MAP 4C Final Exam Review Questions

Trigonometry

1. Solve the triangles below.


Triangle ABC: angle A = 56°, B = 90°, BC = 8.6 m

Triangle DEF: DE vertical, DF = 9.7 m, EF = 7.9 m, E = 90°

Triangle GHI: GH = 12.6 m, GI = 13.5 m, HI = 16.2 m
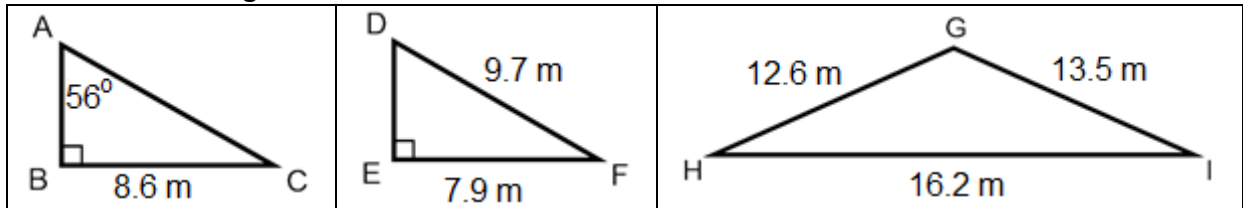
2. Given the coordinates of point P(-2, 8) on the terminal arm of angle θ
   a. Draw a sketch of the angle.
   b. Determine the distance from the origin (0, 0) to the point.
   c. Determine sin θ, cos θ and tan θ to four decimal places.
   d. Determine the measure of angle θ.

3. Determine the measure of angle X, given that the angle is obtuse.

23.5 m, 62.3 m, X, 15°
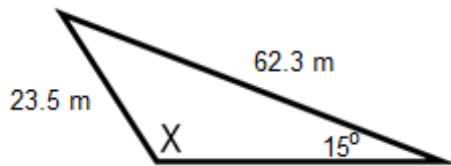
4. Determine the area of the triangle given below.

34.6 m, X, 22°, 18°, Y, Z
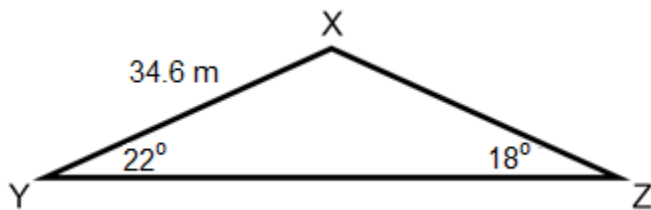
5. Given each diagram below, find x.

51°, X, 15 m, 11 m

42°, x, 30 m, 17 m
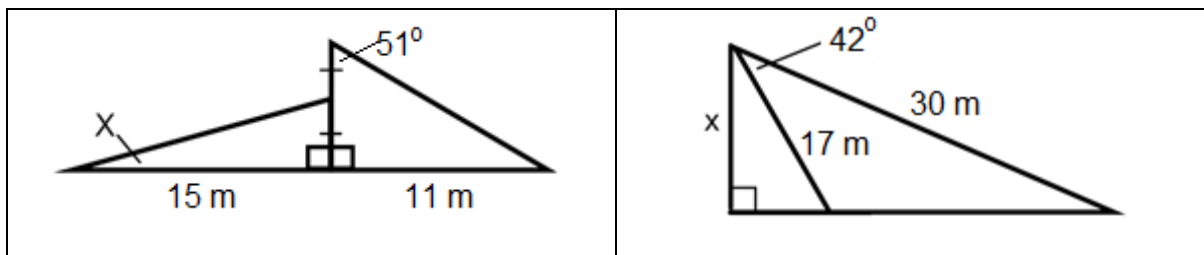
Algebraic Models

1. First, write as a single exponent. Then evaluate, express final answers as integers or fractions, **no decimals**.

   a. $4^5 \times 4^7$ 　　　　　　 b. $(3^4)^{-5}$ 　　　　　　 c. $5^2 \div 5^5$

2. Simplify, using the exponent laws. Write answers with positive exponents.

   a. $(x^{-2})(x)(x^7)$ 　　　　 b. $(m^2 n^5)(m^{-8} n^{-6})$ 　　　 c. $(y^{-4} \div y^{-8})$

   d. $(a^{-1}b) \div (a^{-7}b^{-2})$ 　　 e. $(2u^{-9})^{-1}$ 　　　　　　 f. $(4w^3)^{-4}$

3. Solve. Round your answers to one decimal place.

   a. $k^5 = 20$ 　　　　　　 b. $1200 = 10x^5$ 　　　　 c. $100 = \frac{1}{3}\pi r^3$

4. Express each of the following powers as a radical (root sign), then evaluate. Express final answers as integers or fractions, **no decimals**. (8 marks)

   a. $81^{\frac{1}{4}}$ 　　　　　　 b. $27^{\frac{-2}{3}}$ 　　　　　　 c. $(-32)^{\frac{3}{5}}$

5. Write each power as a power with base 4 with a single exponent.

   a. 64^2 　　　　　　　　　　　　 b. 2^6

   c. 21^0 　　　　　　　　　　　　 d. 16^{3x}

6. Determine the value of x that satisfies the following equations.

   a. $16^{x-2} = 2^{5x}$ 　　　　　　 b. $3^{4x+2} = 9^{x-1}$

   c. $4^{3(x-2)} = 64^{2x+5}$ 　　　　 d. $27^{2x-3} = 9^{2(x-5)}$

7. Solve. Round your answers to one decimal place.

   a. $2^x = 64$ 　　　　 b. $2^x = 15$ 　　　　 c. $4000 = 800(1.06)^t$

8. The approximate population of Gravenhurst, P thousands, is represented by the exponential function P = 10.5(1.023)ⁿ, where n is the number of years since 2014. If this trend continues, in what year will the population break 30 thousand people?

