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# **Senior 4 Applied Mathematics (40S) Standards Test**

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**Inquiry Task**

**January 2005**

**Manitoba** 

*Building for the Future*

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## SENIOR 4 APPLIED MATHEMATICS (40S) STANDARDS TEST

### DESCRIPTION

**Total Possible Marks: 16**

**Time: 2 hours**

**This test consists of two tasks:**

	Description	Suggested Time to Complete	Marks
<b>Task 1</b>	Contains a question on Design and Measurement worth 9 marks	60 minutes	9
<b>Task 2</b>	Contains a question on Sequences worth 7 marks	60 minutes	7

### TEST RESOURCES AND DIRECTIONS

- ◆ This test should be written with the assistance of computer software and/or a graphing calculator.
- ◆ You may consult your 8½" × 11" individually prepared study sheet during the test.
- ◆ If you use a graphing calculator, make sure you indicate all the values you entered in the space provided in this booklet.
- ◆ If you use a spreadsheet, make sure you print two copies of your spreadsheets, one showing the answers and one showing the formulas. Indicate your booklet ID number on each printout. Remain seated and your teacher will distribute these printouts to you.
- ◆ If you use a Website, make sure you indicate all the values you entered, and print or copy the screen, showing answers.
- ◆ Please staple printed copies of all your work on the page of the question. Indicate in the response space of the question that the answer is on a printed sheet.
- ◆ Clearly identify the question number on your answer sheet(s) (e.g., Question 2b).
- ◆ Always state your assumptions.

**DESIGN AND MEASUREMENT**

1. You have been contracted by the local extreme sports club to design and build a functional ramp that costs between \$500.00 and \$1000.00 including taxes. This must include \$300.00 plus taxes for the hardware and internal steel structure. The ramp must meet the following specifications:

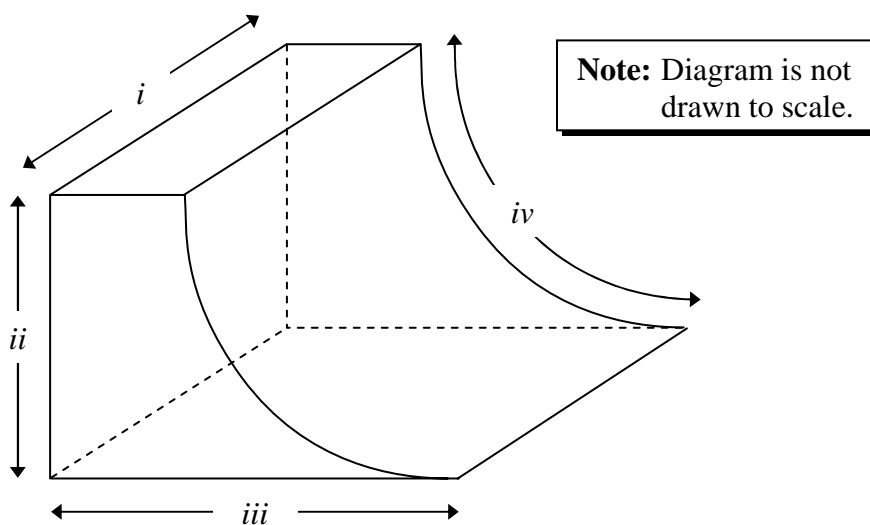
Total:  
9 marks

**Design and Description**

- The curved portion must be in the shape of a  $\frac{1}{4}$  circle.
- The ramp must be supported by an internal steel structure.
- Plywood is used to cover the outside of the structure, excluding the bottom.

