

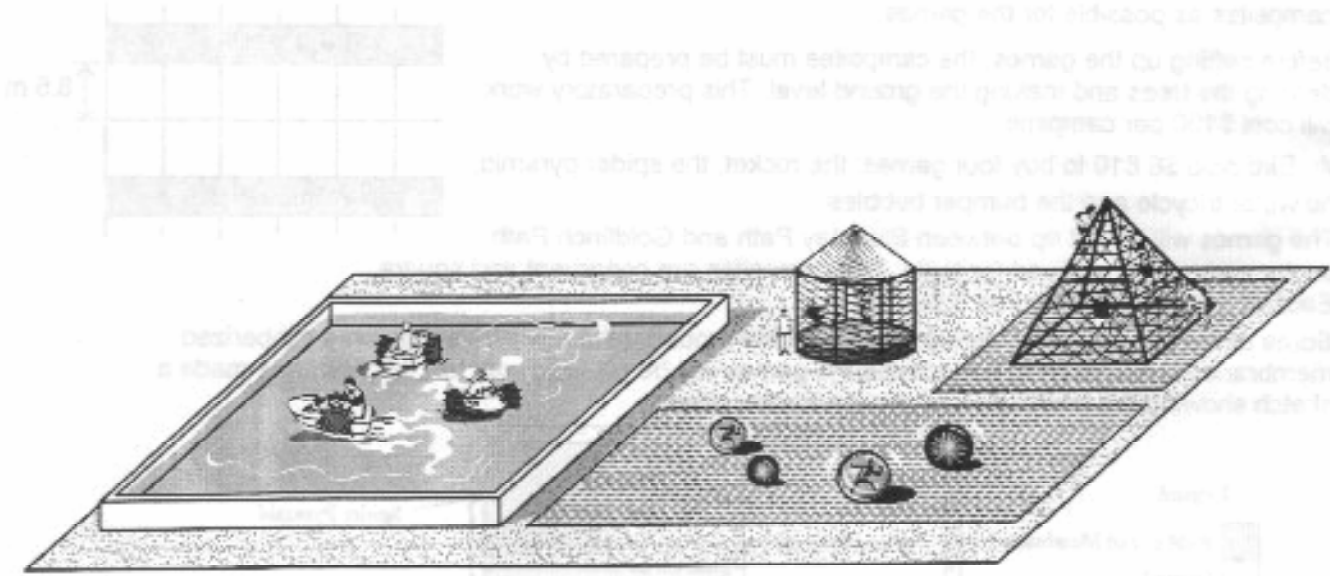
MATHEMATICS

563-306

PROTOTYPE EXAMINATION 2008

Mathematics Prototype Examination First Year of Secondary Cycle Two CAMPGROUND AMUSEMENTS

Context



Name: _____

Class number: _____

School: _____

Time: 3 hours

Éducation,
Loisir et Sport

Québec

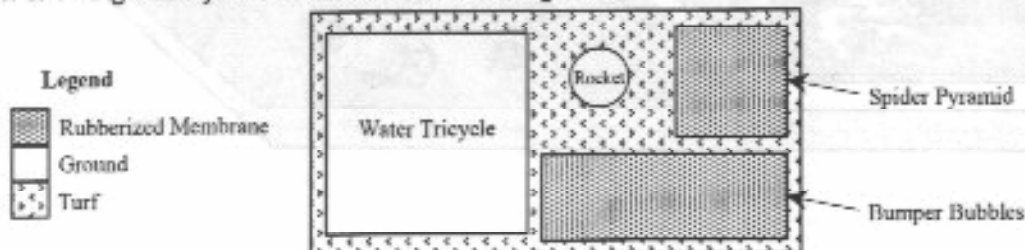
CAMPGROUND AMUSEMENTS

Mr. Bird owns a popular campground. In order to encourage families to stay at his campground, he has purchased games similar to those found in an amusement park. He will have to eliminate some campsites to provide space for setting up these games. As a result, these campsites can no longer be rented, which will decrease his income. Mr. Bird wants to increase camping fees so that he can make back the cost of purchasing and setting up these games as well as the lost rental income for one season. He must make this extra money by the end of the first camping season. He wants this fee increase to be as small as possible so that his prices will remain competitive.

Mr. Bird needs you to help him achieve his objectives by determining the increase in rental fees for the campsites that will be available for rent after the games have been set up.

Below you will find the information required to do your calculations. Certain measurements have been rounded off. All the costs presented include taxes.

