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.

\[
n \quad = \\
I\% \quad = \\
PV \quad = \\
PMT = \\
FV = \\
P/Y = \\
C/Y = \\
ANSWER = 
\]

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.

\[
n \quad = \\
I\% \quad = \\
PV \quad = \\
PMT = \\
FV = \\
P/Y = \\
C/Y = \\
ANSWER = 
\]

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?

\[
n \quad = \\
I\% \quad = \\
PV \quad = \\
PMT = \\
FV = \\
P/Y = \\
C/Y = \\
ANSWER = 
\]

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)

\[
n \quad = \\
I\% \quad = \\
PV \quad = \\
PMT = \\
FV = \\
P/Y = \\
C/Y = \\
ANSWER = 
\]

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.

\[
n \quad = \\
I\% \quad = \\
PV \quad = \\
PMT = \\
FV = \\
P/Y = \\
C/Y = \\
ANSWER = 
\]
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previous question!!  

NAME: SOLUTIONS

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

\[
\begin{align*}
n &= 10 \\
I\% &= 12 \\
PV &= -2,000 \\
PMT &= 0 \\
FV &= ? \\
P/Y &= 1 \\
C/Y &= 1 \\
\text{ANSWER} &= \$6,211.70
\end{align*}
\]

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

\[
\begin{align*}
n &= 50 \\
I\% &= 12 \\
PV &= -2,000 \\
PMT &= 0 \\
FV &= ? \\
P/Y &= 1 \\
C/Y &= 1 \\
\text{ANSWER} &= \$578,004.38
\end{align*}
\]

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

\[
\begin{align*}
n &= 30 \times 12 = 360 \\
I\% &= 6 \\
PV &= -2,000 \\
PMT &= 0 \\
FV &= ? \\
P/Y &= 12 \\
C/Y &= 12 \\
\text{ANSWER} &= \$12,045.15
\end{align*}
\]

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

\[
\begin{align*}
n &= 20 \times 12 = 240 \\
I\% &= 12 \\
PV &= -2,000 \\
PMT &= 0 \\
FV &= ? \\
P/Y &= 12 \\
C/Y &= 12 \\
\text{ANSWER} &= \$21,785.11
\end{align*}
\]

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

\[
\begin{align*}
n &= 20 \times 365 = 7300 \\
I\% &= 12 \\
PV &= -2,000 \\
PMT &= 0 \\
FV &= ? \\
P/Y &= 365 \\
C/Y &= 365 \\
\text{ANSWER} &= \$22,037.66
\end{align*}
\]

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

\[
\begin{align*}
n &= 20 \times 2 \\
I\% &= 12 \\
PV &= -2,000 \\
PMT &= 0 \\
FV &= ? \\
P/Y &= 2 \\
C/Y &= 2 \\
\text{ANSWER} &= \$20,571.44
\end{align*}
\]
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)

\[ n = 5 \times 365 = 1825 \]
\[ I\% = \ ? \]
\[ PV = -12\,000 \]
\[ PMT = 0 \]
\[ FV = 18\,000 \]
\[ P/Y = 365 \]
\[ C/Y = 365 \]
**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?

\[ n = 10 \times 12 = 120 \]
\[ I\% = 18 \]
\[ PV = \ ? \]
\[ PMT = 0 \]
\[ FV = 4\,500\,000 \]
\[ P/Y = 12 \]
\[ C/Y = 12 \]
**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?

\[ n = 30 \times 12 = 360 \]
\[ I\% = 18 \]
\[ PV = \ ? \]
\[ PMT = 0 \]
\[ FV = 4\,500\,000 \]
\[ P/Y = 12 \]
\[ C/Y = 12 \]
**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?

\[ n = 50 \times 12 = 600 \]
\[ I\% = 18 \]
\[ PV = \ ? \]
\[ PMT = 0 \]
\[ FV = 4\,500\,000 \]
\[ P/Y = 12 \]
\[ C/Y = 12 \]
**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.

\[ n = 5 \times 12 = 60 \]
\[ I\% = 9 \]
\[ PV = -10,000 \]
\[ PMT = -200 \]
\[ FV = ? \]
\[ P/Y = 12 \]
\[ C/Y = 12 \]
\[ ANSWER = $30,741.64 \]

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.

\[ n = 15 \times 12 = 60 \]
\[ I\% = 9 \]
\[ PV = -5,000 \]
\[ PMT = -200 \]
\[ FV = ? \]
\[ P/Y = 12 \]
\[ C/Y = 12 \]
\[ ANSWER = $94,871.37 \]

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?

\[ n = 10 \times 12 = 120 \]
\[ I\% = 12 \]
\[ PV = ? \]
\[ PMT = -100 \]
\[ FV = 100,000 \]
\[ P/Y = 12 \]
\[ C/Y = 12 \]
\[ ANSWER = $23,329.43 \]

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?

\[ n = 5 \times 12 = 60 \]
\[ I\% = ? \]
\[ PV = -20,000 \]
\[ PMT = -500 \]
\[ FV = 80,000 \]
\[ P/Y = 12 \]
\[ C/Y = 12 \]
\[ ANSWER = 13.0\% \]

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?

\[ n = 5 \times 12 = 60 \]
\[ I\% = ? \]
\[ PV = -20,000 \]
\[ PMT = -500 \]
\[ FV = 40,000 \]
\[ P/Y = 12 \]
\[ C/Y = 12 \]
\[ ANSWER = -6.6\% \]

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!!)