Summer holidays! MFM 2P1 Culminating Task Name: ________________

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You have two months off from school and your family is planning a trip either to Egypt to see the pyramids or to Italy to see the Leaning Tower of Pisa.

Task 1- Purchasing the Tickets

Select a county by circling it: **Egypt** **Italy**

You must book your ticket and the choices vary. A search on Expedia gives the options shown in Table 1.

a) Calculate the cost per hour of travelling time for both Option A and B - ***only for your destination***.

Table 1: Purchasing the airline ticket.

Country	Option A- Direct Flight		Option B- At least one stopover	
	Information	$ cost per hour of travelling time	Information	$ cost per hour of travelling time
EGYPT	YYZ-CAI-YYZ $1491 (Air Canada) OUT: 17h25m BACK: 15h30m		YYZ-CAI-YYZ $1054 (Air France) OUT: 20h30m BACK: 25h38m	
ITALY	YYZ-FCO-YYZ $2158 (Delta) OUT: 8h35m BACK: 9h30m		YYZ-FCO-YYZ $1580 (Delta) OUT: 8h35m BACK: 17h20m	

b) ***Circle*** the choice of booking you will make(Option A or Option B).

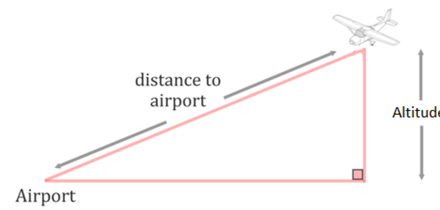
c) ***Give two reasons*** for why you made the choice that you did.

Task 2 - Leaving YYZ….Wave Goodbye!

For large airlines the angle of elevation upon take-off must be carefully calculated. These aircrafts gain altitude at a steady rate, based on the speed at take-off. Depending on the speed of the plane, altitude is gained and distance along a slant is gained.

Your cousins come to see you off at the airport. They look for the plane soon after takeoff and frantically wave goodbye to you.

a) ***Calculate*** the altitude of the plane 50 seconds after takeoff, if the angle of elevation of the plane is 15^0 and the take-off climb rate is 1800fps, or 1800 feet per second.



b) Since this is Canada, ***convert*** this altitude from Imperial units to metric units. Remember **1 m = 3.3 ft.**

c) ***Convert*** the altitude from metres to kilometres?

There are many other planes leaving on different runways. An air traffic controller is watching a plane that is at an altitude of 281 feet and is 1595 feet from the airport along the ground.

d) **Calculate** the angle of elevation for this airplane, to the nearest degree. Draw a diagram to help you.

<u>Task 3 - Spending Money…Currency Exchange</u>

Upon arriving at the airport in the country you are visiting, you must change money from Canadian currency to the local currency.

A well-travelled friend says never to trust the cashiers at the Currency Exchange kiosks in the airport. So, planning ahead you use your unit conversion knowledge and the exchange rates to convert $1250 Canadian dollars to the currency of the country you are visiting.

The kiosk has posted the following exchange rates:

Table 2: Exchange Rates

Country	Exchange Rate
Egypt	1 Canadian dollar = 13.90 Egyptian pounds
Italy	1 Canadian dollar = 0.72 Euro

a) ***Calculate*** how much you should expect to receive in the currency of ***the country you are in***.

b) The Currency Exchange Kiosk charges a flat fee of 2% for exchanging the money, after they've converted it to the new currency. ***Calculate*** how much you will have left in your pocket after this fee is taken.

Task 4 - Let's Rent a Car

Your family must rent a vehicle to explore the country, and there are two choices that make sense for the size of your family.

A full tank for each vehicle represents a volume of 60L for the Land Rover and 50L for the Mercedes-Benz SL.

The equations relating the distance driven (d) and the volume remaining in fuel tanks are given for each vehicle:

Land Rover
V = 60 – 0.13d, where d is the distance driven in multiples of 100km

Mercedes- Benz SL
V = 50 – 0.10d, where d is the distance driven in multiples of 100km

a) Assuming the number of days that each vehicle is rented is the same, therefore not an issue, ***complete the table*** of values relating Volume in tank (V) and distance driven (d), in multiples of 100km.

Land Rover		**Mercedes-Benz SL**	
d ,*km*	V, *litres*	d, *km*	V, *litres*
0		0	
100		100	
200		200	
300		300	
400		400	
500		500	
600		600	

b) ***Graph*** these lines (on graph paper given to you) ***and state*** the point of intersection of the lines. ***Explain*** what this point of intersection means, in terms of the given context.

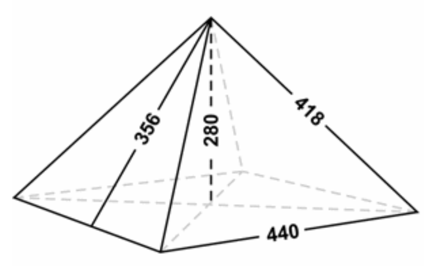
<u>Task 4 - Let's Rent a Car - continued</u>

c) Now ***solve***, **algebraically**, for the point of intersection of the lines:

$V = 60 - 0.13d$ [Land Rover line]

$V = 50 - 0.10d$ [Mercedes Benz line]

Task 5 – Sightseeing (complete the task for your location only)



If you are in ***Egypt*****,** you finally see the amazing Pyramids of Giza.
They are built of stone, and you wonder what the volume of one of the Pyramids is and the surface area. The travel guide contains the following picture and measurements. [Units are in metres]

Using your strong mathematical skills gained in grade 10 math, you stun your Dad by ***calculating both*** the volume and surface area of the pyramid before you.

