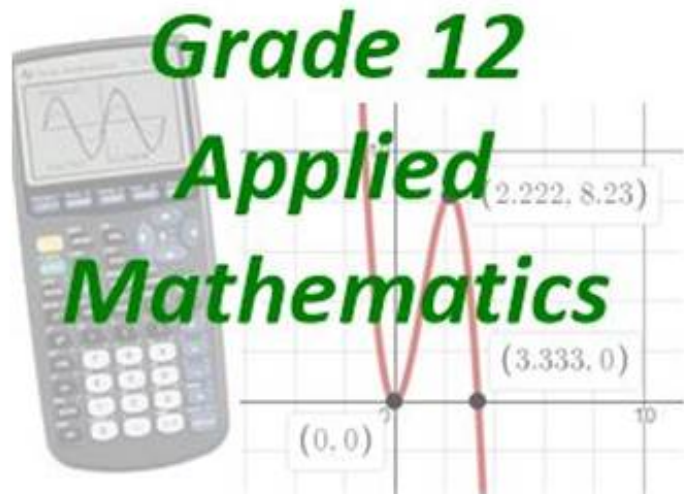


# **Grade 12 Applied**



## **Weekly Quiz Debrief**

**Week 5**

**MrF**

## **Probability & Finance**

23 Feb 2023

**GRADE 12 APPLIED  
WEEK 5 QUIZ**

Name: \_\_\_\_\_

Date: \_\_\_\_\_

**CLOSED BOOK.** My and/or your adjusted Study Notes (Cheat Sheet) are permitted. Use the FnCalculator TVM App for finance calculations.

Show hand-drawn screen shots of all App entries.

**Time Limit!** 45 minutes Max.

Each individual question is worth two marks unless otherwise indicated.

Round all decimal and % answers to the nearest 0.01. Simplify all fractions.

**SHOW WORK** for best mark. Use separate paper if necessary and attach.

1. Kevin takes a loan for \$12,500 to renovate his kitchen. The loan is for a term of 4 years with an APR of 14.5% compounded monthly.

- a. Determine Kevin's monthly payment. [show screen shot] **\$344.72/month**
- b. Determine how much Kevin paid for interest by the end of the loan.
- c. If Kevin had instead decided to pay off the same loan quicker with payments of \$400 per month instead, determine how long it would take to 'amortize' (kill off) the loan. [show screenshot]

PV **12,500**  
\* PMT **-344.72 ?**  
FV **0**  
% **14.5**  
Pds **48** *4 yr \* 12 month / 1 yr*  
Compounding **monthly**  
↑↑  
Hand-drawn  
screenshot

Mode  End  Beginning

Present Value

Payments  *Coming out of your pocket so negative*

Future Value

Annual Rate (%)

Periods

Compounding

1. Kevin takes a loan for \$12,500 to renovate his kitchen. The loan is for a term of 4 years with an APR of 14.5% compounded monthly.

- Determine Kevin's monthly payment. [show screen shot]
- Determine how much Kevin paid for interest by the end of the loan.
- If Kevin had instead decided to pay off the same loan quicker with payments of \$400 per month instead, determine how long it would take to 'amortize' (kill off) the loan. [show screenshot]

a)

Mode  End  Beginning

Present Value 12,500

Payments -344.72 *Coming out of your pocket so negative*

Future Value 0

Annual Rate (%) 14.5

Periods 48

Compounding Monthly

b) He pays  $\$344.72$  / ~~month~~  $\cdot 48$  ~~month~~

$$\begin{array}{r} = \$16,546.56 \text{ Total Payments} \\ - 12,500.00 \text{ Principal Loan} \\ \hline \$4,046.56 \text{ Interest Paid} \end{array}$$

1. Kevin takes a loan for \$12,500 to renovate his kitchen. The loan is for a term of 4 years with an APR of 14.5% compounded monthly.

a. Determine Kevin's monthly payment. [show screen shot]

b. Determine how much Kevin paid for interest by the end of the loan.

c. If Kevin had instead decided to pay off the same loan quicker with payments of \$400 per month instead, determine how long it would take to 'amortize' (kill off) the loan. [show screenshot] ← 39.48 months to amortize the loan

a)

Mode  End  Beginning

Present Value 12,500

Payments 344.72 *Coming out of your pocket so negative*

Future Value 0

Annual Rate (%) 14.5

Periods 48

Compounding Mor

*He pays \$344.72/month \* 48 month = \$16,546.56 Total Payments*

<i>\$16,546.56</i>	<i>Principal Loan</i>
<i>- 12,500.00</i>	<i>Interest Paid</i>
<i>\$ 4,046.56</i>	

c)

Mode  End  Beginning

Present Value 12,500

Payments -400

Future Value 0

Annual Rate (%) 14.5

\* Periods 39.48 *←*

Compounding Monthly

It would take 39.48 months.

