# Patio vs. Deck: Adventures in Home Ownership

### *Comparing the Creation of a Concrete Patio to a Wooden Deck*

## Task:

You have just purchased a 3 year old bungalow.  You have enough money to immediately do your first home improvement project, to create a backyard dining area.   You are doing a cost analysis between building a wood deck or a cement patio.

## Part A: Graphing Analysis

In this task you want to analyze the sales of cement and ready- mix concrete, to help you in your decision.

Using the Excel files "***Conrete.xls***" create graphs from the data.

1. Choose a two year range of data (e.g. 2008 – 2010).
2. Create a graph using the Cement data.
3. Create a graph using the Ready Mix Concrete data.  Be sure to use the same years as in your Cement graph.
4. Create a comparison graph for Cement and Ready Mix Concrete.  Again, use the same years as before.
5. List at least 6 observations from any of the three graphs you create.  (At least two from each graph.)

| Category | Description | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|---|---|---|---|
| Communication | • Graphs have appropriate titles <br> • Graphs have legends (were required) <br> • Graphs are easy to read | Communicates with limited clarity | Communicates with some clarity | Communicates with considerable clarity | Communicates with a high degree of  clarity |
| Knowledge and Understanding | • Appropriate type of graph competed <br> • Understands how to do a comparative graph <br> • Understands how to extract info from the graphs | Limited ability to create 3 graphs, needed lots of content help. Explanations lack detail and proof | Some ability to create 3 graphs, needed coaching. Explanations are vague with some proof. | Graphs are well done, explanations are lacking proof | Graphs are thorough and the explanations are detailed with valid arguments |

# Part B: Taking Measurements

**1. Measuring**

Given the diagram of the backyard that indicates the location of the patio or deck, determine the measurements given the scale.

      1. Measure the blueprint diagram using centimeters.

      2. Convert the centimeters measurements to Imperial (inches) using the conversion 1 cm = 0.39 inches.

      3. Convert the inches to feet using the scale in the blueprint diagram.

**Note:** If you have access to an Imperial ruler, you can measure the diagram using inches and then convert to feet.

**2. Calculations**

      1. Using the Imperial measurements from part 1, you will determine the area of the deck/patio.

      Some important formulas:

<p align="center"><strong>Area = length x width</strong></p>

<p align="center"><strong>Area of a triangle = ½ base * height</strong></p>

      2. If you choose to go with a deck, you will edge out the deck with decorative railing.  Determine the perimeter of the deck.
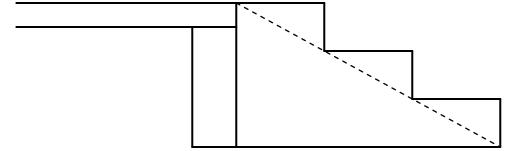
3. If you choose to go with a patio, you will need the volume of the cement fill.  The depth (height) of a cement patio is 5 inches by code.  Determine the volume of cement required for the patio. *Hint: Change the inches to feet with a fraction.*

**Volume = Area * Height**

4. In addition, you will need gravel below the cement.  There are two kind of gravel: Grade A, and Grade B.  If you use Grade A gravel, you will require a 6 inch depth for it.  If you use Grade B gravel, you will require a 12 inch dept for it.  Calculate the volume of gravel for each Grade.

5. As well with a cement patio, you will need to put down wire mesh (aka "rebar") before you pour the cement.  The wire mesh comes in 4 inch by 8 inch sheets.  How many sheets will you require for your patio? *Hint: You will need the area for the sheets.*

## Part C: Budgeting for Your Patio or Deck

Using the measurements from Part B, you will determine the costs involved with creating the deck and a patio.  Then, you will determine which the best option is based on how much money you have to spend and explain your reasoning.

