MATHEMATICS QUESTIONS BY TOPICS

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FINANCIAL MATHEMATICS

50 Multiple Choice Questions with curriculum references and detailed answers

- Click here for the question index

- Click here for the answer index

- Scan or click the QR codes for more information

SAMPLE

Mathematics Questions by Topics
Financial Mathematics – Multiple Choice

Index – Click on the question. ACR = Australian Curriculum Reference

About the Authors: William Paul Healy BSc BA Dip Ed and Barbara Clarice Healy BSc BEd are experienced mathematics and science teachers each with more than 30 years classroom experience. As principal writers for Kilbaha Education they bring a wealth of pedagogical knowledge and expertise to their many publications. The quality of their work has been demonstrated over the years with content written for the VCE examinations in Victoria Australia.

Mathematic Questions by Topics

Financial Mathematics   Question 1   Source: K20FM1Q17

A sequence is generated by the recurrence relation

$$T_0 = 2, \ T_{n+1} = 3T_n - 7$$

The first four terms of this sequence will be

A. 2, -1, 12, 29

B. 2, -1, -10, -37

C. 2, 13, 32, 89

D. 2, -15, 24, -65

E. 2, -13, 46, -131

Curriculum	Subject	Topic	Description
Australia	General Mathematics Unit 3	First order linear recurrence relations	use a general first order linear recurrence relation to generate the terms of a sequence and to display it in both tabular and graphical form (ACMGM075)
Victoria	General Mathematics Unit 1,	First order linear recurrence relations	use of a first-order linear recurrence relation of the form $t! = a$, $t'' = t''\#! + d$ where a and d are constants, to generate the terms of an arithmetic sequence and display this in a table or as a graph, and the explicit rule for the $n\$\%$ term
New South Wales	Mathematics Standard Stage 6	Definition only	A recurrence relation occurs when each successive application uses the resultant value of the previous application to generate the next value. Examples include compound interest and annuities.

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Mathematic Questions by Topics

Financial Mathematics   Question 50   Source: K14FM1Mod4Q9

A home loan of $450000 is to be fully repaid in 25 years with monthly repayments of $3800. The interest is to be compounded monthly. Which one of the following statements is true?

A.   The interest rate to one decimal place is 9.8%.

B.   After 5 years, the amount owing will be $400,049.68

C.   Payments of $4000 per month instead of $3,800 would reduce the time to pay off the loan by 3 years.

D.   The amount paid off the principal with each monthly repayment will decrease with time.

E.   After one year, the mortgage will have been reduced by less than $5000.

Curriculum	Subject	Topic	Description
Australia	General Mathematics Unit 3	The geometric sequence	use geometric sequences to model and analyse practical problems involving geometric growth and decay; for example, analysing a compound interest loan or investment (ACMGM074)
Victoria	General Mathematics Units 3 and 4	Compound interest investments and loans	use of a recurrence relation to model and analyse a compound interest investment or loan, including the use of a recurrence relation to determine the value of the compound interest loan or investment after n compounding period for an initial sequence from first principles
New South Wales	Mathematics Standard Stage 6	Depreciation and loans	solve practical problems involving reducing balance loans, for example determining the total loan amount and monthly repayments

**End of
MATHEMATICS QUESTIONS BY TOPICS
FINANCIAL MATHEMATICS
50 Multiple Choice Questions**

MATHEMATICS QUESTIONS BY TOPICS

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FINANCIAL MATHEMATICS
Answers to 50 Multiple Choice Questions

- Click here for the answer index

- Check your answer

- Scan or click the QR code to get more questions

Mathematics Questions by Topics

Financial Mathematics – Multiple Choice Summary of Answers

Q	Answer	Q	Answer
1	B	26	B
2	D	27	C
3	A	28	E
4	E	29	D
5	C	30	A
6	A	31	C
7	C	32	B
8	E	33	B
9	D	34	A
10	B	35	C
11	A	36	D
12	D	37	E
13	B	38	C
14	E	39	B
15	C	40	D
16	B	41	D
17	A	42	E
18	B	43	C
19	E	44	B
20	C	45	B
21	A	46	D
22	D	47	D
23	B	48	B
24	C	49	B
25	E	50	E

Distribution: A 7 B 14 C 10 D 10 E 9

Mathematics Questions by Topics
Data Analysis – Multiple Choice

Index – Click on the answer. ACR = Australian Curriculum Reference.

Q	Topic	ACR	Q	Topic	ACR
1	recurrence relations	ACMGM075	26	geometric sequences	ACMMM074
2	recurrence relations	ACMGM075	27	depreciation	ACMGM070
3	loans, investments	ACMGM094	28	recurrence relations	ACMEM171
4	loans, investments	ACMGM094	29	recurrence relations	ACMEM174
5	reducing balance loans	ACMGM097	30	recurrence relations	ACMEM174
6	loans, investments	ACMGM094	31	recurrence relations	ACMEM174
7	loans, investments	ACMGM096	32	depreciation	ACMGM070
8	compound interest	ACMGM096	33	recurrence relations	ACMEM064
9	recurrence relations	ACMGM075	34	growth and decay	ACMGM067
10	recurrence relations	ACMGM075	35	recurrence relations	ACMGM074
11	recurrence relations	ACMGM075	36	depreciation	ACMGM070
12	depreciation	ACMGM070	37	annuities, perpetuities	ACMGM100
13	reducing balance loans	ACMEM171	38	depreciation	ACMGM070
14	compound interest	ACMEM171	39	reducing balance loans	ACMGM096
15	annuities, perpetuities	ACMGM100	40	arithmetic sequences	ACMMM070
16	reducing bank loans	ACMGM096	41	rates and percentages	ACMEM013
17	recurrence relations	ACMGM075	42	rates and percentages	ACMEM013
18	depreciation	ACMEM174	43	depreciation	ACMGM070
19	compound interest	ACMEM174	44	compound interest	ACMGM094
20	depreciation	ACMGM070	45	compound interest	ACMGM094
21	annuities, perpetuities	ACMGM099	46	compound interest	ACMEM171
22	geometric sequence	ACMMM076	47	arithmetic sequences	ACMMM070
23	annuities, perpetuities	ACMGM099	48	annuities, perpetuities	ACMGM100
24	compound interest	ACMGM096	49	depreciation	ACMGM074
25	recurrence relations	ACMGM075	50	compound interest	ACMGM074

