Foundations of Math 12

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Materials:

- Nelson Foundations of Math 12 Textbook (~$100)
- Graphing Calculator Required (TI-83 plus or TI-84 or TI-84 plus)
- Graphing Paper, pencils, erasers

Structure:

This course is generally designed with the self-paced student in mind. There will be a chapter outline showing a brief explanation of the material with some examples and solutions as well as links to YouTube lessons by various teachers. This material will follow the new curriculum as per the BC Ministry of Education Learning Outcomes and will include some Aboriginal Content.

Outline:

Unit 1	Section 1: Chapter 1	Finance: Investments
	Section 2: Chapter 2	Finance: Borrowing
Unit 2	Section 3: Chapter 4	Counting Methods
	Section 4: Chapter 5	Probability
Unit 3	Section 5: Chapter 6	Polynomials Functions
	Section 6: Chapter 7	Exponential & Logarithmic Functions
Unit 4	Section 7: Chapter 8	Sinusoidal Functions
Unit 5	Section 8: not in textbook	Conic Sections
	Section 9: not in textbook	Constructions and Fractals

Evaluation:

There are 9 section tests which account for 30% of the final mark. There are 4 cumulative tests which account for 70% of the final mark.

Composition:

The course is made up of:

- 9 Section Outlines
- 9 Section Tests each with an A and a B version (18 tests), Plus (18 tests) Answer Keys
- 4 Cumulative Unit Tests with an A and a B version (8 tests), Plus (8 tests) Answer Keys
- All Answer Keys have a suggested marking scheme
- All files are put on disk in pdf and MS Word
- A perpetual license for your school
- The entire paper course is placed in a binder along with the disk and shipped as one unit.

Cost: $ 495.00. ***See Ordering on website.***

Foundations of Math 12 Record Chart

Name: **Start Date:**

Section	Topic	% on Test A	% on Test B	% on Cumulative Unit Test	Date
UNIT 1: FINANCIAL MATHEMATICS					
1	Finance: Investing Money				
2	Finance: Borrowing Money				
	Unit 1 Financial Mathematics Cumulative Test				
UNIT 2: COUNTING METHODS AND PROBABILITY					
3	Counting Methods (combinatorics and Pascal's Triangle)				
4	Probability				
	Unit 2 Counting Methods & Probability Cumulative Test				
UNIT 3: POLYNOMIAL, EXPONENTIAL & LOGARITHMIC FUNCTIONS					
5	Polynomial Functions				
6	Exponent & Logarithmic Functions				
	Unit 3 Polynomial, Exponential & Logarithmic Functions Cumulative Test				
UNIT 4: SINUSOIDAL FUNCTIONS					
7	Sinusoidal Functions				
	Unit 4 Sinusoidal Functions Cumulative Test				
UNIT 5: GEOMETRIC EXPLORATIONS					
8	Conic Sections				
9	Construction & Fractals				
	Unit 5 Geometric Explorations Cumulative Test				

Course Evaluation

Course Evaluation	Total Percent	Out of Percent	Calculated Percent	Value	Result
Chapter Tests (8)		800		30%	
Cumulative Unit Tests (4)		400		70%	
				Final Mark	

Unit 1: Financial Mathematics

Textbook: Foundation of Math 12 by Nelson

Chapter 1: Investing Money

Learning Outcomes:

- Understanding and comparing simple and compound interest
- Determining how changes in investment variables changes rate of return
- Comparing investment options and portfolios

Section 1.1: Simple Interest

Study the notes and examples on pages 6-12 and memorize the Summary on page 13.
View this YouTube video for a lesson on this section:
http://tinyurl.com/MEC-FOM12-1-1

Simple interest is the interest that an investment accumulates when the interest is calculated on the initial investment and added or paid to the investor after different periods of time. (this is not compound interest which you will learn about in the following sections)

- **Formula for determining simple interest:**
  - $I=Prt$
    - **I = simple interest earned**
    - **P = the principle or amount of the original investment (in dollars and cents)**
    - **r = the rate of the simple interest on the investment (in decimal form)**

t = amount of time the investment is invested = the term (in years).

Example: Gary invests $500 in a short-term GIC investment that earns 4% simple interest for 3 years. How much interest will Gary earn from this investment?

