GRADE 11 APPLIED MATHEMATICS (30S)

Final Practice Examination

Grade 11 Applied Mathematics

Final Practice Examination

Name: _____

Student Number: _____

Attending ❑ Non-Attending ❑

Phone Number: _____

Address: _____

_____

_____

For Marker's Use Only

Date: _____

Final Mark: _____ /100 = _____ %

Comments:

Instructions

The final examination is based on Modules 5 to 8 of the Grade 11 Applied Mathematics course. It is worth 25% of your final mark in this course.

Time

You will have a maximum of **2.5 hours** to complete the final examination.

Notes

You are allowed to bring the following to the examination: pens/pencils (2 or 3 of each), metric and imperial rulers, a graphing and/or scientific calculator, and your Final Exam Resource Sheet. Your Final Exam Resource Sheet must be handed in with the examination. Graphing technology (either computer software or a graphing calculator) **is required** to complete this examination.

Show all calculations and formulas used. Use all decimal places in your calculations and round the final answers to the correct number of decimal places. Include units where appropriate. Clearly state your final answer. Final answers without supporting calculations or explanations will **not** be awarded full marks. Indicate equations and/or keystrokes used in calculations.

When using graphing technology, include a screenshot or printout of graphs **or** sketch the image and indicate the window settings (maximum and minimum x- and y-values), increments, and axis labels, including units.

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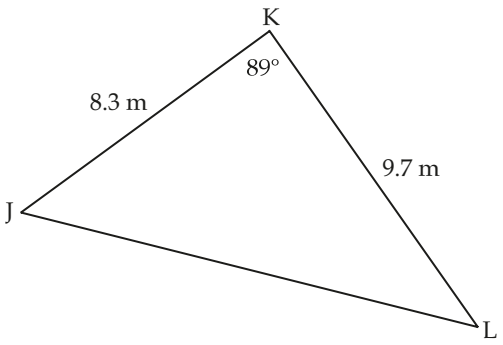
Answer all questions to the best of your ability. Show all your work.

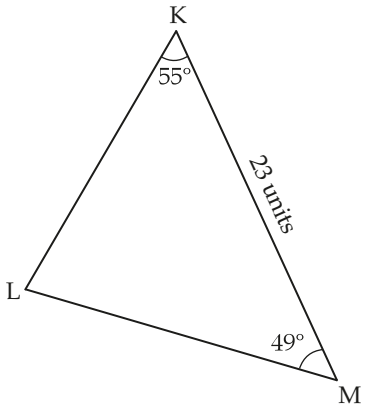
Module 5: Trigonometry *(25 marks)*

1. Solve for all the missing angles and all the missing sides in the triangles below. Round your answers to one decimal place.

   a) *(6 marks)*

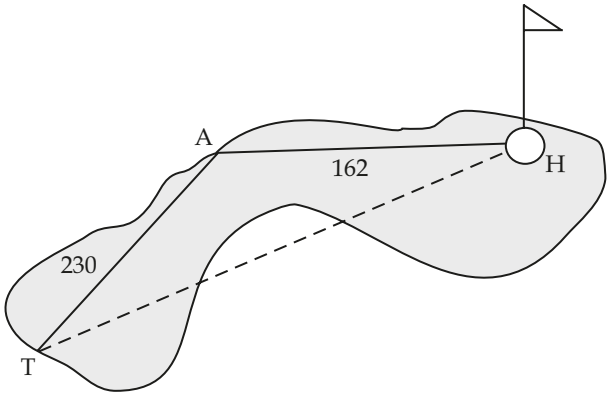


b) *(5 marks)*

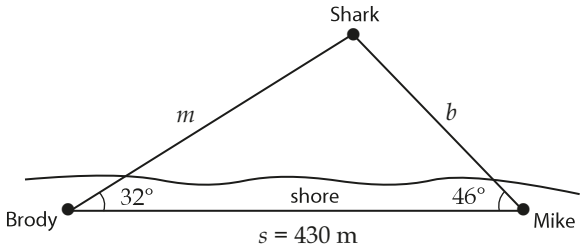


Name: _____

2. A golf hole has a dogleg as shown in the diagram below. What is the angle at the dogleg (TAH), if the distance from the tee, T, to the hole, H, is 362 m? *(3 marks)*