*FYI: 39.48 months \* \$400/month = \$15,792 Total Paid*

*Save ~\$755*

2. Debbie inherits \$8,300 from an uncle. Debbie invests the \$8,300 in a financial product that guarantees a growth of 7.25% interest compounded monthly.

a. Determine the value of her investment at the end of 8 years. (Show screen shot if using TVM App)

b. Using Rule of 72, approximately how long would the investment take to double?

c. Debbie is thinking of taking a \$12,000 course at college in 5 years once her kids are in school. Determine the interest rate (APR) she would need if she were to instead invest the \$8,300 in an investment product that compounded quarterly. (Show screen shot if using TVM App)

$$\begin{aligned}
 b. \quad n \cdot r &= 72 \\
 n \cdot 7.25 &= 72 \\
 n &= 72 / 7.25 \approx 9.93 \text{ yr} \\
 &\text{to double}
 \end{aligned}$$

a) Use Formula:

$$A = P \cdot \left(1 + \frac{r}{s}\right)^{h \cdot s} = 8300 \cdot \left(1 + \frac{0.0725}{12}\right)^{(8 \cdot 12)}$$

96 periods

$$= \$14,798.27$$

TVM App:

Present Value	-8,300
Payments	0
Future Value	14,798.27
Annual Rate (%)	7.25
Periods	96
Compounding	Monthly

c)

Present Value	-8,300
Payments	0
Future Value	12,000
Annual Rate (%)	7.441
Periods	20
Compounding	Quarterly

3. Olivia goes to a pow wow. She buys three bison burgers and a \$2.50 coke. The total cost is \$12.70. Determine the price of one burger.

Old news this!

We used to do guess and check! It works (if there is only one answer)

$3 \cdot (2.00) + 2.50$	$= 8.5$	<del>X</del> Nope
$3 \cdot (3.00) + 2.50$	$= 11.5$	<del>X</del> ← Nope
$3 \cdot (4.00) + 2.50$	$= 14.5$	↑ Too high ← Too High
$3 \cdot (3.50) + 2.50$	$= 13$	<del>X</del> ↑ Close!
$3 \cdot (3.40) + 2.50$	$= 12.7$	↑ $\$3.40$ works ✓ Yes

Most of us just work backwards!  
 Let  $x =$  price of one burger!

$$3x + 2.5 = 12.7$$

Take off the coke!

$$\begin{array}{r} 3x + 2.5 = 12.7 \\ - 2.5 \quad - 2.5 \\ \hline 3x = 10.2 \end{array}$$

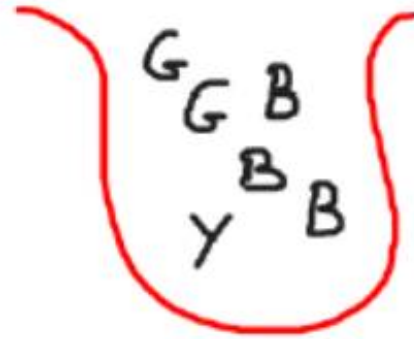
So the 3 burgers alone were \$10.20

$$x = 10.2 / 3 \leftarrow \text{So one burger}$$

$$x = 3.4 = \$3.40$$

Check?  $3 \cdot (3.4) + 2.5 = 12.70$   
 Yes! It works

4. Braden has a bag of marbles. Two GREEN, three BLUE, and a YELLOW. Consider the following separate situations below: [express answers as both % and as reduced fraction]



a. Determine the probability that in one random draw that Braden draws out a GREEN Marble

$$a) P(\text{Green}) = \frac{\# \text{ of Green}}{\text{Total \#}} = \frac{2}{6} = \frac{1}{3} \approx 33.33\%$$

b. Determine the probability that Braden draws out a BLUE OR a YELLOW Marble.

c. Determine the probability that Braden draws out a GREEN then a BLUE without replacement of the first marble. *!!*