Solution:

$$I = \Pr t$$
$$I = (500)(0.04)(3)$$
$$I = \$60$$

Gary will earn $60 in interest on this investment**.**

Note: time must always be converted to years and does not take into consideration how often interest is paid. For example, if the investment was made for 15 months, you would divide by 12 months to convert to years $\left(t = \frac{15}{12} years\right)$. If the investment was for 235 days, you divide by 365 days to convert to years $\left(t = \frac{235}{365} years\right)$. If the question is in weeks, divide by 52 $\left(t = \frac{n}{52} years\right)$. Lastly, the frequency of interest payments only matters if interest is paid after the term that is calculated and so the investment must be left longer to get the correct interest earned; ie. If you calculate *n* to be 14 months but the interest is paid semi-annually, round up to 18 months to get the correct interest payment.

Example: How long should an investment of $1000 earning 2.5% simple interest be invested for if the interest earned needs to be $500 and the interest is paid annually.

Solution: Rewrite the formula to solve for *t*.

$$I = P\ rt$$
$$\$500 = (\$1000)(0.025)t$$
$$t = \frac{500}{(1000)(0.025)}$$
$$t = 20 \text{ years}$$

20 years to earn $500 in interest.

Future Value is the amount of the total investment and includes the initial principle plus the interest earned on the investment.

- **Formula for calculating future value:**
  - $A = P + \Pr t \quad \text{or} \quad A = P(1 + rt)$
    - **A = future value of simple interest investment**

Example: What is the future value of Gary's investment from the previous example?
Solution:

$$A = P + \Pr t$$
$$A = 1000 + (1000)(0.025)(20)$$
$$A = 1000 + 500$$
$$A = \$1500$$

The future value of Gary's investment is \$1500 dollars; this is \$500 in interest earned plus the original \$1000 investment.

Complete the following questions and check your answers with the solutions at the back of the text.

Section	Page	Practice Questions	Check When Done
1.1	14-17	1,3,5,8,10, 12	☐

Section 5.4: Mutually Exclusive & Not Exclusive Events

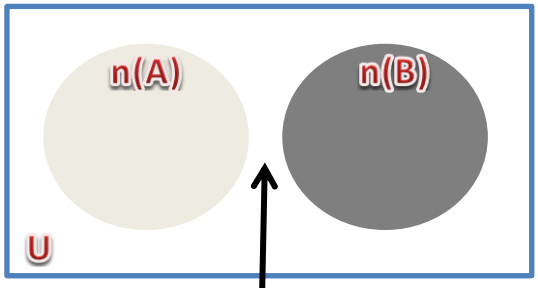
Study the notes and examples on pages 328-336 and memorize the Summary on page 337. View these YouTube videos for lessons on this section:
http://tinyurl.com/MEC-FOM12-5-4a

Recall the difference between mutually exclusive and mutually not exclusive events. In mutually exclusive, the outcomes of the events where not shared and did not overlap in a Venn diagram. In the not mutually exclusive events, there are shared outcomes and an overlapping section where these shared outcomes occur in the Venn diagram.

Notation:

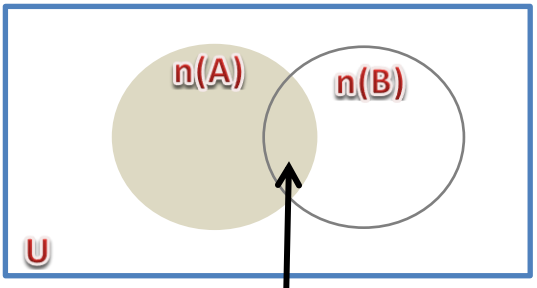
$P(A \cup B) =$ the probability of A **OR** B
$P(A \cap B) =$ the probability of A **AND** B
$P(A \setminus B) =$ the probability of A **NOT** B (A only)
$P(A') =$ the probability of NOT A (this is the conjugate of A)
$P(B') =$ the probability of NOT B (this is the conjugate of B)

Mutually Exclusive Events or Disjoint Sets



$$P(A \cup B) = P(A) + P(B)$$

Not Mutually Exclusive Events



$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

Example: Determine the probability of selecting an even card OR an ace card from a standard deck of 52 playing cards.

Solution: First you must decide whether these events are mutually exclusive or not; here, they are mutually exclusive since you cannot have a card which is both even and an ace on the single card.

