



FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS AND APPLIED MATHEMATICS

MODULE	MAFT0A2 MATHEMATICS 2A FOR TEACHERS
CAMPUS	APK
ASSESSMENT	SUPPLEMENATARY EXAM

DATE 15/07/2019

TIME 11:30

ASSESSOR(S)

MR T. MUDZIIRI SHUMBA

MODERATOR

MS S. RICHARDSON

DURATION 120 MINUTES

MARKS 80

SURNAME AND INITIALS _____

STUDENT NUMBER _____

CONTACT NUMBER _____

NUMBER OF PAGES: 1 + 10 PAGES

INSTRUCTIONS:

1. ANSWER ALL THE QUESTIONS ON THE PAPER IN PEN.
2. CALCULATORS ARE ALLOWED.
3. SHOW ALL CALCULATIONS AND MOTIVATE ALL ANSWERS.
4. IF YOU REQUIRE EXTRA SPACE, CONTINUE ON THE FACING BLANK PAGE AND INDICATE THIS CLEARLY.

Question 1 [8 marks]

For questions 1.1 – 1.4, choose **one** correct answer, and make a cross (X) in the correct block.

Question	A	B	C	D	E
1.1					
1.2					
1.3					
1.4					

1.1 If $a, 6, 12, \dots$ is a geometric sequence, what is the value of a ?

2

- (A) 4
- (B) $\frac{1}{3}$
- (C) 2
- (D) 3
- (E) None of the above.

1.2 What is the coefficient of x^3 in the expansion of $(1 + \frac{3}{x})(1 + 2x)^{14}$?

2

- (A) 48 048
- (B) 1092
- (C) 364
- (D) 6
- (E) None of the above

1.3 A letter is chosen at random from the word **VUKAUZENZELE**. The probability that the letter is an E is :

2

- (A) $\frac{1}{4}$
- (B) $\frac{12!}{3!2!2!1!1!1!1!1!1!}$
- (C) 0
- (D) $\frac{1}{12}$
- (E) None of the above

1.4 A license plate in a certain country consists of three letters and three digits. You visited this country and hired a car. In trying to recall the license plate, you remember the car's license plate was ABD followed by 3, 6, 9 in some order. How many possibilities are there for the license plate?

2

- (A) 3
- (B) 6
- (C) 0
- (D) 18
- (E) None of the above

Question 2 [4 marks]

- (a) Simplify the expression

$$\frac{(n+2)!}{(n-1)!}$$

2

- (b) State whether the following statement is true or false. Justify your answer. “If the mean equals the median, then the data is skewed either to the left or the right”.

2

Question 3 [15 marks]

3.1 A travel agent did a survey amongst his clients as to which type of holiday they prefer. The results are shown in the table.

	Game Reserve	Sea	Travel	Total
Male	450	100	150	700
Female	150	150	75	
Total	600			

(a) Complete the table. 2

(b) A person is chosen at random. What is the probability that :

(i) The person is not male and prefers traveling holidays? 2

(ii) Prefers game reserve or sea holidays? 2

(iii) Are the events “is not male” and “prefers traveling holidays” independent? Show all the working to justify your answer. 3

3.2 A bag contains six red balls and six green balls. Two balls are randomly selected in succession without replacement.

3.2.1 Draw a tree diagram to illustrate all the possible outcomes.

4

3.2.2 Determine the probability that both balls are red.

2

Question 4 [18 marks]

4.1 Nonsikelelo wishes to buy a house that costs R650 000. She has R200 000 in savings which she plans to deposit for the house and she borrows the rest from a bank. She will repay the loan with equal monthly installments at the end of each month over a period of 20 years. The bank charges interest at a rate of 15.5% per annum compounded monthly.

(a) Calculate her monthly installments.

4

(b) Calculate the balance outstanding on the loan after 10 years.

3

- (c) At the end of 10 years, she falls into some financial difficulty and cannot keep up with her payments. Her situation improves after six months of failing to pay and at the end of the seventh month, she can afford to pay. Further, she still wants to settle her loan by the end of 20 years. What will her new monthly installment be? Show a timeline.

4

- 4.2 Themba takes out a loan of R350 000 in order to start a business. Two years later, he repays R150 000. Four years after starting the first business, he expands and borrows a further R560 000. Three years after this, he pays off the total debt in one payment. The bank charges interest at the rate of 18% compounded monthly. By use of a timeline, determine Themba's debt payment at the end of 7 years.

