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Grade 12  
Applied Mathematics  
Standards Test

# Inquiry Task

June 2009

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## GRADE 12 APPLIED MATHEMATICS STANDARDS TEST

### DESCRIPTION

**Total Possible Marks: 19**

**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 9 marks	60 minutes	9

### TEST RESOURCES AND DIRECTIONS

- You may consult your 8½" × 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

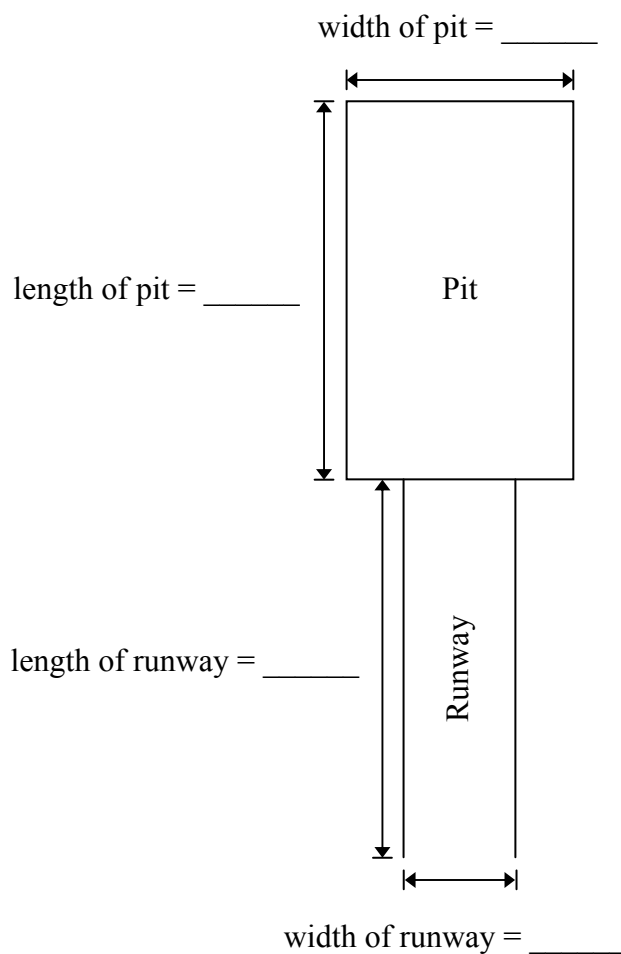
1. Your track and field coach wants a long jump pit for the school. He has volunteers who will build it, but he needs your help to plan the design and calculate the cost of the materials.

Total:  
10 marks

The long jump pit must meet the following specifications:

- The perimeter of the pit must be lined with 2"  $\times$  6" boards to keep the sand separated from the grass.
- The pit must be between 6 and 10 metres long inclusively.
- The pit must be twice as wide as the runway.
- The depth of the sand in the pit must be between 40 and 60 cm inclusively.
- The runway must be at least 20 metres long and at least 1 metre wide.
- The concrete in the runway must be between 10 and 15 cm thick inclusively.

Indicate the dimensions of the pit and runway on the following diagram.



- a) You will need to give the coach an estimate for the total cost of the materials using the following information:
- A hole will need to be dug for the pit.
  - The depth of the hole should be equal to the depth of sand you plan on using.
  - Sand costs \$28.50/m<sup>3</sup>.
  - 4.9 metre long 2" × 6" boards cost \$32.50 each.
  - Concrete costs \$130.00/m<sup>3</sup>.
  - The total cost for the long jump pit must be between \$1200.00 and \$1500.00, including taxes. (GST = 5%, PST = 7%)

All materials must be purchased in whole units.

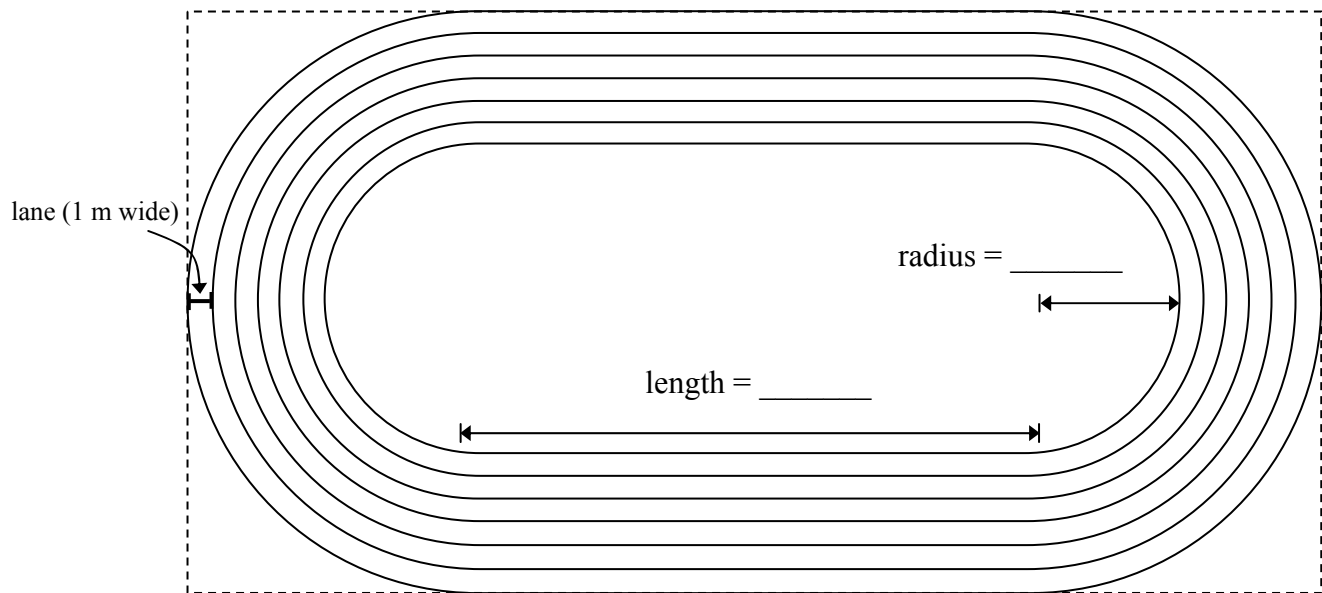
Keeping in mind the budget for this project, determine the total cost of the long jump pit and runway, including taxes. Show your work.

