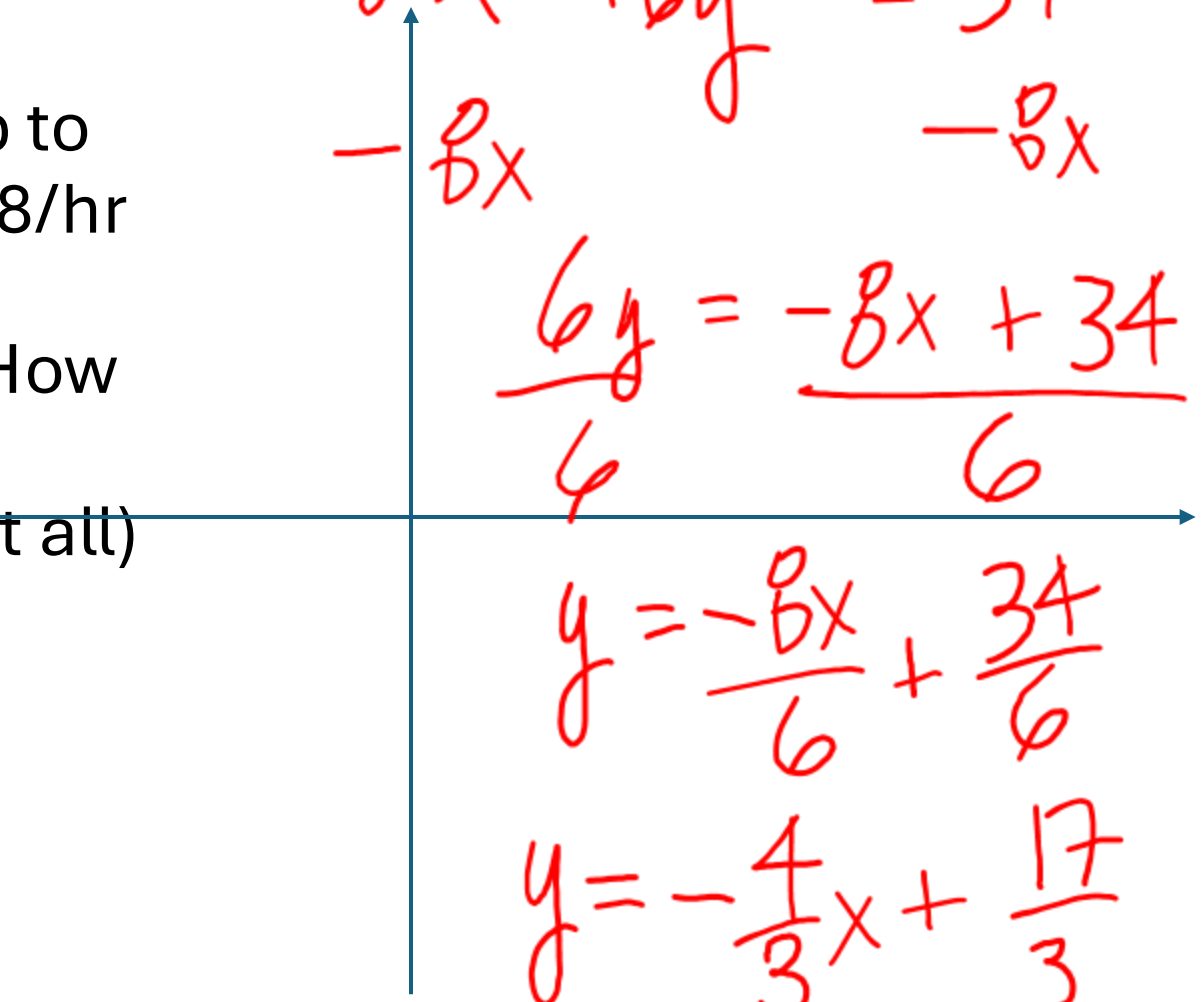
$8x + 6y = 34$

$-8x \quad -8x$

$\frac{6y}{6} = \frac{-8x + 34}{6}$

$y = \frac{-8x}{6} + \frac{34}{6}$

$y = -\frac{4}{3}x + \frac{17}{3}$



