## An Application – Determining the '*Break-Even*' Point.

A yearbook committee must choose a printing company to print the yearbooks. The first company charges an initial set-up fee of $8000 plus $4 per copy. The second company charges an initial fee of $8400 plus $3 per copy. How many yearbooks must be printed for the cost to be the same for both companies?

Let c represent the total cost of printing.
Let n represent the number of copies printed.

<u>First Company</u>   <u>Second Company</u>

$c = 8000 + 4n$ ① $c = 8400 + 3n$ ②

Variable Rate

Initial Fee
(fixed cost)
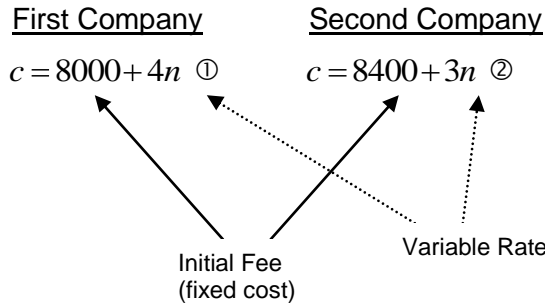
For the break-even point, substitute ① into ②:

$$8000 + 4n = 8400 + 3n$$
$$4n = 400 + 3n$$
$$n = 400 \quad ③$$

Substitute. ③ into ①: $\quad c = 8000 + 4(400)$

$$c = 9600$$

It is very important that you can **'interpret'** what the break-even point represents in the problem.

If they print 400 yearbooks, the cost is $9600 for each company.

Using this solution as a guide, create appropriate equations and solve each of the following problems.

1. Two different rental companies will rent snow blowers. One company charges a base fee of $20, plus an hourly rate of $8. The second company charges a base fee of $12 with an hourly rate of $10. Determine **and interpret** the break-even point.

2. Two different shipping companies will mail packages out of the province. One company charges $5 plus $1/kg for shipping a package, while a second company charges $3.50 plus $1.25/kg. Determine the 'break-even' point. In this problem, what does this point represent?

3. Two different movie rental stores will rent movies to customers. One store charges $4.50 per video and has a $10 membership fee, while the second store charges $5 per video with no membership fee. Determine the break-even point and interpret your answer.

4. A truck rental company has two different rental plans:
    Plan 1: $30 plus $0.20 per kilometre.
    Plan 2: $65 with unlimited mileage.
    a) Under what conditions would a customer choose plan 1?
    b) Under what conditions would a customer choose plan 2?

5. Two different plumbing companies have costs for doing repairs. One company charges $50 for a service call plus $40/h for labour. The second company charges $30 for a service call plus $45/h for labour.
    a) Determine and interpret the break-even point.
    b) Which company would you hire for a job that has an estimate of 5 hours to complete?

Answers:

1. (4,52)   2. (6,11)   3. (20,100)   4a. < 175 km   4b. > 175 km   5. (4,210) ; first