4

- 4.3 R2 000 was invested in a fund paying $r\%$ interest per annum, compounded monthly. After one and a half years, the fund has a value of R2 204.24. What is the nominal rate r ?

3

Question 5 [23 marks]

5.1 Consider the following sequence of numbers:

$$1, 3, 1, 5, 1, 7, 1, 9,$$

Calculate the sum of the 50 terms of the sequence.

4

5.2 Given the series $(2x - 3) + (2x - 3)^2 + (2x - 3)^3 + \dots$,

5.2.1 For what values of x will the series converge?

2

5.2.2 Determine

$$\sum_{j=0}^{\infty} (2x - 3)^{j+1}$$

if $x = \frac{7}{4}$.

3

5.3 Given that $S_n = \frac{4}{3}n^2 + 1$, find T_3 .

3

5.4 A sequence with terms $a_1 = 0, a_2, a_3 = 16, a_4, a_5 = 40$ has common second differences.

(a) Find the terms a_2 and a_4 .

4

(b) Write a formula for the n th term a_n .

4

5.5 Use the Binomial Theorem to expand and simplify the expression: $(2x - \frac{1}{2})^4$.

3

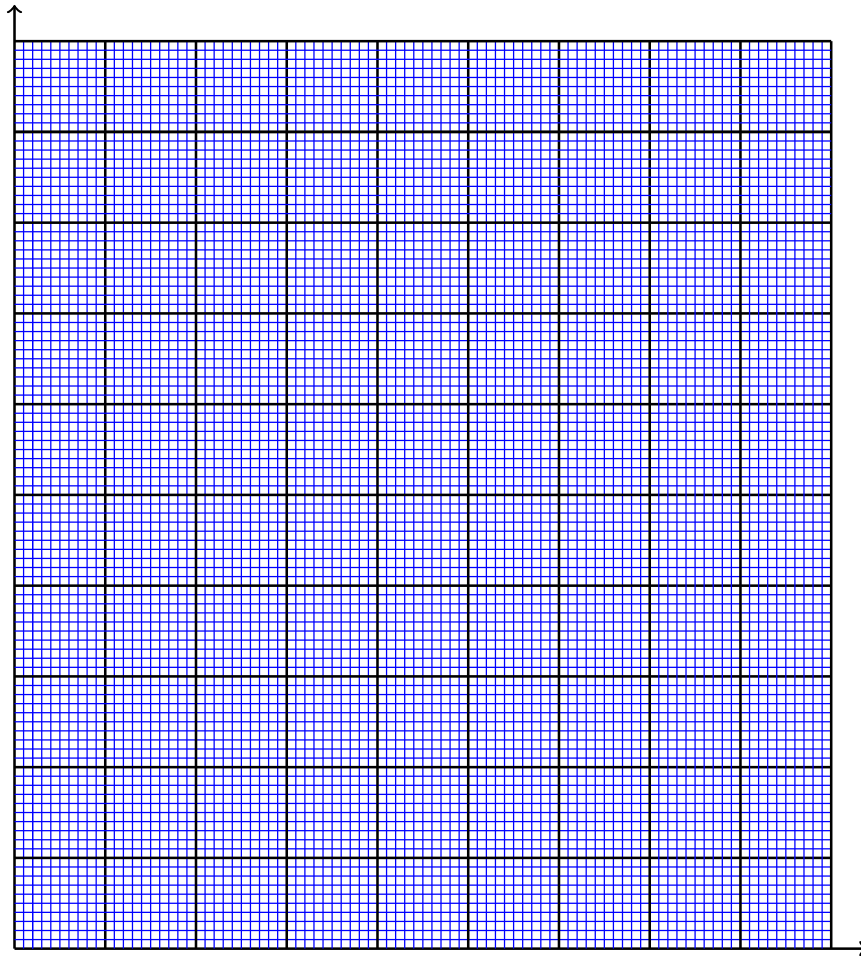
Question 6 [12 marks]

6.1 The following data illustrates the relationship between annual profit of a certain section of his business and the corresponding advertising expenditure (both thousands):

Annual expenditure (x)	12	14	17	21	26	30
Annual profit (y)	60	70	90	100	100	120

(a) Plot a scatter plot for the data.

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(b) Draw on the above system the line of best fit.

2

(c) Determine the equation of the least squares regression line.

3

(d) Calculate the correlation coefficient.

2

(e) Estimate the annual profit if R17 500 is spent on marketing.

2