



Financial Literacy: Secondary Comparing Annuities

Connections to Financial Literacy

Describe the financial literacy knowledge and skills which will be addressed and assessed in this lesson. Financial literacy knowledge and skills could include, but are not limited to:

- understanding needs and wants;
- personal financial planning such as budgeting, saving and investing;
- planning for the future.

Mathematics, Grade 11
UNIT: Discrete Functions
LESSON TITLE: *Comparing Annuities*

Subject/Course: Mathematics –
 Functions & Applications
Code/Title/Curriculum Policy:
 MCF 3M1

Curriculum Expectations

Learning Goals

- explain the meaning of the term *annuity*, through investigation of numeric and graphical representations using technology
- determine, through investigation using technology (e.g., the TVM Solver on a graphing calculator, online tools), the effects of changing the conditions (i.e., the payments, the frequency of the payments, the interest rate, the compounding period) of ordinary simple annuities (i.e., annuities in which payments are made at the *end* of each period, and the compounding period and the payment period are the same) (e.g., long-term savings plans, loans) **Sample problem:** Compare the amounts at age 65 that would result from making an annual deposit of \$1000 starting at age 20, or from making an annual deposit of \$3000 starting at age 50, to an RRSP that earns 6% interest per annum, compounded annually. What is the total of the deposits in each situation?

At the end of this lesson, students will know, understand and/or be able to:

- explain the difference between a compound interest problem & an annuity problem
- using present value formula to solve problems
- describe the advantages and disadvantages of changing various conditions (payments, frequency of payments, interest rates, compounding period)

Instructional Components and Context

Readiness

List what students need to know and be able to do before beginning new learning.

- Solve compound interest problems
- Confidently use formulae involving exponents
- Use TVM solver to solve compound interest problems

Terminology

- Compound interest
- Annuity
- Regular payment
- Compounding period
- Annual interest rate

Materials

- Graphing calculators (TVM Solver)
- Online TVM Solver
 - <http://www.zenwealth.com/BusinessFinanceOnline/TVM/TVMCalcWindow.html>
- TAKING STOCK IN YOUR FUTURE (SENIOR GUIDE) Activity 3.1 – 3.4
 - <http://www.getsmarteraboutmoney.ca/education-programs/for-teachers/curriculum-tools/Taking-stock-in-your-future/Pages/taking-stock-senior-resource-guide.aspx>
- VIDEO: BUILDING LONG TERM WEALTH
 - <http://www.getsmarteraboutmoney.ca/managing-your-money/planning/investing-basics/Pages/video-building-long-term-wealth.aspx?group=FunnyMoney&page=1>
- Large Venn Diagram template

Minds On

- ♦ Establishing a positive learning environment
- ♦ Connecting to prior learning and/or experiences
- ♦ Setting the context for learning


Connections

Explicitly label:

 Assessment **for** learning

 Assessment **as** learning

 Assessment **of** learning


 Explicitly identify planned differentiation of content, process, or product based on readiness, interest, or learning

Whole Class or Groups ⇒ Name of Activity and/or Strategy

INTRODUCTORY VIDEO – “Building Long Term Wealth”

Discussion Questions:

- What is the primary message of this video?
- *sample answer(s): make purchases that will increase in value, start investing early*
- Name investments that decrease in value.
- *Sample answer(s): cars, electronics, clothing*
- Name investments that increase in value.
- *Sample answer(s): mutual funds, bonds, high interest savings accounts, RRSPs, GICs, etc.*
- How does investing early help out the “Funny Money Man”?
- *Sample answer(s): has more time for money to grow*
- What details regarding investments are missing from this cartoon?
- *Sample answer(s); interest rate, amount invested, investment schedule, compounding periods*

 Assessment **for** learning

- Quick diagnostic of familiarity with investment terminology and possible variables

<p>Action!</p> <ul style="list-style-type: none"> ♦ Introducing new learning or extending/reinforcing prior learning ♦ Providing opportunities for practice and application of learning (guided > independent) 	
<p>Whole Class or Groups ⇒ Name of Activity and/or Strategy</p> <p>THINK PAIR SHARE</p> <p>Similarities and differences – Class Venn Diagram to compare past compound interest problems with new annuity problems</p> <ul style="list-style-type: none"> ▪ Janice purchases a Canada Savings Bond for \$6000. It earns interest at a rate of 2.5% compounded semi-annually. How much money will Janice have after 10 years? ▪ Sandra deposits \$50 every six months into a high interest savings account earning 2.5% compounded semi-annually. How much money will Sandra have after 10 years? <p>TEACHER-LED INSTRUCTION</p> <ul style="list-style-type: none"> ▪ Today we will focus on problems similar to Sandra’s situation ▪ Discuss how interest grows differently for Sandra than for Janice ▪ Introduce new annuity formula with “PMT” – Regular Payment $PVA = PMT \left[\frac{1 - (1 + r)^{-t}}{r} \right]$ <p>ACTIVITY – “A TALE OF TWINS”: work in pairs</p> <ul style="list-style-type: none"> - Complete pg. 56 (Activity 3.1) ***remove solution from worksheet*** use TVM solver (graphing calculator or online) - Complete the “WHAT IF” table, illustrating the effect of changing various conditions while keeping one condition constant 	<p>AOL Assessment for learning</p> <ul style="list-style-type: none"> - Open discussion referencing prior knowledge (compound interest problems)
<p>Consolidation</p> <ul style="list-style-type: none"> ♦ Providing opportunities for consolidation and reflection ♦ Helping students demonstrate what they have learned 	
<p>Whole Class or Groups ⇒ Name of Activity and/or Strategy</p> <p>EXIT CARD:</p> <ul style="list-style-type: none"> ▪ Which of the changes had the greatest effect on the total amount of money earned? ▪ Which of the changes has the least effect on the total amount of money earned? 	

Next Steps ♦ future lesson plans and assessment ideas	
<ul style="list-style-type: none"> ▪ Discuss other uses for annuity formulae – (Present Value) <ul style="list-style-type: none"> - Use example from Activity 3.2 – <i>“Buying on the Installment Plan”</i> ▪ Activity 3.4 – Exploratory Activity <i>“Buy or Lease a Car – Which is the Cheaper Option?”</i> <ul style="list-style-type: none"> - Research assignment - Select a car and a company from which to purchase it 	<p>A^{of}L Assessment of learning</p> <ul style="list-style-type: none"> - See attached rubric