

# Fishing Adventures 2

Sample task from [achievethecore.org](http://achievethecore.org)

Task by Illustrative Mathematics, annotation by Student Achievement Partners

GRADE LEVEL Seventh

IN THE STANDARDS 7.EE.B.4

WHAT WE LIKE ABOUT THIS TASK




Mathematically:

- Represents several aspects of modeling (MP.4), including defining variables to write an expression and create an inequality; computing with the model; and interpreting the results
- Connects to computing with numbers in any form (7.EE.B.3)

In the classroom:

- Correspondence between the symbols, the solutions, the number line, and the situation are highlighted in the solution
- Allows the teacher to check for student understanding throughout students' work

MAKING THE SHIFTS<sup>1</sup>

|   |                    |  |
|---|--------------------|--|
|   | Focus              | Belongs to the major work <sup>2</sup> of seventh grade  |
|  | Coherence          | Builds on grade 6 work with expressions and equations; prepares students for more advanced modeling expectations                                 |
|  | Rigor <sup>3</sup> | Conceptual Understanding: not targeted in this task<br>Procedural Skill and Fluency: secondary in this task<br>Application: primary in this task |

<sup>1</sup>For more information read [Shifts for Mathematics](#).

<sup>2</sup>For more information, see [Focus in Grade Seven](#).

<sup>3</sup>Tasks will often target only one aspect of rigor.

ADDITIONAL THOUGHTS

Note that simplifications like  $150p + 10p = 160p$  rely on the distributive property:  $150p + 10p = (150 + 10)p$ . The left-hand side,  $150p + 10p$ , evokes a picture of  $p$  passengers standing at one end of the boat and all their gear piled at the other end of the boat. The right-hand side,  $(150 + 10)p$ , evokes a picture of  $p$  passengers standing in the boat with each passenger clutching his or her own gear. The total weight is the same in either picture. So this task can also connect to 7.EE.A.2: "Understand that rewriting an expression in different forms in a problem can shed light on the problem and how the quantities in it are related."

Some students might take an arithmetic approach to this problem: First, subtracting 200 lb from the total limit, there is 1000 lb for passengers and their individual gear; so at 160 lb per passenger, the boat can accommodate  $1000/160 = 6.25$  or rather 6 people. It isn't a bad idea for students to solve the problem this way, but students also need to practice writing algebraic expressions and using them to solve problems.

For a direct link, go do: <http://www.achievethecore.org/page/619/fishing-adventures-2-task>

## Illustrative Mathematics

### 7.EE Fishing Adventures 2

#### Alignment 1: 7.EE.B.4

*Not yet tagged*

Fishing Adventures rents small fishing boats to tourists for day-long fishing trips. Each boat can only carry 1200 pounds of people and gear for safety reasons. Assume the average weight of a person is 150 pounds. Each group will require 200 lbs of gear for the boat plus 10 lbs of gear for each person.

- a. Create an inequality describing the restrictions on the number of people possible in a rented boat. Graph the solution set.
- b. Several groups of people wish to rent a boat. Group 1 has 4 people. Group 2 has 5 people. Group 3 has 8 people. Which of the groups, if any, can safely rent a boat? What is the maximum number of people that may rent a boat?

## Commentary

This task is the second in a series of three tasks that use inequalities in the same context at increasing complexity in 6th grade, 7th grade and in HS algebra. Students write and solve inequalities, and represent the solutions graphically. The progression of the content standards is 6.EE.8 to 7.EE.4 to A-REI.12.

This particular task could be used for instruction or assessment.

Solution: graphing inequalities

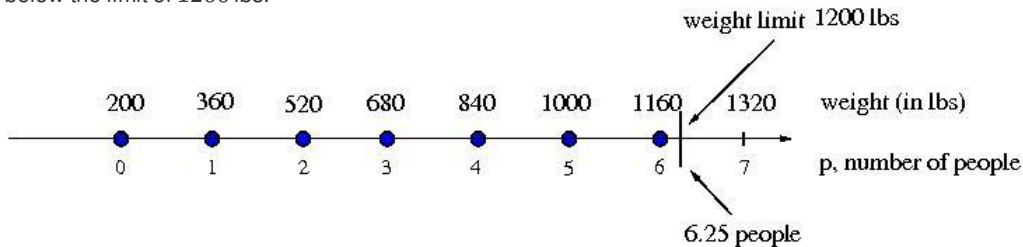
- a. Let  $p$  be the number of people in a group that wishes to rent a boat. Then  $150p$  represents the total weight of the people in the boat, in pounds. Also,  $10p$  represents the weight of the gear that is needed for each person on the boat. So the total weight in the boat that is contributed solely by the people is

$$150p + 10p = 160p$$

Because each group requires 200 pounds of gear regardless of how many people there are, we add this to the above amount. We also know that the total weight cannot exceed 1200 pounds. So we arrive at the following inequality:

$$160p + 200 \leq 1200$$

A graph illustrating the solutions is shown below. We observe that our solutions are values of  $p$ , listed below the number line and shown by the blue dots, so that the corresponding weights  $160p + 200$ , listed above the line, are below the limit of 1200 lbs.



- b. We can find out which of the groups, if any, can safely rent a boat by substituting the number of people in each group for  $p$  in our inequality. We see that

$$\text{For Group 1 : } 160(4) + 200 = 840 \leq 1200$$

$$\text{For Group 2 : } 160(5) + 200 = 1000 \leq 1200$$

$$\text{For Group 3 : } 160(8) + 200 = 1480 \not\leq 1200$$

We find that both Group 1 and Group 2 can safely rent a boat, but that Group 3 exceeds the weight limit, and so cannot rent a boat.

To find the maximum number of people that may rent a boat, we solve our inequality for  $p$ :

$$160p + 200 \leq 1200$$

$$160p \leq 1000$$

$$p \leq 6.25$$

As we cannot have .25 person, we see that 6 is the largest number of people that may rent a boat at once. This also matches our graph; since only integer values of  $p$  make sense, 6 is the largest value of  $p$  whose corresponding weight value lies below the limit of 1200 lbs.



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