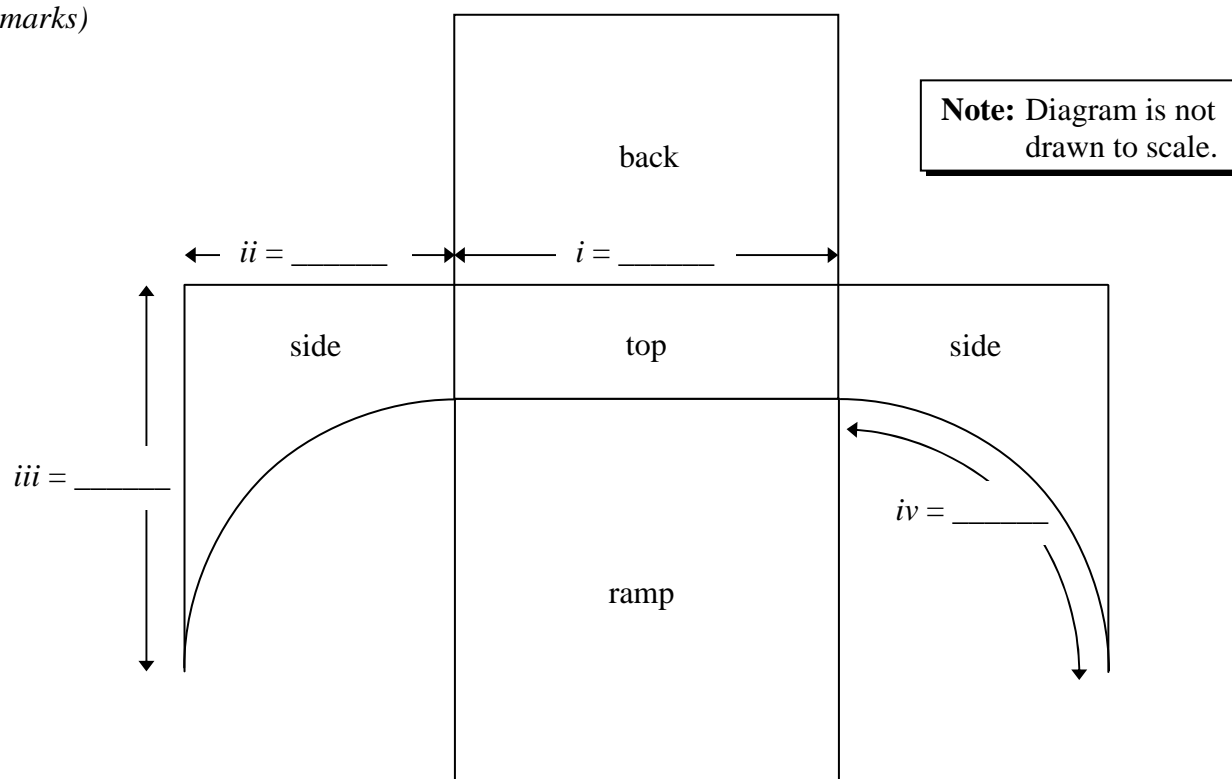
- Plywood: \$22.65 per 4 ft.  $\times$  8 ft. sheet
- Hardware and internal steel structure: \$300.00
- Stain: 3.8 L can: \$40.00  
1 L can: \$15.00

**Prices do not include taxes.**



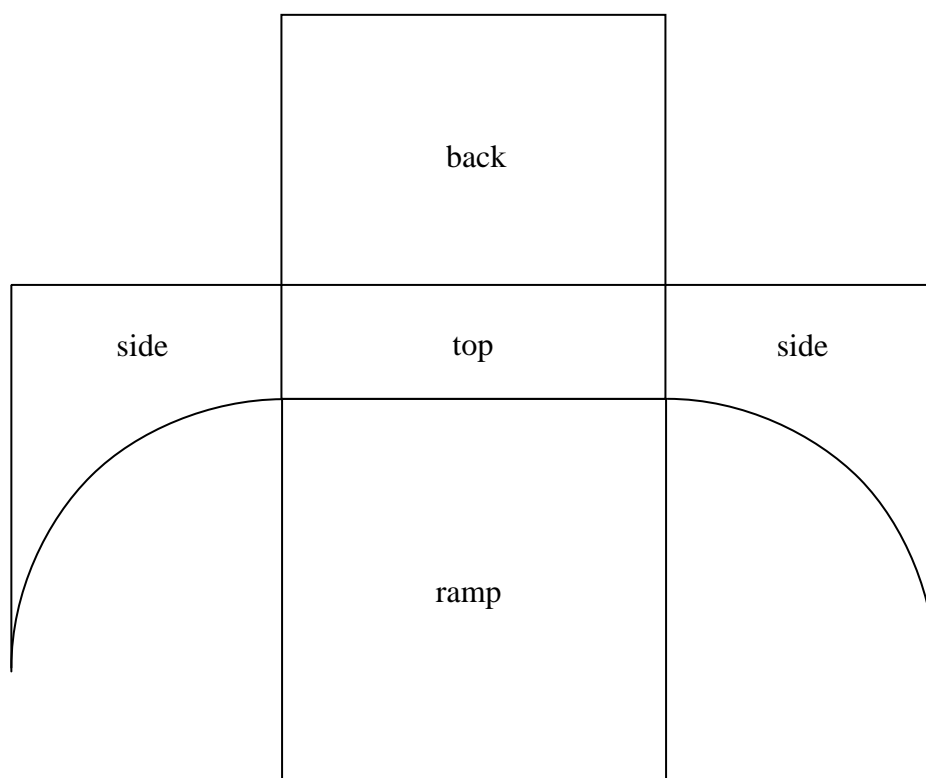
- a) You must determine the dimensions of your ramp. Use the following net to indicate the dimensions for your design.

