Have your HW out and ready

Pick Up the Warm Up

HW questions

Use the following Currency Exchange table to answer the questions below, Figure are based on the exchange of the US Dollar.

	You get	You pay
Canadian Dollar	0.99915	1.00015
Swedish Krona	6.78548	6.79664
Great British Pound	0.63080	0.63120
Euro	0.76433	0.76492

For this question, give all of your answers correct to the nearest dollar.

a)How many Canadian dollars would you get for 150 US Dollars assuming there was no commission?

b) If you exchanged 300 US Dollars for Euros and a commission of 2.5% was charged, how many Euros would you receive?

Use the following Currency Exchange table to answer the questions below, Figure are based on the exchange of the US Dollar.

Paying to get USD back

	You get	You pay
Canadian Dollar	0.99915	1.00015
Swedish Krona	6.78548	6.79664
Great British Pound	0.63080	0.63120
Euro	0.76433	0.76492

For this question, give all of your answers correct to the nearest dollar.

a)How many Canadian dollars would you get for 150 US Dollars assuming there was no commission?

Buying Canadian

$(150 \text{ USD})\left(\frac{.99915 \text{ Can}}{1 \text{ USD}}\right) = 149.87 \text{ Canadian}$

or 150 CAN

b) If you exchanged 300 US Dollars for Euros and a commission of 2.5% was charged, how many Euros would you receive?

Comission $(0.025)(300) = 7.50$ USD

Amount to exchange $300 - 7.50 = 292.50$ USD

$(292.50 \text{ USD})(.76433 \text{ Euro}) = 223.57$ EURO

	You get	You pay
Canadian Dollar	0.99915	1.00015
Swedish Krona	6.78548	6.79664
Great British Pound	0.63080	0.63120
Euro	0.76433	0.76492

c) How many USD will you get for the exchange 1000 Swedish Krona?

Buying USD

$(1000 \text{ Krona})\left(\frac{1 \text{ USD}}{6.79664 \text{ Krona}}\right) = 147.13 \text{ USD}$

or 147 USD

d) If you exchanged 10000 USD into GBP and then back again, how many GBP would you get back?

$(10{,}000 \text{ USD})\left(\frac{0.63080 \text{ GBP}}{1 \text{ USD}}\right) = 6308 \text{ GBP}$

$(6308 \text{ GBP})\left(\frac{1 \text{ USD}}{0.63120 \text{ GBP}}\right) = 9{,}993.66 \text{ USD}$

or 9994 USD

① Consider the geometric sequence: 2, 6, 18, 54.....

a) what is the common ratio? ___ b) List the next 3 terms _____

c) Calculate the 30th term (show work) ...using IB NOTATION

d) Find the sum of the first 10 terms, showing IB NOTATION.

② Find the n^{th} term formula, U_n, for each sequence below

a) 7, 14, 28, ...

b) 80, 86, 92, 98, ...

c) 80, 40, 20, ...

d) 5, -10, 20, -40 ....

(3) Find the sum of each sequence (showing work, etc.) of the first 11 terms.

a) 1000, 500, 125, ...

b) 10, 6, 2, -2, ...

(4) A geometric sequence has $u_1 = 8$ and $u_4 = 216$. What is the common ratio? (show work)

and find the general term, u_n.

and find S_7

(5) Find the sum of each series (show details for all steps)

(a) $10 + 7 + 4 + \ldots\ldots - 50$

(b) $\frac{1}{4} + \frac{1}{2} + 1 + \ldots\ldots + 64$

(6) Find k given that a geometric sequence has consecutive terms of

$$4 \;,\; k \;,\; k^2-1$$

$$r = \frac{u_2}{u_1} = \frac{k}{4}$$

$$r = \frac{u_3}{u_2} = \frac{k^2-1}{k}$$

$$\frac{k}{4} = \frac{k^2-1}{k}$$

$$k^2 = 4(k^2-1)$$

$$k^2 = 4k^2 - 4$$

$$0 = 3k^2 - 4$$

$$3k^2 = 4$$

$$k^2 = \frac{4}{3}$$

$$k = \pm\sqrt{\frac{4}{3}}$$

(7) The figure shows two adjacent triangular fields ABC and ACD where AD = 30 m, CD = 80 m, BC = 50m. m∠ADC=60° and m∠BAC = 30°

