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Grade 12  
Applied Mathematics  
Standards Test

# Inquiry Task

January 2009

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## GRADE 12 APPLIED MATHEMATICS STANDARDS TEST

### DESCRIPTION

**Total Possible Marks: 20**

**Time: 2 hours**

	Description	Suggested Time	Marks
<b>Task 1</b>	A question on the Design and Measurement Unit worth 10 marks	60 minutes	10
<b>Task 2</b>	A question on the Periodic Functions Unit worth 10 marks	60 minutes	10

### TEST RESOURCES AND DIRECTIONS

- You may consult your  $8\frac{1}{2}'' \times 11''$  individually prepared study sheet during the test.
- You may use a geometry set, a graphing calculator, computer software, and have access to the Internet for tools such as a mortgage payment calculator or applets. **The use of the Internet to access course notes, to find definitions, or to search for conceptual information about the course is prohibited during the test.**
- Provide **complete answers** in the spaces provided in the test booklet. You may print out diagrams from the computer or your calculator where applicable. Indicate your booklet number and question number on the printouts and staple them into the booklet where your answer begins. Remain seated and your teacher will distribute these printouts to you. Indicate in the response space of the question that the answer is on a printed sheet.
- Provide clear explanations or justifications where applicable. This can be done through labelled diagrams, in words, by showing mathematical operations to verify your answer, or by referring to a calculator or software program.
  - If you refer to a calculator program, indicate your input values.
  - If you refer to a software program or a website, indicate your input values and print or copy the screen showing the answers.
  - If you refer to a spreadsheet, print a copy of the answers.
- Let the mark values for each question guide your time and the amount of detail you use in your answer.
- Round your final answers to the nearest two decimal places.
- Unless otherwise indicated, it is not necessary to draw diagrams to scale. If you draw a diagram to scale, make sure to indicate the scale you used.
- An answer without any work shown will be considered incomplete.
- Always state your assumptions.

**DESIGN AND MEASUREMENT**

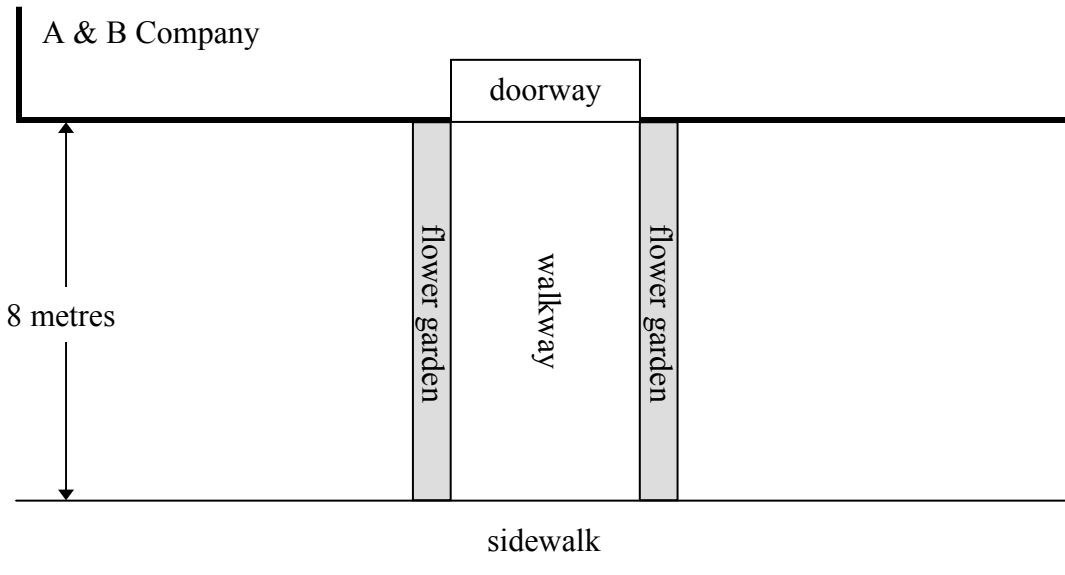
1. The A & B company has hired you to do some landscaping in front of their building. The owners want you to design a walkway according to the following conditions. The walkway must:

- be 8 metres long and extend from the doorway to the sidewalk
- be built using paving stones
- have an area between 8 m<sup>2</sup> and 24 m<sup>2</sup> inclusively
- have flower gardens on both sides

All items must be purchased in whole units.