*(7 marks)*

- b) The coach also asks you to plan the design for a 6-lane track.
- The perimeter of the inside edge of the track must be 300 metres.
  - Each lane must be 1 metre wide.

Determine the length of the straight portion and the radius of the curve for the track.  
 Calculate the minimum dimensions of the rectangular field required to build the track.  
 Show your work.

(3 marks)



b) Continuation of student work:

**PERIODIC FUNCTIONS**

2. During class, you are asked to perform an experiment using a spring. You attach a mass to the end of the spring and record the following data:

Total:  
9 marks

<b>Time (s)</b>	0.30	1.05	1.80	2.55	3.30
<b>Distance between the mass and the floor (cm)</b>	60	50	40	50	60

- a) Determine the sinusoidal equation for this situation.

(2 marks)

- b) What will be the distance between the mass and the floor at 5 seconds? Show your work.

(2 marks)

- c) When will the mass be 60 cm from the floor for the 5th time?

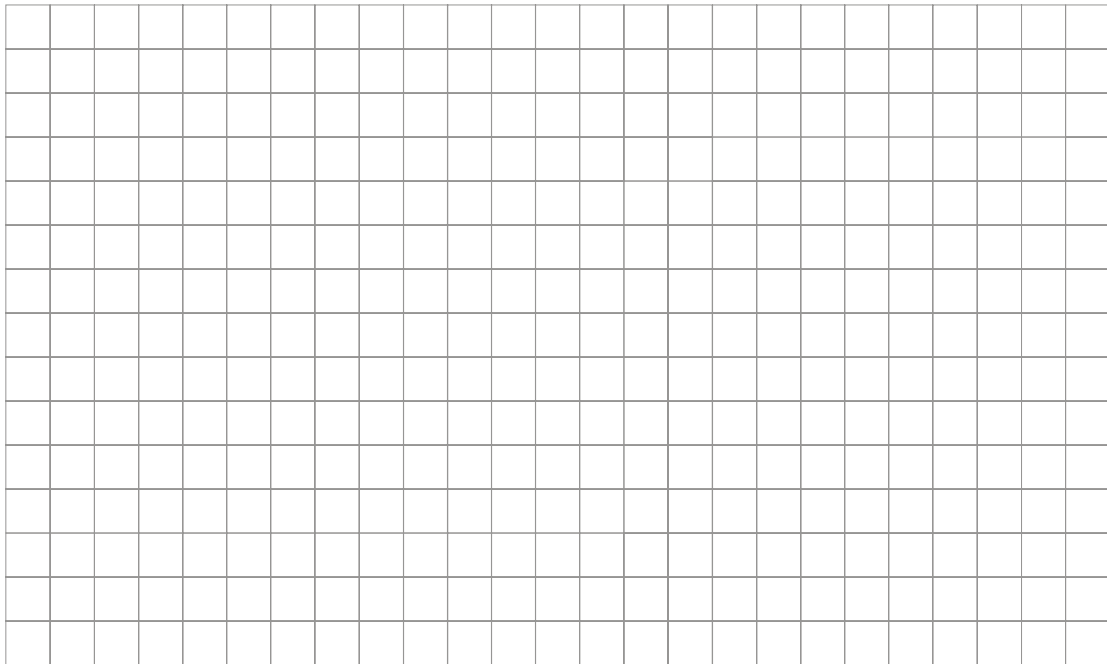
(1 mark)

- d) Your teacher gives you a second spring. You attach the same mass to the end of the spring and compare it to the first experiment. You note that it bounces higher and more often in the same amount of time. Create a sinusoidal equation which could represent this new situation.

(2 marks)

- e) Draw a graph showing two complete cycles which represents the situation in (d). Label your graph completely including the axes. State the maximum and minimum values.

(2 marks)



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

**END OF TEST**

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