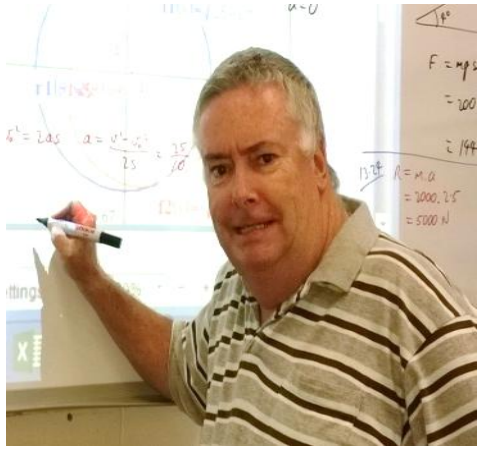
TI-30X Plus Mathprint

4D: Calculator skills and preparation for the General Mathematics QCAA Technology Active Examination

Brian Lannen & Stephen Broderick

Texas Instruments



Brian Lannen

Murray Mathematics Curriculum Services

T³ National Instructor

4D: Calculator skills and preparation for the General Mathematics QCAA Technology Active Examination (TI-30X Plus Mathprint)

Participants in this session will look at how the TI scientific calculators can be accurately and efficiently used to answer questions from the 2024 QCAA Technology-Active Examination. As part of this session, we will also consider how this technology might positively inform future teaching and learning.

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QLD

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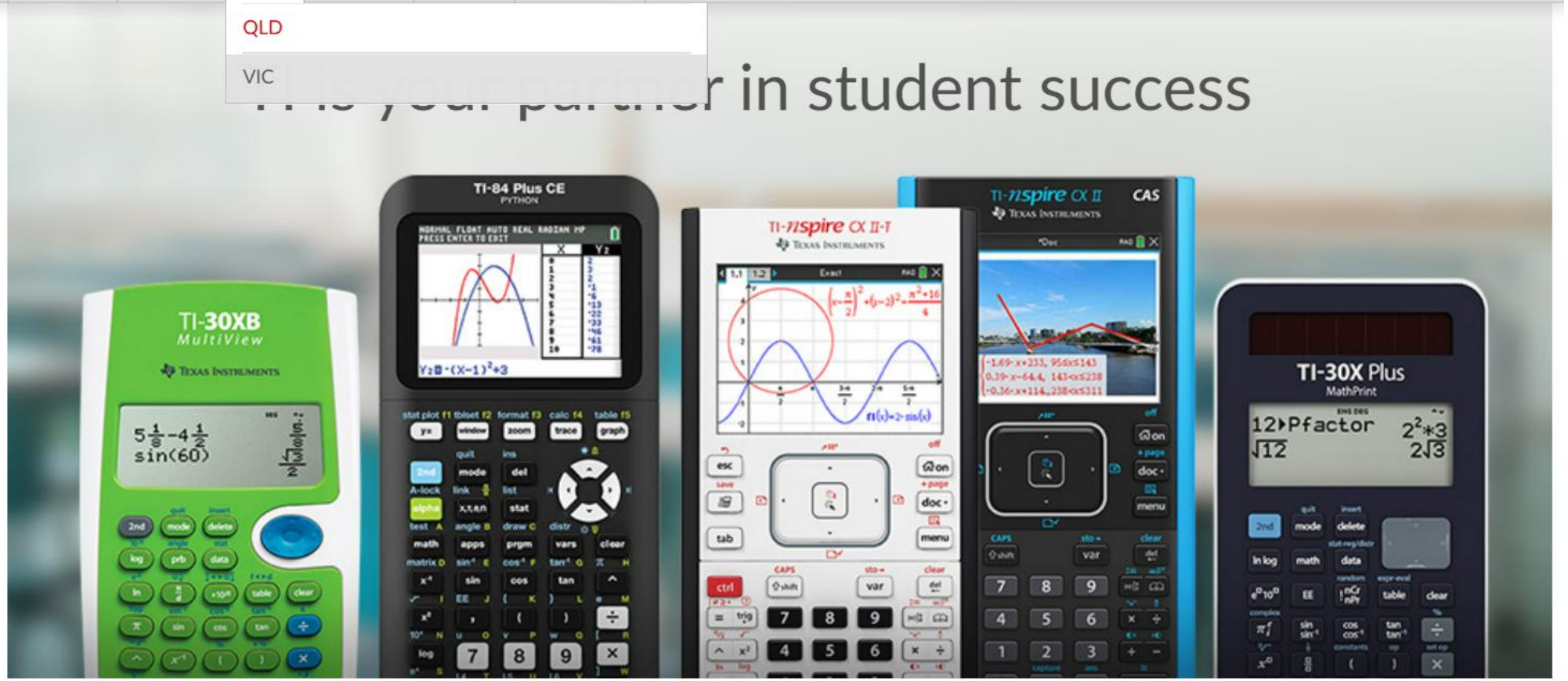


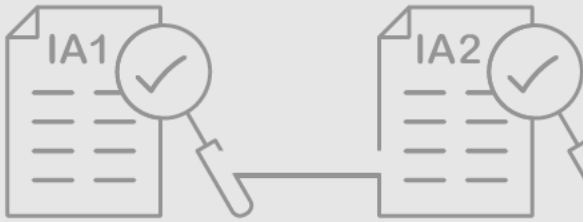
TI calculators and resources are built with the classroom in mind —

TEXAS INSTRUMENTS

General Mathematics subject report

2024 cohort

January 2025



Question	A	B	C	D
1	10.91	**69.62**	2.89	15.96
2	2.76	9.59	36.96	**50.05**
3	35.16	**24.57**	29.38	9.96
4	25.00	8.20	2.93	**63.26**
5	6.62	5.80	**64.35**	22.59
6	**83.66**	6.55	2.88	6.34
7	10.34	16.89	**62.37**	9.70
8	12.47	15.62	**65.88**	5.25
9	4.53	8.84	31.37	**54.26**
10	9.16	16.05	**46.44**	27.39
11	3.94	**92.78**	1.63	1.08
12	**33.66**	38.85	19.93	6.36
13	**43.89**	11.25	17.02	26.89
14	10.82	31.48	**44.25**	12.51
15	**43.29**	12.11	39.77	4.12

Multiple choice question book

General Mathematics

Paper 1

QUESTION 1

A location with coordinates (28° N 16° W) is positioned

Task 15: Global greatness

Topic 5: Earth Geometry and Time Zones > Locations on the Earth

Focus: Calculate angular distance and distance between two places on Earth on the same meridian.

