# Section MCU504\_\_\_\_\_ SITUATIONAL PROBLEM Dec, 05, 2014, Name: \_\_\_\_\_\_\_

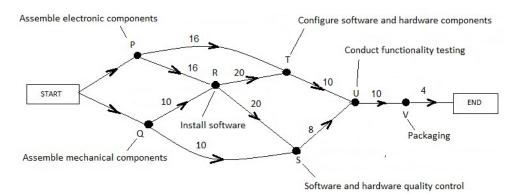
Gatineau Toy Company produces robot toys and a type of a dice game made out of wood called The Challenger Board. The steps necessary to build these two lines of toy production are summarized in the table and the graph below.

| Steps | Description                                | Duration in minutes | Prior steps |
|-------|--------------------------------------------|---------------------|-------------|
| Α     | Cutting the challenger board               | 22                  | None        |
| В     | Cutting the dice                           | 15                  | None        |
| C     | Painting and drying the board and the dice | 19                  | A and B     |
| D     | Testing the dice                           | 4                   | С           |
| E     | Preparing the board frame                  | 8                   | A and C     |
| F     | Polishing the board and the dice           | 6                   | D and E     |
| G     | Packaging                                  | 5                   | E and F     |

#### **PRODUCTION PROCESS OF A CHALLENGER BOARD**

#### **PRODUCTION PROCESS OF A ROBOT**

Each step is measured in minutes. The production time needed to carry out a step is inversely proportional to the number of employees involved in that step. In other words, the greater the number of employees working on a given task, the shorter the time needed to complete that task. For example, if it takes 40 minutes to carry out a task executed by one employee, then it will take 20 minutes to carry out the same task executed by two employees.



Each step is initially handled by two employees regardless of the production line. A marketing analyst suggested that to effectively monitor the production of toys and to better control the finances of the Gatineau Toy company, the following constraints must be taken into account:

- The company must produce at most three times as many challenger boards as robots weekly.
- To avoid overstocking, the company cannot produce more than 280 toys per week.
- The weekly minimum number of challenger boards and robots produced depends on the minimum time required to make each individual product during the production process. On good days, the company produces more toys than the weekly minimum numbers required. A week of production extends for a period of 5 working days, 8 hours a day.

A challenger board costs \$80 to make and a robot costs \$200 to build.

- a) Determine how many robot toys and challenger board toys must be produced to maximize the profit of the company in the current week, given that a challenger board and a robot sell respectively for \$180 and \$480, taxes included.
- b) In anticipation for future growth, the company decided to make more robots next week. As a result of this decision, Gatineau Toy hired eight more employees: six will join the existing Software Installation team and two will be working with the Software and Hardware Component Configuration team. A new packaging machine will also be used. It will reduce the packaging time by 3 minutes regardless of the number of employees involved in that department. Determine the minimum revenue increase of the company between this week and next week.

Situational Problem (Competency 1)

### MAJOR ASSIGNMENT

GRADE-11 MATH (MCU504) Cultural, Social and Technical Option

### **ANSWER BOOKLET**

Title: Gatineau Toy Company

Name: \_\_\_\_\_

Section:

Date: December 05, 2014

#### MARKING: FOR TEACHER USE ONLY

| Criterion 1 | Shows understanding of the situational problem                                                                                         | 40 | 36 | 32 | 28 | 24 | 20 | 16 | 12 | 8 | 4 | 0 |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------|----|----|----|----|----|----|----|----|---|---|---|
| Criterion 2 | Uses mathematical knowledge that is applicable to the situational problem                                                              | 40 | 36 | 32 | 28 | 24 | 20 | 16 | 12 | 8 | 4 | 0 |
| Criterion 3 | Develops an appropriate solution to the situational<br>problem and shows clear procedures and steps,<br>final results and a conclusion |    |    |    |    |    | 20 | 16 | 12 | 8 | 4 | 0 |
| Criterion 4 | Shows appropriate validation of the steps in the solution                                                                              |    |    |    |    |    |    |    |    |   |   |   |

STUDENT MARK:

## Gatineau Toy Company

Let x: number of robots Y: number of challenger boards

### SHOW ALL YOUR WORK

|          |  |  |  | <br> |      |      | -    | - |  |  |  |  |  | <br> |  |
|----------|--|--|--|------|------|------|------|---|--|--|--|--|--|------|--|
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      | <br> |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      | <br> |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      | <br> | <br> | <br> |   |  |  |  |  |  |      |  |
|          |  |  |  |      | <br> |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      | <br> | <br> |      |   |  |  |  |  |  |      |  |
| <u> </u> |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      | <br> | <br> |   |  |  |  |  |  |      |  |
|          |  |  |  |      | <br> |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      | <br> |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      | <br> | <br> | <br> |   |  |  |  |  |  |      |  |
|          |  |  |  |      | <br> |      |      |   |  |  |  |  |  |      |  |
| L        |  |  |  |      | <br> |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
| <u> </u> |  |  |  |      | <br> |      |      |   |  |  |  |  |  |      |  |
| L        |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
|          |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |
| L        |  |  |  |      |      |      |      |   |  |  |  |  |  |      |  |

a) The maximum weekly profit of the company is: \_\_\_\_\_\_dollars

b) The increase in minimum revenue between this week and next is: \_\_\_\_\_\_dollars