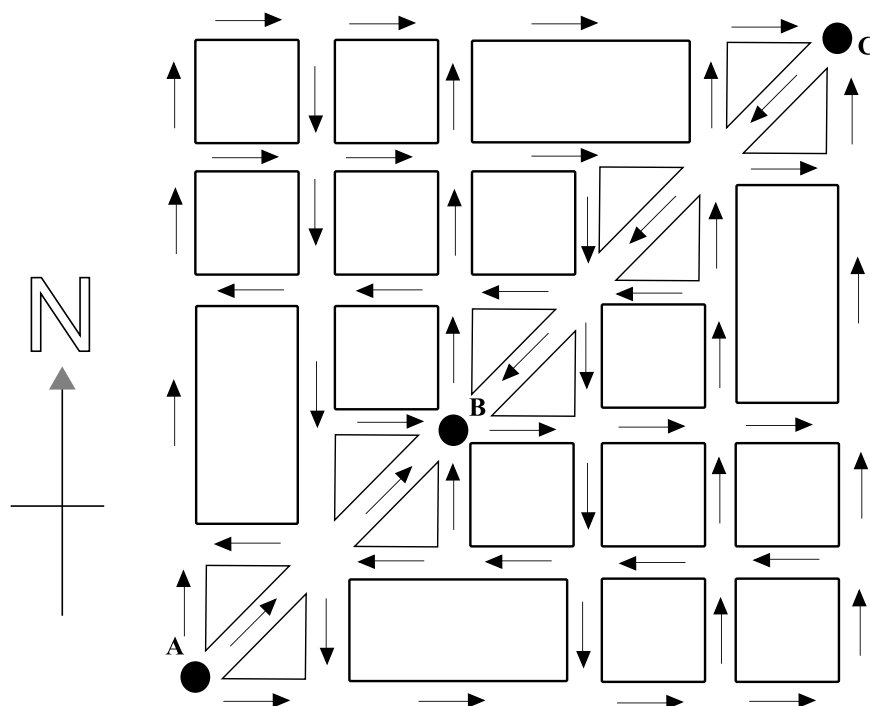


# MCV4U1 - Final Portfolio Math Tasks

## Task 1: Taxi Cab Vectors!



A taxi has three passengers when it starts at A. It must drop off two people at B and the third at C. The arrows represent one-way streets.

1. Using vectors, find two different routes that go from A to C via B.
2. Show that the total displacement is equal in each case.
3. Using the Travel Times table on the following page, determine which of your routes takes less time.
4. Is there a best route? Is there only one unique "best route" solution?
5. List the vector properties that you used in your solution.
6. If the taxi charges for mileage are \$0.50/rectangular block and the time charges are \$0.10/minute, what is the cheapest route from A to C? How much should each passenger pay?

**Table 1: Taxi Travel Times**

<b>Direction</b>	<b>Travel Time per Block</b>
Northbound	12 minutes
Southbound	5 minutes
Westbound	6 minutes
Eastbound	8 minutes
Southwest	10 minutes
Northeast	10 minutes

**Task 2: History of Mathematics**

Your group must choose from one of the topics listed below and prepare a (no more than) 500 word research paper. You will be graded on the quality and level of research of your paper. Be sure to include a list of your references and not to rely solely on secondary sources like Wikipedia.

- What is the origin of the logarithm?
- What is the GRAD button on your calculator for?
- Who came up with the names sine, cosine, tangent and why?
- How did the Greeks calculate square roots?
- What's the deal with Fermat's Last Theorem?
- Where did zero come from?
- Who really invented calculus anyway?

### Task 3: Calculus Review

1. Use all your curve sketching tools to sketch the graph of each function. Be sure to include a graph of your function and all of your calculations.

a.  $f(x) = 4x^3 + 6x^2 - 24x - 2$

b.  $y = \frac{3x}{x^2 - 4}$

2. Determine the derivative of each function.

a.  $y = 2\sin x - 3\cos 5x$

b.  $y = (\sin 2x + 1)^4$

c.  $y = \sqrt{x^2 + \sin 3x}$

d.  $y = \frac{\sin x}{\cos x + 2}$

e.  $y = \tan x^2 - \tan^2 x$

f.  $y = \sin(\cos x^2)$

3. A corridor that is 3 m wide makes a right-angle turn, as shown on the right. Find the longest rod that can be carried horizontally around this corner. Round your answer to the nearest tenth of a metre.

