TRINITY COLLEGE

Year 12 Mathematics Applications
Test 4 2017

Calculator Assumed

Finance

STUDENT'S NAME _____

DATE: Thursday 29th June **TIME:** 50 minutes **MARKS**: 51

INSTRUCTIONS:

Standard Items: Pens, pencils, drawing templates, eraser

Special Items: Three calculators, notes on one side of a single A4 page (these notes to be handed in with this assessment)

Questions or parts of questions worth more than 2 marks require working to be shown to receive full marks.

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1. (9 marks)

Aaron is investigating obtaining a loan for a new car. Use the screen capture below to answer the following the questions regarding his loan.

(a) Fill in the blank spaces. [6]

A loan of _____, with an annual

interest rate of _____ , will be reduced to

a balance of _____ after _____ years,

when interest is compounded _____,

i.e _____ times per year.

Compound Interest

N	36
I%	7.8
PV	9100
PMT	-350
FV	-214.1490296
P/Y	4
C/Y	4

(b) Determine the interest rate per compounding period? [1]

(c) How much will Aaron's final repayment be? [2]

2. (3 marks)

Determine the principal that would need to be invested at 3.7% p.a. compounded daily to earn $1400 interest in 6 years.

3. (5 marks)

Ryan would like to invest some money. By first determining the effective interest rate, rank the following options from the best (number 1) to the worst.

Scheme	Effective Interest Rate	Rank
10.5% p.a. compounding daily		
11% p.a. simple interest		
0.9% per month compounding monthly		

4. (9 marks)

Luke is depreciating his car for tax purposes. He can choose between using fixed depreciation at of $2000 per year or reducing balance depreciation at rate of 15% per year. Luke purchased the car at the beginning of 2014 for $38 000.

(a) Using the fixed depreciation method,

(i) determine the value of the car in 2017. [2]

(ii) after how many years will the value of the car first fall below $15 000 [2]

(b) Using the reducing balance depreciation,

(i) write a recursive rule that gives the value of the car n years after 2014. [2]

(ii) determine the value of the car in 2017. [1]

(iii) after how many years will the value of the car first fall below $15 000 [2]

5. (20 marks)

Liam is planning to borrow money from the bank to purchase a new car. He will get a reducible interest loan that compounds monthly and he will make regular monthly repayments.

The table below shows the progress for the first 6 months. All values have been rounded to the nearest cent.

Month	Amount owing at the beginning of the month	Interest for the month	Repayment	Amount owing at the end of the month
1	$ 25,000.00	$ 150.00	$ 700.00	$ 24,450.00
2	$ 24,450.00	$ 146.70	$ 700.00	$ 23,896.70
3	$ 23,896.70	$ 143.38	$ 700.00	$ 23,340.08
4	$ 23,340.08	$ 140.04	$ 700.00	$ 22,780.12
5	$ 22,780.12	$ 136.68	$ 700.00	$ 22,216.80
6	$ 22,216.80	$ 133.30	$ 700.00	$ 21,650.10
7				

(a) Determine the values of **A, B, C** and **D** to complete the table below. [5]

Annual Interest Rate (%)	**A**
Number of compounds p.a	**B**
Monthly loan repayment	**C**
Starting amount	**D**

(b) Complete the last row of the table, to show the progress for the 7^{th} month. [2]

(c) In which month will Liam pay off the loan? [1]

(d) Determine the amount of interest that Liam will pay over the life of the loan. [3]

(e) What affect will it have on the loan if Liam repays $150 per month? [2]

(f) Write a recurrence relation where V_n is the value outstanding after n months. [3]

After 2 years Liam explores some options to determine if he can pay the loan back quicker.

(g) If, after 2 years, Liam decides to double the repayment he makes each month, by how much will he shorten the life of the loan? [2]

(h) If Liam would like to repay the remaining amount in 6 equal monthly repayments, how much, to the nearest cent, should he repay each month? [2]

6. (5 marks)

To save up to buy a new car James opens a savings account that earns 11.4% p.a. compounded monthly. He initially deposits $2700 when he opens the account at the beginning of the month and then he deposits $420 at the end of every month.

(a) How much is in James' account after 2 years? [2]

(b) Calculate the interest earned in the two years as a percentage of James' total contributions to the account. [2]

(c) Explain why the percentage in part (b) is different from the annual interest rate. [1]