The shortest distance between two points on the Earth lies along a curve, not a straight line. Our planet is approximately spherical having a radius of about 6371km. All meridians of longitude form great circles around the earth with $r = 6371$ km. As such the distance D between any two places on the same meridian can be calculated as $D = 6371 \times \frac{\pi}{180} \times \theta$ where θ is the angular distance between the two places and can be determined from the latitudes of those places.

This formula can also be simplified to $D = 111.2 \times \theta$.

(a) Explain how the angular distance θ is calculated using the latitudes of two locations that are both north or both south of the equator and located along the same meridian.

(b) Explain how the angular distance θ is calculated using the latitudes of two locations that are located along the same meridian but one is north and the other is south of the equator.

(e) The following table provides latitudes for pairs of cities that are in the same hemisphere and are approximately located on the same meridian. Use the lists feature of TI-30X Plus MathPrint to calculate the distances between each pair of cities.

Pair	longitude	City 1	latitude	City 2	latitude
1	88°W	Mobile (USA)	30.695°N	Chicago (USA)	41.878°N
2	145°E	Melbourne (Australia)	37.814°S	Cairns (Australia)	16.919°S
3	122°W	Portland (USA)	45.523°N	San Francisco (USA)	37.775°N
4	144°E	Bendigo (Australia)	36.757°S	Geelong (Australia)	38.150°S

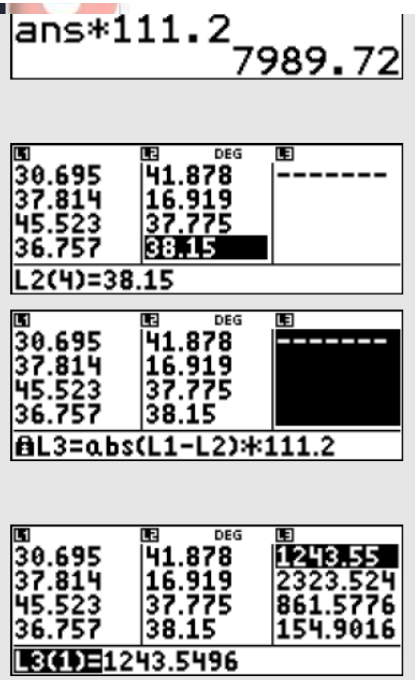
(e) Enter commands as follows:

- Press data key and if necessary clear lists (by a second press of data key and selecting **Clear ALL**).
- Enter City 1 latitudes into L1 and City 2 latitudes into L2.
- Arrow across to L3 and press data key again, arrow across to **FORMULA** and select **Add/Edit Frmla**.
- Press math key.
- Arrow across to **NUM** menu.
- Select the **abs(** command.
- Within the absolute value command type L1 minus L2 then multiply this by 111.2.

Note: L1 and L2 are accessed by an additional press of the data *key.*

- Press enter to see the distances between cities.

Answer:
Mobile and Chicago are 1244 km apart.
Melbourne and Cairns are 2324 km apart.
Portland and San Francisco are 862 km apart.
Bendigo and Geelong are 155 km apart.



TEXAS INSTRUMENTS

Multiple choice question book

General Mathematics

Paper 1

QUESTION 2

In a graph, an open walk with repeated vertices and no repeated edges is called a

2.8	(A) bridge.
9.6	(B) loop.
37	(C) path.
50	(D) trail.

Multiple choice question book

General Mathematics

Paper 1

QUESTION 3

The coefficient of determination, R^2, is equal to 0.36 for the linear association between x (explanatory variable) and y (response variable).

Which statement is correct?

35.2 (A) 36% of the variation in x can be explained by the variation in y.

24.6 (B) 36% of the total variation can be explained by the linear association.

29.4 (C) 36% of the predicted outcomes can be explained by the variation in x.

10 (D) 36% of the variation in x can be predicted by the linear association.

Multiple choice question book

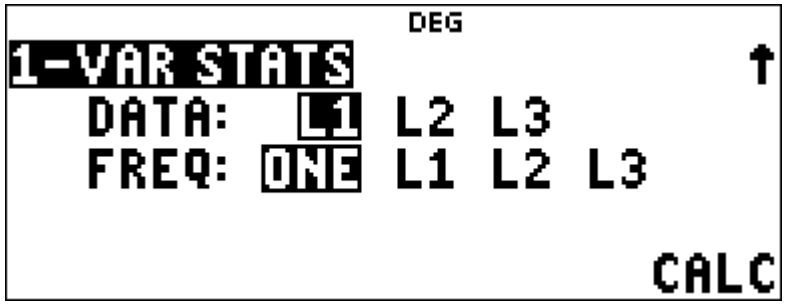
General Mathematics

Paper 1

QUESTION 6

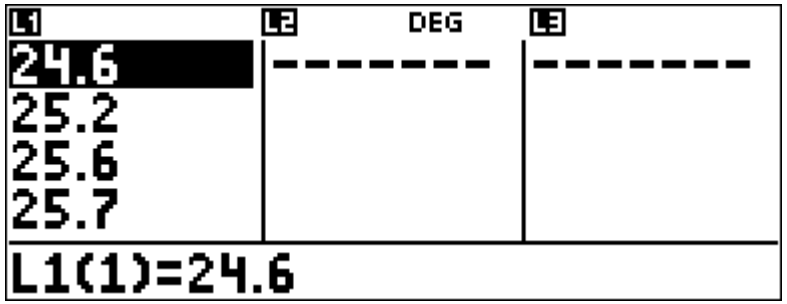
The table shows the maximum daily temperature (°C) for a week.

