Student's Name: _____

Foundations for College Mathematics: Final Examination

St. Peter Catholic Secondary School
Mathematics Department

Teacher: *Mr. J. Wright*
Course Code: *MBF3C*
Duration: *120 minutes*
Materials Permitted: *Pencil/Pen, Ruler & Calculator(NO PHONES!)*
Total Number of Pages: *13*

Instructions:

- *Read all questions carefully and plan your time accordingly*
- *Answer ALL questions on the exam paper in pencil*
- *The exam consists of 12 pages (including the title page), please double check that you have all pages*
- *Be sure to properly label all graphs, and show all necessary work and include units in your answers*
- *Be sure to transfer your multiple choice answers to the attached bubble sheet*
- *When complete, take time to check your exam over*
- *Neatness and proper form are important to obtain full marks*
- *Exams are not returned to students; they are kept on file for one year*
- *Students will only be able to leave at scheduled dismissal times*

Teacher Evaluation:

Section	Total Marks	Time	Student Mark
Exponential Relations	25	30	/ 25
Personal Finance	25	30	/ 25
Data Management	10	10	/ 10
Trigonometry	20	25	/ 20
Quadratics	20	25	/ 20
TOTAL	100	120	/ 100

SECTION A: Exponential Relations (25 marks, 30 minutes)

Part A – Multiple Choice *(Choose the best possible answer, and be sure to transfer it to the **bubble sheet**)*

1. Evaluate. $12\left(\frac{1}{3}\right)^2$

a) 1.203 b) 1.333 c) 0.04 d) 4

2. Determine the decay factor.

Year	Price ($)
0	4 000
1	2 000
2	1000
3	500
4	250

a) -5 b) 2 c) -2 d) 0.5

3. Write $\frac{7.2^{12}}{7.2^{9}}$ as a single power.

a) 1^2 b) 108 c) 7.2^{21} d) 7.2^{3}

4. What is the growth factor that corresponds to growth rate of 3.05%?

a) 1.0305 b) 3.05 c) 0.375 d) 1.35

5. What is the growth rate that corresponds to a growth factor of 1.25?

a) 125% b) 2.5% c) 25% d) 75%

Part B – Short Answer: Exponentials *(Be sure to show any necessary work)*

6. Use the exponent rules to simplify to a single power. ***(3 marks)***

a) $4^2 \times 4^3$ **b)** $\left(2^3\right)^4$ **c)** $\dfrac{8^{10}}{8^2 \times 8^6}$

7. Evaluate. Write the answer as a whole number or as a fraction. ***(3 marks)***

a) 2^{-1} **b)** 3^0 **c)** $\left(\frac{3}{4}\right)^2$

8. Mary purchased a car for $37 000. It depreciates 15% per year. Use an exponential equation, $y = ab^x$, to determine the value of the car after 4 years. ***(2 marks)***

9. The number of loons, *L,* in a conservation area can be modelled by the equation

$L = 300(1.1)^t$ where *t* is the number of years since 2010.