Total:  
10 marks

Item	Cost
paving stones (25 cm × 25 cm)	\$8.50 each
soil	\$40.00 per m <sup>3</sup>
cement	\$107.00 per m <sup>3</sup>
water pump	\$325.00



a) State the dimensions of your walkway design.

(1 mark)

b) Determine the number of paving stones for your walkway. Show your work.  
(2 marks)

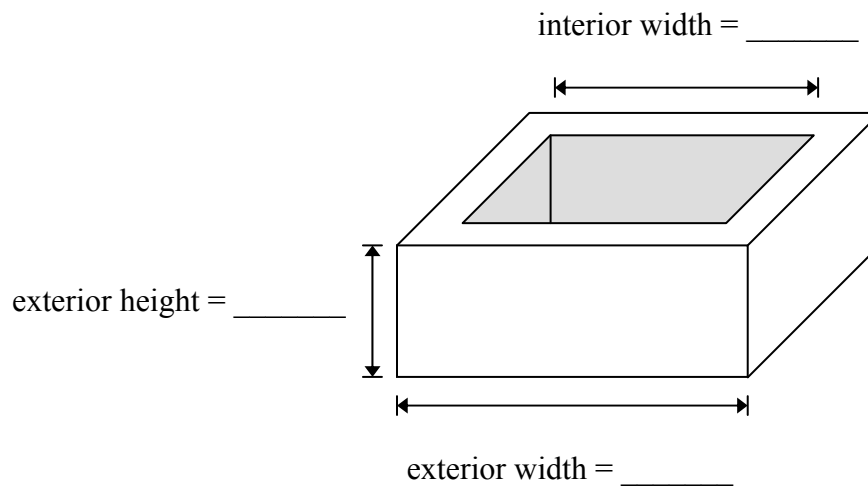
c) Determine the amount of soil you need for the flower gardens, if each garden is 50 cm wide and requires a thickness of 30 cm of soil. Show your work.  
(2 marks)

After completing the walkway and flower gardens, the owners want you to add a water fountain with a square base on the lawn. It will be made of cement.

Here is the information that you will need:

- You can spend between \$400.00 and \$600.00.
  - The interior of the fountain must be 50 cm deep.
  - The walls of the fountain must be at least 25 cm thick.
  - The square base of the fountain must be at least 25 cm thick.
- d) Indicate the dimensions of your fountain, including units, on the diagram below. Determine the total cost of the cement and the water pump for your fountain, not including taxes. Show your work.

(5 marks)



d) Continuation of student work:

**PERIODIC FUNCTIONS**

2. The average monthly temperatures for Winnipeg, Manitoba in 2006 are shown in the table below.

Total:  
10 marks

<b>Month</b>	<b>Average Monthly Temperature (°C)</b>
January	-14
February	-11
March	-3
April	9
May	18
June	23
July	26
August	24
September	18
October	11
November	-1
December	-9

