GENERAL MATHEMATICS 2024

Unit 3
Key Topic Test 7 – Recursion and Financial Modelling: Annuities and Perpetuities

Recommended writing time*: 45 minutes
Total number of marks available: 25 marks

SOLUTIONS

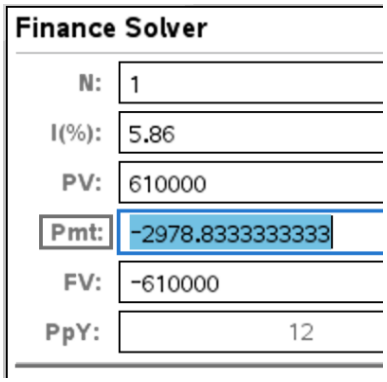
SECTION A – Multiple Choice (1 mark per question)

Question 1
Answer: C

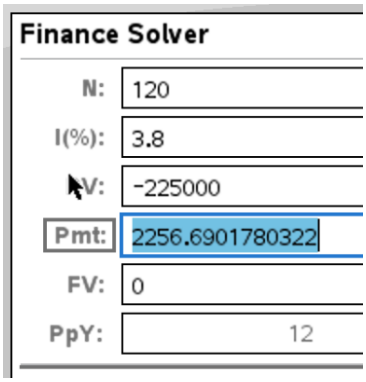
$\frac{4.2}{400} \times P = 8200$

$P = 780\ 952.38$

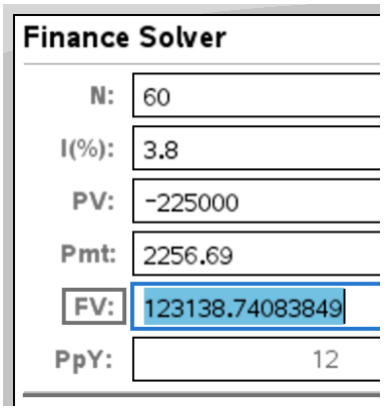
Question 2
Answer: D



Question 3
Answer: B



Question 4
Answer: D



Question 5
Answer: A

$A_0 = 845\,000, \;\; A_{n+1} = 1.002A_n - 3100$

SECTION B – Short Answer

Question 1

a. $\frac{r}{1200} \times 210000 = 1085$

$r = \frac{1085 \times 1200}{210000}$

$r = 6.2\%$

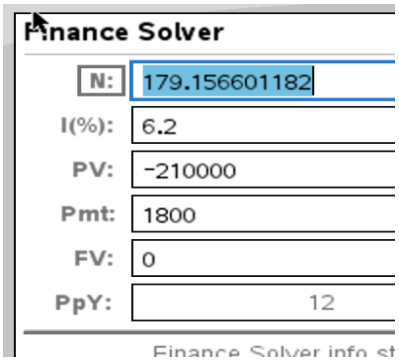
1 mark

b.

Payment number	*Payment*	*Interest*	*Principal reduction*	*Balance of the annuity*
0	-	-	-	210 000
1	1800.00	1085	715	209 285
2	1800.00	1081.31	718.69	208 566.31
3	**1800.00**	**1077.59**	**722.41**	**207 843.90**

3 marks

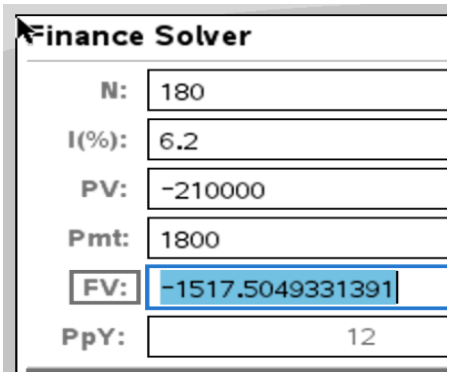
c. 180 months or 15 years



2 marks

d. Payments = $179 \times 1800 + 1 \times (1800 - 1517.50) = 322\,482.50$

Interest = $322\,482.50 - 210\,000 = \$112\,482.50$



3 marks

Total 9 marks

Question 2

a. $V_0 = 922\,500,\ V_{n+1} = 1.004V_n - 4800$

2 marks

b.

Payment number	*Payment*	*Interest*	*Principal reduction*	*Balance of the annuity*
0	-	-	-	922 500.00
1	4800	3690.00	1110.00	921 390.00
2	**4800**	**3685.56**	**1114.44**	**920 275.56**

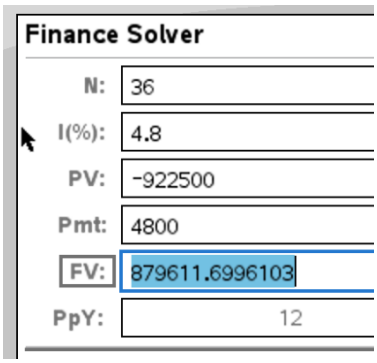
Interest $= \frac{4.8}{1200} \times 921390 = 3685.56$ (1 mark)

Principal reduction $= 4800 - 3685.56 = 1114.44$ (1 mark)

Balance $= 921390 - 1114.44 = 920275.56$ (1 mark)

3 marks

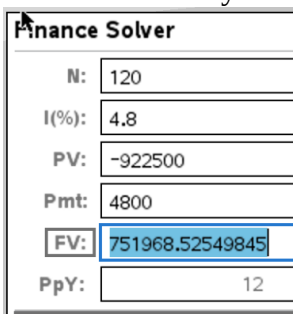
c.



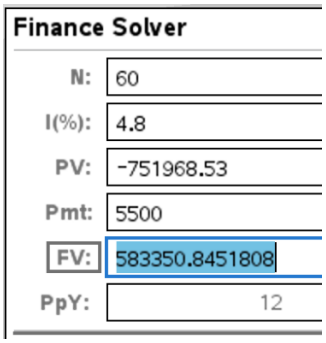
Balance = \$879 611.70

2 marks

d. Balance after 10 years = $751 968.53

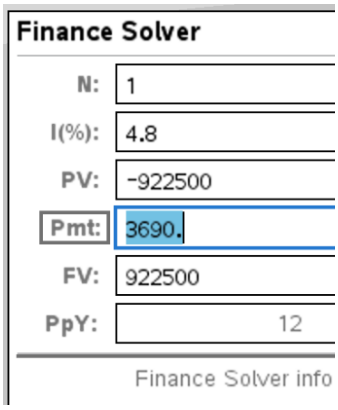


Balance after 15 years = $583 350.85



1 mark

e. $3690



2 marks

f. Perpetuity

1 mark
Total 11 marks

END OF KEY TOPIC TEST SOLUTIONS