Chapter 1 Problem Wrap-Up

Student Text Pages
49

Suggested Timing
20–60 min, depending on whether the Chapter Problem questions were assigned in the regular homework

Tools
- grid paper

Technology Tools
- graphing calculator

Related Resources
- G–1 Grid Paper
- G–3 Coordinate Grids
- BLM 1–11 Chapter 1 Problem Wrap-Up Rubric

Using the Chapter Problem

- If you choose to use the Chapter Problem throughout the chapter, introduce the Chapter Problem on the first day and revisit it as it occurs in the chapter exercises. If you choose to use it as a summative assessment tool, wait until the end of the chapter to introduce the problem, and have students work on the series of questions involved.
- Discuss whether students' families have rented a car for any of their vacations, and how their family chose the particular car rental company.
- Give students time to work on the problem, either individually or as a group. It may be helpful to make available graphing calculators and/or graphing software.
- For part d), some students will have difficulty managing the large quantity of information with eight different relations. Provide guidance on how to manage the presentation of these graphs.
- This problem is quite open-ended, particularly parts c) and d). Students can provide simple solutions or very complex ones. Encourage students to reflect on their work and consider revising to provide a more sophisticated set of solutions.
- This would be a good project to include in a portfolio. Students could also include some data they obtained themselves from car rental companies.
- Provide sufficient time for the revision process. Students will create higher quality work if they have an opportunity for constructive feedback and time to incorporate suggestions and additional ideas into their project.

Summative Assessment

- Use **BLM 1–11 Chapter 1 Problem Wrap-Up Rubric** to assess student achievement.

Level 3 Sample Response

Note: Students may choose to solve this question either graphically or algebraically (or even using CAS, if you so direct).

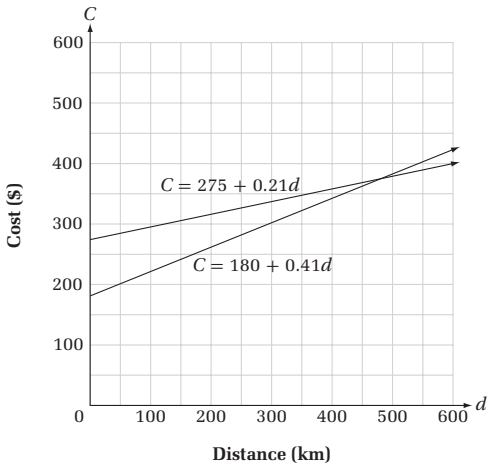
a) Graphical Solution

Let d represents the number of kilometres driven.

Let C represent the total cost.

For Mrs. Clarke's rental car: $C = 180 + 0.41d$

For Mr. Clarke's rental car: $C = 275 + 0.21d$



The intersection point for the two lines is (475, 375).

Therefore, if the Clarkes drive 475 km, the cost will be the same with either rental company.

Algebraic Solution

$C = 180 + 0.41d$ ①

$C = 275 + 0.21d$ ②

Substitute $180 + 0.41d$ in place of C in equation ②.

$$\begin{aligned} C &= 275 + 0.21d \\ 180 + 0.41d &= 275 + 0.21d \\ 0.20d &= 95 \\ d &= 475 \end{aligned}$$

By substituting $d = 475$ into equation ① or ②, $C = 374.75$.

Therefore, if the Clarkes drive 475 km, the cost will be the same with either rental company.

b) Answers will depend on which method was followed in part a).

Graphical Solution

I can see from the graph that the car chosen by Mr. Clarke is cheaper for all distances greater than 475 km.