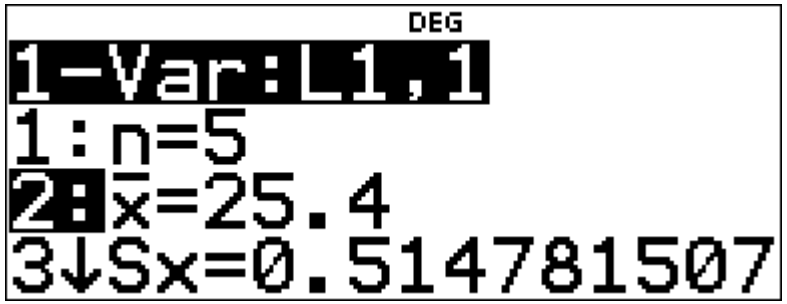
Mon	Tue	Wed	Thu	Fri	Sat	Sun
24.4	25.2	24.6	25.2	25.6	25.7	25.9



If the simple 5-point moving average for Wednesday is 25.0 °C, what is the simple 5-point moving average (°C) for Friday?

83.7	(A) 25.4
6.6	(B) 25.5
2.9	(C) 25.6
6.3	(D) 26.0





Multiple choice question book

General Mathematics

Paper 1

QUESTION 8

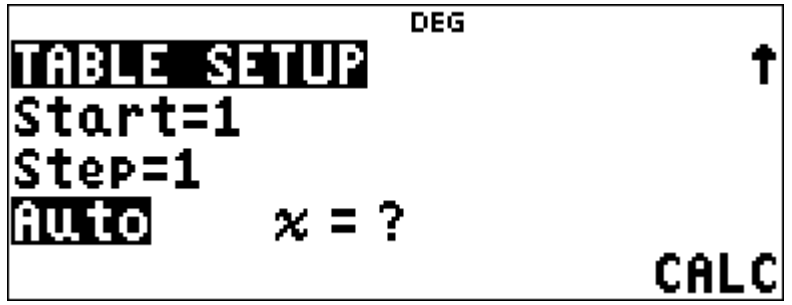
After n bounces, the rebound height (cm) of a ball, t_n, is modelled by the rule $t_n = 240 \times 0.5^{(n-1)}$.
Calculate the difference in rebound height (cm) between the first bounce and the third bounce.

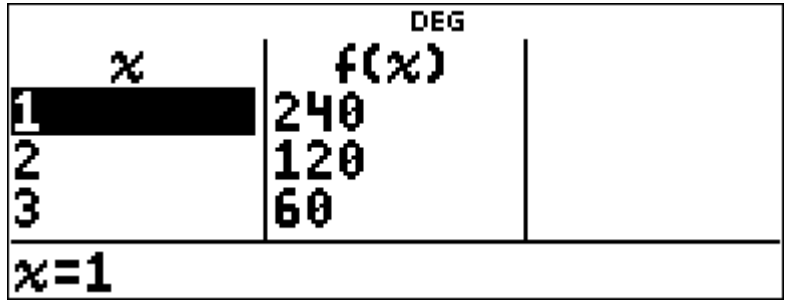
12.5 (A) 90

15.6 (B) 120

65.9 (C) 180

5.3 (D) 210





Multiple choice question book

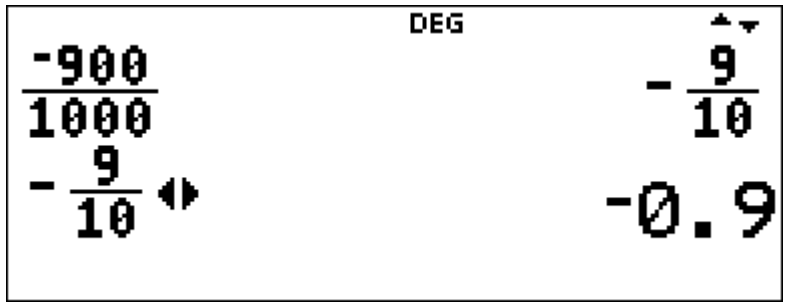
General Mathematics

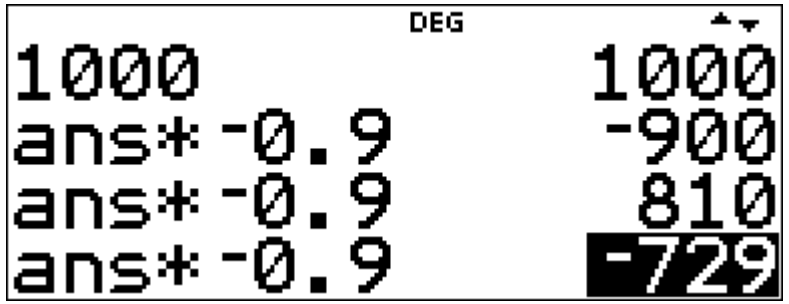
Paper 1

QUESTION 9

Determine the 4th term for the geometric sequence that begins 1000, –900, …

4.5	(A) 729
8.8	(B) 700
31.4	(C) –700
54.3	(D) –729





Multiple choice question book

General Mathematics

Paper 1

QUESTION 12

For a dataset with 10 points, the value of $\sum\left(\frac{x_i-\bar{x}}{s_x}\right)\left(\frac{y_i-\bar{y}}{s_y}\right)$ is equal to -4.5.

Calculate the correlation coefficient.

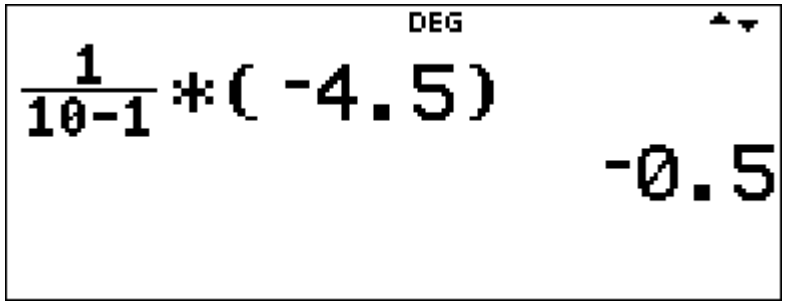
33.7 (A) -0.50

38.9 (B) -0.45

19.9 (C) 0.45

6.4 (D) 0.50

$$r=\frac{1}{n-1}\sum\left(\frac{x_i-\bar{x}}{s_x}\right)\left(\frac{y_i-\bar{y}}{s_y}\right)$$



Multiple choice question book

General Mathematics

Paper 1

QUESTION 13

The table shows time series data for a company's quarterly sales.