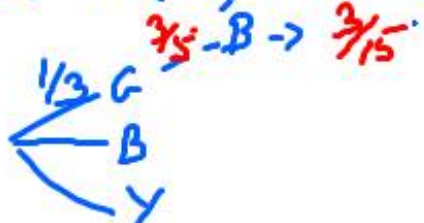
$$b) P(\text{Blue OR Yellow}) = \frac{3 + 1}{6} = \frac{4}{6} = \frac{2}{3} \approx 66.67\% \quad \underline{\underline{OR \text{ MEANS Add}}}$$

$$= P(\text{Blue}) + P(\text{Yellow}) - P(\text{the marble is blue and yellow})$$

$$= \frac{3}{6} + \frac{1}{6} - \frac{0}{6} = \frac{4}{6} = \frac{2}{3} = 66.67\%$$

$$c) P(G, \text{ then } B) = P(G) \cdot P(B|G) = \frac{1}{3} \cdot \frac{3-1}{5} = \frac{1}{3} \cdot \frac{2}{5} = \frac{2}{15} \approx 13.33\%$$

$$= \frac{1}{5} = 20\%$$



oops!  
Had to fix my answer



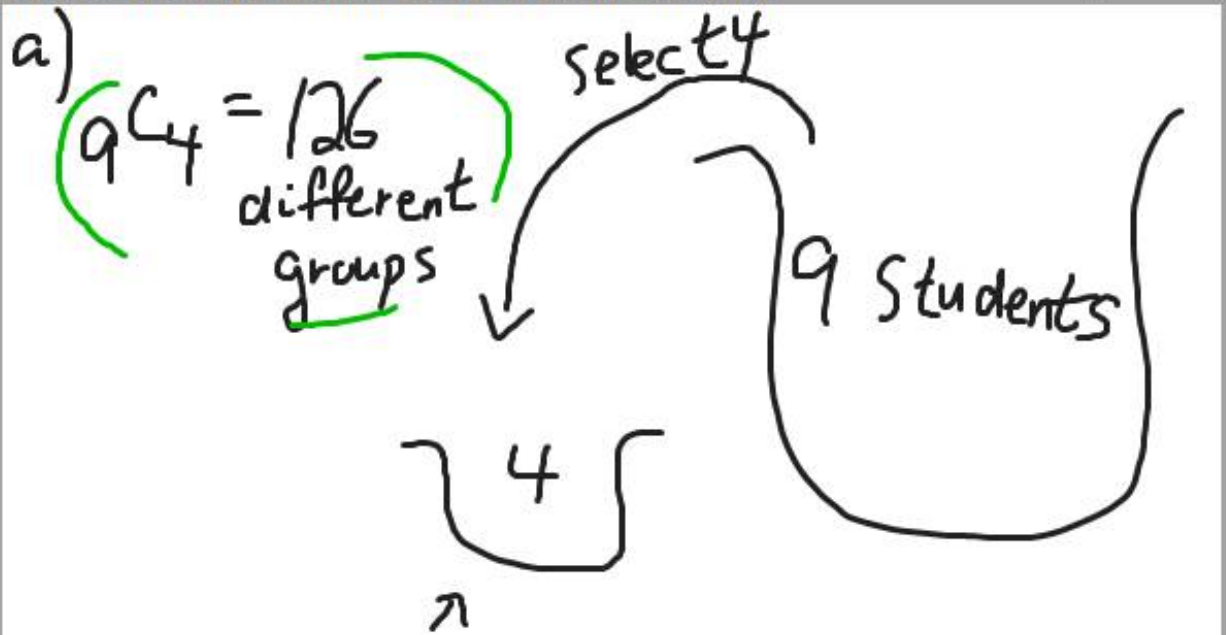
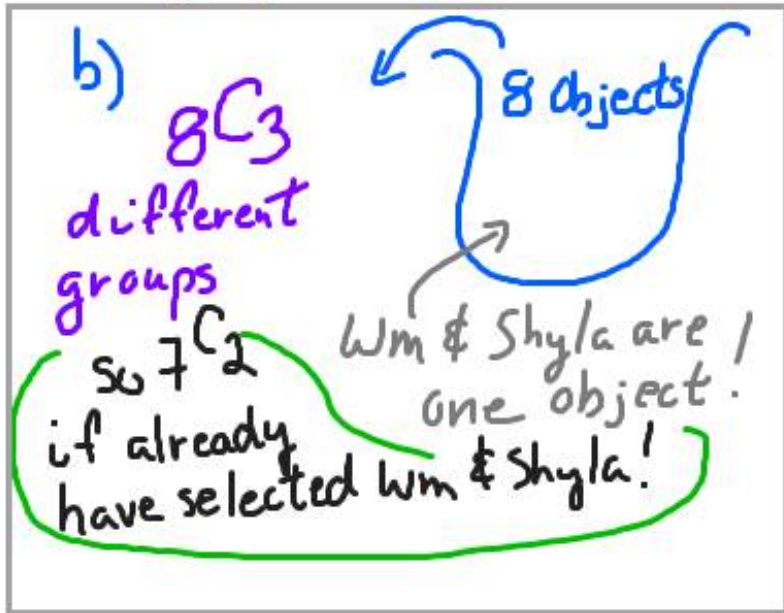
5. Mr F has nine students. He has room in his vehicle to take a **group** of four students to a tour of Red River College.

a. determine how many different groups Mr. F could randomly form.

b. Shyla and William want to be together! If MrF randomly selects a group of four, determine how many of the randomly selected groups have Shyla and William selected together.

c. **Bonus** (1 mark). Determine the probability Alexie is **not** selected in the group of four.