Determine the number of loons in both 2005 and 2014. ***(4 marks)***

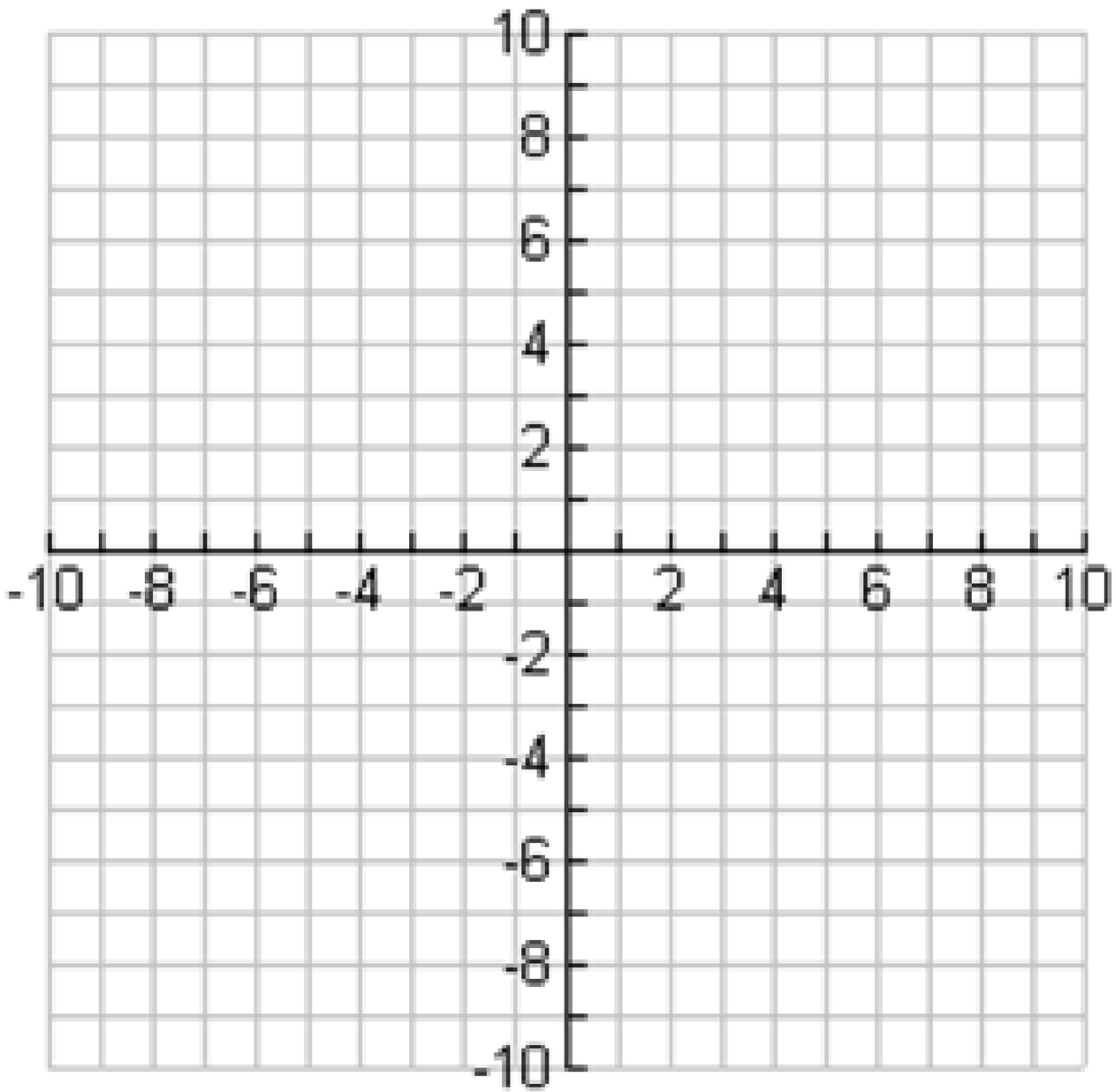
a) 2003 b) 2017

10. a) Complete the table for $y = 3^x$

Round to 2 decimal places where necessary. **(1 marks)**

x	y
-2	
-1	
0	
1	
2	

b) Graph the curve**. (2 marks)**



Section B: Personal Finance (25 marks, 30 minutes)

Personal Finance Formulas

Compound Interest (Amount): $A = P(1+i)^n$

Compound Interest (Principle or present value): $P = A(1+i)^{-n}$ OR $P = \frac{A}{(1+i)^n}$

Simple Interest: $I = P \times r \times t$ **Amount (Simple Interest):** $A = P + I$

Part A – Multiple Choice *(Choose the best possible answer, and be sure to transfer it the **bubble sheet**)*

1. Cole purchased his car for $40 495. The car depreciates by 8% during the first year. What is the value of the car after the first year?

a) $51 743.55 b) $28 751.45 c) $37 255.40 d) $45 950.45

2. Jose invests $600 at 8.5% simple interest. Which equation should be used to calculate the interest earned after 7 months?

a) $600 \times .085 \times \frac{248}{12}$ b) $600 \times .085 \times \frac{7}{12}$ c) $600 \times .085 \times \frac{7}{365}$ d) $600 \times \frac{.085}{12} \times 7$

3. Which investment will earn the most total interest?

a) A $900 simple interest bond that earns 6.7% per year for 2 years

b) A $900 simple interest bond that earns 6.7% per year for 3 years

c) A $900 compound interest bond that earns 6.7% per year for 2 years

d) A $900 compound interest bond that earns 6.7% per year for 3 years

4. You have $2000 to invest. Which compounding option should you choose if you want to maximize your interest earned?

a) compounded annually

b) compounded semi-annually

c) compounded quarterly

d) compounded monthly

5. A $1500 *Guaranteed Investment Certificate* (GIC) earns 4.9% compounded semi-annually for 5 years. Determine the correct equation for calculating the amount of the investment.

