

Cluster A.2: Linear Functions, Equations, and Inequalities

A.2A: Representing Domain and Range Values

<p>Focusing TEKS</p> <p>A.2A Linear Functions, Equations, and Inequalities. The student applies mathematical process standards when using properties of linear functions to write and represent in multiple ways, with and without technology, linear equations, inequalities, and systems of equations. The student is expected to determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities. Readiness Standard</p> <p>Additional TEKS:</p> <p>A.12B Evaluate functions, expressed in function notation, given one or more elements in their domains. Supporting Standard</p>	<p>Focusing Mathematical Process</p> <p>A.1A Apply mathematics to problems arising in everyday life, society, and the workplace.</p> <p>A.1B Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem solving process and the reasonableness of the solution.</p> <p>A.1E Create and use representations to organize, record, and communicate mathematical ideas.</p>
<p>▲ Performance Task</p> <p>Main Taxi Company offers taxi services within a 75-mile distance of any point in the city area. The taxi charge is based on the number of trip miles. Whenever a distance is not an exact amount, the miles are always rounded up to the next whole mile.</p> <p>The rate per mile for the taxi is \$2.50. The taxi service also charges an initial service charge of \$2.75 at the start of a trip. When a passenger wants to go to the airport, there is also a \$4.50 airport fee added and charged as soon as a passenger gets into the car.</p> <p>If a passenger wants to travel to the airport from any location within the taxi service's city area, how can the situation range be expressed using an inequality? Justify your reasoning.</p> <p>Answer: $7.25 \leq y \leq 194.75$</p>	

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Mathematically Speaking...

In this task, students are being asked to evaluate a real-world situation and determine reasonable domain and range values within the context of the situation. First, students must determine which part of the situation reflects the input or domain values and which part reflects the output or range values. Then, they must think about the reasonable values for the context of the problem, and differentiate this from domain and range values that apply to a function rule without limitations.



To express the range values as an inequality, the student must be able to infer a function rule and then evaluate the rule within the confines of the situation to calculate the minimum and maximum values that make sense in the context of the real-world problem.

Possible Solution

Determine the function variables that represent the situation in order to determine which variable is the domain and which variable is the range.

The input variable is the length of the trip in miles, which would be the domain, or x -values, for the situation.

The output variable is the total cost of the airport trip using the car service, which will be the range, or y -values, for the situation.

For this situation, the domain is limited to whole numbers in the inequality $0 \leq x \leq 75$. The range values would then be the output values that correspond to the domain values when input into the function rule.

The smallest range value would be for an input of 0 miles. Since the airport trip carries an initial fee of \$2.75 and an airport fee of \$4.50 the minimum range value would be \$7.25.

The greatest range value would be the highest total cost of a trip. To find this you would use the maximum number of miles possible for the taxi service in the area, which in this case is 75 miles.

$$75 \text{ miles} \times \$2.50 \text{ per mile} = \$187.50$$

$$\text{Then add the initial trip charge and the airport fee: } \$187.50 + \$7.25 = \$194.75.$$

Since the total cost of a taxi trip can include the smallest and largest values, the range is represented by the inequality $7.25 \leq y \leq 194.75$ for the situation.

Cluster A.2: Linear Functions, Equations, and Inequalities

● Differentiation: Simplified Task

Main Taxi Company offers taxi services within a 75-mile distance of any point in the city area. The taxi charge is based on the number of trip miles.

Whenever a distance is not an exact amount, the miles are always rounded up to the next whole mile. The rate per mile for the taxi is \$2.50. The taxi service also charges a service charge, which is charged as soon as a passenger gets into the car, of \$3.00 for any regular trip or \$8.00 for an airport trip.

If a passenger wants to travel to the airport from any location within the taxi service's city area, how can the situation range be expressed using an inequality? Justify your reasoning.

Answer: $8 \leq y \leq 195.50$

■ Differentiation: Enriching Task

Main Taxi Company offers taxi services within a 75-mile distance of any point in the city area. The taxi charge is based on the number of trip miles.

Whenever a distance is not an exact amount, the miles are always rounded up to the next whole mile. The rate per mile for the taxi is \$2.50. The taxi service also charges an initial service charge of \$2.75 at the start of a trip. When a passenger wants to go to the airport, there is also a \$4.50 airport fee added and charged as soon as a passenger gets into the car.

If a passenger wants to travel to the airport from any location within the taxi service's city area, how can the situation range be expressed using an inequality?

City Car Company offers taxi services within the same 75-mile city area. Their airport fee is \$4.75, their initial trip fee is \$3.50, and their mileage rate is \$2.25 per whole mile. How does the maximum range value for City Car Company compare to the maximum range value for Main Taxi Company? Justify your reasoning.

Answer:

Main Taxi Company's range is
 $7.25 \leq y \leq 194.75$

City Car Company's range is
 $8.25 \leq y \leq 177$

At the 75 maximum miles the maximum range for City Car Company is \$177, which is \$17.50 less than the maximum range for Main Taxi Company.

Performance Task: A.2A
Representing Domain and Range Values

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The rate per mile for the taxi is \$2.50. The taxi service also charges an initial service charge of \$2.75 at the start of a trip. When a passenger wants to go to the airport, there is also a \$4.50 airport fee added, and charged, as soon as a passenger gets into the car.

If a passenger wants to travel to the airport from any location within the taxi service's city area, how can the situation range be expressed using an inequality? Justify your reasoning.

Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points: _____



Performance Task: A.2A
Representing Domain and Range Values

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If a passenger wants to travel to the airport from any location within the taxi service's city area, how can the situation range be expressed using an inequality? Justify your reasoning.

Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points: _____



Performance Task: A.2A
Representing Domain and Range Values

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If a passenger wants to travel to the airport from any location within the taxi service's city area, how can the situation range be expressed using an inequality?

City Car Company offers taxi services within the same 75-mile city area. Their airport fee is \$4.75, their initial trip fee is \$3.50, and their mileage rate is \$2.25 per whole mile. How does the maximum range value for City Car Company compare to the maximum range value for Main Taxi Company? Justify your reasoning.

Procedural	0	1	2
Conceptual	0	1	2
Communication	0	1	2

Total points: _____

