
Grade 12
Applied Mathematics
Standards Test

Inquiry Task

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GRADE 12 APPLIED MATHEMATICS STANDARDS TEST

DESCRIPTION

Total Possible Marks: 19

Time: 2 hours

	Description	Suggested Time	Marks
Task 1	A question on the Design and Measurement Unit worth 10 marks	60 minutes	10
Task 2	A question on the Vectors 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 applets or a mortgage payment calculator. **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. 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 and staple it to the page.
- 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. You decide to build a stand for your television, game console, and Blu-ray player based on the diagram below.

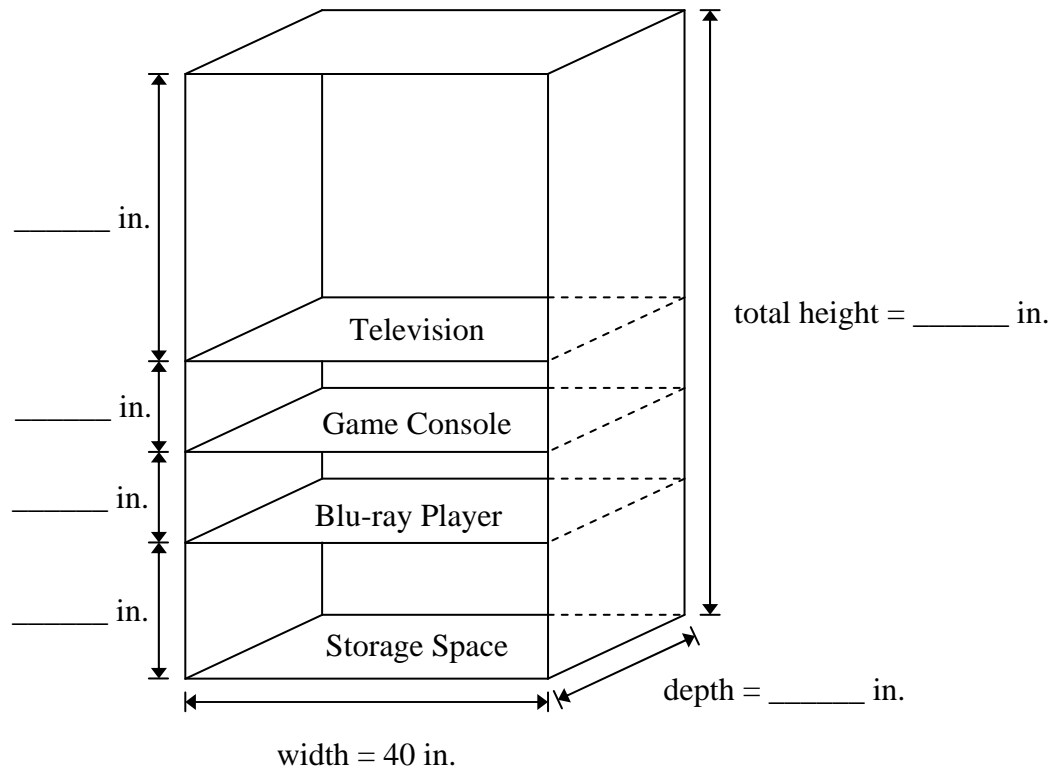
Total:
10 marks

The stand must meet the following specifications:

- The total height of the stand must be at most 84 in.
- The width of the stand must be 40 in.
- For stability, the depth of the stand must be at least one-third of the total height.
- The top shelf must accommodate a television with a diagonal length of at least 50 in.
- The shelves for the game console and Blu-ray player must each be at least 8 in. high.
- The storage space at the bottom of the stand must be at least 12 in. high.

a) Label the following diagram with your dimensions for the height of each shelf, the total height, and the depth.

(2 marks)



b) Based on the diagram in (a) and the following specifications, determine the minimum number of sheets of plywood needed to build your stand.

- The sides, top, bottom, and shelves of the stand must be built with $\frac{3}{4}$ in. plywood.
- The back of the stand must be built with $\frac{3}{8}$ in. plywood.
- Plywood is purchased in 48 in. \times 96 in. sheets.
- Smaller pieces of plywood cannot be fastened together to make a larger piece.

