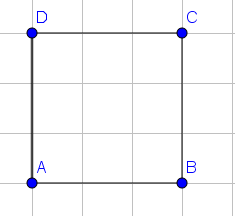
60% 2.5 hours

**Section A:**

12 Short questions (4 marks each). Candidates are required to answer ***any 10 questions*** in this section

1. ABCD is a square as shown. Express as a single vector i) + ii) + iii) + iv) +
2. U = {1, 2, 3, 4,……., 8, 9, 10}, A = {2, 3, 4, 5, 6, 7}, B = {3,4,5,8,9} find Ac, AUB and B\A.
3. Let A = . Determine if A has an inverse. If so, find it.
4. Find .
5. Find the first four terms of the expansion (1 + X)8.
6. If P = and G = , find 3P – 2G.
7. Determine whether the function  is increasing or decreasing at the point x = 4.
8. Say which of the following sequences are geometric. Find the common ratio of those that are?
9. 2, -6, 18 2) 6, 3, , 3) , , 4) , ,
10. Differentiate y = (X2 + 2X - 8)5
11. Find the sum to infinity of the series …… Is the series convergent or divergent?
12. If D = {4, 5, 6}, find P(D), the power set of D.
13. Which term of the arithmetic series 7, 10, 13, 16, …… is 97?

….

**Section B:** Answer 4 questions from Section B. Each question will carry 20 marks.

**Question 1** – answer part A, part B and part C

Part A

If P = {a, b, c} and Q = {s, t}, find the Cartesian product QxP.

Part B

U = {1, 2, 3, …….., 8, 9, 10, 11} A = {2, 3, 4, 5, 6, 7} B = { 5. 6. 7, 8} C = {6, 7, 8, 9}

D = {1, 3, 5, 7, 9} E = {2, 5, 6, 7, 8} F = {1, 2, 3, 5, 9}

Find i) Ac ii) B\A, ii) CD iii)A(BE) iv) (DE)\B v) Fc v) #(B)

Part C

In a class of 100 students, 40 take Gaelic,53 take Soccer, and 5 take both Soccer and Gaelic.  How many students in the class are not enrolled in either Soccer or Gaelic? Complete the Venn Diagram for this. State, from the diagram who many students are i)taking Gaelic only, ii) taking neither Gaelic nor Soccer, iii) Soccer only

**Question 2**

1. If A = and B = find (i) 4A (ii) 2A - B and (iii)A.B
2. If P = find P-1.
3. State the transformation matrices for reflection i) in the x-axis and ii) in the y-axis.

Hence find the image of the triangle ABC with vertices A = (2, 2), B = (4, 2) and C = (2, 6) under reflection in i) the x-axis and ii) the y-axis. Use a diagram[x/y axes] to illustrate your answers. Note: You must use matrices to find answers.

**Question 3**

1. If and , evaluate .. What can you say about the vectors and

b) Given the vectors Using separate diagrams construct + and - .

c) If = and = , express in the form of and

1. 2 (ii) (iii) iv) (iv)

**Question 4**

1. Use the binomial theorem to expand the functions (1+x)3 and (1-x)5.
2. In the arithmetic sequence 3, 8, 13, ……. find i)a ii)d iii)Tn and iii)T20.
3. Find Sn and hence S20 of the series 5 + 8 + 11 + 14 +……
4. Write out the first four terms of the sequence Tn = .3n-1 . Show the sequence is geometric.
5. Find the sum to infinity of the series 2 + 6 + 18 + ….. Is the series convergent or divergent?

**Question 5**

1. Find the co-ordinates of the turning point of the function y = 5 + 6x – x2 and using the second derivative investigate if the turning point is a maximum or a minimum.
2. Find the slope of the tangent to the curve y = 3x2 + x - 7 at x = 02.
3. Find .
4. Using integration find the area under the curve y = 2x2+3 between x = 0 and x = 2.