3. Brody and Mike are two harbour masters who are tracking the position of a great white shark. The harbour masters are located in buildings on the ocean shore that are 430 m apart. Brody's line of sight to the shark makes an angle of 32° with his line of sight to Mike. Mike's line of sight to the shark makes an angle of 46° with his line of sight to Brody. Determine the distance of the shark from each harbour master. Round your answers to the nearest metre. *(5 marks)*



Name: _____

4. Given points A, B, and C, determine measurements for angle A, side *a*, and side *b*, so that each of the following situations is created. *(3 × 2 marks each = 6 marks)*

   a) no triangle is possible

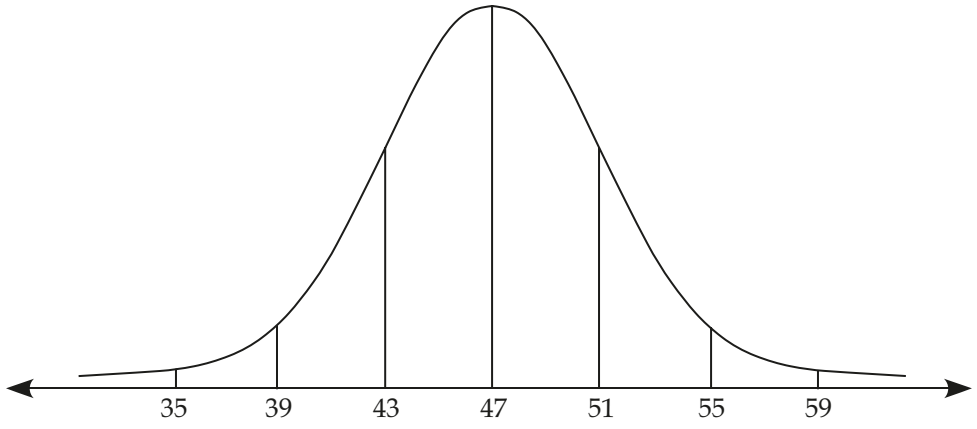
b) two triangles are possible

c) one right triangle is possible

Module 6: Statistics *(23 marks)*

1. State two properties that apply to all normal distributions. *(2 marks)*

2. Determine the mean and standard deviation of the following normal curve. *(2 marks)*



Name: _____

3. The following data represents a sample of the waiting times at a dentist's office. These times are expressed in minutes.

12	19	2	13	21	23	18	13	20
23	26	7	10	8	16	12	17	21

a) Determine the mean and standard deviation for the data. Round to one decimal place. *(2 marks)*

b) Calculate the percentage, to one decimal place, of the waiting times that fall within ±1 standard deviation of the mean. *(2 marks)*

c) Verify if the waiting times resemble a normal distribution. Justify your answer.
(3 marks)

Name: _____

4. The lifetime of a microwave is normally distributed with a mean of 4.7 years and a standard deviation of 0.4 years.

   What percent of microwaves will last at least 5 years? *(2 marks)*

5. For a university calculus course, the professor decided that only 5% of students would fail. Assume the marks are normally distributed.

   a) What z-score represents this value? *(1 mark)*

   b) If the mean mark was 71.4 and the standard deviation was 14.3, what is the lowest mark that would represent a passing mark? *(2 marks)*

   c) If the mean was 60 and the standard deviation was 16.2, will you pass with a mark of 45? Justify your answer using mathematical calculations. *(2 marks)*

Name: _____

6. Based on survey results, 61 out of 100 people who go to a car dealership end up purchasing a vehicle. These results are accurate to within ±5%, 19 times out of 20.
   a) Determine the confidence level. *(1 mark)*

   b) State the margin of error. *(1 mark)*

   c) What is the confidence interval? *(1 mark)*

7. Explain how the margin of error affects the confidence interval. *(1 mark)*

8. In a study of the water quality of Manitoba lakes, pollutants are measured in parts per million (ppm). The average amount of pollutants found in the lakes for a particular region of Manitoba is 0.88 ppm, with a standard deviation of 0.27. The data follows a normal distribution. The measured pollutants at Green Lake are 1.21 ppm. Determine the equivalent *z*-score. *(1 mark)*