a) $A = 1500(1 + 0.49)^{10}$ b) $A = 1.049\ (1500)^5$

c) $A = 1500(1 + (\frac{0.049}{2}))^{10}$ d) $A = 1500(1 + (\frac{0.049}{2}))^5$

Part B – Short Answer: Personal Finance *(Be sure to show any necessary work)*

6. Determine the interest earned on an investment of $2500 compounded monthly 7.5% for 7 months. ***(2 marks)***

7. Thomas receives 900 as a gift for graduating high school. Suppose he invests his money at 3.5% per year, compounded semi-annually for 6 years. Determine the **amount** of the investment. ***(4 marks)***

A =

P =

i =

n =

8. Janet plans to buy a car in 5 years. She estimates she will need $38 000 to buy the car. How much should Jasmine invest now (*present value)* at 3.5% per year, compounded monthly?
(3 marks)

A =

P =

i =

n =

9. Suppose Liam borrows $3250 for 7 years at 6.25% per year, compounded semi-annually. Determine the amount that Liam would have to repay. ***(3 marks)***

A =

P =

i =

n =

10. Explain <u>two</u> advantages and <u>two</u> disadvantages to having a credit card. How can you manage a credit card responsibly? ***(4 marks)***

Section C: Data Management & Probability (10 marks, 15 minutes)

Part A – Multiple Choice *(Choose the best possible answer, and be sure to transfer it the **bubble sheet**)*

1. Determine the MEDIAN for the data set: 3, 9, 11, 3, 9, 8, 11.

a) 8 b) 9 c) 7.7 d) 3.4

2. Use probability vocabulary (*impossible, unlikely, likely, or certain*) to describe the likelihood that the Toronto Blue Jays baseball team will win the Stanley Cup (hockey championship).

a) Impossible b) Unlikely c) Likely d) Certain

3. A card is drawn at random from a standard deck of playing cards (52 cards). What is the theoretical probability of drawing the Six of Spades?

a) $\frac{1}{52}$ b) $\frac{1}{27}$ c) $\frac{1}{4}$ d) $\frac{1}{13}$

Part B – Short Answer: Data Management and Probability *(Be sure to show any necessary work)*

4. Determine the mean, median, mode for the data set.
Round the mean to one decimal place*. *(6 marks)

Gr. 11 Test Results: 57, 63, 78, 77, 91, 88, 77

Mean =

Median =

Mode =

5. A standard deck of playing cards has 52 cards (4 suits– hearts, diamonds, clubs and spades, with 13 cards in each suit- 2,3,4,5,6,7,8,9,10,J,Q,K,A). If one card is drawn from the deck, find the theoretical probability of each event. Express your answers a both a **fraction** is simplest form and a **percent**. ***(6 marks)***

a) picking a heart or diamond

b) picking a red 5 (5 of hearts or diamonds)

c) picking a face card (J,Q,K) of any suit.

Section D: Trigonometry (20 marks, 20 minutes)

Formulas

RIGHT TRIANGLES: SOHCAHTOA

and **Pythagorean Theorem:** $a^2 + b^2 = c^2$

Sine Law: $\frac{a}{sinA} = \frac{b}{sinB} = \frac{c}{sinC}$ **OR** $\frac{sinA}{a} = \frac{sinB}{b} = \frac{sinC}{c}$

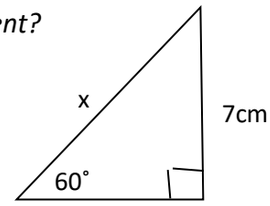
Cosine Law: $a^2 = b^2 + c^2 - 2bccosA$

$cosA = \frac{b^2+c^2-a^2}{2bc}$ **or** $< A = cos^{-1}(\frac{b^2+c^2-a^2}{2bc})$

Part A – Multiple Choice *(Choose the best possible answer, and be sure to transfer it the **bubble sheet**)*

1. Based on the reference angle shown in the triangle, what side does *x represent?*

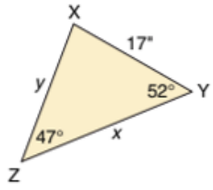
a) hypotenuse b) adjacent c) opposite d) right



2. Based on the triangle in question #1, which primary trigonometric ratio would you use to find *x*?

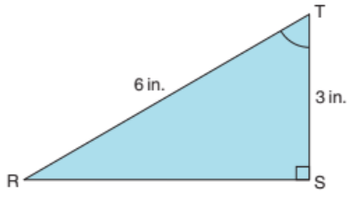
a) Sine b) Cotangent c) Cosine d) Tangent

