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| AIC, MATHEMATICS LEARNING AREA  **YEAR 11 MATHEMATICS APPLICATIONS – UNIT 1**  **Assessment type: Response**  **TASK 3 – TEST 2**  **Calculator assumed section 2** |

Student Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID: \_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_

**TIME ALLOWED FOR THIS PAPER**

**Reading and Working time for this paper: 45 minutes in class under test conditions**

**MATERIAL REQUIRED FOR THIS PAPER**

*TO BE PROVIDED BY THE SUPERVISOR*

Question/answer booklet for sections one and two.

*TO BE PROVIDED BY THE CANDIDATE*

*Standard Items:* pens, pencils, pencil sharpener, highlighter, eraser, ruler, drawing templates

**IMPORTANT NOTE TO CANDIDATES**

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further.

**Structure of this paper**

|  |  |  |  |
| --- | --- | --- | --- |
| Section | Number of questions available | Suggested working time (minutes) | Marks available |
| **1- Non-calculator** | **3** | **15** | **15** |
| **2- Calculator assumed** | **5** | **30** | **30** |
|  | | **Marks available:** | 45 |
| **Task Weighting** | 7% |

**Instructions to candidates**

* The rules for the conduct of this examination are detailed in the booklet *WACE* *Examinations Handbook*. Sitting this examination implies that you agree to abide by these rules.
* Answer the questions in the spaces provided.
* Spare answer pages can be used. If you need to use them, indicate in the original answer space where the answer is continued.

### SCSA Content – Topic 1.1: Consumer Arithmetic

### Applications of rates and percentages and use of spread sheets

* + 1. calculate weekly or monthly wage from an annual salary, wages from an hourly rate, including situations involving overtime and other allowances, and earnings based on commission or piecework
    2. calculate payments based on government allowances and pensions
    3. prepare a personal budget for a given income taking into account fixed and discretionary spending
    4. compare prices and values using the unit cost method
    5. use currency exchange rates to determine the cost in Australian dollars of purchasing a given amount of a foreign currency, or the value of a given amount of foreign currency, when converted to Australian dollars
    6. calculate the dividend paid on a portfolio of shares given the percentage dividend or dividend paid for each share, and compare share values by calculating a price-to-earnings ratio
    7. use a spreadsheet to display examples of the above computations when multiple or repeated computations are required; for example, preparing a wage-sheet displaying the weekly earnings of workers in a fast food store where hours of employment and hourly rates of pay may differ, preparing a budget, or investigating the potential cost of owning and operating a car over a year

### SCSA Content – Topic 1.2: Algebra and Matrices

**Matrices and matrix arithmetic**

1. Use matrices for storing and displaying information that can be presented in rows and columns, for example, databases, links in social or road networks. Recognises different types of matrices (row, column, square, zero, identity) and determine their size.
2. Perform matrix addition, subtraction, multiplication by a scalar, and matrix multiplication, including determining the power of a matrix using technology with matrix arithmetic capabilities when appropriate.
3. Use matrices, including matrix products and powers of matrices, to model and solve problems; for example, costing or pricing problems, squaring a matrix to determine the number of ways pairs of people in a communication network can communicate with each other via a third person.

**Question 1 [5 marks]**

The following represents a train line map, answer the questions below.

**M**onroe

Obery

Luxembourg

Newcastle

**P**adbury

(a) Determine the one-stage route matrix. (3 marks)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | L | M | N | O | P |
| L |  |  |  |  |  |
| M |  |  |  |  |  |
| N |  |  |  |  |  |
| O |  |  |  |  |  |
| P |  |  |  |  |  |

(b) A tourist wishes to travel from Monroe to Luxembourg visiting every city along the way, what would his path be? and which stage matrix would represent his path? (2 marks)**Question 2 [ 8 marks]**

An investor inspects the portfolios of 3 of his clients. They all have invested into the same 3 companies. He was unable to find all the relevant information for client A’s portfolio. However, he knows the net worth of client A, client B and client C to be $146,250 , $87,750 and $66,250 respectively. He also knows the share prices BatelCo, AramCo and HoustinCo to be $50, $35 and $27.50 respectively. He was also able to construct matrix **S** showing how many shares each client had in each company.

BatelCo AramCo HoustinCo

S =

(a) Construct a matrix **P** for the share prices that can be multiplied by matrix **S** to give the net worth of each client. (2 marks)

(b) Find the missing values **a** in the matrix provided. (3 marks)

(c) The dividend paid on the shares of BatelCo, AramCo and HoustinCo were $1.49, $1.36 and $1.28 respectively. Using the P/E ratio of the companies’ shares, which company would be best to invest in? (3 marks)

**Question 3 [ 5 marks]**

A year 12 graduate looking for work found these 2 job opportunities for a salesperson at 2 different companies:

Company 1: $14/hr working 30 hours per week

Company 2: $1700 a month

(a) How much would the student’s monthly salary be for Company 1? (1 mark)

(b) The student found a 3rd Company and they offered a retainer of $1000 with a 10% commission for sales above $2500. The student did some research and found that employees at this company made an average of $8500 in sales every month. Should he pursue this offer over the other companies? Justify your answer. (4 marks)

**Question 4 [ 7 marks]**

In the country of Wealthyland, the government will pay allowances to families with children.

The following tables represent the amount of allowance a family can receive.

|  |  |
| --- | --- |
| **Families with 1 child meeting the criteria** | |
| **Combined annual income** | **Allowance for the year** |
| Up to $54 000 | $5100 |
| $54 000 to $73 000 | $5100 less 10 cents for each $1 that annual income exceeds $54 000 |
| $73 000 to $83 000 | $2200 |
| $83 000 to $94 000 | $2200 less 20 cents for each $1 that annual income exceeds $83 000 |
| Over $94 000 | Nil |

|  |  |
| --- | --- |
| **Families with 2 or more children meeting the criteria** | |
| **Combined annual income** | **Allowance for the year** |
| Up to $54 000 | $11 100 |
| $54 000 to $73 000 | $11 100 less 20 cents for each $1 that annual income exceeds $54 000 |
| $73 000 to $97 000 | $7300 |
| $97 000 to $110 000 | $7300 less 30 cents for each $1 that annual income exceeds $97 000 |
| $110 000 to $130 000 | $4400 |
| $130 000 to $140 000 | $4400 less 44 cents for each $1 that annual income exceeds $130 000 |
| Over $140 000 | Nil |

(a) Determine the allowance paid to a family with one child and a combined annual income of $76 000. (1 mark)

(b) Determine the allowance paid to a family with two children and a combined annual income of $105,000. (3 marks)

(c) Determine the combined income a family with one child would earn if the allowance paid to them was $4600. (3 marks)

**Question 5 [ 5 marks]**

A supermarket is offering specials on its drinks. The prices and quantities are in the table below:

|  |  |
| --- | --- |
| Special 1 | Special 2 |
| 8 pack  350 ml cans  $14 | 4 pack  1.25 L bottles  $30 |

(a) Which special is the best buy? Justify your answer (3 mark)

(b) If a 10% discount was applied to both specials would this affect the best buy choice? Why?

(2 marks)

**EXTRA WORKING PAGE:**