(3 marks)



- b) Find the total exterior surface area of your ramp. Show the calculations for all the surface areas.

(2 marks)



- c) Determine the total number of sheets of plywood required to build your ramp. Plywood must be purchased in 4 ft.  $\times$  8 ft. sheets. Justify your answer.

*(1 mark)*

d) Determine the most cost-effective way to stain your ramp.  
How many of each size of can(s) would you buy?

- Stain is to be used to weather seal the exterior of the structure. All exterior surfaces must receive two coats. The second coat requires 75% of the amount of the first coat of stain.
- Stain: 3.8 L can: \$40.00 .....covers 200 square feet  
1 L can: \$15.00 .....covers 50 square feet  
(Prices do not include taxes.)

*(1 mark)*

e) Determine the total cost of the ramp including taxes.

*(2 marks)*

**SEQUENCES**

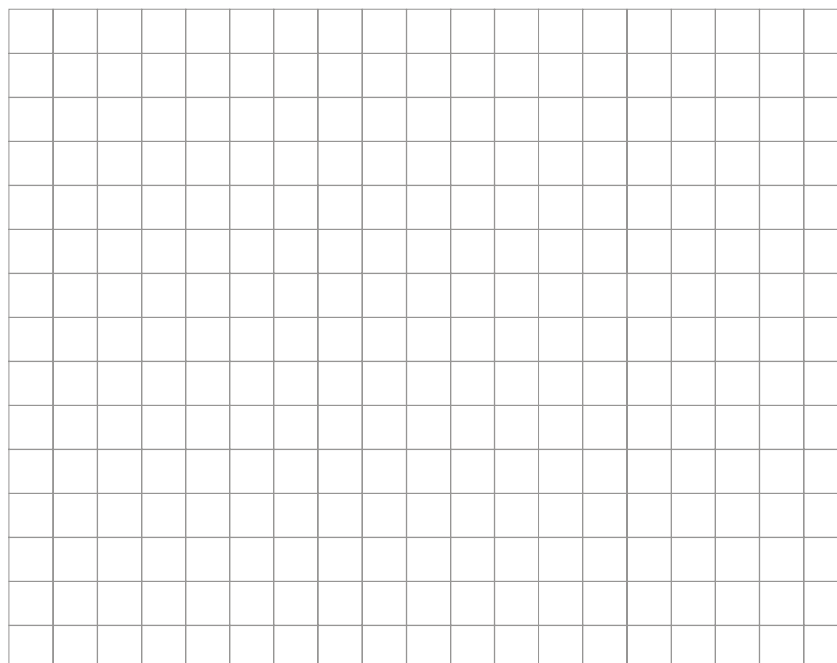
2. On Murky Island there is a bear population of 400. Every year, 12% of the bear population dies. Each spring an average of 56 bear cubs are born.

Total:  
7 marks

a) Determine the bear population each year over the next 5 years. Show your work.  
(2 marks)

b) What will the bear population be after it stabilizes?  
(1 mark)

c) Construct a population graph of the sequence extending the  $x$ -axis to include the first 50 years. Label the graph.  
(2 marks)



d) Devise a plan to stabilize the bear population between 400 and 450 bears (inclusive) by the 50<sup>th</sup> year by using the following parameters:

- The initial bear population is 400.
- The birth rate remains at 56 bear cubs each year.
- The death rate remains at 12% of the population each year.
- You **must** catch and transport bears off the island each year.
- You **may** stop recreational fishing which results in an increase of up to a maximum of 10 more bears each year.

State the stabilized bear population. Show your work to explain how you arrived at your answer.

(2 marks)

**END OF TEST**

**NO MARKS WILL BE AWARDED FOR WORK DONE  
ON THIS PAGE.**