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(A) **Lesson Objectives:**

- Introduce Linear Inequalities through several practical applications.
- Provide algebraic solutions to simple questions involving the solution to linear inequalities.
- Illustrate the solutions to linear inequalities through diagrams involving number lines.

(B) **Investigations for Classwork** → Solve and verify the following linear systems:

Mr Santowski is investing \$10,000 into an education fund for his son Ian. The investment earns 10% pa simple interest. (Formulas involved will be  $I = Prt$  &  $A = P + Prt$ ).

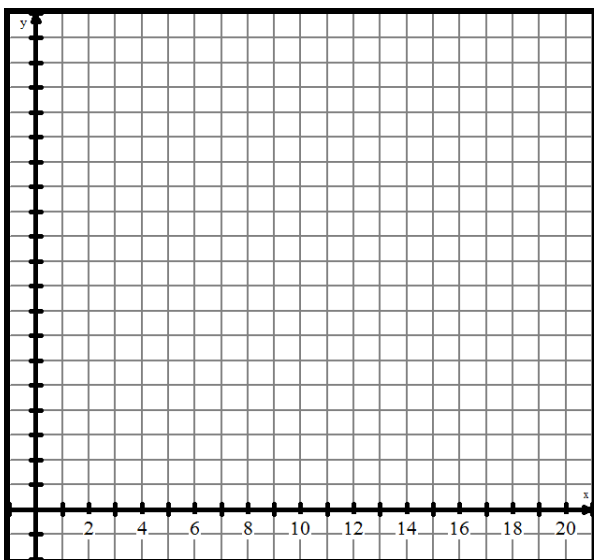
So write an equation showing the relationship between the amount of the investment and the length of time invested.

Provide a data table, showing the relationship between the amount of the investment and the length of time of the investment.

Years	0	1	2	3	4	5	6	7
Amount								

Years	8	9	10	12	14	17	20
Amount							

Provide a graph, showing the relationship between the amount of the investment and the length of time of the investment.



Now deal with the following scenario → I need the investment to earn AT LEAST \$17,000.

- If I keep the investment for 5 years, will I accomplish my goal?
- If I keep the investment for 8 years, will I accomplish my goal?
- If I keep the investment for 10 years, will I accomplish my goal?
- How many solutions are there to my scenario?
- What is the least number of years that I should keep my money in this investment to meet my requirement?

Now let's write a new type of equation to model this situation → we will call this a **linear inequality** .....

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Investigation #2

Mr Santowski is renting a car for the Christmas holidays. The company offers me a rate of \$25 per day and rate of \$0.15 for every km driven.

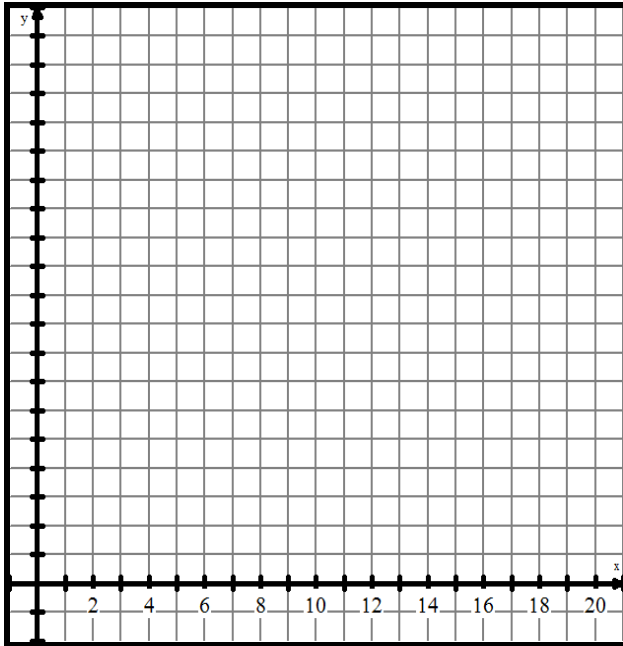
So write an equation showing the relationship between the cost of a daily rental and the distance travelled.

Provide a data table, showing the relationship between the cost of a daily rental and the distance travelled.

Distance	0	10	20	30	40	50	60	70
Cost								

Distance	80	90	100	120	140	170	200
Cost							

Provide a graph, showing the relationship between the cost of a daily rental and the distance travelled.



Now deal with the following scenario → I need the rental costs to be AT MOST \$37.50.

- (a) If I drive for 40 km, will I accomplish my goal?
- (b) If I drive for 80 km, will I accomplish my goal?
- (c) If I drive for 100 km, will I accomplish my goal?
- (d) How many solutions are there to my scenario?
- (e) What is the furthest I should drive in order to meet my requirement?

Now let's write a new type of equation to model this situation → we will call this a **linear inequality** .....

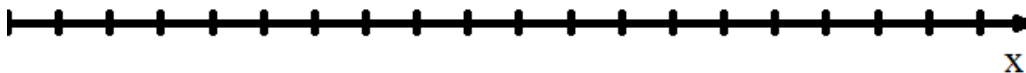
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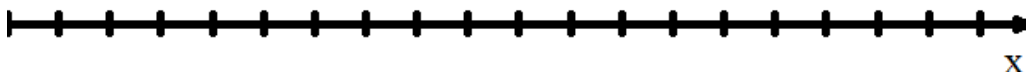
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(C) Algebraic Examples – In Class

1. Solving an inequality means →
2. Solve  $x > 5$  and EXPLAIN what the original question means and EXPLAIN what the solution means.
3. Solve  $x < -3$  and EXPLAIN what the original question means and EXPLAIN what the solution means.
4. Solve  $x - 4 > 0$  and ILLUSTRATE YOUR SOLUTION on a number line. EXPLAIN HOW your number line shows “the solution”.



5. Solve  $x + 3 \leq 0$  and ILLUSTRATE YOUR SOLUTION on a number line. EXPLAIN HOW your number line shows “the solution”.



6. Solve and graph your solution →  $2x \leq 9$ . For further investigation, graph EACH linear function on your TI-84 and then INTERPRET your solution.
8. Solve and graph your solution →  $-2x < 5$ . For further investigation, graph EACH linear function on your TI-84 and then INTERPRET your solution.

7. Solve and graph your solution →  $\frac{x}{8} < \frac{1}{5}$ . For further investigation, graph EACH linear function on your TI-84 and then INTERPRET your solution.

9. Solve and graph your solution →  $\frac{2x-3}{4} \leq 2$ . For further investigation, graph EACH linear function on your TI-84 and then INTERPRET your solution.

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10. Solve and graph your solution →  $5x + 7 < 3(x + 1)$

12. Solve and graph your solution →

$$\frac{x}{5} - 2 > \frac{2}{3}(x + 3).$$

11. Solve and graph your solution →

$$2(3x + 2) \geq 8(x - 3).$$

13. Solve and graph your solution →

$$\frac{(x-2)}{4} - \frac{2}{7} < \frac{(3-x)}{7} - \frac{1}{2}.$$

(D) Homework/Resources

- HW: from Textbook →

- Video from JMT → <http://www.youtube.com/watch?v=0X-bMeIN53I>

- Help from OnlineMathLearning with inequalities:

- o <http://www.onlinemathlearning.com/linear-inequality-4.html>
- o <http://www.onlinemathlearning.com/linear-inequality.html>

- <http://www.videojug.com/film/algebra-solving-linear-inequalities-sample-video>

- Reading from PurpleMath → <http://www.purplemath.com/modules/ineqlin.htm>