3. Based on the triangle shown, which formula would you use to solve for side *x*?



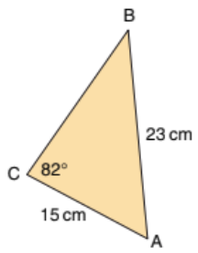
a) SOHCAHTOA b) Pythagorean Theorem c) Cosine Law d) Sine law

4. Based on the given triangle, which trigonometric ratio will properly calculate angle T?



a) $SinT = \frac{3}{6}$ b) $CosT = \frac{6}{3}$ c) $T = Sin^{-1}(\frac{3}{6})$ d)) $T = Cos^{-1}(\frac{3}{6})$

5. Which equation properly uses Sine Law to find angle B?



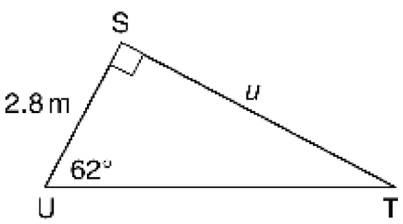
a) $\frac{Sin\ 82}{15} = \frac{Sin\ B}{23}$ b) $\frac{Sin\ B}{15} = \frac{Sin\ 23}{82}$ c) $SinB = \frac{15Sin23}{82}$ d) $B = Sin^{-1}(\frac{15Sin82}{23})$

Part B – Short Answer: Trigonometry *(Be sure to show any necessary work)*

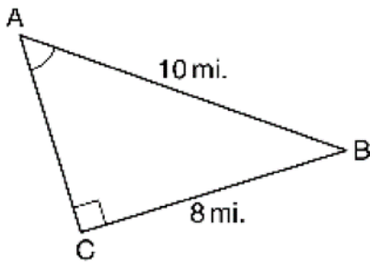
****NOTE: ROUND ALL ANSWERS TO 2 DECIMAL PLACES AND INCLUDE UNITS****

6. Determine the measure of the indicated angle or the length for each triangle below. ***(4 marks)***

a) side u

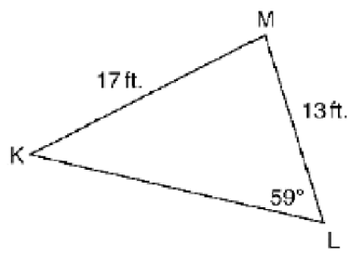


b) angle A

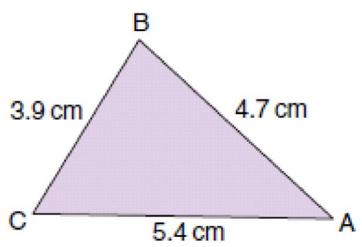


7. Determine the indicated measure in each triangle. ***(4 marks)***

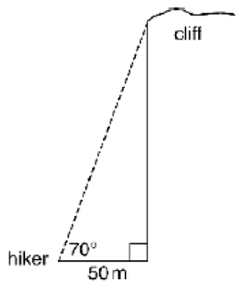
a) Find ∠K. Use sine law.



b) Find ∠B. Use cosine law.



8. A hiker walks along a path 50 m from the base of a cliff. The angle of elevation from the hiker to the top of the cliff is 70°. How tall is the cliff? ***(3 marks)***



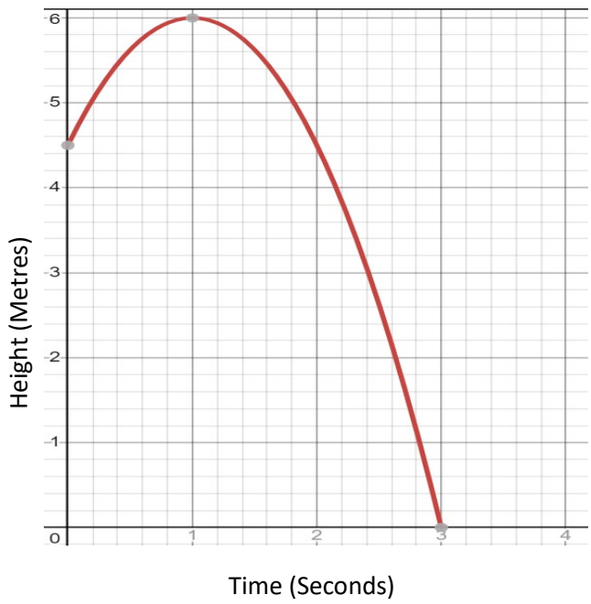
9. A hockey net is 1.8m wide. A player is 6.0m from one goal post and 6.7m from the other. Within what angle must she keep her shot in order to score a goal? Draw a diagram of the problem. ***(4 marks)***

Section E: Quadratic Relations (20 marks, 25 minutes)

Part A – Multiple Choice *(Choose the best possible answer, and be sure to transfer it the **bubble sheet**)*

Answer all the multiple choice questions based on the following graph.