Mathematic Questions by Topics
Financial Mathematics   Answer 1   Source: K20FM1S17
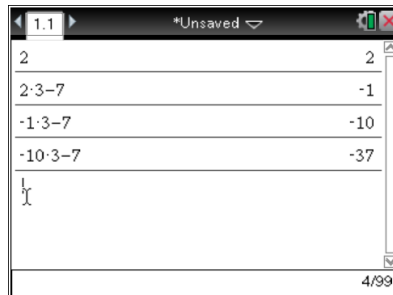
A sequence is generated by the recurrence relation

$$T_0 = 2, \ T_{n+1} = 3T_n - 7$$

The first four terms of this sequence will be

A. 2, -1, 12, 29

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Answer B

Each term is 7 less than 3 times the previous term. Begin with the first term of 2 and repeat the calculation on each term.

With an fx-CG50Au calculator use run mode.

Mathematic Questions by Topics

Financial Mathematics   Answer 50   Source: K14FM1Mod4S9

A home loan of $450,000 is to be fully repaid in 25 years with monthly repayments of $3,800. The interest is to be compounded monthly. Which one of the following statements is true?

Answer E

Use financial mode

$N = 300$	$N = 60$	$N = 12$
$PV = 450,000$	$I = 9.0765$	$I = 9.0765$
$PMT = -3800$	$PV = 450,000$	$PV = 450,000$
$FV = 0$	$PMT = -3800$	$PMT = -3800$
$P/Y = 12$	$P/Y = 12$	$P/Y = 12$
$C/Y = 12$	$C/Y = 12$	$C/Y = 12$
This gives $I = 9.08$	This gives $FV = 420,049.68$	This gives $FV = 445,041.56$
Hence, A is not true.	Hence, B is not true.	This means that the mortgage has been reduced by 450,000 – 445,041.56 = $4958.44 which is less than $5000. Hence, E is true

The amount paid off the mortgage consists of principal and interest.
As time goes by there is less interest to pay so more comes off the principal with each payment. Hence, D is not true.

$I = 9.0765$

$PV = 450,000$

$PMT = -4000$

$FV = 0$

$P/Y = 12$

$C/Y = 12$

This gives $N = 252.586$

This means that the time to pay off the loan has been reduced by 300 – 252.586 = 47.4 months. This is more than 3 years.

Hence, C is not true.

**End of
MATHEMATICS QUESTIONS BY TOPICS
FINANCIAL MATHEMATICS
Answers to 50 Multiple Choice Questions**

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FINANCIAL MATHEMATICS
50 Multiple Choice Questions
STUDENT BOOK

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Mathematic Questions by Topics

Financial Mathematics   Question 2   Source: K20FM1Q18

The values of the first five terms of a sequence are plotted on the graph below.
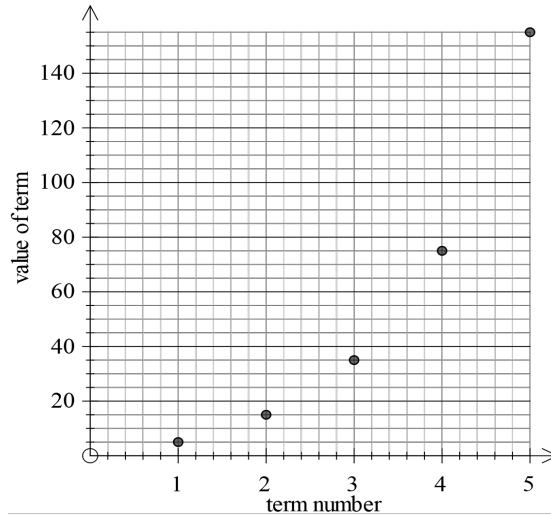
The recurrence relation that could generate this sequence is

A. $T_0 = 5$, $T_{n+1} = 3T_n$

B. $T_0 = 5$, $T_{n+1} = 5T_n - 10$

C. $T_0 = 5$, $T_{n+1} = T_n + 20$

D. $T_0 = 5$, $T_{n+1} = 2T_n + 5$

E. $T_0 = 5$, $T_{n+1} = 3T_n - 15$

Mathematic Questions by Topics

Financial Mathematics   Question 49   Source: K14FM1Mod4Q5

Diana buys a car for $35,000. If the car is depreciated at 12% per annum using the reducing balance method, then the value of the car after 6 years is closest to

A. $9,800

B. $16,254

C. $18,746

D. $25,200

E. $30,800

Mathematic Questions by Topics

Financial Mathematics   Question 50   Source: K14FM1Mod4Q9

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