A = drawing an even card → $n(A) = 20$ → $P(A) = \frac{20}{52}$

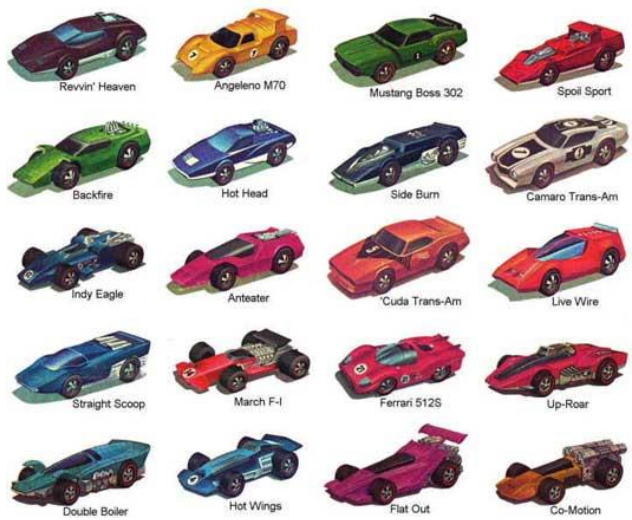
B = drawing an ace card → $n(B) = 4$ → $P(B) = \frac{4}{52}$

The probability of drawing an even OR ace card is:

$P(A \cup B) = P(A) + P(B)$

$P(A \cup B) = \frac{20}{52} + \frac{4}{52} = \frac{24}{52} = \frac{6}{13}$ or $0.4615 = 46.15\%$

Example: The following cars are placed in a bag. What is the probability that you will pull out a car that has numbers on its body OR a car that has numbers in its name (cars with one or more numbers in the name are included)?



Solution: Decide if these events are mutually exclusive or not; here they are not mutually exclusive since there are four cars that have both numbers on its body and in its name.

A = cars with numbers on its body → $n(A) = 8$ → $P(A) = \frac{8}{20}$

B = cars with numbers in its name → $n(B) = 4$ → $P(B) = \frac{4}{20}$

Number of cars with both conditions → $n(A \cap B) = 4$ → $P(A \cap B) = \frac{4}{20}$

The probability of pulling a car with numbers on its body OR in its name is:

$P(A \cup B) = P(A) + P(B)$

$P(A \cup B) = \frac{8}{20} + \frac{4}{20} - \frac{4}{20} = \frac{8}{20} = \frac{2}{5}$ or $0.4 = 40\%$

Complete the following questions and check your answers with the solutions at the back of the text.

Section	Page	Practice Questions	Check When Done
5.4	338-341	3,5,6,8,13,15	☐

Name: _____ Date: _____ Total Mark = _____/ 27

FOM12: Chapter 1 - Function Transformations Test A

Multiple Choice = 12 Marks

1. This portfolio was started 12 years ago. What is the current value of the portfolio?
• A $1100 GIC that earns 2.6%, compounded quarterly
• Monthly deposits of $300 into an account earning 1.3%, compounded weekly
A. $46 726.09
B. $48 227.34
C. $47 626.10
D. $49 287.22

2. Determine the future value on an investment of $200 that earns 2.1% simple interest on a 5-year term.
A. $21.00
B. $111.00
C. $211.00
D. $221.00

3. Determine the interest earned on a simple interest investment with a 10-year term at 6.2% on a deposit of $5 000.
A. $310
B. $1200
C. $3100
D. $8100

4. Jenna invests $2500 in a Canada Savings Bond at a rate of 3.9% interest compounded semi-annually for 10 years. What is the future value of this bond?
A. $3678.62
B. $3475.00
C. $2942.89
D. $2497.91

3. Vinn bought a $10 000 corporate bond he will invest for 9 years. The bond will earn 3.1%, compounded semi-annually and after 5 years, the interest rate changes to 4.1%, compounded annually. Determine the value of Vinn's investment at the end of 9 years.
(2 marks)

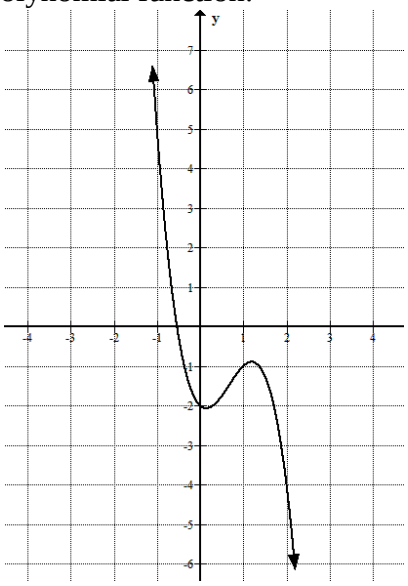
4. Matthew deposited $25 semi-monthly into a high interest savings account that earned 1.9%, compounded weekly. Roshan deposited $300 semi-annually into an investment that earned 2.1%, compounded semi-annually. Whose investment is worth more after seven years, and by how much?
(3 Marks)

