

Problem Solving – Distance, Rate, and Time

Ron Cammaert
Alberta Education

There are many opportunities for problem solving using distance-type problems. The level of information given can vary with the class and individual. For students with a great deal of experience with problem-solving, one might ask the following types of questions:

1. Do different jets fly at different rates?
2. How does the price of a flight compare on a cost/km basis for a short flight compared with a long flight? Why?
3. Does it take longer to fly east or west? Why?

Students would be expected to define the problem, gather the data, make a model, solve the problem, and present the results with little help from the teacher. One way to solve the third problem could be as follows:

PROBLEM: Does it take longer to fly east or west?

INFORMATION: Air Canada flight schedule

Vancouver to Toronto (747) — 0915h-1625h

Toronto to Vancouver (747) — 1930h-2115h

SOLUTION: Flight time east $1625\text{h} - 0915\text{h} = 7'10''$

Subtract time zone change $7'10'' - 3' = 4'10''$

Flight time west $2115\text{h} - 1930\text{h} = 1'45''$

Add time zone change $1'45'' + 3' = 4'45''$

$$\begin{array}{r} 4'45'' \\ -4'10'' \\ \hline 35'' \end{array}$$

COMMUNICATION: It takes longer to fly west by 35 minutes due to the prevailing west wind or jet stream.

Other questions that could be answered, using flight schedules, are:

1. How long does it take to fly from Calgary to Toronto?
2. How long does it take to fly from Toronto to Calgary?
3. Why is there a difference between the answers to questions 1 and 2?
4. What is the average speed of a plane going from Calgary to Toronto?

Classes or individuals who are less secure with problem solving will need more structure in order to be successful in problem solving. Less-open questions than the above need to be asked with more secure sources of data supplied. An

assignment such as the following can be used. If you use the assignment you should modify the names to suit your city or town and use the appropriate schedules.

Use the bus schedule to answer the following:

1. How many kilometres is it from Nanton to Barnwell?
2. What is the time in Taber when the #1145 departs to Calgary?
3. How long does it take the #1158 to go from Barnwell to Calgary?
4. How long does it take each bus to run from Calgary to Lethbridge?
5. How long does it take each bus to run from Lethbridge to Calgary?
6. Why do various buses have different running times?
7. What is the average speed of #1185 between Calgary and Lethbridge?
8. At about what distance from Calgary will the #1145 and the #1186 meet?
9. What is the minimum number of buses needed to maintain this schedule?

Bus Schedule (from Greyhound Schedule 704A 6-24-81)

City/ Town (dis- tance from Calgary)	Bus Run # 1185 Read down	1145 Read down	1186 Read up	1158 Read up
Calgary (0 km)	0800h	0600h	0735h	1000h
Nanton (87 km)	Non-Stop Express ↓	Non-Stop Express ↓	↑ Non-Stop Express	0825h
Lethbridge (224 km)	1100h	0915h	0500h	0630h
Lethbridge (224 km)	—	—	—	0605h
Barnwell (262 km)	—	—	—	0523h
Taber (272 km)	—	—	—	0515h