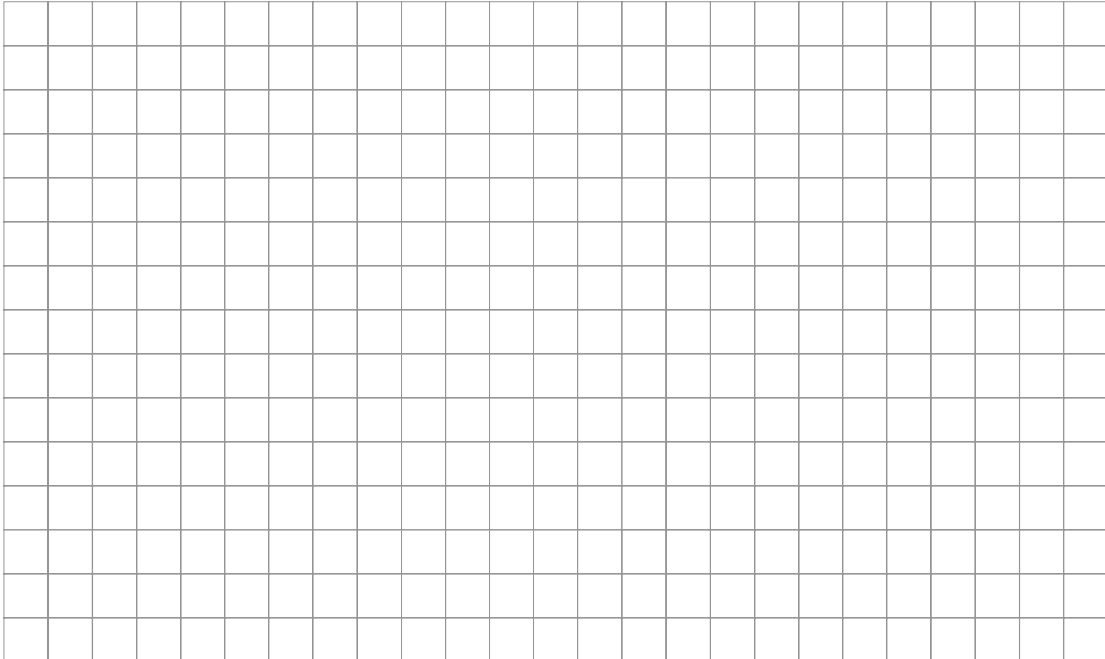
- a) Assuming January is month 1, determine the sinusoidal equation for this data.  
(2 marks)
- b) Describe in words what the period represents in this situation. Stating the value of the period is not sufficient.  
(1 mark)

- c) The sinusoidal equation that represents the average monthly temperatures for Sydney, Australia in 2006 is:

$$y = 4.92 \sin(0.48x + 0.79) + 20.96$$

Draw a graph which represents the average monthly temperature as a function of time for Sydney for the year 2006. Label your graph completely including the axes. State the maximum and minimum values to two decimal places.

(2 marks)



maximum value = \_\_\_\_\_

minimum value = \_\_\_\_\_

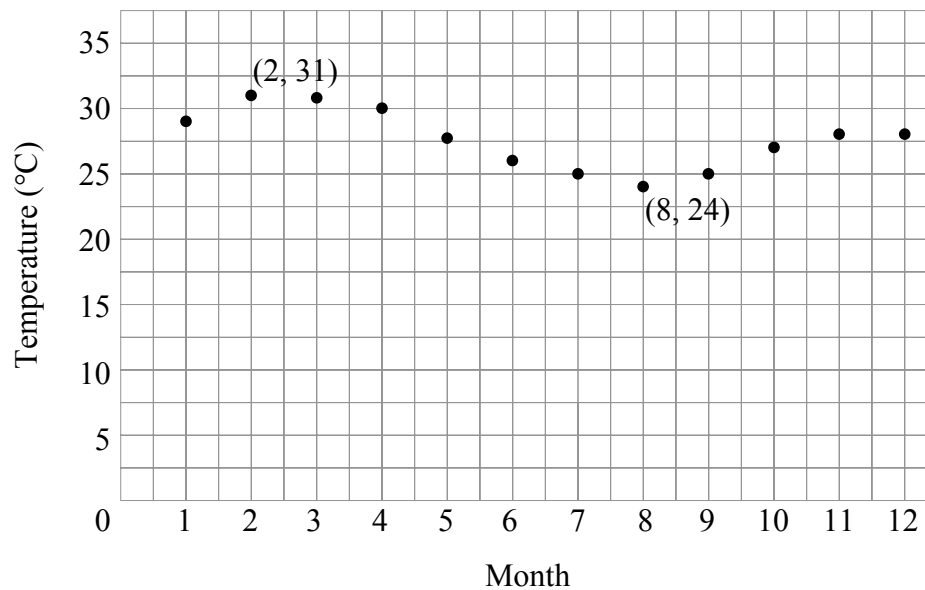
- d) According to the sinusoidal equation for Sydney, Australia, for how many months in 2006 is the average monthly temperature below  $18^{\circ}\text{C}$ ? Show your work.

(2 marks)

- e) Describe one similarity and one difference between the average monthly temperatures for Winnipeg and Sydney. Your descriptions must refer to your work in (a) and (c).

(2 marks)

- f) The graph below shows the average monthly temperatures for a city situated close to the equator. (Assume January is month 1.)



Given that Winnipeg is north of the equator and Sydney is south of the equator, is this city north or south of the equator? Explain your reasoning.

(1 mark)

**END OF TEST**