



Objective 7.1 To translate a situation into a system of linear relations and vice versa.

Chapter 3

1. Josie belongs to a videoclub called Z-PLUS. Membership fees cost her \$5 and she pays \$3.50 each time she rents a movie. Mark belongs to the REEL MOVIES videoclub. Membership is free but he pays \$4 per movie. Consider the relation between the number of movies rented and total rental cost.

- a) Identify the independent variable and the dependent variables.
Independent (x): number of movies rented
Dependent (y): total rental cost
- b) Translate the situation into a system of linear relations.
 $y = 3.5x + 5$ $y = 4x$
- c) Determine the total amount Josie paid to rent 10 movies. \$40
- d) Determine the total amount Mark paid to rent 10 movies. \$40

2. Stephanie and Peter make plans to meet in Wildwood during their summer vacations. Each will travel 900 km along the same route. Stephanie already has covered 180 km. She is driving at an average speed of 90 km/h. Peter has covered 50 km and is driving at an average speed of 100 km/h. Consider the relation between time (in h) and distance (in km) for each.

- a) Translate the situation into a system of linear relations.
Steph $y_1 = 90x + 180$ Peter $y_2 = 100x + 50$
- b) In how many hours will Stephanie arrive in Wildwood? 8 hours
- c) In how many hours will Peter arrive in Wildwood? 8.5 hours
- d) Can Peter catch up to Stephanie before she arrives in Wildwood? _____

3. To compare the salaries of two employees, the following system of linear relations was used.

$Y_A = 9.5x$ $Y_B = 7x + 100$
 Solve the system
~~Translate the system into a real life situation and specify what each variable represents.~~

$9.5x = 7x + 100$
 $9.5x - 7x = 100$
 $2.5x = 100$
 $\frac{2.5x}{2.5} = \frac{100}{2.5}$
 $x = 40$

<u>$y_1 = 9.5x$</u> <u>$y_1 = 9.5(40)$</u> <u>$y_1 = 380$</u>	<u>$y_2 = 7x + 100$</u> <u>$y_2 = 7(40) + 100$</u> <u>$y_2 = 280 + 100$</u> <u>$y_2 = 380$</u>
<u>$(40, 380)$</u>	

4. The following system of linear relations represents service rates of two rental companies for identical services.

$$Y_A = 4x + 10$$

$$Y_B = 5x + 5$$

Solve the system.

~~Translate the system into a real-life situation and specify what each variable represents.~~

5. OTO Inc. charges \$25 per day plus \$0.10/km for a car rental. GWT Inc. does not charge a basic fee but the rental rate is \$0.20/km. Consider the relation between the number of kilometres covered and the rental rate of a car for one day.

- a) Translate this situation into a system of linear relations.

$$\overset{\text{OTO}}{y_1 = 0.1x + 25}$$

$$\overset{\text{GWT}}{y_2 = 0.2x}$$

- b) Calculate the rental rate for each company for a distance of 200 km.

$$y_1 = 0.1(200) + 25$$

$$y_2 = 0.2(200)$$

$$y = 20 + 25$$

$$y_2 = 40$$

$$y = 45 \quad \$45$$

$$\$40$$

6. ~~Translate the following system of linear relations into a real-life situation.~~

Solve the system.

$$y_1 = 200 + 0.01x$$

$$y_2 = 100 + 0.02x$$

$$S_1 = 200 + 0.01s$$

$$S_2 = 100 + 0.02s$$

$$| y_1 = y_2 |$$

$$200 + 0.01x = 100 + 0.02x$$

$$0.01x - 0.02x = 100 - 200$$

$$-0.01x = -100$$

$$\frac{-0.01x}{-0.01} = \frac{-100}{-0.01}$$

$$| x = 10,000 |$$

$$y_1 = 200 + 0.01(10,000)$$

$$y_2 = 100 + 0.02(10,000)$$

$$y_1 = 200 + 100$$

$$y_2 = 100 + 200$$

$$y_1 = 300$$

$$y_2 = 300$$

$$(10,000, 300)$$