Module 7: Mathematical Models *(27 marks)*

1. A delivery truck is bringing goods to a store 180 km away. For the first half hour, the driver maintains a speed of 60 km/h. The driver then accelerates to 100 km/h for the remainder of the trip. Create a graph to represent this trip. *(3 marks)*

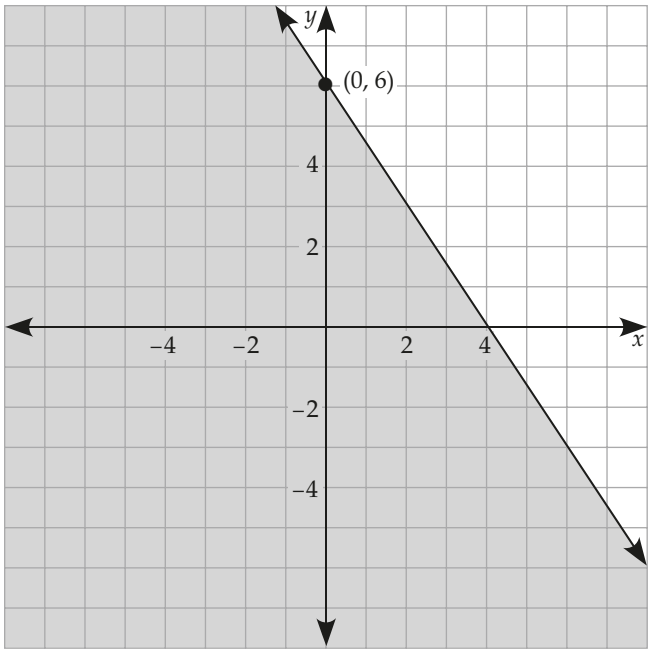
Name: _____

2. Determine a point that is in the solution region for the following system of linear inequalities. Prove that your point is in the solution region. *(3 marks)*

$$y \leq -\frac{1}{2}x + 2$$

$$y \geq -2x + 5$$

3. Write the linear inequality that is represented in the graph below. *(3 marks)*



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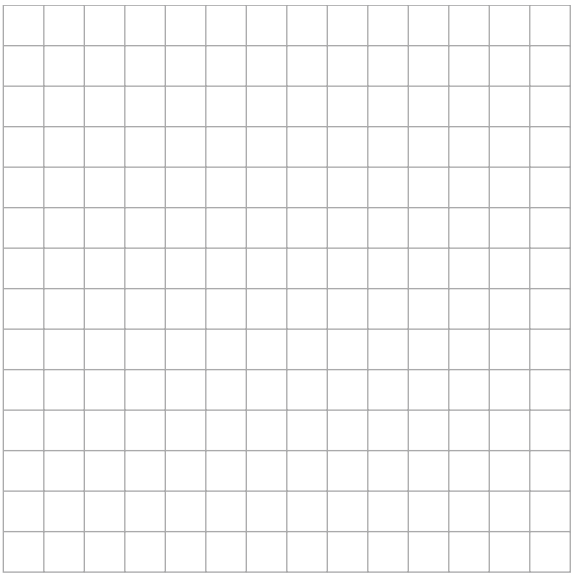
4. Sketch the following system of inequalities. Shade the region of overlap. *(5 marks)*

$4x + 3y \geq 9$

$-y < -2x + 3$



5. You have $200 to spend on clothing. Shirts costs $20 and pants cost $35. Determine how many shirts and pants you can purchase.