A diver jumps from a board at a diving competition. The graph shows her height above the water during the dive.



1. From what height did the diver jump?

a) 5m b) 4.5m c) 3.5m d) 0m

2. Determine the maximum height of the diver?

a) 5m b) 10m c) 3m d) 6m

3. How long does it take from the diver to reach the water?

a) 2 sec b) 5 sec c) 2.6 sec d) 3 sec

4. What is the vertex of the graph?

a) (6, 1) b) (3, 0) c) (1, 6) d) (1, 5)

5. Which equation could be used to model the graph?

a) $h = -1.5(t-1)^2 + 6$

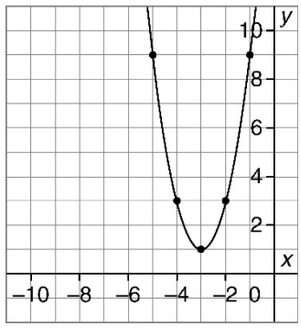
b) $h = -2(t-6)^2 + 1$

c) $h = -1.5t + 6$

d) $h = 2(t-6)^2 + 1$

Part B – Short Answer: Quadratics *(Be sure to show any necessary work)*

6. The parabola can be represented by the equation in vertex form: $y = a(x - h)^2 + k$. Determine: ***(5 marks)***



a) The coordinates of the vertex: (___ , ___)

b) The direction of opening: _____

c) The equation of the axis of symmetry: x = _____

d) The first 3 terms of the step pattern: _____, _____, _____

e) The equation of the parabola in vertex form: _____

7. The height, *h* feet, of a ball *t* seconds after it is kicked is given by the equation $h = -4(t - 3)^2 + 38$. ***(6 marks)***

a) What is the maximum height of the ball?

b) How long does it take for the ball to reach its maximum height?

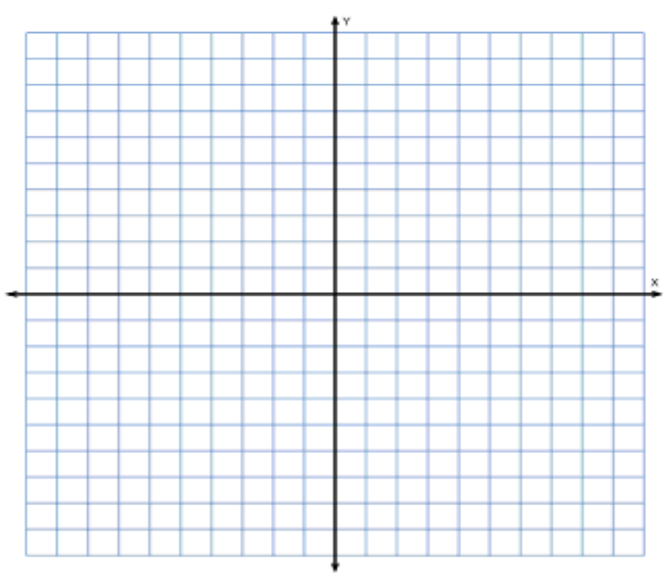
c) Change the vertex form of the equation, $h = -4(t - 3)^2 + 38$, into standard form ($y = ax^2 + bx + c$).

d) From what height was the ball kicked?

8. Use the vertex and the step pattern to graph the following equations. ***(4 marks)***

a) $y = 3(x - 3)^2 + 6$

b) $y = (x - 2)^2 - 7$



Multiple Choice Answer Sheet

(Bubble Sheet)

For each answer, please fill in marks like this: ● not like this: ✗ ⊘ ✓

Section A – Exponential Relations

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D

Section B – Personal Finance

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D

Section C – Data Management & Probability

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D

Section D – Trigonometry

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D

Section E – Quadratics

1	A	B	C	D
2	A	B	C	D
3	A	B	C	D
4	A	B	C	D
5	A	B	C	D