Quarter	1	2	3	4
Sales ($)	2700	3600	4500	7200
Seasonal index	0.6	0.8	1.0	—

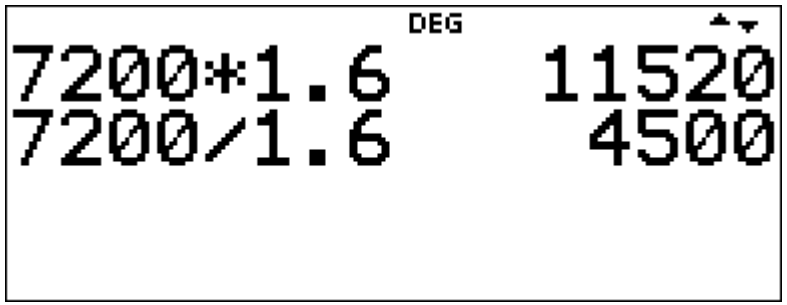
Determine the seasonally adjusted sales ($) for the fourth quarter.

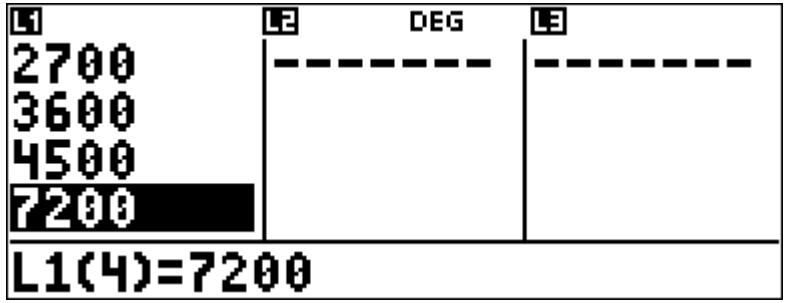
43.9 (A) 4500

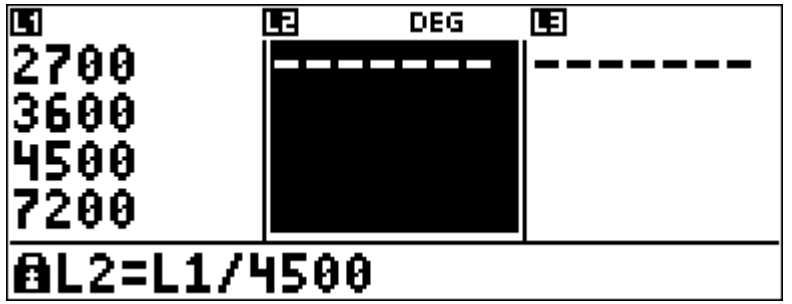
11.3 (B) 6000

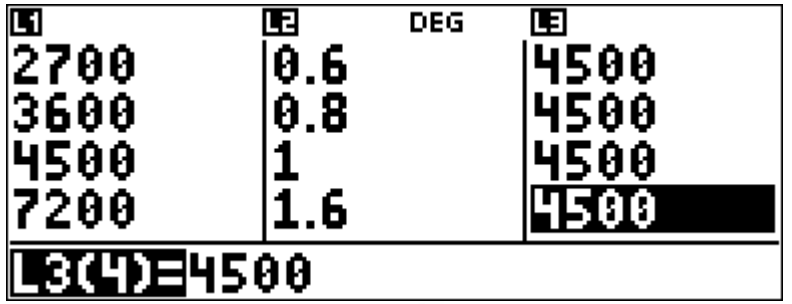
17 (C) 8640

26.9 (D) 11 520









Multip

QCE General Mathematics Unit 4

Task 17: That's effective!

Topic 1: Loans, investments and annuities 1 > Cor

Focus: Calculate the effective annual rate of interest.

Answer the following questions correct to two decimal

(a) Calculate the effective annual rate of interest for t compounding periods:

(i) 4.2% p.a. compounding daily
(ii) 4.6% p.a. compounding weekly
(iii) 5.1% p.a. compounding monthly
(iv) 5.4% p.a. compounding quarterly
(v) 5.7% p.a. compounding six-monthly

Sharni is considering a car loan of $40 000. Her bank i

Option A: 7.7% p.a. compounding quarterly *O*

(b) Calculate the effective annual interest rate for each

(c) How much interest would Sharni pay in the first ye

(d) Which option should she choose and how much w compared to the other option?

Solution to Task 17: That's effective!

(a) (i) Use the effective interest rate formula $i_{effective} = (1+i)^k - 1$ where i is interest rate per compounding period and k is number of compounding periods per year.

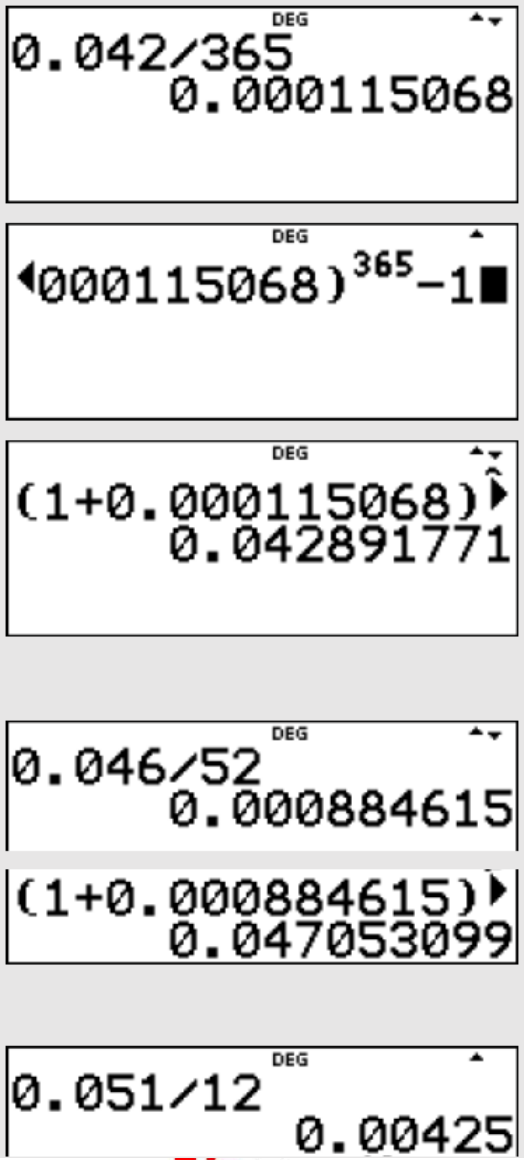
- Divide the nominal annual interest rate by 100 to convert it to a decimal and then divide it by 365 to find the daily interest rate.
- Use this value for i in the effective interest rate formula and 365 for k. Calculate as shown.
- Multiply this result by 100 to find the effective annual interest rate.