Algebraic Solution

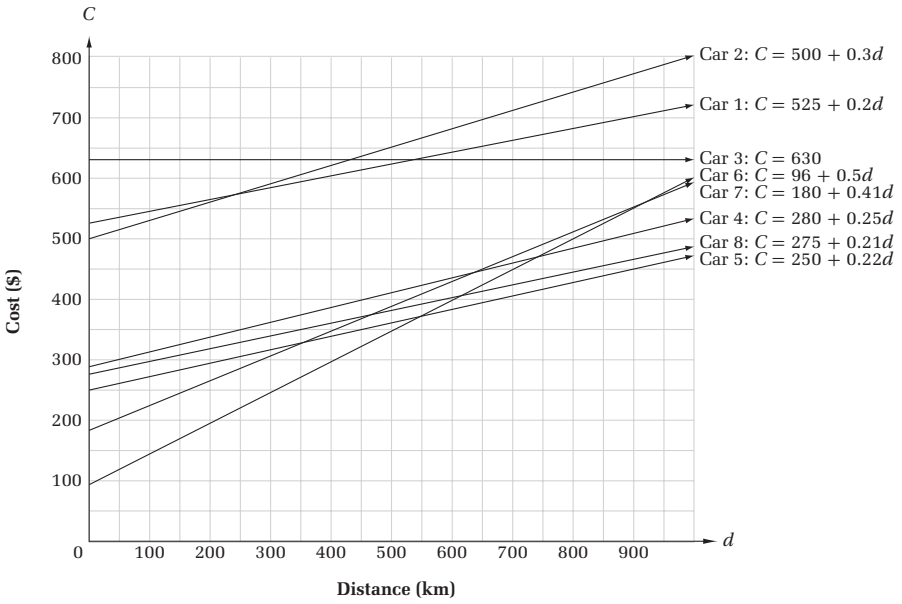
Calculate the total cost for each car.

For Mrs. Clarke's rental car: \$180 + \$0.41(628) = \$437.48

For Mr. Clarke's rental car: \$275 + \$0.21(628) = \$406.88

Therefore, the car chosen by Mr. Clarke is cheaper.

c) The Clarkes have considered eight car rentals. If they only need a car for one or two days, the daily rental companies are the best deal. They can choose a full-size or a mid-size car, depending on how much space they need in the car. If they need the car for longer, it is best to consider a weekly rental. The equations can be graphed as follows:



Car 6 is the cheapest for the week if the distance travelled is less than about 550 km. From 550 km to 1000 km and above, car 5 is the cheapest. If enough kilometres are travelled (about 1800), then car 3 becomes the cheapest, with its unlimited mileage.

d) Some other factors that the family might consider are
- size of vehicle
- number of passengers travelling at any one time
- maximum number of passengers
- fuel efficiency of the various vehicles
- insurance costs
- reliability of the vehicle (some rentals are older used cars)
- location of rental agency (for easy pickup and drop-off)
- make of vehicles (personal preference)
- type of engine (gas, diesel)
- which companies accept particular credit cards, award points, or air miles points

Level 3 Notes

Look for the following:
- Correct solution to part a) using graphing or algebra
- Detailed graphs
- Mostly correct calculations
- Important details, such as references to a graph or equation characteristics, for the part b) note
- At least four of the eight equations considered for part c), some dismissed without explanation
- A few reasonable considerations with explanations for part d)

What Distinguishes Level 2

At this level, look for the following:
- Partial solution to part a) using graphing or algebra
- Attempt to provide answers for both d and C in part a)
- Graphs lacking in some details
- Algebraic calculations with some significant errors
- Lack of important details, such as reference to a graph or equation characteristics, for the part b) note
- Only one of the previous equations considered for part c), some dismissed without explanation
- Only one consideration for part d)

What Distinguishes Level 4

At this level, look for the following:

- Part a) solved using one method and verified using another
- Correct algebraic calculations
- Succinct note for part b), including important details such as references to a graph or equation characteristics
- Detailed graphs
- Part c) solution that considers all of the previous situations, some dismissed with explanation
- Part c) solution that includes three segments ($0 < d < 550$, $550 < d < 1750$, and $d > 1750$)
- Five or more considerations for part d)