9. The volume, V, of a cone is given by the formula $V = \frac{1}{3}\pi r^2 h$ where r is the radius. If a cone with volume 600 m³ has a radius that is 1/4 the height. What is the diameter of the cone?

Graphical Models

1. Andrew invested $12,000 in an investment earning 6% compound interest compounded annually.

Year	Value of Investment ($)
0	12,000.00
1	12,720.00
2	13,483.20
3	14,292.19
4	15,149.72
5	16,058.71

    a. Identify the independent and dependent variables.

    b. What are appropriate units for the rate of change?

    c. Calculate the first and second differences and determine whether the data in the table of values shows a linear, quadratic or exponential trend. Be sure to explain your decision.

    d. Under what circumstances would the differences have suggested each other type of trend?

    e. What is the rate of change, or percent increase of the investment each year.

    f. Determine an equation to represent the value of this investment over time.

    g. Explain what each variable in your equation from part e represents.

    h. Determine the value of the investment after 30 years. Show your work.

2. The screenshots below show the results of linear, quadratic and exponential regression analyses performed on data of the percent of Canadian homes with air conditioners over time. The initial year was 1999.

```
LinReg
y=ax+b
a=1.94047619
b=32.70833333
r²=.9436086487
r=.9713952073
```
```
QuadReg
y=ax²+bx+c
a=.2321428571
b=.3154761905
c=34.33333333
R²=.9976275713
```
```
ExpReg
y=a*b^x
a=33.13277827
b=1.049554964
r²=.9606012029
r=.9801026492
```

    a. For each model, rewrite the equation with appropriate variables, identify the initial value, and identify the r^2 value and percent confidence.

    b. For each model, determine the expected percentage of Canadian homes with air conditioners in1990 and 2020.

    c. Which model do you think does the worst job at predicting into the past? Justify your choice.

    d. Which model do you think does the best job at predicting into the future? Justify your choice.

Statistics

1. Canada's total land area is approximately 10,000,000 square kilometers. If Canada's current population is 34.88 million, what is Canada's per capita area?

2. On June 16, 2004, average gas prices were 86.7 cents / litre. Today the average price of gas is 135.5 cents / litre. Determine the percent change in gas prices over this 10 year period.

3. Draw a rough sketch of a graph that would correspond to each correlation coefficient, r.

   r = 0.10   r = 1   r = -1   r = -0.50   r = 0.90   r = -0.8

4. The table of values below shows the grades and absences for a class of 19 students. The class data is sorted by grade.

Student	Grade (%)	Number of Absences
1	47	30
2	47	32
3	47	8
4	51	6
5	52	27
6	57	21
7	65	15
8	69	14
9	69	18
10	75	3
11	75	8
12	76	4
13	80	1
14	85	8
15	85	2
16	85	7
17	85	9
18	87	14
19	90	3

a. Pose, and answer, a one-variable question.

b. Student #3 has gone home and claimed to their parents that they are in the 50th percentile of the class. Explain their error and determine their actual percentile rank.

c. Determine what grade is in the 85th percentile of this course

d. In this course, final grades were based on a 70% term mark, 10% culminating activity and a 20% final exam. If the student scored 444/700 marks through the term, 123/200 on their culminating activity and 65/175 on the final exam, what is their final grade?

5. Given the graph of the TSX Composite index below,

S&P/TSX Composite as of Dec 11, 2008

a. Determine the percent change between January 1, 2000 and September 1, 2000.

b. If you invested $1,000,000 on October 1, 2008 in a fund that mirrors the TSX, what would your investment have been worth 9 days later on October 10, 2008? How much money would you have gained or lost?

c. Between 2000 and 2010, the Consumer Price Index (CPI) increased by 22%. The CPI is an index known to approximate inflation. Assume you invested $5,000 in 2000, and your investment was worth $8,000 in 2010. Determine the "**real value**" of your investment and indicate whether your investment is ahead of, or behind, the rate of inflation? Show your work and explain your answer.

Measurement and Geometry

1. Given that **1 in. = 2.54 cm** and **12 in. = 1 ft** complete the conversions below.

3 in. = _____ cm	14 in.² = _____ cm²	62 in³ = _____ cm³
13 cm = _____ in.	10 ft.² = _____ in.²	32 in.³ = _____ ft.³

2. A circular in-ground garden pond has a radius of 16 m. A 1.5 m concrete deck will be constructed around the pond. The concrete should be 12 cm thick. Calculate the volume of concrete required to construct the deck.

3. Tennis balls are stacked three wide by three deep by two high in a square-based prism package. The diameter of one ball is 2.6 inches.
   Draw a labelled diagram and determine the volume of the box.

4. A garden is in the shape of a rectangle and a semicircle as shown below.
   a. How much fencing is required to enclose the garden? (3 marks)
   b. What is the total area of the garden? (3 marks)
   c. If the garden is to have a depth of 0.3 m, what is the volume?

4.3 m   —8.6 m—   6.5 m
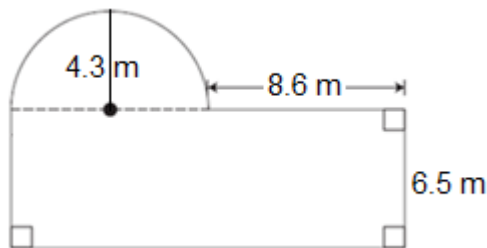
5. A stop sign is a regular octagon (8-sided polygon where all sides are the same).
   Determine the area of a stop sign where each side length is 2 feet. Include a diagram.

6. Describe two methods that you could use to determine the area of the figure below.
   Verify that both methods are the same by creating equations for each.

2x

x