Support your answer by including sketches with dimensions showing how you would cut the sheets of plywood.

(3 marks)

- c) You must apply two coats of paint to all the surfaces, not including the edges, before the stand is assembled. All the edges will be laminated. How many cans of paint will you need if each one-litre can covers 9000 square inches?

(2 marks)

d) Calculate the total cost to build the stand, including taxes.
(GST = 5%, PST = 7%)

- One $\frac{3}{4}$ in. sheet of plywood costs \$49.95.
- One $\frac{3}{8}$ in. sheet of plywood costs \$29.95.
- A one-litre can of paint costs \$14.95.
- The laminated edging costs \$19.95.

All materials must be purchased in whole units.

(2 marks)

e) A Blu-ray case has a volume of 20 cubic inches. Determine the maximum number of cases that could be kept in the storage space of your stand.

(1 mark)

VECTORS

2. Allan and Renée are in a boat travelling to an island that is 70 km away and at a bearing of 240° with respect to their starting point. Unfortunately, they run out of gas and end up 25 km from the island. The direction from the island to the boat is 22° south of east.

Total:
9 marks

- a) Draw a vector sketch of this situation including all the magnitudes and directions.

(1 mark)

- b) Determine the distance and direction of the boat with respect to its starting point when Allan and Renée run out of gas. Show your work.

(3 marks)

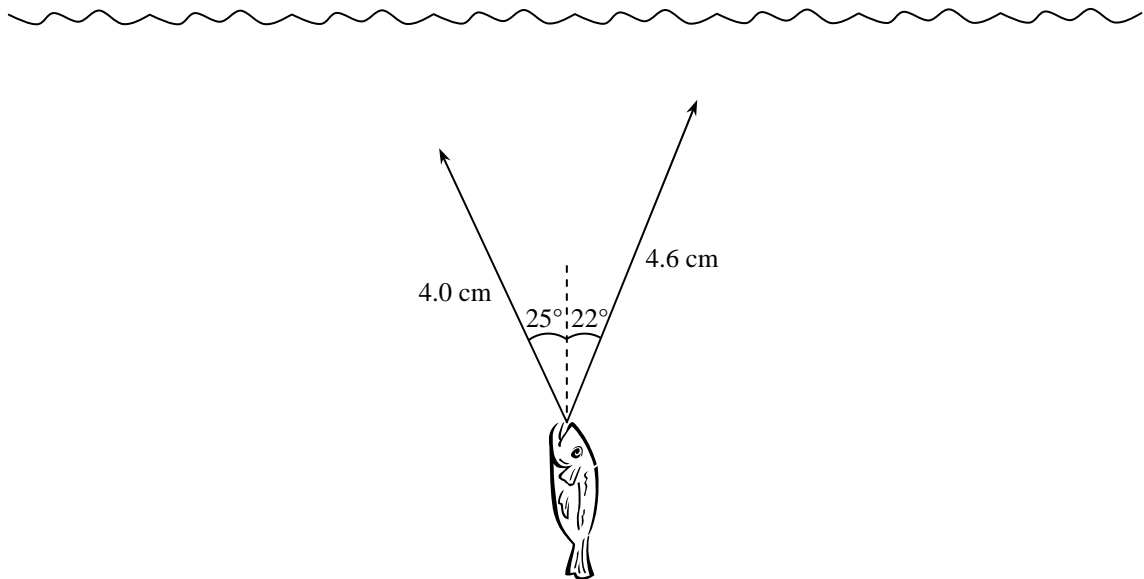
- c) A rescue boat receives a distress signal from Allan and Renée and leaves from the same starting point. It must first set out in a direction of $E 60^\circ S$ to meet a supply boat in order to exchange equipment. Design a route for the rescue boat to get to Allan and Renée's boat in 80 km or less. Indicate all the distances and directions. Show your work.

(3 marks)

- d) While waiting for the rescue boat, Allan and Renée decide to fish. By chance, they catch the same fish and pull on it with the forces indicated in the scale vector diagram below. Using the scale vector diagram, determine the magnitude of the resultant force, in newtons, acting on the fish. Show your work.

(2 marks)

Scale: 1 cm = 5 newtons



END OF TEST