

FINANCIAL MATHEMATICS WORKSHEET 1

(for Casio Graphics Calculators – TVM Mode)

NOTE: The questions with a # at the end should provide an interesting answer when compared to the previous question!!

NAME: _____

1. How much will \$2 000 grow to at 12% interest pa compounding annually for 10 years?

n =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
ANSWER =

2. How much will \$2 000 grow to at 12% interest pa compounding annually for 50 years? #

n =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
ANSWER =

3. How much will \$2 000 grow to at 6% interest pa compounding monthly for 30 years?

n =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
ANSWER =

4. How much will \$2 000 grow to at 12% interest pa compounding monthly for 20 years?

n =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
ANSWER =

5. How much will \$2 000 grow to at 12% interest pa compounding daily for 20 years? (assume 365 days per year) #

n =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
ANSWER =

6. How much will \$2 000 grow to at 12% interest pa compounding half yearly for 20 years? #

n =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
ANSWER =

7. How long will you need to invest \$10 000 for at 9% pa compounding monthly so that it triples in value? (Answer in years)

n =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
ANSWER =

8. What per annum interest rate will be required for an investment of \$12 000 to become \$18 000 in 5 years if the interest were to compound annually? (Answer to 3sig figs)

n =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
ANSWER =

9. What per annum interest rate will be required for an investment of \$12 000 to become \$18 000 in 5 years if the interest were to compound daily? (Answer to 3sig figs) #

n =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
ANSWER =

10. How much will you need to invest today in order to have an investment of \$4 500 000 in 10 years time at 18% pa interest compounding monthly?

n =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
ANSWER =

11. How much will you need to invest today in order to have an investment of \$4 500 000 in 30 years time at 18% pa interest compounding monthly? #

n =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
ANSWER =

12. How much will you need to invest today in order to have an investment of \$4 500 000 in 50 years time at 18% pa interest compounding monthly? #

n =
I% =
PV =
PMT =
FV =
P/Y =
C/Y =
ANSWER =

13. Calculate the value of an annuity after 5 years which begins with an initial investment of \$10 000, has regular monthly payments of \$200 added to it and accrues interest of 9% pa compounding monthly.

n =
 I% =
 PV =
 PMT =
 FV =
 P/Y =
 C/Y =
 ANSWER =

14. Calculate the value of an annuity after 15 years which begins with an initial investment of \$5 000, has regular monthly payments of \$200 added to it and accrues interest of 9% pa compounding monthly.

n =
 I% =
 PV =
 PMT =
 FV =
 P/Y =
 C/Y =
 ANSWER =

15. How much should you initially invest in an account into which you will make monthly payments of \$100 if the account gains 12% pa interest compounding monthly if you need \$100 000 in 10 years time?

n =
 I% =
 PV =
 PMT =
 FV =
 P/Y =
 C/Y =
 ANSWER =

16. What pa interest rate, monthly compounding will you require for an initial investment of \$20 000 to become \$80 000 over 5 years if regular monthly payments of \$500 are made? (Answer to 3 sig figs)

n =
 I% =
 PV =
 PMT =
 FV =
 P/Y =
 C/Y =
 ANSWER =

17. What pa interest rate, monthly compounding will you require for an initial investment of \$20 000 to double over 5 years if regular monthly payments of \$500 are made? (Answer to 2 sig figs)

Explain why the answer is a negative percentage.

n =
 I% =
 PV =
 PMT =
 FV =
 P/Y =
 C/Y =
 ANSWER =

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NAME: **SOLUTIONS**

1. How much will \$2 000 grow to at 12% interest pa compounding annually for 10 years?

n = 10
I% = 12
PV = -2 000
PMT = 0
FV = ?
P/Y = 1
C/Y = 1
ANSWER = \$6 211.70

2. How much will \$2 000 grow to at 12% interest pa compounding annually for 50 years?

n = 50
I% = 12
PV = -2 000
PMT = 0
FV = ?
P/Y = 1
C/Y = 1
ANSWER = \$578 004.38

3. How much will \$2 000 grow to at 6% interest pa compounding monthly for 30 years?

n = 30 x 12 = 360
I% = 6
PV = -2 000
PMT = 0
FV = ?
P/Y = 12
C/Y = 12
ANSWER = \$12 045.15

4. How much will \$2 000 grow to at 12% interest pa compounding monthly for 20 years?

n = 20 x 12 = 240
I% = 12
PV = -2 000
PMT = 0
FV = ?
P/Y = 12
C/Y = 12
ANSWER = \$21 785.11

5. How much will \$2 000 grow to at 12% interest pa compounding daily for 20 years? (assume 365 days per year)

n = 20 x 365 = 7300
I% = 12
PV = -2 000
PMT = 0
FV = ?
P/Y = 365
C/Y = 365
ANSWER = \$22 037.66

6. How much will \$2 000 grow to at 12% interest pa compounding half yearly for 20 years?

n = 20 x 2
I% = 12
PV = -2 000
PMT = 0
FV = ?
P/Y = 2
C/Y = 2
ANSWER = \$20 571.44

7. How long will you need to invest \$10 000 for at 9% pa compounding monthly so that it triples in value? (Answer in years)

n = ?
 I% = 9
 PV = -10 000
 PMT = 0
 FV = 30 000
 P/Y = 12
 C/Y = 12
 ANSWER = 12.25 years