Answer: 4.29% (rounded to 2 decimal places)

(ii) Use the effective interest rate formula $i_{effective} = (1+i)^k - 1$ where i is interest rate per compounding period and k is number of compounding periods per year.

- Divide the nominal annual interest rate by 100 to convert it to a decimal and then divide it by 52 to find the daily interest rate.
- Use this value for i in the effective interest rate formula and 52 for k. Calculate as shown.
- Multiply this result by 100 to find the effective annual interest rate.

Answer: 4.71% (rounded to 2 decimal places).



Multiple choice question book

General Mathematics

Paper 1

L1	L2	L3
50	20	-------
55	18	
60	16	
65	14	

L2(1)=20

DEG

2-VAR STATS

xDATA: L1 L2 L3

yDATA: L1 L2 L3

FREQ: ONE L1 L2 L3

CALC

DEG

2-Var:L1,L2,1

↑b=34.1

:r²=0.985199005

↓r=-0.992571914

43.3

12.1

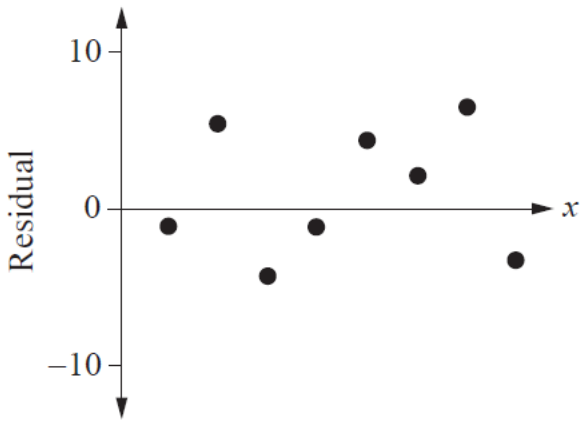
39.8

4.1

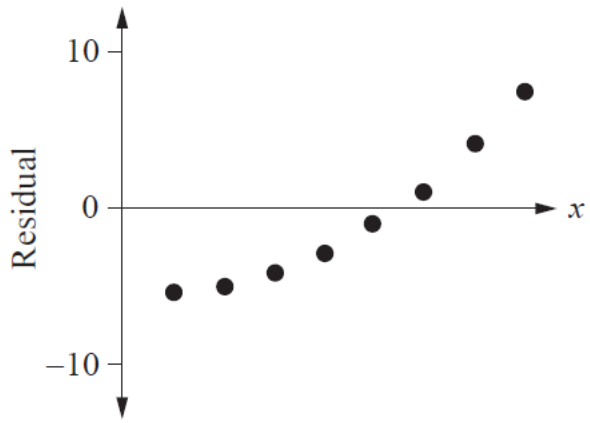
QUESTION 15

Which residual plot best supports fitting a linear model to a dataset?

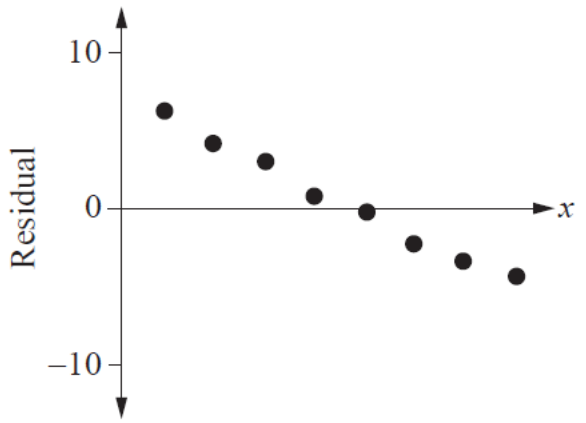
(A)



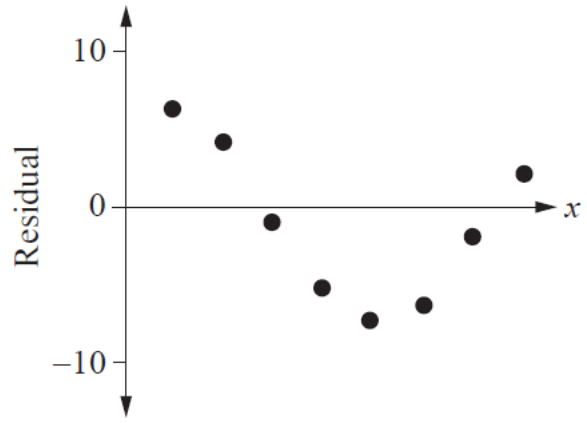
(B)



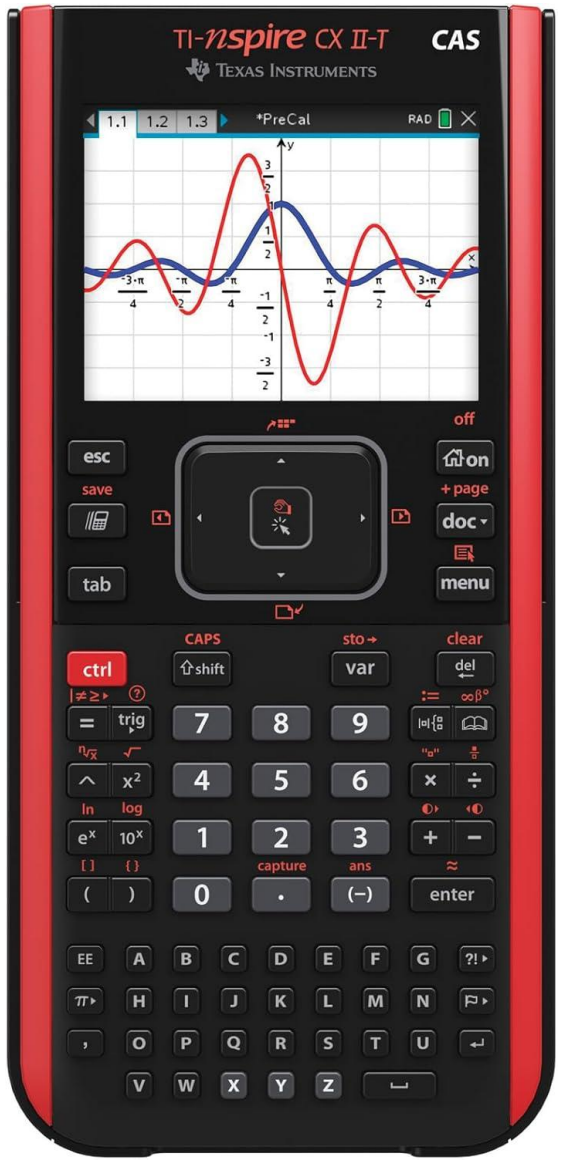
(C)