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$y = -x + 5$

x	y
0	5
2	3
5	0

$y = -\frac{4}{3}x + \frac{17}{3}$

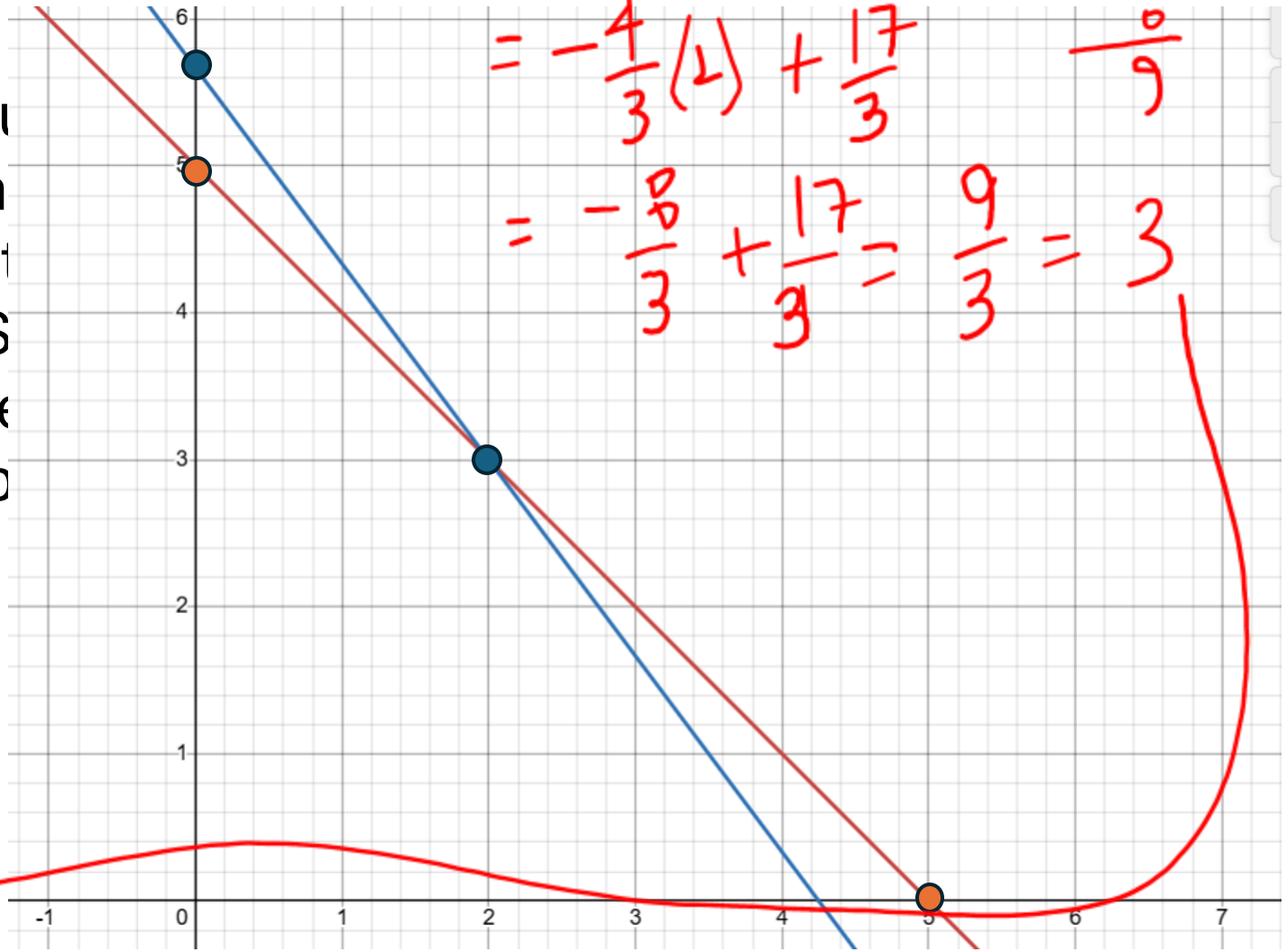
x	y
0	$\frac{17}{3}$
2	$\frac{9}{3} = 3$

