TOPIC 9

LESSON 9.3b

Deep Flight 1

7.EE.4

Objective

Building Inequalities and Equations to Solve Problems

Warm-Up

Determine the parts of the solution set that make each inequality true.

Solution set: {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15}

1. $x > 8$

2. $x + 3 > 7$

3. $2x + 2 > 4$

4. $8 < 2(x + 2) - 2$

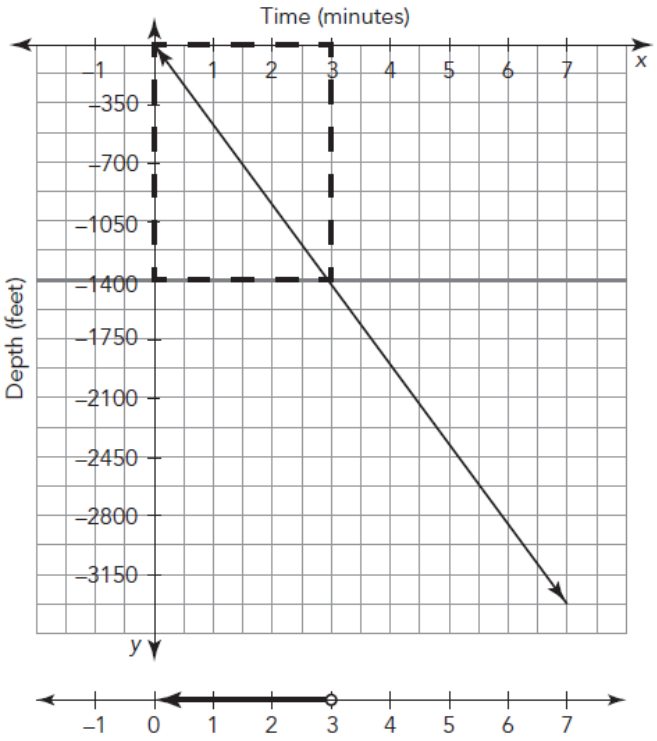
EXPLORE 2

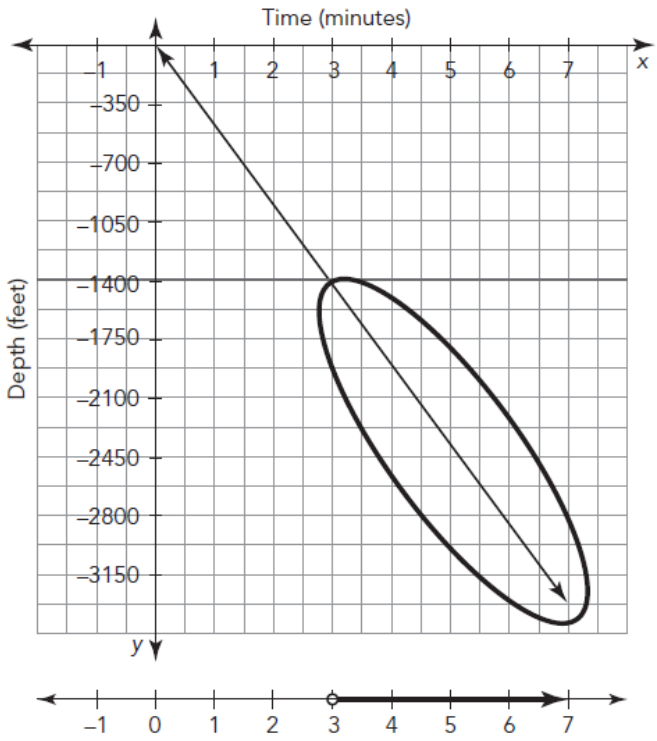
Representing Inequalities on Graphs

You can use your graph to estimate solutions to inequality problems. Use the graph to estimate the times Deep Flight I will be more than 1400 feet below sea level and the times Deep Flight I will be less than 1400 feet below sea level.

WORKED EXAMPLE

Each of these graphs shows the relationship between the time in minutes and the depth of Deep Flight I.
The rectangle on the left graph shows the set of all depths for Deep Flight I less than 1400 feet below sea level. The oval on the right graph shows the set of all depths for Deep Flight I more than 1400 feet below sea level.





Deep Flight I will be greater than −1400 feet for times less than 3 minutes. Deep Flight I will be less than −1400 feet for times greater than 3 minutes.

1. Use the graph to estimate the times Deep Flight I will be:

a. less than 2100 feet below sea level.

b. more than 2100 feet below sea level.

2. Write an inequality and solve it to determine the time Deep Flight I is:

a. less than 2100 feet below sea level.

b. more than 2100 feet below sea level.

3. How do your answers using the graph compare to those when you wrote and solved inequalities?

EXPLORE 3

Graphing Equations and Inequalities

Deep Flight I can dive to a depth of 3300 feet below sea level and can ascend to the surface at a rate of 650 feet per minute.

1. Suppose Deep Flight I is going to ascend to sea level starting at its maximum depth of 3300 feet below sea level. Identify the independent and dependent quantities, define variables for these quantities, and write an equation to represent Deep Flight I's depth.

2. Use your equation to copy and complete the table shown for this problem situation.

	Independent Quantity	Dependent Quantity
Quantities		
Units of Measure		
Variables		
	0	
	1	
	2	
	3	
	4	
	5	

3. Why does the table end at 5 minutes for this problem situation?

4. Consider the possible values for time and depth.

a. What do you think are all the possible values for time in terms of this situation?
Write inequalities to express your answer.

b. What do you think are all the possible values for depth in terms of this situation? Write inequalities to express your answer.

