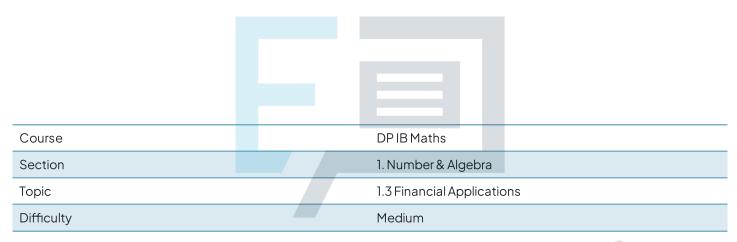


## 1.3 Financial Applications

#### **Mark Schemes**



**Exam Papers Practice** 

To be used by all students preparing for DP IB Maths Al SL Students of other boards may also find this useful



Question 1

a) Simple interest formula

$$FV = PV(1 + \frac{1}{100}n) \qquad (not in formula booklet)$$

$$PV = 5000 \qquad n = 9 \qquad r = 3.5\%$$

$$Sub PV, r and n into formula.$$

$$FV = 5000 (1 + \frac{3.5}{100} \cdot 9)$$

$$FV = $6575$$

b) Compound interest formula

$$FV = PV(1 + \frac{r}{100k})^{kn}$$
 $PV = 4000$ 
 $r = 2.5$ :

 $R = 1$ 

Sub  $PV$ ,  $r$ ,  $k$  and  $n$  into formula.

 $FV = 4000(1 + \frac{2.5}{100(1)})^{(1)(14)}$ 

Example 25651. 90 (2dp)

C) Bank A < Bank B  

$$5000(1 + \frac{3.5}{100}n) < 4000(1 + \frac{2.5}{100})^{n}$$
  
Find n when Bank A = Bank B on your GDC.  
 $5000(1 + \frac{3.5}{100}n) = 4000(1 + \frac{2.5}{100})^{n}$   
\*n = 50.0095



When n=50 it's the start of 2071 and

Bank A > Bank B.

When n=51 it's the start of 2072 and

Bank A < Bank B.

The amount in Bank B will surpass the amount in Bank A during 2071.

\* Possible GDC methods to find n:

· Use the algebraic solver.

· Graph Bank A and Bank B and find their intersection.

Question 2 a) Compound interest formula

Sub PV, r, k and n into formula.

FV = \$5978.31 (2dp)



b) Compound interest formula

$$FV = PV(1 + \frac{r}{100k})^{kn}$$
 (in formula booklet)

$$FV = 10 000 \quad PV = 5000 \quad k = 2 \quad n = 10$$
Sub FV, PV, k and n into formula and solve for r using your GDC.

$$10 000 = 5000 \left(1 + \frac{r}{100(2)}\right)^{(2)(10)}$$

$$r \approx 7.05 \%$$
Question 3 a) Depreciation formula

$$FV = PV(1 - \frac{r}{100})^{n}$$
 (not in formula booklet)

$$PV = 4499 \quad r = 9\% \quad n = 5$$
Sub PV, r and n into formula

$$FV = 4499 \quad (1 - \frac{9}{100})^{n}$$
FV \approx \$1807.52 (1dp)



b) Depreciation formula

$$FV = PV(1 - \frac{r}{100})^n$$
 (not in formula booklet)

Sub FV, PV and r into formula and solve for a using your GDC.

$$n = 15.9564$$

## : 15 years and 11 months

c) Use the finance / TVM solver on your GDC.

	N	I%	PV	PMT	FV	P/Y	CIY	PMT@
1	12	17.2	4499	-410.76	0	12	12	END

Hence the monthly repayment is \$410.76 (2dp).



$$FV = PV(1 - \frac{r}{100})^n$$
 (not in formula booklet)

Sub FV, PV and n into tormula and solve

for r using your GDC.

 $|4792 = 20000 \left(1 - \frac{c}{100}\right)^2$ 

### r = 14 %

Sub PV, r and n into formula.

# FV≈ \$9408.54 (2dp)

$$FV = PV \left(1 - \frac{r}{100}\right)^{\Lambda}$$
 (not in formula booklet)

FV=4000 PV=20000 C=141.

Sub FV, PV and r into tormula and solve

for n using your GDC.

4000 = 20 000 (1 - 14)

 $\Lambda = 10.67$ 

: 10 years and 8 months



c) Use the finance / TVM solver on your GDC.

N	I/	PV	PMT	FV	P/Y	CIY	PMT@
36	9	20 000	-635.99	0	12	12	END

Hence the monthly repayment is \$635.99 (2dp).

Question 5 a) Terms of the loan require a 15% deposit.

: Loan amount = 85% of the van's value.