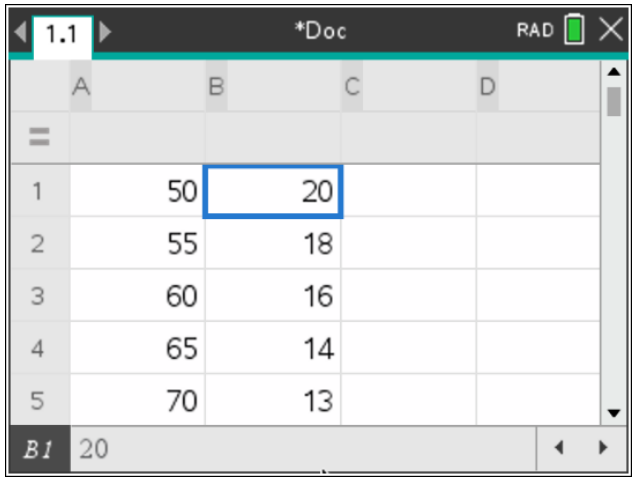


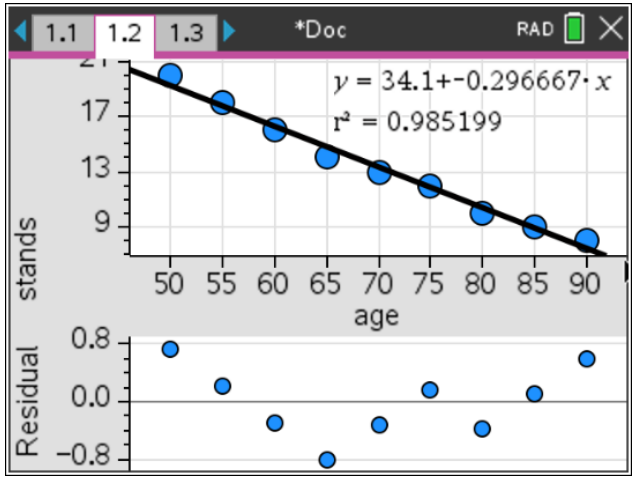
(D)

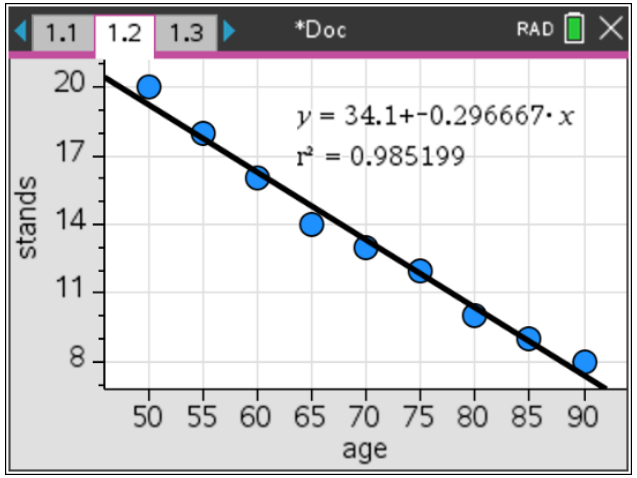


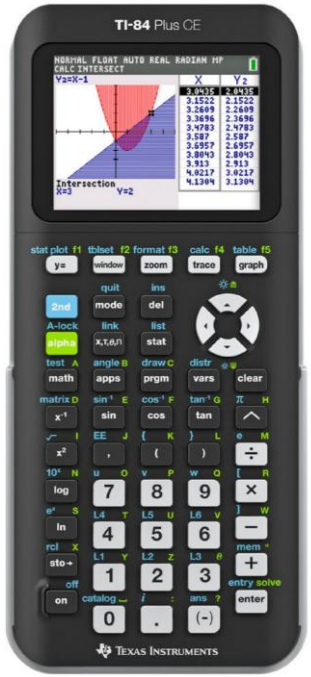
Students need to see residual plots!

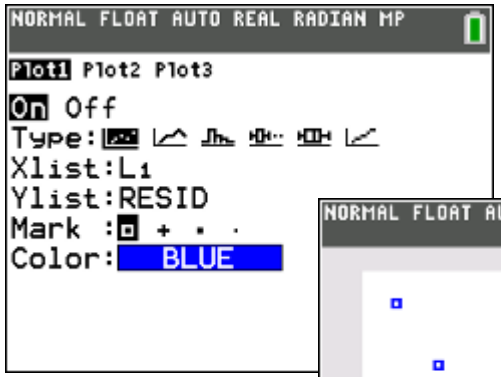


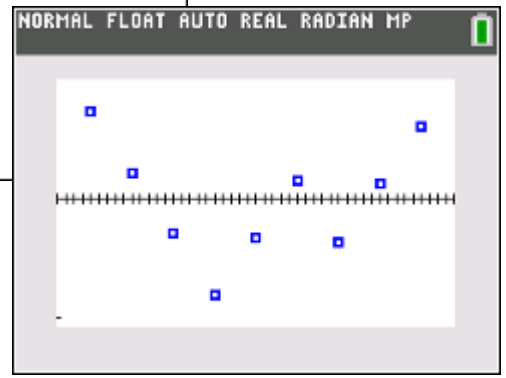












Texas Instruments

Question and response book

General Mathematics

Paper 1

QUESTION 16 (3 marks)

The number of seats in each row of a theatre forms the terms of the arithmetic sequence $t_{n+1} = t_n + 8$, where $t_1 = 25$.