5. Examine your table. What do you notice about each depth value in relation to the one before and the one after?

6. In this problem, what is the unit rate of change?

7. How deep would the submarine be after ascending for:

a. 2.5 minutes? b. 90 seconds?

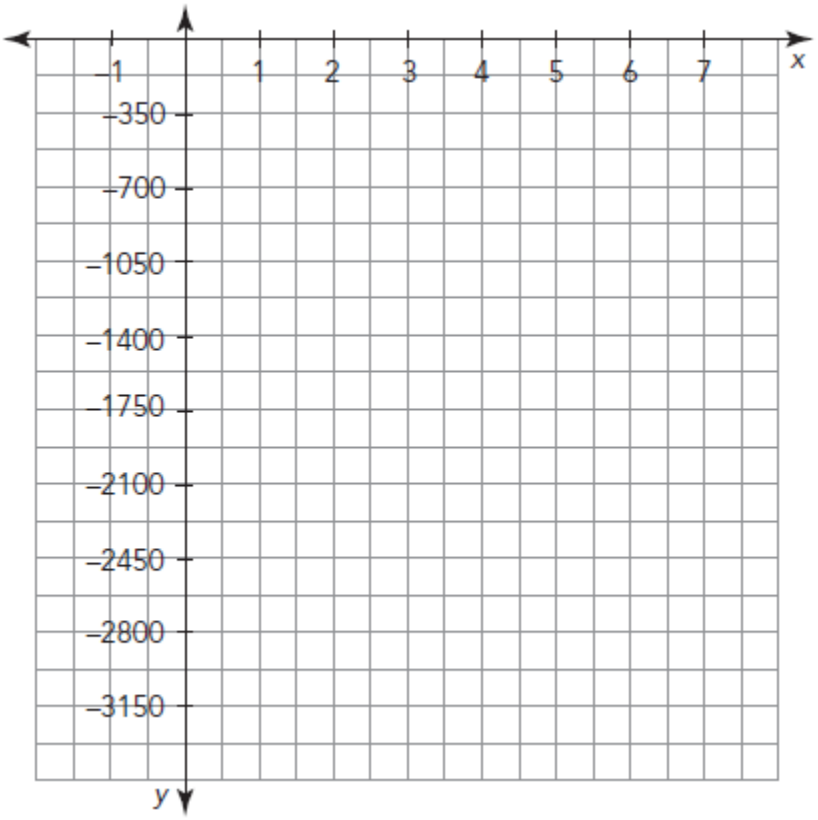
c. 45 seconds?

8. How many minutes would it take Deep Flight I to ascend to:

a. 1000 feet below sea level? b. 2100 feet below sea level?

c. sea level?

9. Use your information to construct a graph of this problem situation. First, label the units of measure on each axis. Then, plot all the points from the table and from Questions 7 and 8. Finally, draw the graph to represent the problem situation.



10. Draw a box or oval on the graph to estimate each.

a. the time Deep Flight I is above 1000 feet below sea level

b. the time Deep Flight I is below 2000 feet below sea level

11. Write an inequality and solve it to determine the time Deep Flight I is above 1000 feet below sea level.

12. Write an inequality and solve it to determine the time Deep Flight I is below 2000 feet below sea level.

Show You KNOW

Digging to China

Did you ever hear the saying, "If you dig deep enough, you will dig to China?" You would have to live in South America, possibly Argentina, for this to happen. If you live in the United States, chances are you would pop out on the other side of the Earth in the Indian Ocean!

Technically speaking it would be impossible to dig a hole to the other side of the Earth, but let's pretend.

Suppose you were digging at a rate of 10 feet a day. Assume you are at sea level when you begin digging.

1. Identify the independent and dependent quantities and their units of measure, and define variables for these quantities.

2. Write an equation to represent the depth of the hole, where d represents depth in feet, and t represents the time in days.

3. If there are 365 days in a year, write an equation to represent the depth of the hole, where d represents depth in feet and t represents the time in years.

4. Use your equation to copy and complete the table for this problem situation.

Time (Years)	Depth (Feet)
t	d
0	
1	
2	
3	
4	
5	

5. Write an inequality and solve it to determine the number of years the hole is more than one mile deep. There are 5280 feet in a mile.

Name: _____ Date: _____ Class: _____

Homework HW

LESSON 9.3b

Deep Flight 1

Objective

Building Inequalities and Equations to Solve Problems

Practice

The Transverse Tire Company produces all types of tires at its factory. Due to fixed costs associated with running the factory, the company starts with a loss of $200,000, or a profit of 2$200,000, at the beginning of each month. The first major hurdle the company faces each month is to break even, or reach the point at which the profit is zero. The tires are sold in batches of 1000. The company earns $40,000 for each batch of tires they manufacture and sell.

1. Identify the two quantities that are changing in this situation, identify the independent and dependent quantities, and define the variables for these quantities. Then write an equation to represent the profit the company will make when they manufacture and sell batches of tires.

2. Use your equation to complete a table for this problem situation.

3. What is the unit rate of change in this problem?

4. How much profit would the company make if they manufactured and sold 3 and one-half batches (3500 tires)?