

**St Dominic’s Catholic School for Girls**

**Mathematics Exam**

100

**NAME :**

|  |  |  |  |
| --- | --- | --- | --- |
| **Topic(s) :** | Paper 3 | **Grade :** | 12 |
| **Examiner :** | Mrs E. Sales | **Date :** | September 2012 |
| **Moderator(s):** | Mrs S. Van Rooyen | **Duration :** | 2 hours |

**INSTRUCTIONS :**

1. Answer all questions in this answer booklet.
2. Show all your **calculations**.
3. An approved **calculator** may be used unless otherwise stated.
4. Round off to **two decimal places** where applicable.
5. It is in your own interest to **write legibly** and to present your work neatly.
6. **Additional blank pages** are included at the back of this booklet.
7. **Pencil work** will not be marked. **Sketches** may be done in pencil.
8. This booklet contains **18 pages**.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **SECTION A** | | | | |  |
|  |  | | | | |  |
|  | **Question 1** | | | | | **[5]** |
|  |  | | | | |  |
|  | Consider the Arithmetic Sequence given by . | | | | |  |
|  |  | | | | |  |
| a) | Generate the first 4 terms. | | | | | (2) |
|  |  | | | | |  |
| b) | Determine the recursive formula for this sequence. | | | | | (3) |
|  |  | | | | |  |
|  |  | | | | |  |
|  |  | | | | |  |
|  | **Question 2** | | | | **[16]** | |
|  |  | | | |  | |
|  | In the 2008 Beijing Paralympic Games, South Africa was in sixth place in the Overall Medals Standing, having won 21 gold, 3 silver and 6 bronze medals. South Africa’s top athletes were Natalie du Toit, Oscar Pistorius and Hilton Langenhoven. China was in first position having achieved a total of 211 medals, 89 of them gold. The number of gold medals won by the countries in position 2 to 20, have been grouped into class intervals, and listed in the table that follows. | | | |  | |
|  |  | | | |  | |
|  | **Number of gold medals won** | **Number of countries** | **Cumulative frequency** | **Points to plot for an ogive** |  | |
|  |  | 6 |  |  |  | |
|  |  | 4 |  |  |  | |
|  |  |  | 14 |  |  | |
|  |  | 3 |  |  |  | |
|  |  | 0 |  |  |  | |
|  |  | 0 |  |  |  | |
|  |  |  | 18 |  |  | |
|  |  |  |  |  |  | |
|  | TOTAL | 19 |  |  |  | |
|  |  |  |  |  |  | |
| a) | Calculate the values for and . | | | | (3) | |
|  |  | | | |  | |
|  |  | | | |  | |
|  |  | | | |  | |
|  |  | | | |  | |
|  |  | | | |  | |
|  |  | | | |  | |
|  |  | | | |  | |
| b) | Complete the given table. | | | | (4) | |
|  |  | | | |  | |
| c) | Draw a cumulative frequency curve to illustrate the given data set. | | | | (3) | |
|  |  | | | |  | |
|  | | | | | | |
|  |  | | | |  | |
|  |  | | | |  | |
| d) | On your graph, record where you would read the following, and write down your results below correct to the nearest whole number. | | | | (6) | |
|  |  | | | |  | |
|  | Lower quartile : | | | |  | |
|  |  | | | |  | |
|  | Median : | | | |  | |
|  |  | | | |  | |
|  | Upper quartile : | | | |  | |
|  |  | | | |  | |

|  |  |  |
| --- | --- | --- |
|  | **Question 3** | **[4]** |
|  |  |  |
| 3.1 | The following graph illustrates the number of new members of a political party over a six month period. The cumulative frequencies are shown on the vertical axis. Discuss how this graph, used by the political party, is misleading to an average member of the public. | (2) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| 3.2 | The following histogram shows the sales made by a motor car company over a period of four months. Discuss how this graph used by the motor car company is misleading to an average member of the public. | (2) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Question 4** | | **[14]** | |
|  |  | |  | |
| 4.1 | There are four bus lines between Boksburg and Benoni, and three bus lines between Benoni and Brakpan. | |  | |
|  |  | |  | |
| a) | In how many ways can Saneli travel from Boksburg to Brakpan, via Benoni? | | (1) | |
|  |  | |  | |
|  |  | |  | |
|  |  | |  | |
| b) | In how many ways can Saneli travel RETURN from Boksburg to Brakpan, via Benoni? | | (2) | |
|  |  | |  | |
|  |  | |  | |
|  |  | |  | |
| c) | In how many ways can Saneli travel RETURN from Boksburg to Brakpan, via Benoni, if she doesn’t want to use the same line twice? | | (2) | |
|  |  | |  | |
|  |  | |  | |
|  |  | |  | |
| 4.2 | In how many ways can the top 4 positions of the St Dominic’s executive be chosen from the 22 members of the executive? | | (1) | |
|  |  | |  | |
|  |  | |  | |
|  |  | |  | |
| 4.3 | At the recent Olympic games, three South African VIP’s, four American VIP’s four Italian VIP’s and two British VIP’s had to be seated in a row. In how many ways could they be seated if the VIP’s from each country had to sit together? | | (2) | |
|  |  | |  | |
|  |  | |  | |
|  |  | |  | |
| 4.4 | The producer of a TV Game show wants to scramble the letters of the word WINNING which contestants have to the unscramble. | |  | |
|  |  | |  | |
| a) | In how many ways can the letters of the word be scrambled, excluding the word itself? | | (3) | |
|  |  | |  | |
|  |  | |  | |
|  |  | |  | |
| b) | In how many ways can the letters of the word be scrambled, if it starts with W and ends with G, excluding the word itself? | | (3) | |
|  |  | |  | |
|  |  | |  | |
|  |  | |  | |
|  | **Question 5** | | **[6]** |
|  |  | |  |
|  | http://www.positscience.com/sites/default/files/images/games-teasers/brain_cool1a.gif  Source : positscience.com | |  |
|  |  | |  |
| 5.1 | What is the probability that the word ACCORDING, when arranged in any order, will start with an A and end with a G? | | (3) |
|  |  | |  |
|  |  | |  |
|  |  | |  |
|  |  | |  |
| 5.2 | What is the probability that the word LETTERS, when arranged in any order, will start with and end with the same letter? | | (3) |
|  |  | |  |
|  |  | |  |
|  |  | |  |
|  | **Question 6** | | **[13]** |
|  |  | |  |
|  | A local nursery records the effect of temperature on the growth of a new plant that has been imported into the country recently. | |  |
|  |  | |  |
|  | **Temperature (°C)** | **Number of flowers on plant** |  |
|  | **25** | **1** |  |
|  | **26** | **3** |  |
|  | **27** | **4** |  |
|  | **28** | **6** |  |
|  | **29** | **7** |  |
|  | **30** | **7** |  |
|  | **31** | **8** |  |
|  | **32** | **9** |  |
|  | **33** | **10** |  |
|  | **35** | **15** |  |
|  |  | |  |
| 6.1 | Determine the equation of the line of best fit. | | (2) |
|  |  | |  |
|  |  | |  |
|  |  | |  |
| 6.2 | Predict the number of flowers if the temperature is 34°C. Give a reason whether you think your prediction is a good one or not. | | (3) |
|  |  | |  |
|  |  | |  |
|  |  | |  |
| 6.3 | Would you use the equation in 6.1 to predict the number of flowers at a temperature of 48°C? Give a reason for your answer. | | (2) |
|  |  | |  |
|  |  | |  |
|  |  | |  |

|  |  |  |
| --- | --- | --- |
| 6.4 | Do you think the trend shown in the table above will continue as the temperature increases? Give a reason for your answer. | (2) |
|  |  |  |
|  |  |  |
|  |  |  |
| 6.5 | Describe the correlation between temperature and number of flowers by calculating the correlation coefficient (). | (3) |
|  |  |  |
|  |  |  |
|  |  |  |
| 6.6 | Calculate the standard deviation of the number of flowers on a plant. | (1) |
|  |  |  |
|  |  |  |
|  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **SECTION B** | | | | |  |
|  |  | | | | |  |
|  | **Question 7** | | | | | **[13]** |
|  |  | | | | |  |
| 7.1 | is the centre of the circle.        Calculate, with reasons, . | | | |  | (3) |
|  |  | | | | |  |
|  |  | | | | |  |
|  |  | | | | |  |
| 7.2 | is the centre of the circle.  Calculate, with reasons, and . | | | |  | (4) |
|  |  | | | | |  |
|  |  | | | | |  |
|  |  | | | | |  |
| 7.3 | Calculate, with reasons, , and . | | | |  | (3) |
|  |  | | | | |  |
|  |  | | | | |  |
|  |  | | | | |  |
| 7.4 | Calculate, with reasons, and . | | | |  | (3) |
|  |  | | | | |  |
|  |  | | | | |  |
|  |  | | | | |  |
|  | **Question 8** | | | | | **[7]** |
|  |  | | | | |  |
|  | is the centre of the circle.  is a tangent at .        Calculate, with reasons, the size  of :   1. (1) 2. (1) 3. (1) 4. (4) | |  | | |  |
|  |  | | | | |  |
|  |  | | | | |  |
|  |  | | | | |  |
|  | **Question 9** | | | | | **[7]** |
|  |  | | | | |  |
|  | is a diameter of circle .  is the centre of the circle.  is a tangent at .    is a chord.  is a chord produced to .  Prove that :   1. is a cyclic quadrilateral (3) 2. (4) | | |  | |  |
|  |  | | | | |  |
|  |  | | | | |  |
|  |  | | | | |  |
|  | **Question 10** | | | | | **[8]** |
|  |  | | | | |  |
|  | In , bisects .     1. Give, with reasons, four angles which are equal to . (4) 2. Prove that . (4) |  | | | | |
|  |  | | | | |  |
|  |  | | | | |  |
|  |  | | | | |  |
|  | **Question 11** | | | | | **[7]** |
|  |  | | | | |  |
|  | is the centre of the circle through , , and .      Express in terms of . | | | |  |  |
|  |  | | | | |  |
|  |  | | | | |  |
|  |  | | | | |  |

|  |  |  |
| --- | --- | --- |
|  |  |  |