GRADE 12   **THURSDAY 20 AUGUST 2015**

ADVANCED PROGRAMME MATHEMATICS

PAPER II

TRIAL EXAMINATION

TIME: 1 HOURS   **TOTAL: 100 MARKS**

PLEASE READ THE FOLLOWING INSTRUCTIONS CAREFULLY:

- This question paper consists of 3 pages

- Non–programmable and non–graphical calculators may be used, unless otherwise indicated.

- All necessary calculations must be clearly shown and writing should be legible.

- Round off your answers to **four decimal places** or leave answers in fraction form.

QUESTION 1

A group of 80 athletes were asked which of the three sprint events (100m, 200m, and 400m) they intended to enter in the athletics meeting.

- 21 athletes entered none of these events
- 6 entered all three events
- 10 entered the 100m and 200m
- 11 entered the 200m and 400m
- Of the 21 athletes that entered the 100, 10 entered nothing else
- 27 athletes entered the 400m

1.1 Represent the above information on a Venn diagram. (8)

1.2 How many athletes entered the 200m event? (2)

1.3 What is the probability of an athlete, selected at random, running in at least 2 of the 3 sprint events? (4)

[14]

QUESTION 2

A wine connoisseur has a full wine cellar that can store 366 bottles of wine. In the cellar, 264 bottles are red wines, 68 are white wines and the remainder are sparkling wines.

2.1 What is the probability that a bottle chosen at random is a white wine? (3)

2.2 Two bottles are chosen at random. What is the probability that both are red wines? (3)

2.3 If two bottles are chosen from the wine cellar at random, what is the probability that they will be different types of wine, given that they are not white wines? (5)

[11]

QUESTION 3

The two events, A and B are such that $P(A) = 0,5, \ P(B) = 0,3$, and $P(A|B) = 0,1$.

3.1 Prove that the probability that both events occur is 0,03. (2)

3.2 Calculate the probability that:

    a) At least one of the events occurs. (4)

    b) Exactly one of the events occurs. (3)

    c) B occurs, given A has occurred. (3)

3.3 Determine whether A and B are independent events? (3)

[15]

QUESTION 4

Four married couples have bought 8 seats in a row for a concert.

4.1   In how many ways can they be seated, with no restrictions.   (3)

4.2   What is the probability that each couple sits together?   (5)

4.3   What is the probability that all the men sit together?   (5)

[13]

QUESTION 5

Given the word: B U L U N G U L A ?

5.1   How many distinct words can be formed from all the letters in the word?   (5)

5.2   What is the probability that a randomly chosen word, formed as described above,
       starts and ends with the letter "L"?   (5)

[10]

QUESTION 6

The connoisseur has space on a shelf in the wine cellar for 12 bottles of wine. She wishes to place twelve of her favourite wines on display. Seven are red wines and five white wines. Of the seven red wines, four are from South Africa and three are from Italy. Of the five white wines, three are Spanish and two are Californian.

6.1   How many ways can she rearrange her wines if each of the wines from each region must stay
       together, and all red wines and white wines are together.   (5)

6.2   What is the probability that the bottle of wine on the left of the shelf will be South African?   (4)

[9]

QUESTION 7

Each week, James and Khanyi take part in a raffle independently at their respective workplaces.

The probability that James wins a prize in his raffle is $\frac{1}{9}$.

The probability that Khanyi wins a prize in her raffle is $\frac{1}{16}$.

7.1 What is the probability that both James and Khanyi will win prizes in next week's raffle? (2)

7.2 What is the probability that at least one of them will win a prize in next week's raffle? (4)

7.3 What is the probability that, during the next three weeks, at least one of them wins a prize? (4)

[10]

QUESTION 8

A personal identification number (PIN) is made up of four digits. An example of a PIN is 0229.

8.1 When all ten digits are available for use, how many different PINs are possible? (2)

8.2 Rhys has forgotten his four-digit PIN, but knows that the first digit is either a 5 or a 6.
What is the probability that he will guess his PIN correctly in one attempt? (4)

[6]

QUESTION 9

9.1 In a batch of 50 computers brought in for repairs, 20 of them have viruses. If 5 computers are selected at random, what is the probability that one or two of them will have a virus? (6)

9.2 On average, 20% of the bolts produced by a machine in a factory are faulty. Samples of 10 bolts are chosen at random each day. Each sample bolt is returned after inspection.
Calculate the probability that more than two bolts will be faulty. (6)

[12]