8. What per annum interest rate will be required for an investment of \$12 000 to become \$18 000 in 5 years if the interest were to compound annually? (Answer to 3sig figs)

n = 5
 I% = ?
 PV = -12 000
 PMT = 0
 FV = 18 000
 P/Y = 1
 C/Y = 1
 ANSWER = 8.45% pa

9. What per annum interest rate will be required for an investment of \$12 000 to become \$18 000 in 5 years if the interest were to compound daily? (Answer to 3sig figs) #

n = 5 x 365 = 1825
 I% = ?
 PV = -12 000
 PMT = 0
 FV = 18 000
 P/Y = 365
 C/Y = 365
 ANSWER = 8.11% pa

10. How much will you need to invest today in order to have an investment of \$4 500 000 in 10 years time at 18% pa interest compounding monthly?

n = 10 x 12 = 120
 I% = 18
 PV = ?
 PMT = 0
 FV = 4 500 000
 P/Y = 12
 C/Y = 12
 ANSWER = \$753 854.35

11. How much will you need to invest today in order to have an investment of \$4 500 000 in 30 years time at 18% pa interest compounding monthly? #

n = 30 x 12 = 360
 I% = 18
 PV = ?
 PMT = 0
 FV = 4 500 000
 P/Y = 12
 C/Y = 12
 ANSWER = \$21 156.18

12. How much will you need to invest today in order to have an investment of \$4 500 000 in 50 years time at 18% pa interest compounding monthly? #

n = 50 x 12 = 600
 I% = 18
 PV = ?
 PMT = 0
 FV = 4 500 000
 P/Y = 12
 C/Y = 12
 ANSWER = \$593.73 !!!!!

13. Calculate the value of an annuity after 5 years which begins with an initial investment of \$10 000, has regular monthly payments of \$200 added to it and accrues interest of 9% pa compounding monthly.

$$\begin{aligned} n &= 5 \times 12 = 60 \\ I\% &= 9 \\ PV &= -10\,000 \\ PMT &= -200 \\ FV &= ? \\ P/Y &= 12 \\ C/Y &= 12 \\ \text{ANSWER} &= \$30\,741.64 \end{aligned}$$

14. Calculate the value of an annuity after 15 years which begins with an initial investment of \$5 000, has regular monthly payments of \$200 added to it and accrues interest of 9% pa compounding monthly.

$$\begin{aligned} n &= 15 \times 12 = 60 \\ I\% &= 9 \\ PV &= -5\,000 \\ PMT &= -200 \\ FV &= ? \\ P/Y &= 12 \\ C/Y &= 12 \\ \text{ANSWER} &= \$94\,871.37 \end{aligned}$$

15. How much should you initially invest in an account into which you will make monthly payments of \$100 if the account gains 12% pa interest compounding monthly if you need \$100 000 in 10 years time?

$$\begin{aligned} n &= 10 \times 12 = 120 \\ I\% &= 12 \\ PV &= ? \\ PMT &= -100 \\ FV &= 100\,000 \\ P/Y &= 12 \\ C/Y &= 12 \\ \text{ANSWER} &= \$23\,329.43 \end{aligned}$$

16. What pa interest rate, monthly compounding will you require for an initial investment of \$20 000 to become \$80 000 over 5 years if regular monthly payments of \$500 are made? (Answer to 3 sig figs)

$$\begin{aligned} n &= 5 \times 12 = 60 \\ I\% &= ? \\ PV &= -20\,000 \\ PMT &= -500 \\ FV &= 80\,000 \\ P/Y &= 12 \\ C/Y &= 12 \\ \text{ANSWER} &= 13.0\% \end{aligned}$$

17. What pa interest rate, monthly compounding will you require for an initial investment of \$20 000 to double over 5 years if regular monthly payments of \$500 are made? (Answer to 2 sig figs)

Explain why the answer is a negative percentage.

$$\begin{aligned} n &= 5 \times 12 = 60 \\ I\% &= ? \\ PV &= -20\,000 \\ PMT &= -500 \\ FV &= 40\,000 \\ P/Y &= 12 \\ C/Y &= 12 \\ \text{ANSWER} &= -6.6\% \end{aligned}$$

This is because 60 payments of \$500 = \$30 000 which, on top of the initial \$20 000, becomes \$50 000, and this is more than the target \$40 000.

Therefore, this is an impossible compound interest situation (requiring a negative percentage!!)