(A) Lesson Objectives

a. Introduce formulas for working with compound interest
b. Connect compound interest to geometric sequences
c. Extend skills to include exchange rates & inflation

(B) Opening Problem

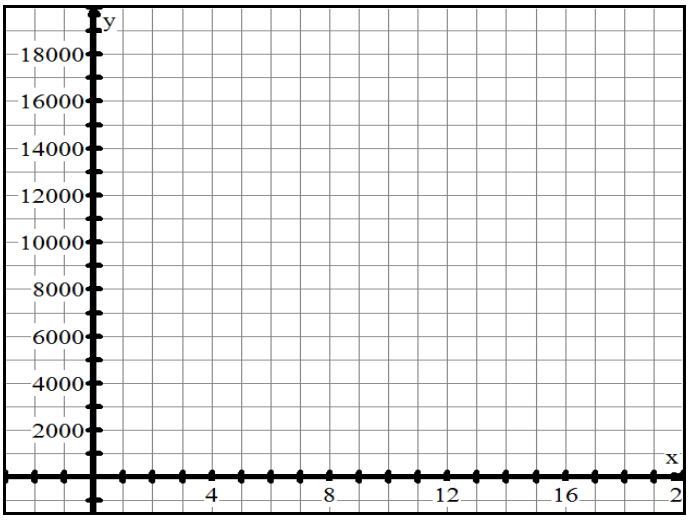
Mr. Santowski has a $9,000 (US$) education savings plan (for Andrew) which earns him a compound interest of 7.75% p.a., compounded yearly. Two other details are important in this opening problem ➔I keep this investment for 19 years and the annual rate of inflation grows exponentially at a rate of 2.35%.

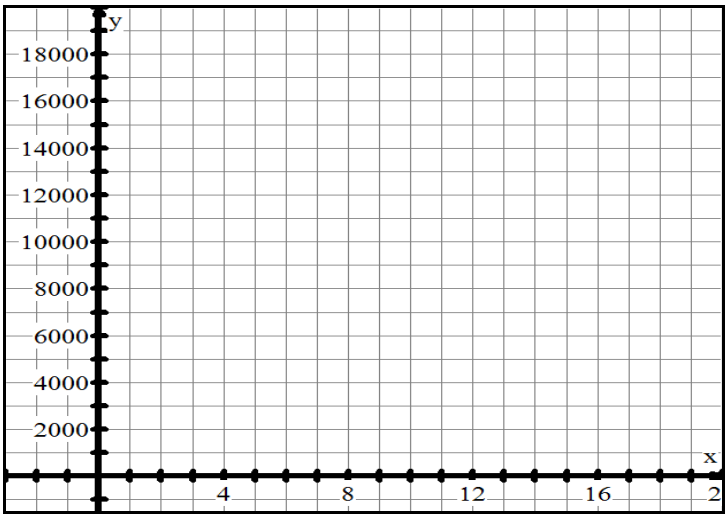
Complete the following table, showing the values of the investment and the interest amounts earned.

	Initial amount	1 year	2 years	3 years	5 years	10 years	15 years
Interest earned per year							
Cumulative amount of interest earned							
Total value of the investment							

i. Prepare graphs of the data as (i) a continuous function and (ii) as discrete terms of an arithmetic sequence

ii. CHALLENGE: Determine the instantaneous rate of change of the investment at 15 years.





iii. How did you calculate the amount of annual interest paid?

iv. Calculate the total amount of interest earned after 19 years.

v. How did you determine the value of the investment at any given year?

vi. Write out the first 6 annual values of the investment as terms of a geometric sequence.

vii. Determine the value of $\boldsymbol{u}_1$ and $\boldsymbol{r}$ for Q(iv) and explain their significance in the context of the question

viii. Mr. S. needs to exchange the final value of this investment (after 19 years) into English pounds as my son wants to study in London, given the exchange rate of 1 GBP = 1.553 CAD.

ix. What is the REAL effect of the fact that inflation must be taken into account?

x. What is the REAL EARNINGS of this investment, given the rate of inflation as 2.25%

(C) Basic Skills – Compound Interest

We can write several different formulas for Compound Interest and for calculating the total interest earned and for calculating the total value of the investment ➔

(D) Concept Connection – Geometric Sequences

(E) Practice

Interest Earned	Principle	rate	time	Amount
?	$2500	3.75 % /a compounded annually	3 a	?
?	$1200	4.25 % /a compounded annually	6 a	?
?	$3000	3 % /a compounded annually	?	$3120
?	$2000	?	10 a	$2210
?	?	4 % /a compounded annually	2 a	$4050
?	?	4.25 % /a compounded annually	17 a	$1200

(F) Extension – Other Compounding Periods

Compounding can occur in other time periods as well ➔ This will cause us to change our formula

Semi-annual => interest determined and added every 6 months, twice a year

Quarterly => interest determined and added every 3 months, 4 times a year

Monthly => interest determined and added every month, 12 times a year

Daily => interest determined and added every day, 365 times a year

(G) Extension – Other Compounding Periods

Amount	Principle	conversion periods	rate (i)	time (n)
	$2000	quarterly	3%	2 a
	$1500	semi-annually	4%	4 a
	$500	daily	1%	275 d
	$1250	monthly	2.4%	1½ a