

FINANCIAL MATHEMATICS WORKSHEET 3

(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. Rob is going to invest \$20 000 at 9% pa compounding monthly.

a. Calculate the value of the investment at the end of 6 years.

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

b. How long will he need to leave the money in this account for the balance to be twice the original investment?

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

c. Rob would really like to double his investment in 5 years. What interest rate would he need to do this?
(Answer to 3 sig figs)

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

2. (2002 HSC question) Katherine and Liz are sisters. They both have \$50 000 to invest for 5 years.

*Katherine invests at 3.1% pa,
compounding annually
Liz invests at 3% pa compounding
monthly*

a. How much will Katherine's investment be worth at the end of 5 years?

Katherine:

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

b. Which sister makes the better investment? Justify your answer with appropriate calculations.

Liz:

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

3. Gloria needs \$35 000 in 3 years time.

a. How much should she invest today at 5.5% pa, compounding annually, to achieve \$35 000 in 3 years time?

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

b. How much less would Gloria need to invest today to achieve the \$35 000 in 3 years time if the 5.5% pa interest compounded daily?

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

4. A car is purchased for \$42 000. Use the declining balance method to calculate the salvage value of the car after 4 years at a depreciation rate of 15% pa. (2001 HSC question)

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

5. David is going to start saving for an overseas holiday. He plans to save \$300 each month for the next 5 years. The account pays 6% pa with interest compounding monthly. How much will he have at the end of 5 years?

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

6. Vicky plans to take a holiday in 2 years time and she estimates that she will need \$12 000. At the end of each month Vicky invests \$486.44 in an account that pays 4% pa, compounding monthly. Will she have enough in this account immediately after the 24th payment to pay for her holiday? Justify your answer with calculations. (2003 HSC question)

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

7. Brian has \$250 000 in his superannuation account. After fees and charges, the account pays 5% pa compounding monthly. Brian wants to retire in 4 years time and he wants to have \$500 000 in his account. How much should he contribute to the account each month to reach his retirement goal?

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

8. Mary borrowed \$140 000 at 7.2% pa, compounding monthly over 15 years.

a. Calculate the value of Mary's monthly repayments.

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

b. How much did Mary repay in total?

c. How much interest will Mary pay during the 15 years?

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SOLUTIONS

1. Rob is going to invest \$20 000 at 9% pa compounding monthly.

a. Calculate the value of the investment at the end of 6 years.

n = 6 x 12 = 72
I% = 9
PV = -20 000
PMT = 0
FV = ?
P/Y = 12
C/Y = 12
ANSWER = \$34 251.05

b. How long will he need to leave the money in this account for the balance to be twice the original investment?

n = ?
I% = 9
PV = -20 000
PMT = 0
FV = 40 000
P/Y = 12
C/Y = 12
ANSWER = 92.77 months
= 7.7 years (1dp)

c. Rob would really like to double his investment in 5 years. What interest rate would he need to do this?

(Answer to 3 sig figs)
n = 5 x 12
I% = ?
PV = -20 000
PMT = 0
FV = 40 000
P/Y = 12
C/Y = 12
ANSWER = 13.9%

2. (2002 HSC question) Katherine and Liz are sisters. They both have \$50 000 to invest for 5 years.

*Katherine invests at 3.1% pa,
compounding annually
Liz invests at 3% pa compounding
monthly*

a. How much will Katherine's investment be worth at the end of 5 years?

Katherine:

n = 5
I% = 3.1
PV = -50 000
PMT = 0
FV = ?
P/Y = 1
C/Y = 1
ANSWER = \$58 245.63

b. Which sister makes the better investment? Justify your answer with appropriate calculations.

Liz:

n = 5 x 12 = 60
I% = 3
PV = -50 000
PMT = 0
FV = ?
P/Y = 12
C/Y = 12
ANSWER = \$58 080.84

Katherine makes the better investment by \$164.79

3. Gloria needs \$35 000 in 3 years time.

a. How much should she invest today at 5.5% pa, compounding annually, to achieve \$35 000 in 3 years time?

n = 3
 I% = 5.5
 PV = ?
 PMT = 0
 FV = 35 000
 P/Y = 1
 C/Y = 1
 ANSWER = \$29 806.49

b. How much less would Gloria need to invest today to achieve the \$35 000 in 3 years time if the 5.5% pa interest compounded daily?

n = 3 x 365 = 1095
 I% = 5.5
 PV = ?
 PMT = 0
 FV = 35 000
 P/Y = 365
 C/Y = 365
 ANSWER = \$29 687.47
 ie \$119.02 less

4. A car is purchased for \$42 000. Use the declining balance method to calculate the salvage value of the car after 4 years at a depreciation rate of 15% pa. (2001 HSC question)

n = 4
 I% = -15
 PV = -42 000
 PMT = 0
 FV = ?
 P/Y = 1
 C/Y = 1
 ANSWER = \$21924.26

5. David is going to start saving for an overseas holiday. He plans to save \$300 each month for the next 5 years. The account pays 6% pa with interest compounding monthly. How much will he have at the end of 5 years?

n = 5x12 = 60
 I% = 6
 PV = 0
 PMT = -300
 FV = ?
 P/Y = 12
 C/Y = 12
 ANSWER = \$20 931.01

6. Vicky plans to take a holiday in 2 years time and she estimates that she will need \$12 000. At the end of each month Vicky invests \$486.44 in an account that pays 4% pa, compounding monthly. Will she have enough in this account immediately after the 24th payment to pay for her holiday? Justify your answer with calculations. (2003 HSC question)

n = 2 x 12 = 24
 I% = 4
 PV = 0
 PMT = -486.44
 FV = ? (needs 12 000)
 P/Y = 12
 C/Y = 12

ANSWER = yes, after 24 payments she will have \$12 133.22 in her account, \$133.22 more than she required.

7. Brian has \$250 000 in his superannuation account. After fees and charges, the account pays 5% pa compounding monthly. Brian wants to retire in 4 years time and he wants to have \$500 000 in his account. How much should he contribute to the account each month to reach his retirement goal?

$$\begin{aligned}
 n &= 4 \times 12 = 48 \\
 I\% &= 5 \\
 PV &= -250\,000 \\
 PMT &= ? \\
 FV &= 500\,000 \\
 P/Y &= 12 \\
 C/Y &= 12 \\
 \text{ANSWER} &= \$3\,673.99
 \end{aligned}$$

8. Mary borrowed \$140 000 at 7.2% pa, compounding monthly over 15 years.

a. Calculate the value of Mary's monthly repayments.

$$\begin{aligned}
 n &= 15 \times 12 = 180 \\
 I\% &= 7.2 \\
 PV &= 140\,000 \\
 PMT &= ? \\
 FV &= 0 \\
 P/Y &= 12 \\
 C/Y &= 12 \\
 \text{ANSWER} &= \$1\,274.07 \text{ per month}
 \end{aligned}$$

b. How much did Mary repay in total?#

$$\mathbf{\$1274.06 \dots \times 180 = \$229\,331.78 !!}$$

c. How much interest will Mary pay during the 15 years?

$$\$1274.06 \dots \times 180 = 229331.78$$

$$229331.78 - 140\,000$$

$$\mathbf{\text{ANSWER} = \$89\,331.78}$$