Loan amount = 18 000 x 85%

Loan amount = \$15 300

b)i) Use the finance / TVM solver on your GDC.

N	I/	PV	PMT	FV	P/Y	CIY	PMT@
16	12	15 300	-1218.05	0	4	4	END

Hence the monthly repayment is \$1218.05 (2dp).

ii) Total amount paid = N x PMT

Total amount paid = 16 x 1218.05

Total amount pand = \$19488.74



**Question** 6

a)i) Compound interest formula

$$FV = PV(1 + \frac{r}{100k})^{kn}$$
 (in formula booklet)

 $PV = 15000 \quad (= 4.78 \%) \quad k = 12$ 

Sub PV, r and k into formula.

 $FV = 15000 \left(1 + \frac{4.78}{100(12)}\right)^{12n}$ 

ii) Sub  $n = 3$  into expression for amount after 3 years.

 $FV = 15000 \left(1 + \frac{4.78}{100(12)}\right)^{(12)(3)}$ 
 $FV \approx $17 307.94 \quad (2dp)$ 

FV = 15 000 (1 + 4.76 100(12)) (12)(5)

Example \$19 040.64 (2dp) Practice

Sub n=5 into expression for amount after 5 years.



b) Compound interest formula

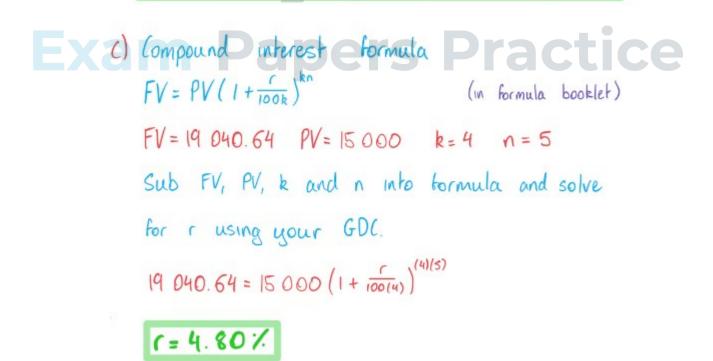
$$FV = PV(1 + \frac{r}{100k})^{kn}$$
 (in formula booklet)

 $FV = 1.5(15000) = 22500$ 
 $PV = 15000 \quad c = 4.78\%$   $k = 12$ 

Sub  $FV$ ,  $PV$ ,  $r$  and  $k$  into formula and solve for  $r$  using your  $GDC$ .

22 500 = 15 000  $(1 + \frac{4.28}{1000(2)})^{120}$ 
 $r = 8.5$ 
 $\therefore$  8 years and 6 months.

Robert will be 48 years and 6 months old.





Question 7

a) Use the finance / TVM solver on your GDC.

N = 25 years x 12 months

N = 300 periods

N	I%	PV	PMT	FV	P/Y	CIY	PMT@
300	5.5	0	- 500	321 018.72	12	12	END

Hence the investment's value in 25 years is \$321 018.72 (2dp).

b) 
$$N = \frac{FV}{P/Y \times PMT}$$

FV = 321 018.72 P/Y = 12 PMT = 1250

Sub FV, P/Y and PMT into formula.

N= 21.4 years



Amount invested = 500 x 300

Amount invested = 150 000

P/Y = 12 PMT = 1250

Sub the amount invested, P/Y and PMT into formula.

$$N = 150 000$$
 $12 \times 1250$ 

N= 10 years

Question 8 a);) Use the finance / TVM solver on your GDC.

N	I%	PV	PMT	FV	P/Y	CIY	PMT@
187.48	4.18	220 000	-1600	0	12	12	END

# Examples Practice

Number of years =  $\frac{187.48}{12}$ Number of years = 15.62

## : 15 years and 8 months

(ii) Total amount paid = N x PMT Total amount paid = 187.48 x 1600

Total amount paul = \$299 970.16 (2dp)



6) Use the finance / TVM solver on your GDC.

N = 10 years x 12 months

N = 120 periods

N	I/	PV	PMT	FV	P/Y	614	PMT@
120	4.18	220 000	-2246. 26	0	12	12	END

Hence the new monthly repayment is \$2246.26 (2dp).

The decision to pay off the loan faster means

Lily will end up paying less overall.

Question 9 a) Use the Finance / TVM solver on your GDC.

N	I /	PV	PMT	FV	P/Y	CIY	PMT@
21.26	3.5	0	-2500	80 000	ı	2	BEGIN

Exa N≈ 21.3 years

b) Use the finance / TVM solver on your GDC.

N	I /	PV	PMT	FV	P/Y	CIY	PMT@
20	4.8036	0	-3500	120 000	-	4	BEGIN

∴ c≈ 4.80%