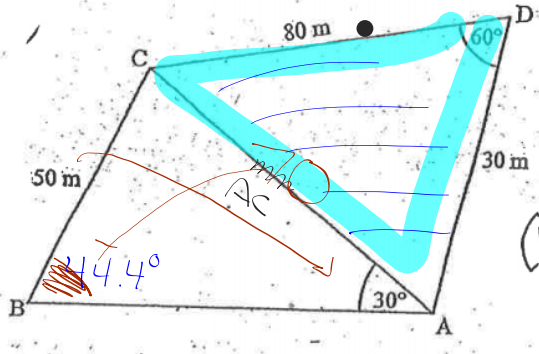


diagram not to scale

(a) Using ΔACD calculate AC

$$AC^2 = 80^2 + 30^2 - 2(80)(30)\cos(60)$$

$$AC = 70 \text{ m}$$

(b) then calculate m∠ABC

$$\frac{50}{\sin(30)} = \frac{70}{\sin(B)}$$

$$\sin(B) = \frac{70 \cdot \sin(30)}{50} =$$

$$B = \sin(\quad) = 44.4°$$

(13) The figure shows two adjacent triangular fields ABC and ACD where AD = 30 m, CD = 80 m, BC = 50m. m∠ADC = 60° and m∠BAC = 30°

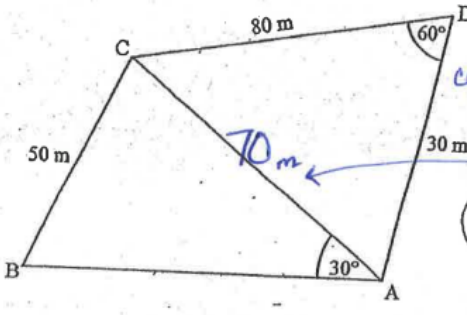


diagram not to scale

(a) Using △ACD calculate AC

COSINE RULE * $AC^2 = 80^2 + 30^2 - 2(80)(30)\cos 60°$

$AC^2 = 4900$

$AC = 70$ m

(b) Then calculate m∠ABC

$\frac{\sin B}{70} = \frac{\sin 30}{50}$

$\sin B = 0.7 \rightarrow B = 44.4°$

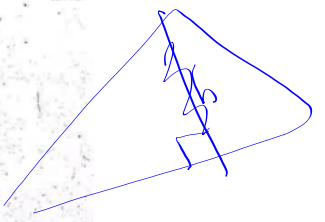
(c) Calculate the area of the field ACD.

$\text{Area} = \frac{1}{2}ab\sin C$

$= \frac{1}{2}(80)(30)\sin 60°$

$= 1039.23\ m^2$

$= 1040\ m^2$ to nearest 3 sf.



Aim Today

Apply the geometric sequence formula to Financial Investing.

$$U_n = U_1 r^{n-1}$$

if we know

$$U_n = U_0 r^{n}$$

Increase 200 by 50%	1.5	300
Increase 500 by 9%	1.09	545
Decrease 80 by 15%	0.85	68
Decre 2000 by 1.3%	.987	1974
Increase 2000 by 100%	2	400

TODAY:

Finance

Have your graphing calculator out.

You will be following a sequence of steps.

Type 1000

ENTER

this represents the amount of money you saved from a job.

you then deposit it in a bank that pays 4% annual interest. You plan to invest this $ for 8 years.

1000
enter

100% + 4%
104%

x1.04
ENTER (8 times)

You have just calculated the future value of your initial investment. This amount is:

$1,368.57

Instead, what if you invested your $1000 at an annual interest rate of 6.5% for 11 years. 1.065

to get $1,999.15

which means you almost doubled your money

Hold it, I meant 30 years at 7%!