a) How many seats are in the second row of the theatre? *[1 mark]*

b) Complete the table and then calculate the total number of seats in the first four rows of the theatre. *[2 marks]*

Row	1	2	3	4
Number of seats				

Question and response book

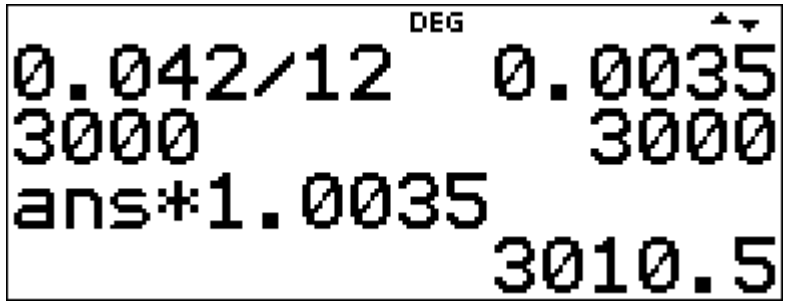
General Mathematics

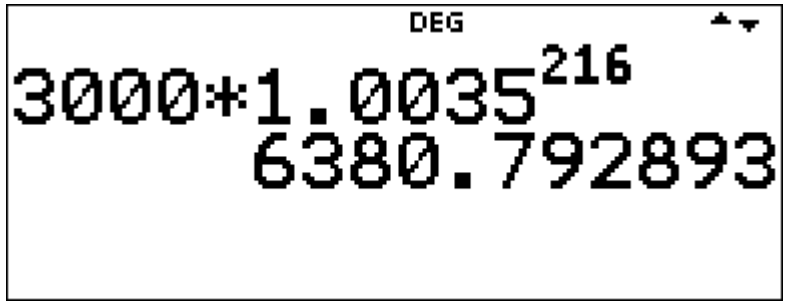
Paper 1

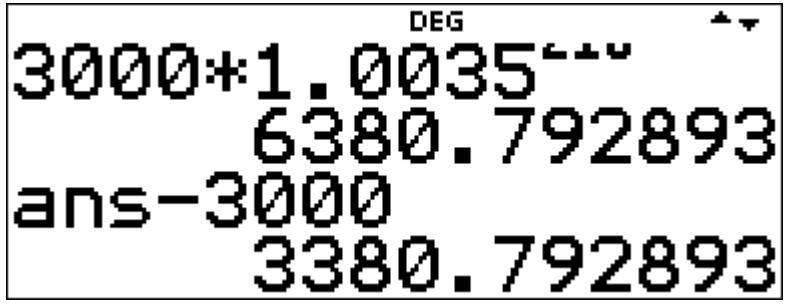
QUESTION 18 (4 marks)

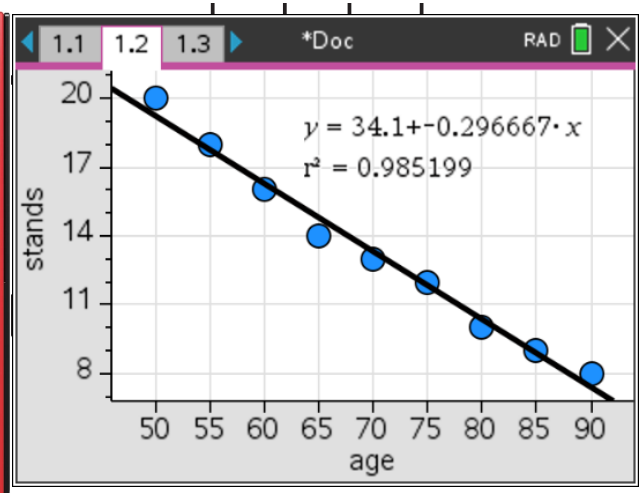
When a child is born, their parent deposits $3000 to open an investment account earning interest at 4.2% p.a. compounding monthly. If there are no further transactions and the interest rate does not change, calculate the amount of interest earned by the child's 18th birthday.

18	Using compound interest rule $P = 3000$ $i = \frac{0.042}{12} = 0.0035$ $n = 18 \times 12 = 216$	• correctly determines the i and n values **[1 mark]**
	$A = P(1+i)^n$ $= 3000 \times (1+0.0035)^{216}$	• substitutes into appropriate rule **[1 mark]**
	$A = 6380.79$	• determines value of investment **[1 mark]**
	$I = A - P$ $= 6380.79 - 3000$ $= 3380.79$ The amount of interest earned is $3380.79.	• determines amount of interest earned **[1 mark]**









General Ma

Paper 1

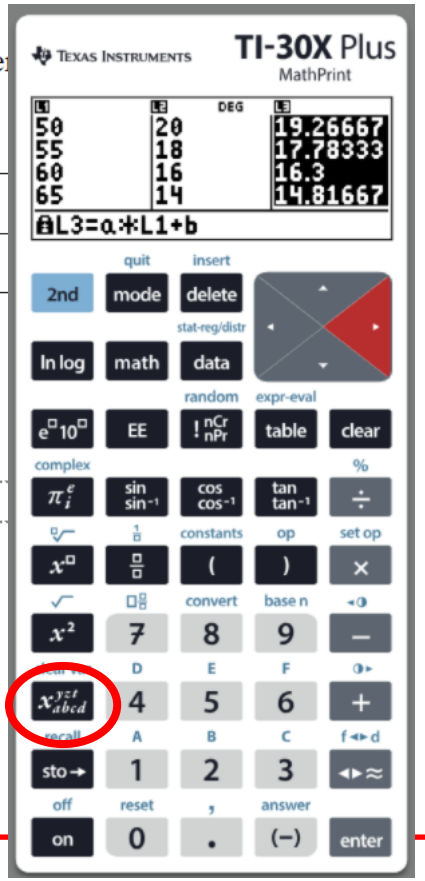
QUESTION 19 (4 marks)

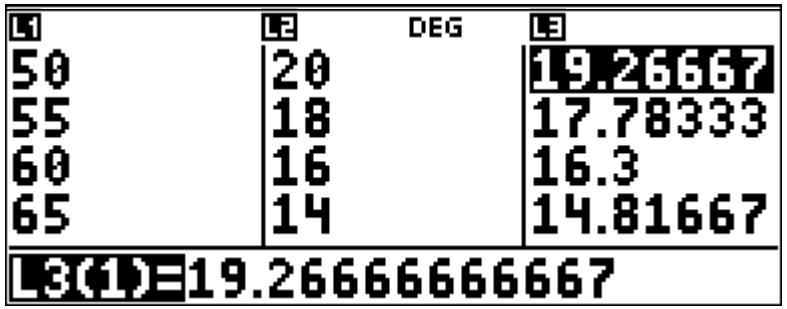
The table shows data from a mobility test that counts the number of times a pe
seated position in 30 seconds.