Not worded well!  
Marks for thinking.



No particular order  
A group, gaggle, ...handful  
**Combo!**

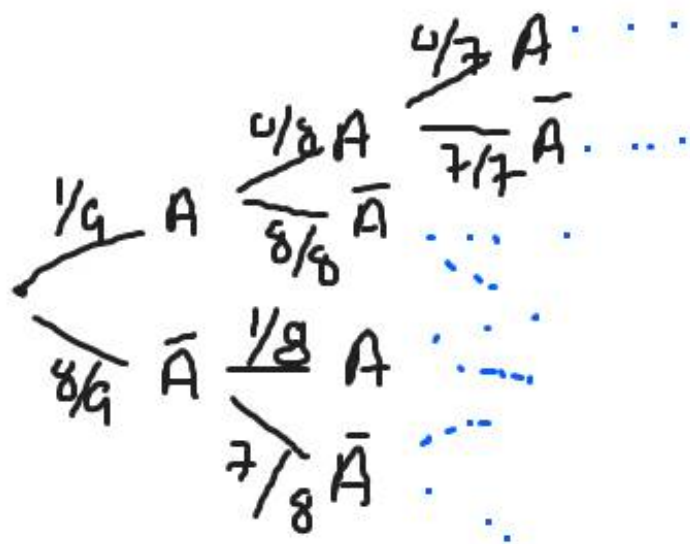
c) Prob (ALEXIE) Is in group

Groups with Alexie  $\rightarrow 8C_3 / 9C_4 = 56 / 126 = 44.44\%$

Total Possible  $\uparrow$  so  $1 - 44.44 = 55.56\%$

Almost forgot to answer question

$$\text{Prob}(\overline{\text{Alexie}}) = 1 - P(\text{Alexie in group})$$



$$\frac{1}{9} + \frac{1}{9} + \frac{1}{9} + \frac{1}{9}$$


$= \frac{4}{9}$  that Alexie is chosen

So  $1 - \frac{4}{9} = \frac{5}{9} = 55.55\%$   
not chosen

I lost sleep over this!

# BONUSES. (1 extra marks each if needed)

**BONUS 1.** Carol has two quarters, two dimes, and a nickel in her wallet. She randomly selects just two coins. Determine how many different sums of money she can make with just two coins.



made a list!  
5 different sums

QQ	50¢
QD	35¢
QN	30¢
DD	20¢
DN	15¢

Thinking is good!

Draw it!

Not necessarily  
Perms or Combs

Table?

Q	Q	D	D	N	
✓	✓				50
✓		✓			35
✓				✓	30
		✓	✓		20
		✓		✓	15

Not sure  
how you would  
do this with  
Perms and  
Combs,  
anyway.  
Thinking about  
it though

**BONUS 2.** Dave decides to quit smoking. He puts away \$60 every week for 30 years into an account that pays 5.75% interest compounded monthly. Determine how much the account is worth after the 30 years. (Use the Advanced TVM, although the compounding frequency is not really an overly significant factor in the calculation)

Advanced Version

PV 0 starts with 0

PMT -60

\* FV 249,485.88 ?

% 5.75 (APR) ← Annual by law!

Pds 1,560 weekly ← 30yr · 52wk/yr

Compounding monthly

A little bit more to consider when the payment period and the compounding period are different  
Not an overly huge difference regardless

Present Value	0
Payments	-60
Future Value	249,485.88
Rate (%)	5.75 Annually
Periods	1560 Weekly
Compounding	Monthly

← a quarter million if he stops smoking!!

Present Value	0
Payments	-60
Future Value	249,989.31
Annual Rate (%)	5.75
Periods	1560
Compounding	Weekly

ONLY A TINY BIT MORE IF WEEKLY COMPOUNDING

ON TIME!  
ON TARGET!



Determined to Deliver!

**Mission Accomplished!**



We carry  
the load!

You call, we haul!

Through  
adversity  
to the  
stars