(just kidding)

$FV = 1000(1.07)^{30}$

Because we are applying a constant percent over and over, we can write an exponential function

$$y = a\,b^{x}$$

$$= 1000(1.08)^{11}$$ ← # of years

$$y = 1000(1 + .08)^{x}$$

$$= 1000(100\% + 8\%)^{x \cdot 2}$$

$$\frac{8\%}{2}$$

money that grows this way is growing with interest compounded annually.

But wait! Some banks pay you interest multiple times per year

for example: Semi-annually (twice a year)

this means your $ is being compounded twice a year

example: 8% annual interest

$100\left(1+\frac{8}{2(100)}\right)^{22}$

4% after six months

4% after next six months

$1000\left(1+\frac{8\%}{2}\right)^{22}$ ← 11 years at 2 compo per year

$1000(1+4\%)^{22}$

$1000(1+.04)^{22} = 1000(1.04)^{22}$

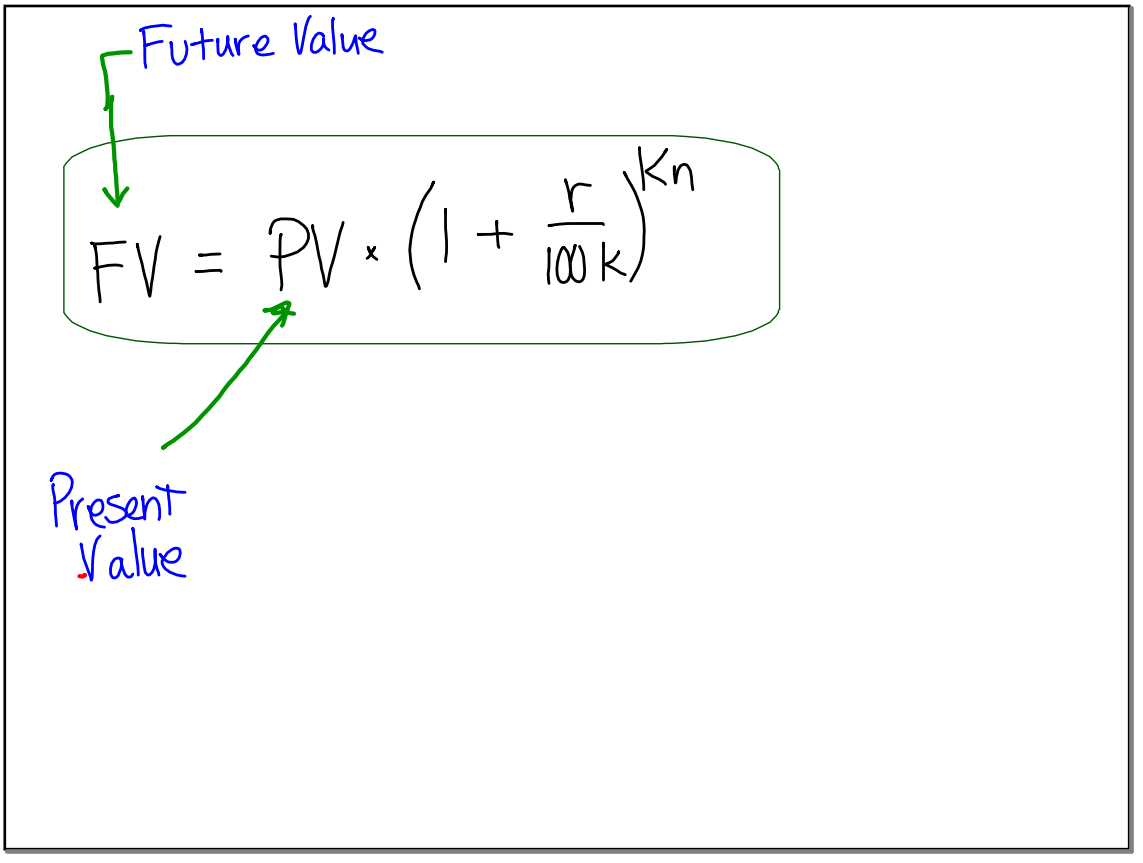
$=$

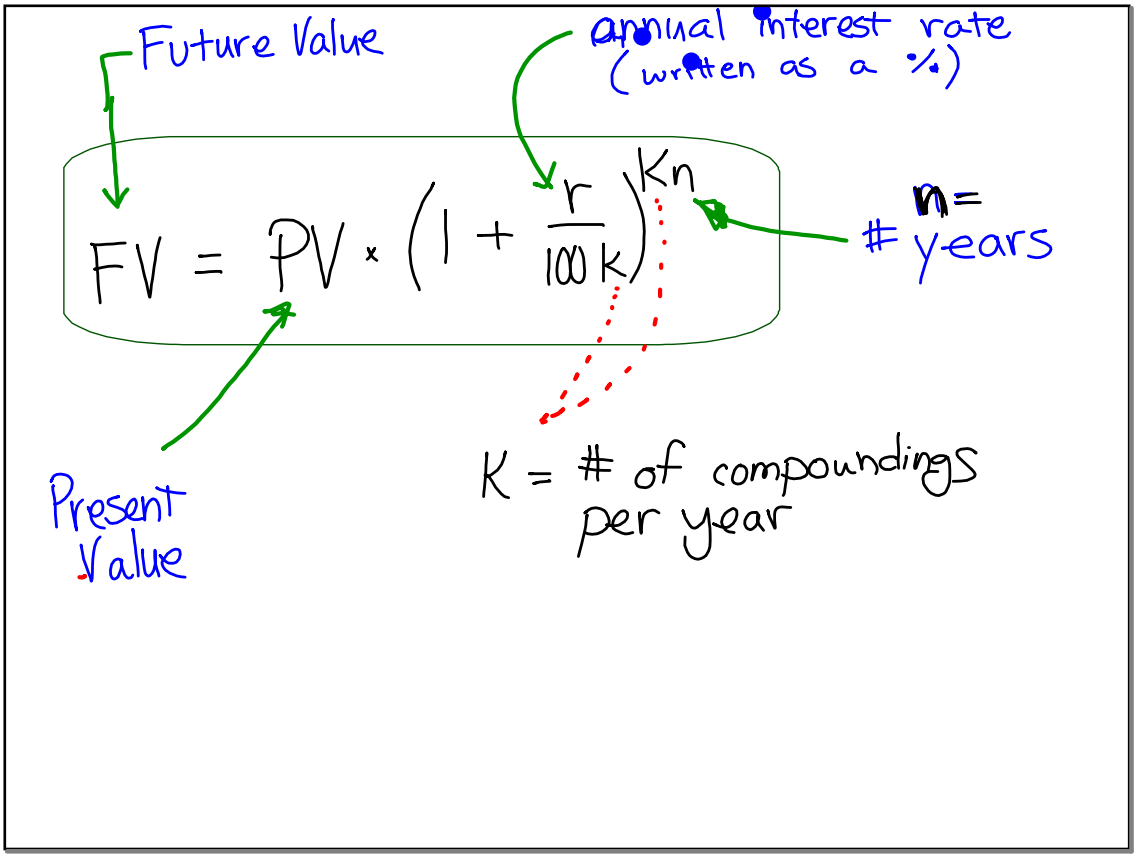
Some banks pay

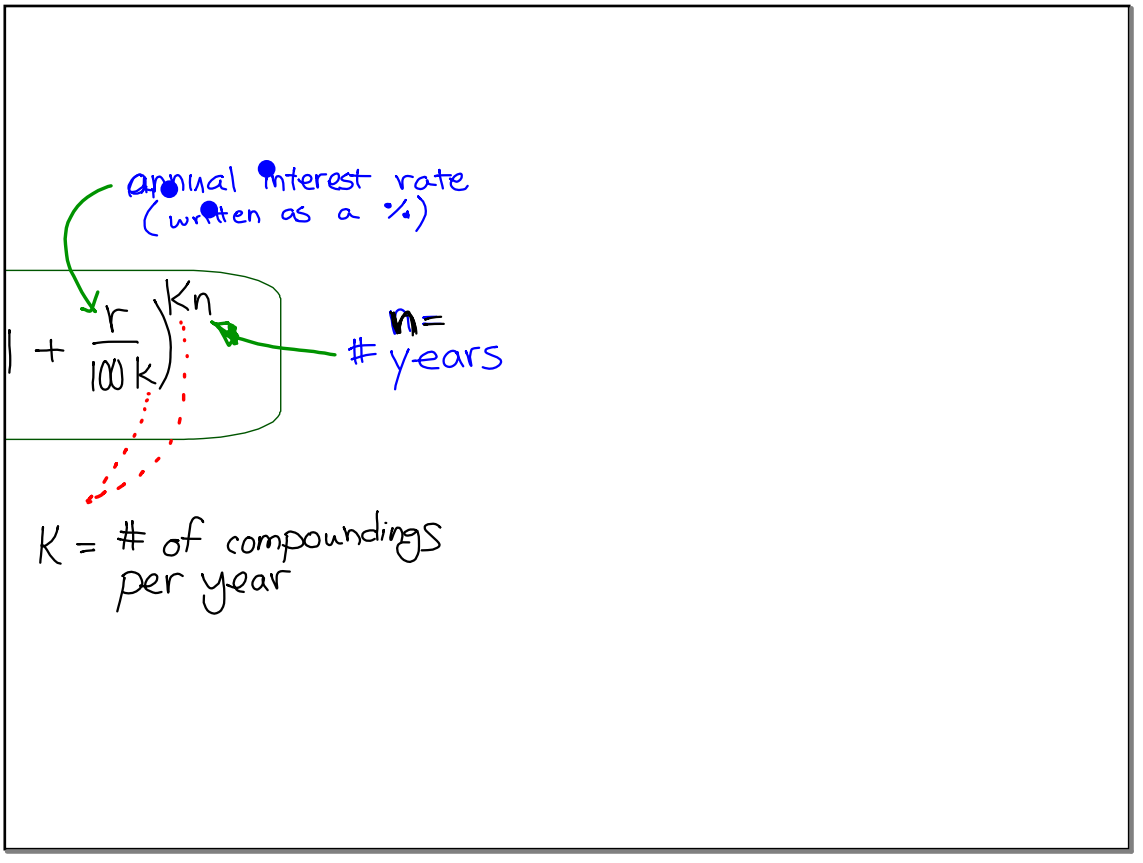
- quarterly
- monthly
- semi-annually
- annually
- daily
- continuously

NOTES

$$FV = PV \times \left(1 + \frac{r}{100k}\right)^{Kn}$$


Future Value
$FV = PV \times \left(1 + \frac{r}{100k}\right)^{Kn}$
Present Value


Future Value
annual interest rate (written as a %)
$FV = PV \times \left(1 + \frac{r}{100k}\right)^{Kn}$
n = # years
Present Value
K = # of compoundings per year


annual interest rate
(written as a %)
$\left(1+\frac{r}{100k}\right)^{Kn}$
n = # years
K = # of compoundings per year

handout

1 **Calculate the future value of the following situations.**

a) $800 invested at 5% interest for 3 years, compouned monthly

$$FV = 800\left(1 + \frac{5}{1200}\right)^{12 \cdot 3} \qquad 12$$

$$= 800\left(1 + \frac{.05}{12}\right)^{12 \cdot 3} =$$

b) $15,000 at 2.5% interest for 20 years, compouned quarterly

c) $4,000 at $6\frac{1}{2}$% interest for 20 years, comp. semi-annually

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$$FV =$$

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a) $800 invested at 5% interest for 3 years, compouned monthly