Name: _____ Date: _____ Total Mark = _____/ 28

FOM12: Chapter 6 – Polynomial Functions Chapter Test A

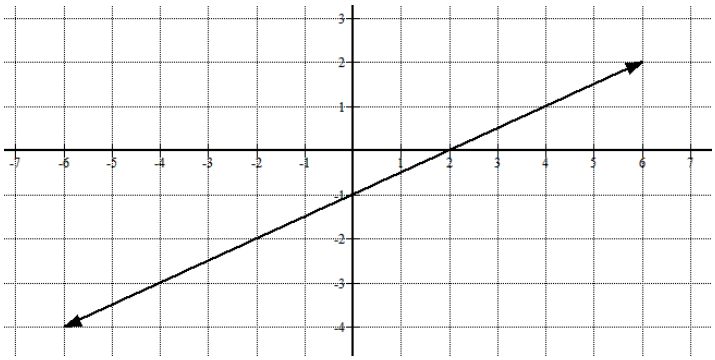
Multiple Choice = 12 Marks
Identify the choice that best completes the statement or answers the question.

1. Determine the degree of this polynomial function:



A. 0
B. 1
C. 2
D. 3

2. Determine the degree of this polynomial function:



A. 0
B. 1
C. 2
D. 3

Multiple Choice = 12 Marks
Identify the choice that best completes the statement or answers the question.

1. You are shopping for school supplies and can select one of each of the following items:

- duotangs that are yellow, red, green, blue, and black
- pens that are blue or black
- binders that are pink, purple, orange, grey, navy, lime, and violet

How many different combinations of these school supplies can you have?

A. 7
C **B.** 14
C. 70
D. 140

2. The Chinese food place in the mall food court offers a three item meal that includes one of four different noodle or rice dishes, and the other two can be selected from the ten other items they have. How many different combinations of meals can be created?

A. 400
B **B.** 360
C. 320
D. 280

3. How many ways can you draw a single card from a standard deck of playing cards and get a heart or a spade?

A. 10
D **B.** 13
C. 22
D. 26

4. Identify the expression that is equivalent to the following:

$$\frac{n!(n+1)!}{(n+2)!(n-1)!}$$

A. $n+2$

D **B.** $\frac{n+2}{n}$

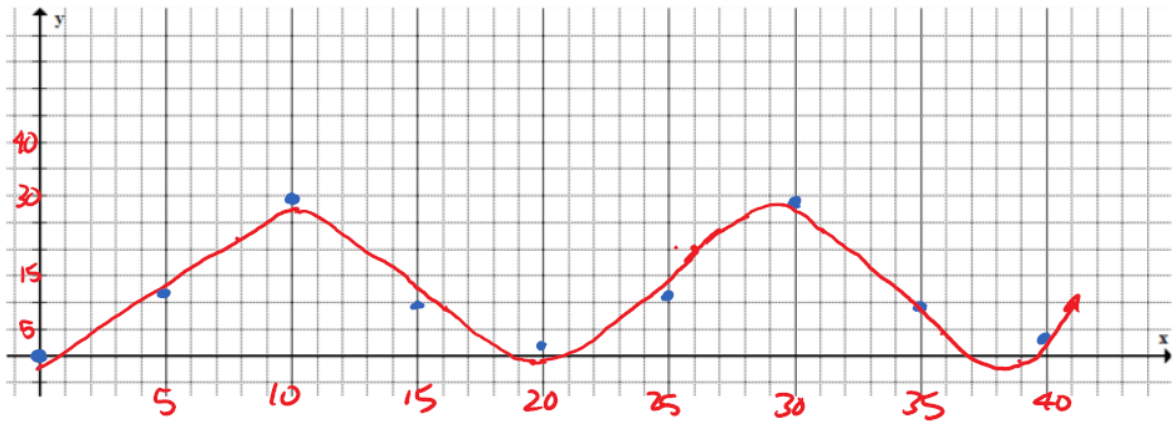
C. $n-1$

D. $\frac{n}{n+2}$

4. The following table gives the average height of a person on a ferris wheel.

Time (seconds)	0	5	10	15	20	25	30	35	40
Height (feet)	0	11.1	29.8	9.4	1.1	10.5	28.6	8.0	2.5

a) Graph the scatter plot on the grid provided and the sinusoidal function that is the curve of best fit.
(2 marks)



b) Determine the sinusoidal regression for the data above.
1 mark

$$y = 13.8287 \sin(0.3271x - 1.7396) + 13.0687$$

c) Determine the height on the ferris wheel at 17 seconds into the ride.
1 mark

$x = 17$

$\boxed{y = 4.4 \text{ ft}}$

d) Determine the next time after 40 seconds that the height will be at 4.5 feet.
1 mark

$y = 4.5 \text{ ft}$

$\boxed{x = 41.7 \text{ sec}}$