Volume:

Surface area:
(draw and label a net also)

If you are in ***Italy***, you are stunned by how old and beautiful the Leaning Tower of Pisa is. A travel brochure has the following picture of the Tower in it, and some measurements.

Height is 55.86 m Volume of stone is 9891 m^3

a) ***Calculate*** the outer diameter of the base of the tower.

b) ***Calculate*** the approximate surface area of the Tower assuming the base diameter is consistent throughout the Tower's height.

Task 6: Skydiving!

Because you are an adventurous traveller, your Dad offers you the opportunity to skydive out of a plane over the landmark that you have visited.

Egypt: **If diving over the Pyramids,** Your skydive follows the path given by $h = -4.9t^2 + 2800$, where t is time in seconds, after you have left the plane and h is your height above round, in metres
Italy: **If diving over the Leaning Tower of Pisa,** Your skydive follows the path given by $h = -4.9t^2 + 3200$, where t is time in seconds, after you have left the plane and h is your height above ground, in metres

Identify where you are first! I am in __________________________________.

a) ***What is*** the altitude of the plane when you skydive out of it?

b) ***What is*** your height above ground 12 seconds after jumping?

c) ***How many*** miles above the ground is this? Remember 1.6 km = 1 mi

d) If your parachute opens at an altitude of 900m, ***how many*** seconds of free fall will you experience?

e) On graph paper, ***graph*** the relationship height vs. time for your skydive. Use the graph to ***estimate*** how many seconds it takes to reach the ground.

f) ***What is*** the name of the *shape* of the graph? **What is** the name of the type of *relation* of the equation?

Shape: ***Type of Relation:***

Rubric for "Summer Holiday" ---MFM 2P1 Culminating Task (January, 2019) Name:

Categories	Level 1 (50 - 59%)	Level 2 (60 - 69%)	Level 3 (70 - 79%)	Level 4 (80 - 100%)
Knowledge (30%)	→ There is no solution, or the solution has no relationship to the task. → Inappropriate concepts are applied and/or procedures are used. → The solution addresses none of the mathematical components presented in the task.	→ The solution is not complete indicating that parts of the problem are not understood. →The solution addresses some, but not all of the mathematical components presented in the task.	→The solution shows that the student has a broad understanding of the problem and the major concepts necessary for its solution. →The solution addresses all of the components presented in the task.	→The solution shows a deep understanding of the problem including the ability to identify the appropriate mathematical concepts and the information necessary for its solution. →The solution completely addresses all mathematical components presented in the task. →The solution puts to use the underlying mathematical concepts upon which the task is designed.
Application (30%)	→Makes weak connections among mathematical concepts and procedures →Weakly relates mathematical ideas to situations drawn from other contexts →Application of knowledge and skills shows limited effectiveness due to misunderstanding of concepts and/or incorrect selection/misuse of procedures	→Makes simple connections among mathematical concepts and procedures →Simply relates mathematical ideas to situations drawn from other contexts →Application of knowledge and skills shows some effectiveness due to partial understanding of concepts and/or errors/omissions in the application of the procedures	→Makes appropriate connections among mathematical concepts and procedures →Appropriately relates mathematical ideas to situations drawn from other contexts →Application of knowledge and skills shows considerable effectiveness due to an understanding of most of the concepts with minor errors and/or omissions in the application of the procedures	→Makes strong connections among mathematical concepts and procedures →Strongly relates mathematical ideas to situations drawn from other contexts →Application of knowledge and skills shows a high degree of effectiveness due to a thorough understanding of the concepts and an accurate application of the procedures (any minor errors and/or omissions do not detract from the demonstration of a thorough understanding
Thinking (20%)	→No evidence of a strategy or procedure, or uses a strategy that does not help solve the problem. →No evidence of mathematical reasoning. →There were so many errors in mathematical procedures that the problem could not be solved.	→Uses a strategy that is partially useful, leading some way toward a solution, but not to a full solution of the problem. →Some evidence of mathematical reasoning. →Could not completely carry out mathematical procedures. →Some parts may be correct, but a correct answer is not achieved.	→Uses a strategy that leads to a solution of the problem. →Uses effective mathematical reasoning. →Mathematical procedures used. →All parts are correct and a correct answer is achieved.	→Uses a very efficient strategy leading directly to a solution. →Employs refined and complex reasoning. →Applies procedures accurately to correctly solve the problem and verify the results. →Verifies solution and/or evaluates the reasonableness of the solution. →Makes mathematically relevant observations and/or connections.
Communication **(20%)**	→There is no explanation of the solution, the explanation cannot be understood or it is unrelated to the problem. →There is no use or inappropriate use of mathematical representations (eg. figures, diagrams, graphs, tables, etc.) →There is no use, or mostly inappropriate use, of mathematical terminology and notation.	→There is an incomplete explanation, it may not be clearly presented. →There is some use of appropriate mathematical representation. →There is some use of mathematical terminology and notation appropriate of the problem.	→There is a clear explanation. →There is appropriate use of accurate mathematical representation. →There is effective use of mathematical terminology and notation.	→There is a clear, effective explanation detailing how the problem is solved. All of the steps are included so that the reader does not need to infer how and why decisions were made. →Mathematical representation is actively used as a means of communicating ideas related to the solution of the problem. →There is precise and appropriate use of mathematical terminology and notation.

Levels:	**1-**	**1**	**1+**	**2-**	**2**	**2+**	**3-**	**3**	**3+**	**4-**	**4**	**4+**
Conversions:	**50-52**	**53-56**	**57-59**	**60-62**	**63-66**	**67-69**	**70-72**	**73-76**	**77-79**	**80-86**	**87-94**	**95-100**