$$FV = 800\left(1 + \frac{5}{100(12)}\right)^{(12\times 3)} = \$929.18$$

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a) $800 invested at 5% interest for 3 years, compouned monthly

$$FV = 800\left(1 + \frac{5}{100(12)}\right)^{(12\times 3)} = \$929.18$$

b) $15,000 at 2.5% interest for 20 years, compouned quarterly

$$FV = 15000\left(1 + \frac{2.5}{100(4)}\right)^{(4\times 20)} = \$24,692.37$$

400

c) $4,000 at 6$\frac{1}{2}$% interest for 20 years, comp. semi-annually

$$FV = 4000\left(1 + \frac{6.125}{100(2)}\right)^{(2\times 20)} = \$13,368.63$$

② Finding the Present Value (or Capital)

How much does Nicole need to deposit into an account to collect $50,000 at the end of 6 years if the account is paying 6.8% p.a. compounded quarterly?

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How much does Nicole need to deposit into an account to collect $50,000 at the end of 6 years if the account is paying 6.8% p.a. compounded quarterly?

$$50000 = PV\left(1 + \frac{6.8}{100(4)}\right)^{(4\times 6)}$$

$$PV = \frac{50000}{\left(1 + \frac{6.8}{400}\right)^{24}} \simeq \$33,363.16$$

$\$33,363.64$

(3) Finding the interest rate

Calculate the interest rate that Tus would need in order to accumulate $25,000 in 5 years time, if the initial amount to invest is $19,971 (assume monthly compounding)

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$$25000 = 19971\left(1 + \frac{r}{100(12)}\right)^{(12\times 5)}$$

$$\frac{25000}{19971} = \left(1 + \frac{r}{1200}\right)^{60}$$

now take 60^{th} root of both sides

$$\sqrt[60]{\frac{25000}{19971}} = 1 + \frac{r}{1200}$$

Subtract, then multiply by 1200

Or multiply all terms by 1200, then subtract

$$\frac{25000}{19971} = \left(1 + \frac{r}{1200}\right)$$

$$\sqrt[60]{\frac{25000}{19971}} = 1 + \frac{r}{1200}$$

$$\sqrt[60]{\frac{25000}{19971}} - 1 = \frac{r}{1200}$$

$$r = 4.5\%$$

(4)

Finding the Time Period

For how long must Jamie invest 4000 euro at 6.4% p.a. compounded half-yearly if is to amount to 10,000 euro?

(4)

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For how long must Jamie invest 4000 euro at 6.4% p.a. compounded half-yearly if is to amount to 10,000 euro?

$$10000 = 4000\left(1 + \frac{6.4}{100(2)}\right)^{2 \times n}$$

$$\frac{10000}{4000} = \left(1 + \frac{6.4}{200}\right)^{2n}$$

$$\log\left(\frac{10}{4}\right) = 2n \log\left(1 + \frac{6.4}{200}\right)$$

$$\log\left(\frac{10}{4}\right) = 2n \log\left(1 + \frac{6.4}{200}\right)$$

$$\log\left(\frac{10}{4}\right) = 2n \log\left(\frac{204}{200}\right)$$

$$n = \frac{\log\left(\frac{10}{4}\right)}{2\left(\log\left(\frac{204}{200}\right)\right)} = 4.50 \text{ years}$$

B.B.

HH Textbook
page 418.....

Review Set 12A... 2 - 5 and
Review Set 12B... 1 , 6 , 8

9th

/90

Your TI-
has a Financial App

- ✓ For IB students:
  in the past, knowledge of this App was not required.
- ✓ Starting on this year's exams going forward, they recommend it!

Handout

Word of warning: be able to get all answers algebraically, except for any problem involving monthly payments.

Assignment:

Worksheet: Compound Interest Practice

and learn how to use the App program