- The campground now has 154 campsites for rent.
The rental fee for the 84 campsites reserved for tents is \$27 per night.
The rental fee for the 70 campsites reserved for recreational vehicles (RVs) is \$40 per night.
- The campground is open 150 days per year and is full for 54 of those days. During the other 96 days, only 42 campsites for tents and 35 campsites for RVs are rented.
- The campsites where the games will be set up can no longer be rented, which will decrease the rental income on the days when the campground is full. For this reason, Mr. Bird wants to use as few campsites as possible for the games.
- Before setting up the games, the campsites must be prepared by clearing the trees and making the ground level. This preparatory work will cost \$100 per campsite.
- Mr. Bird paid \$8 610 to buy four games: the rocket, the spider pyramid, the water tricycle and the bumper bubbles.
- The games will be set up between Blue Jay Path and Goldfinch Path on the campsites reserved for tents. The campsites are congruent and square. Each of their sides measures 8.5 m.
- Some of the games will be set up directly on the ground; others will be set up on a rubberized membrane. The unused space around the games will be covered with turf. Mr. Bird has made a sketch showing the layout he has chosen for the games.



- To give people enough space to walk around the games, there must be a minimum distance of 1 m between the games and between the games and the edges of the area where the games will be located.
- The rubberized membrane is made to measure and costs \$25 per m^2 .
- A local company sells and lays turf. The price includes a fixed amount plus an amount proportional to the area to be covered with turf.

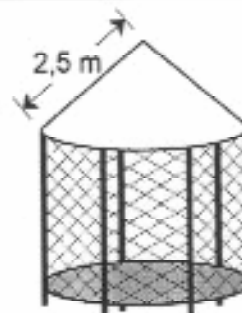
The table of values on the right shows the cost of covering different surface areas with turf.

Area to be covered	Cost of turf
250 m^2	\$1 125
375 m^2	\$1 650
500 m^2	\$2 175

Description of the Games

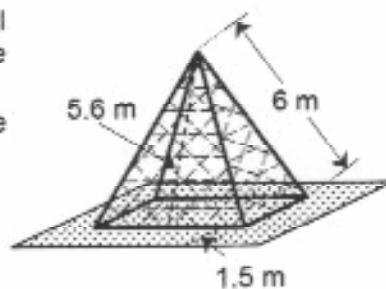
THE ROCKET

- The rocket is a circular trampoline covered with a canvas roof.
- The roof is in the shape of a right circular cone.
- The area of the canvas that makes up the roof is 15.7079 m^2 .
- The slant height of the roof is 2.5 m.
- The radius of the trampoline is the same as that of the roof.
- Safety nets are hung vertically along the sides of the rocket.
- The rocket stands directly on the ground.



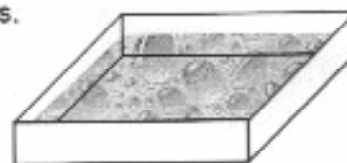
THE SPIDER PYRAMID

- The spider pyramid is a climbing game. Ropes are attached to a metal structure, and people can climb the ropes either on the outside or the inside of the pyramid.
- The metal structure is in the shape of a right pyramid with a square base.
- Each of the lateral edges of the pyramid measures 6 m.
- The slant height of the pyramid is 5.6 m.
- The pyramid stands on a rubberized membrane. There is a strip of membrane 1.5 m wide around the base of the pyramid.



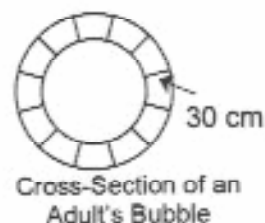
THE WATER TRICYCLE

- The water tricycle is a pool of water in which you can ride floating tricycles.
- The pool is in the shape of a right prism with a square base.
- The volume of water in the pool is 98 kl.
- The height of the water in the pool is 50 cm.
- The pool is placed directly on the ground.



BUMPER BUBBLES

- The bumper bubbles are spheres. Players get into the bumper bubbles and roll them around on a playing surface.
- Each bubble consists of two spheres, one inside the other. The two spheres are held together by air chambers that act as shock absorbers.
- The game can be played with two different-sized bubbles; one for children and one for adults.
- The volume of the outer sphere of a child's bubble is 905 dm^3 .
- The air chambers in a child's bubble are 20 cm thick.
- The air chambers in an adult's bubble are 30 cm thick.
- The playing surface is rectangular and must have an area of at least 100 m^2 .
- The playing surface must be long enough and wide enough so that an adult's bubble can rotate 3 times in one direction and at least once in the other direction.
- The playing area is covered with a rubberized membrane.



To help the campground owner achieve his objectives, you must now determine the increase in rental fees for the campsites that will be available for rent after the games have been set up.