$y = -\frac{4}{3}x + \frac{17}{3}$

$= -\frac{4}{3}(2) + \frac{17}{3}$

$= -\frac{8}{3} + \frac{17}{3} = \frac{9}{3} = 3$

$\frac{17}{9}$



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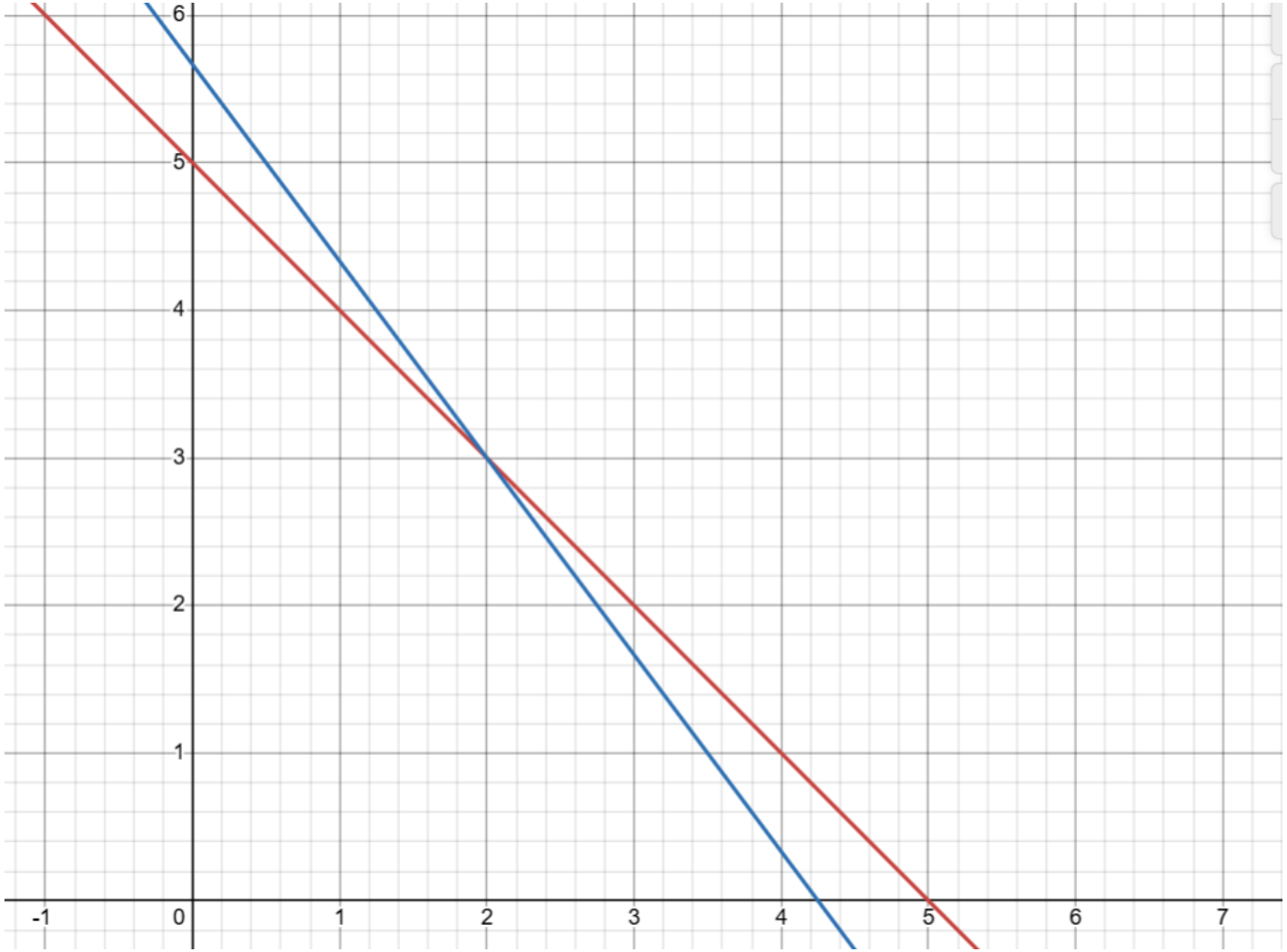

8.1 Axes “problems”

You might get a graph that looks wrong. You can adjust the scales of the axes on a graph that you make or that you have desmos make.