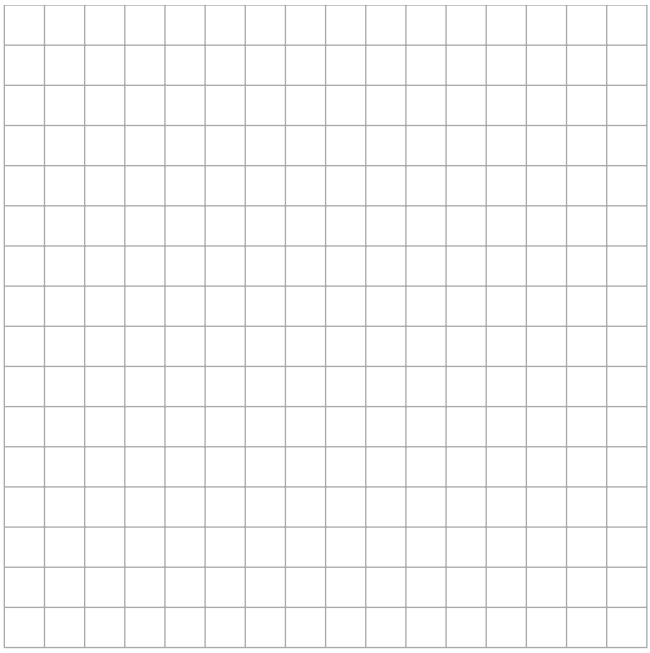
   a) Define the two variables used in this scenario. *(1 mark)*

   b) What are the restrictions on these variables? Explain. *(2 marks)*

   c) Write an inequality to represent how many shirts and how many pants you can purchase. *(1 mark)*

Name: _____

d) Graph the inequality you created in (b) and (c), and label the vertices of the solution region. *(3 marks)*



e) If you buy 4 shirts, how many pairs of pants can you possibly buy? *(1 mark)*

f) If you buy 3 pairs of pants, how many shirts can you possibly buy? *(1 mark)*

6. A food truck sells pizza and chicken wings. Each day, they sell at least three times as many orders of pizza as they do chicken wings. The food truck only has room to hold 42 orders of pizza and 30 orders of chicken wings. Pizzas are sold for $10 each and chicken wings are sold for $8 each. Determine the number of pizza and chicken wings that would have to be sold to maximize the amount of money the food truck receives in sales in one day.

   a) Write the equation of the objective function. *(1 mark)*

   b) The owner of the food truck graphs this inequality and finds the vertices of the solution region to be (0, 0), (42, 14), and (42, 0). How many of each type of food should be sold to maximize profits? Verify your solution by testing all vertices. *(3 marks)*

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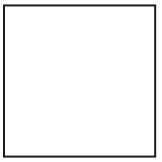
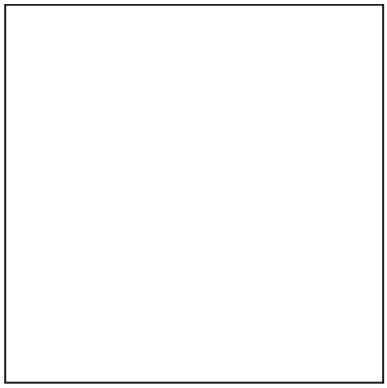
Module 8: Scale Factors for 2-D and 3-D Shapes *(25 marks)*

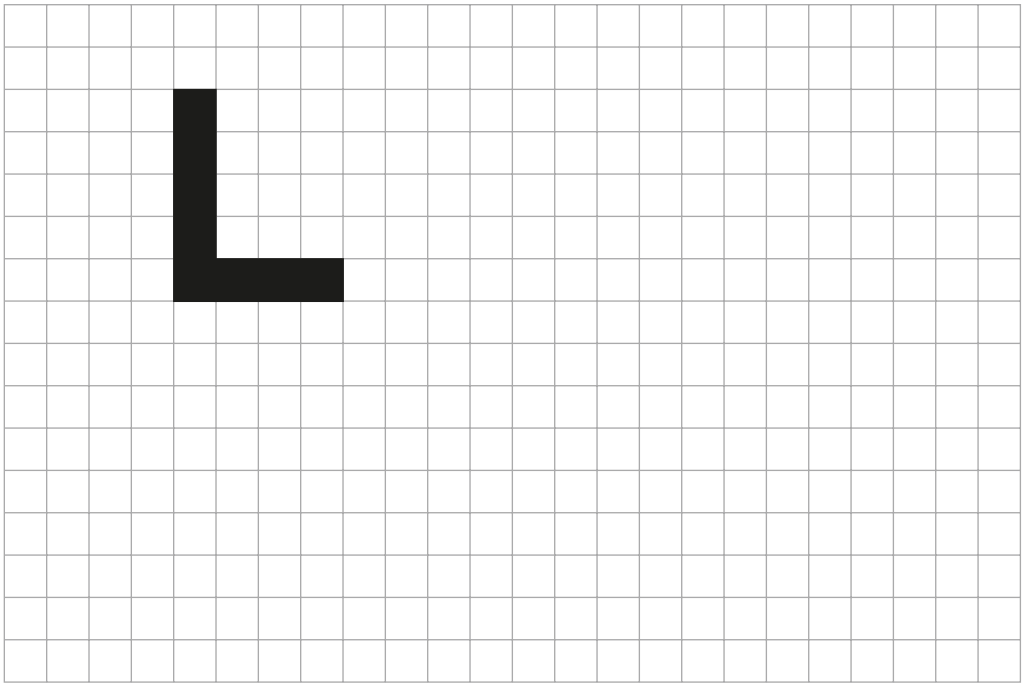
1. Provide an example in your life of when you would use a model of a 2-D shape. *(1 mark)*