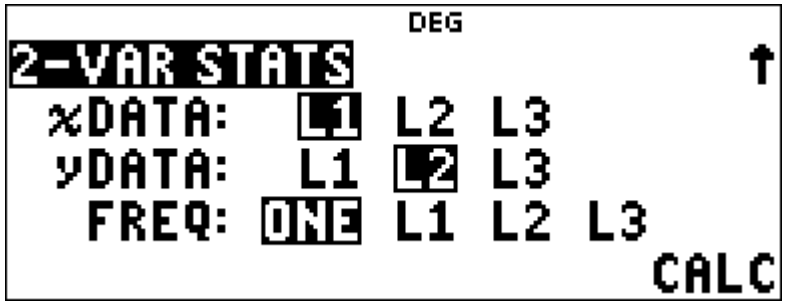
Person's age (years)	50	55	60	65	70	75
Number of stands	20	18	16	14	13	12

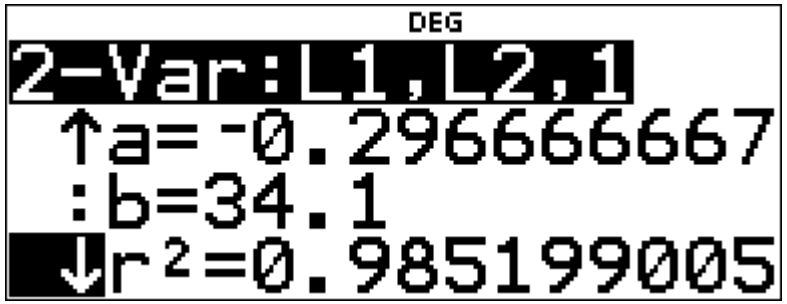
a) Construct a scatterplot to display the data on the grid provided.

b) State the form of the relationship between the variables.









Question and

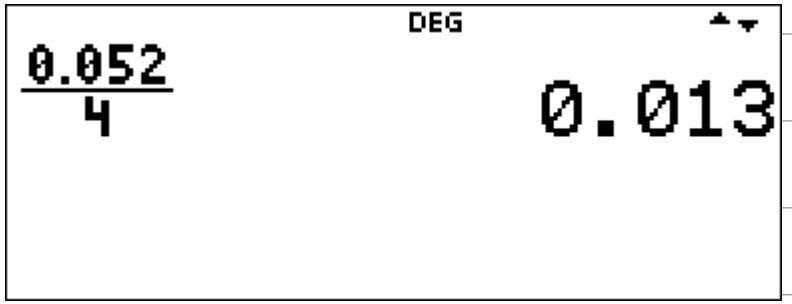
General Mathematics

Paper 1

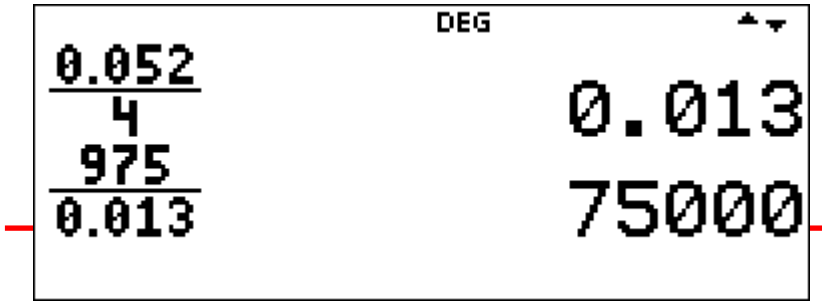
QUESTION 21 (3 marks)

A perpetuity earns interest quarterly at 5.2% p.a. and pays $975 each quarter.

a) Determine the quarterly interest rate.



b) Calculate the value of the perpetuity.

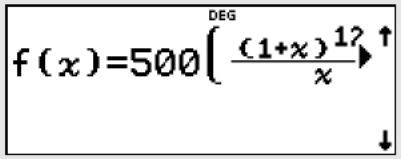


Solution to Task 19: Happy retirement

(a) Use the future value annuity formula

$$A_{FV} = d \times \left(\frac{(1+i)^n - 1}{i} \right) \text{ where}$$

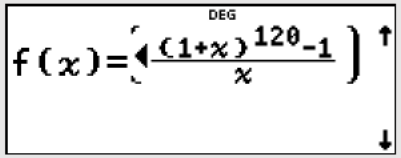
A_{FV} is the amount the annuity grows to after 10 years ($81 940),
d is the periodic payment ($500),
i is the interest rate per compounding period (which is to be determined) and
n is the number of compounding periods (120)



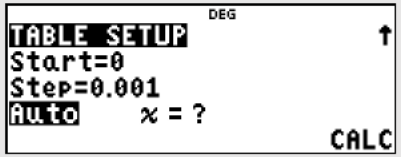
(b) Enter commands as follows:

- Define $f(x)$ for the table feature as shown.

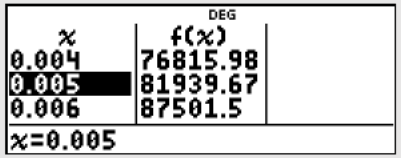
$$f(x) = 500 \times \left(\frac{(1+x)^{120} - 1}{x} \right)$$



- Leave $g(x)$ blank and arrow down to set up the table as shown



*Note: The Step value is set at 0.001 because **i** in our formula requires the per annum rate to be divided by 1200 to make it a monthly decimal value. E.g. for 5% p.a., i = 0.0042.*



- Press enter to see the table and scroll down to the monthly decimal interest rate (given by x) that corresponds to a future annuity value of $81 940.

  Answer: $i = 0.005$ (monthly). Corresponds to 6% p.a.

(c) Enter commands as follows: