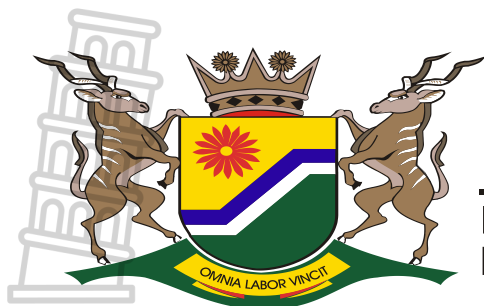




education

DEPARTMENT: EDUCATION
MPUMALANGA PROVINCE

NATIONAL SENIOR CERTIFICATE EXAMINATION



MARKS: 50

TIME: 60 Minutes

This question paper consists of 6 pages including the cover page.



INSTRUCTIONS AND INFORMATION:

- 1 This question paper consists of 4 questions. Answer ALL questions
- 2 Clearly show all calculations.
- 3 An approved calculator (non-programmable and non-graphical) may be used, unless otherwise stated.
- 4 Number the answers correctly according to the numbering system used in this question paper.
- 5 If necessary, answers should be rounded off to TWO decimal places, unless otherwise stated.
- 6 Diagrams are not necessarily drawn to scale.
- 7 It is in your own interest to write legibly and to present your work neatly.



QUESTION 1

The data in the table below represents the score in percentages of 12 Mathematics learners in their grade 11 end of year examination and their corresponding grade 12 final examination.

Grade 11 end of year Exam	76	64	90	68	70	79	52	64	61	71	84	70
Grade 12 Final Exam	82	69	94	75	80	88	56	81	76	78	90	76

Stanmorephysics.com

- 1.1 Determine the equation of the least squares regression line for this set of data. (3)
- 1.2 Hence, predict the grade 12 final percentage for a learner obtaining 73% in the grade 11 end of year examination. Give your answer to the nearest percentage. (2)
- 1.3 Calculate the correlation coefficient for the above data. (2)
- 1.4 Comment on the strength of the correlation between the grade 11 and grade 12 mathematics marks for the data (2)
- 1.5 Do you think that by using the least squares regression line, one can accurately predict a learner's grade 12 final percentage? Provide Mathematical justification for your answer. (2)

[11]

QUESTION 2

A stone is thrown vertically upwards. Its height (in metres) above the ground at time t (in seconds) is given by: $h(t) = -2t^2 + 12t + 32$.

- 2.1 Determine the initial height of the stone above the ground. (1)
- 2.2 Determine the time taken to reach the maximum height. (3)
- 2.3 How fast was the stone travelling when it hit the ground? (5)
- 2.4 Determine the acceleration (rate of change of velocity) of the stone. (1)

[10]**QUESTION 3**

John plans to buy a house for R750 000. He pays a deposit of 20% and takes out a bank loan for the balance. He repays the loan by means of monthly instalments of R9000, starting one month after the granting of the loan. The interest rate is 12.86% per annum, compounded monthly.

- 3.1 Determine the amount John took as loan from the bank. (2)
- 3.2 Determine the number of payments required to settle the loan. (5)
- 3.3 Calculate the balance outstanding after the last payment of R9000 was made. (4)
- 3.4 Calculate the value of the final payment to settle the loan. (2)
- 3.5 Calculate the total amount John paid for the house. (2)

[15]

QUESTION 4

- 4.1 Five Toyota cars, three BMW cars, four Volkswagen cars and two Hyundai cars are to be parked in a hotel's parking lot.

4.1.1 In how many ways can the cars be arranged if they are parked next to each other in a row? (2)

4.1.2 If these cars are randomly arranged in a row, calculate the probability that cars of the same make are parked next to one another? (3)

- 4.2 Consider the letters of the word: RECESSION

4.2.1 How many unique word arrangements can be made from this word if the repeated letters are treated as identical? (3)

4.2.2 How many unique word arrangements can be made if the word ends with the letter R? (2)

4.2.3 What is the probability that a word will start and end with the same letter (4)

[14]

TOTAL: 50

INFORMATION SHEET

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + in)$$

$$A = P(1 - in)$$

$$A = P(1 - i)^n$$

$$A = P(1 + i)^n$$

$$T_n = a + (n - 1)d$$

$$S_n = \frac{n}{2}[2a + (n - 1)d]$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(r^n - 1)}{r - 1}; r \neq 1$$

$$S_\infty = \frac{a}{1 - r}; -1 < r < 1$$

$$F = \frac{x[(1 + i)^n - 1]}{i}$$

$$P = \frac{x[1 - (1 + i)^{-n}]}{i}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

$$(x - a)^2 + (y - b)^2 = r^2$$

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

$$\text{Area of } \triangle ABC = \frac{1}{2}ab \cdot \sin C$$

$$\sin(\alpha + \beta) = \sin \alpha \cdot \cos \beta + \cos \alpha \cdot \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cdot \cos \beta - \cos \alpha \cdot \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cdot \cos \beta + \sin \alpha \cdot \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cdot \cos \beta - \sin \alpha \cdot \sin \beta$$

$$\cos 2A = \begin{cases} \cos^2 A - \sin^2 A \\ 1 - 2\sin^2 A \\ 2\cos^2 A - 1 \end{cases}$$

$$\sin 2A = 2\sin A \cdot \cos A$$

$$\bar{x} = \frac{\sum x}{n}$$

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$