1.  **Cost of the Deck**

    a)  The wood for the deck is $6.50 per square foot.  Determine the total for the wood.

    b)  To give your deck some privacy from the neighbours, the far right side will have lattice instead of a railing.  The cost is $82.97 for a 19 ½  inch by 112.5 inch sheet.
        a.  Determine the amount of lattice required.

        b.  Determine the total cost for the lattice.

    c)  The long side of the deck will have a railing.  The diagonal side will have a railing except for a 2 foot section where the stairs will be. The railing would cost $12.99 per linear foot.
        a.  Determine the amount of railing required.

        b.  Determine the total cost for the railing.

d) You will be putting stairs at the edge of the deck.  Given the diagram below,



    a.  Label the diagram
          i.  If the deck is 22 inches off the ground.
         ii.  The length of the stairs is 37.5 inches.

    b.  Calculate how far away from the deck the stairs end.

e) Determine the total product cost of building the deck.  Assume you purchase prefabricated stairs costing $1000.

f) Determine the after-tax cost.  HST = 13%

**2. Cost of the Patio**

a) You decide to go with Grade A gravel at $7 per cubic yard. The conversion from cubic feet to cubic yards is 1 cubic foot = 0.04 cubic yards. Determine the cost of the Grade A gravel.

b) The cost of a sheet of wire mesh is $14.40. Determine the cost of the mesh needed for the patio.

c) Concrete costs $200 per cubic metre.
    a. The conversion from cubic feet to cubic yards is 1 cubic foot = 0.04 cubic yards. Determine how many cubic yards of concrete are required.

    b. The conversion from cubic yards to metric ton is 1 cubic yard = 1 metric ton. How many metric tons of concrete are required? *Hint: Don't think too hard.*

    c. The conversion from metric tonnes to cubic metres is 1 metric tonne = 0.55 cubic metres. Determine how many cubic metres of concrete are required.

    d. Determine the cost of concrete required.

d) Due to the size of the yard, the cement truck cannot get close enough to pour the cement.  Instead, a boom will have to be used.  It costs $400 to come to the site, and then $200 for each hour it is there.  It is estimated that the complete pour will take 2.5 hours.  Determine the cost for the boom.

e) Determine the total product cost for the patio.

f) Determine the after-tax cost.  HST = 13%

### 3. Analysis

a) Using the results from your calculations above, determine which is the better option if you have a budget of $6000.00 to make the backyard improvement. Give at least two reasons with proof from the work that you have done in this activity.

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b) Unfortunately, your ten year old car needs a new exhaust system. This will cost over $1000, and you will have to take it out of the deck and patio budget. Does this change your answer in (a)? Explain why or why not.

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c) Explain how the backyard aesthetics would influence a decision.  For example, a deck has more options to make it appealing to the eye, or stamped concrete makes a really beautiful patio.

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d) The backyard is on a grade.  You would need a significant amount of fill to create the patio.  Each truck of fill costs $200 and it is estimated to require 3 trucks worth. Explain how this might influence a home owner's final decision.

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# RUBRIC FOR MEASUREMENT SECTION

| Category | Description | Level 1 | Level 2 | Level 3 | Level 4 |
|---|---|---|---|---|---|
| Communication | • used % signs where applicable<br>• used $ signs where applicable<br>• use of units and conventions where applicable<br>• full sentences | Limited demonstration of expectation. | Approaching the expectation, more editing needed for polishing. | Has successfully met the expectation. | Communicates with a high degree of clarity and attention to detail. May go beyond expections. |
| Knowledge and Understanding | • understands how to use the area/perimeter/volume formulae<br>• understands how to do conversions<br>• understands how to calculate cost | Demonstrates a limited understanding of concepts | Demonstrates some understanding of concepts | Demonstrates considerable understanding of concepts | Demonstrates a high degree of understanding of concepts |
| Application | • applies knowledge of area, perimeter, and volume to solve problems<br>• applies knowledge of tax and budgeting to solve problems | Applies knowledge of course with limited effectiveness. | Applies knowledge of course with some effectiveness. | Applies knowledge of course with considerable effectiveness | Thoroughly applies knowledge of course. |
| Thinking / Inquiry | • use Pythagorean Theorem to solve problems<br>• use of Construction knowledge to analyze the situations | Uses critical / creative thinking process with limited effectiveness , solutions have major errors Lots of teacher assistance required | Uses critical / creative thinking process with some effectiveness Some teacher assistance required. | Uses critical / creative thinking process with considerable effectiveness, solution has error (only one major) | Uses critical / creative thinking process with a high degree of effectiveness solution has only minor errors |