2. The following squares are similar. Determine the scale factor if the larger square is the scale model and the area of the larger square is 25 cm^2. *(3 marks)*



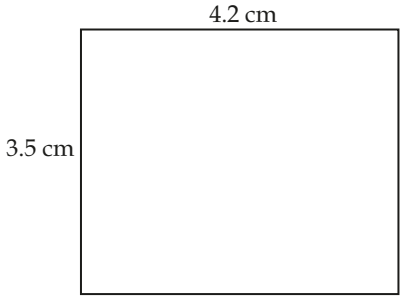


3. Draw a shape similar to the one below, using a scale of 2:1. *(2 marks)*



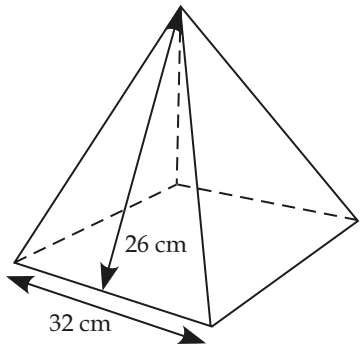
Name: _____

4. a) The floor of a room is drawn to scale as shown in the diagram below, using a reduction factor of 100. Calculate the area of the actual room that the diagram represents. *(3 marks)*



b) A doorway in the actual room is 0.9 m wide. Draw the doorway on the diagram above, using the reduction scale factor of 100. *(1 mark)*

5. The dimensions for a right square pyramid are shown below. A scale model of this pyramid is being created, with a surface area of 4023 cm^2. Calculate the dimensions of the model pyramid. *(5 marks)*



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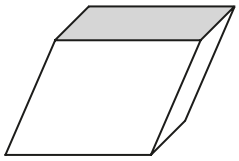
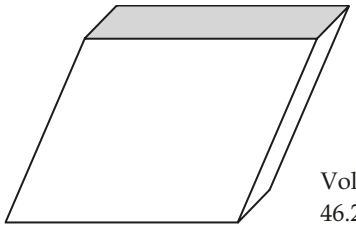
6. Determine the scale factor if the volume of a scale diagram is 21 mm^3 and the volume of the actual shape is 68 cm^3. *(3 marks)*

7. a) Find the scale factor relating the two objects below if the larger prism is the scale diagram. *(2 marks)*

Volume = 12.9 cm^3



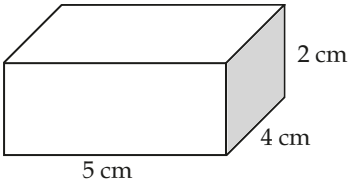


Volume = 46.2 cm^3

b) If the surface area of the top of the small prism is 3.9 cm^2, what is the surface area of the top of the large prism? *(2 marks)*

Name: _____

8. Determine the surface area of the scale model of the rectangular prism given the dimensions of the actual prism below. The scale factor is $\frac{7}{2}$. *(2 marks)*



9. How many times would the volume of a milk container increase if all of the dimensions were doubled? *(1 mark)*