

Linear systems performance task

version A

1. The spreadsheet shows the monthly revenue and expenses for a new business.

	A	B	C
1	Month	Revenue	Expenses
2	Jan	4000	22,000
3	Feb	9000	24,000
4	Mar	13,000	25,000
5	Apr	16,000	27,000
6	May	21,000	30,000

Rate of Change

$+2000$
 $+1000$
 $+2000$
 $+3000$

$\frac{8000}{4} = \$2000$ average

6 month TOTALS 63,000 128,000

Use the information provided to predict the month in which revenue will equal expenses.

a) Find the average monthly revenue and the average monthly expenses.

Revenue: $\frac{\$63,000}{5} = \$12,600$ per month

Expense: $\frac{\$128,000}{5} = \$25,600$ monthly

b) Write a system of linear equations using the average rate of change for the slope.

State what each variable represents.

Revenue \rightarrow average rate of change = $\frac{17000}{4} = \$4250/\text{month}$

$x = \#$ of month since January, $y =$ monthly Revenue/Expense

Revenue $y = 4250x + 4000$ Expense $y = 2000x + 20,000$

c) Solve the system algebraically and answer the question.

Revenue $4250x + 4000 = 2000x + 20,000$

Expense $2000x - 4000 = -2000x - 4000$

$2250x = 16000$ $x = 8$ months since January

d) What are the limitations of using this method to make a prediction?

\downarrow
 assumes that both revenue and expense will constantly continue to increase at the same (average) rate and ignores other factors like economy, competition, marketing, etc.

\therefore September is the predicted month

2. A rental car agency charges a flat fee of \$139.00 plus \$30.00 per day to rent a certain car. Another agency charges a fee of \$13.00 plus \$51.00 per day to rent the same car.

Find the number of days for which the costs are the same (rounded to the nearest whole day). What is the cost of renting a car for that many days?

- a) Write a system of linear equations to represent the rental costs for each agency. State what each variable represents.

$x = \# \text{ of days rented, } y = \text{rental costs}$
 agency A: $y = 139 + 30x$
 agency B: $y = 13 + 51x$

- b) Solve the system algebraically.

$$\begin{array}{r} 139 + 30x = 13 + 51x \\ -13 \quad -30x \quad -13 \quad -30x \\ \hline 126 \qquad \qquad = \quad 21x \\ \underline{21} \qquad \qquad \quad \underline{21} \end{array} \quad x = 6$$

- c) Answer the question.

after 6 days, the cost of renting the car from both agencies is \$319.

3. The length of a rectangle is 7 cm more than 4 times the width. If the perimeter of the rectangle is 94 cm, what are its dimensions?

- a) Write a system of linear equations.

Use the formula for perimeter $P = 2l + 2w$ and write an equation for length in terms of width.

$$2l + 2w = 94$$

$$l = 4w + 7$$

- b) Solve the system algebraically.

$$\begin{array}{r} 2(4w + 7) + 2w = 94 \\ 8w + 14 + 2w = 94 \\ 10w + 14 \qquad -14 \\ \hline 10w = 80 \\ \underline{10} \qquad \quad \underline{10} \end{array}$$

- c) Answer the question.

width is 8 cm
 length is 39 cm