

2007 Excellence in Mathematics Contest



CHANDLER-GILBERT COMMUNITY COLLEGE



School Name:

Group Members:

Reference Sheet

Formulas and Facts

You may need to use some of the following formulas and facts in working through this project. You may not need to use every formula or each fact.

$A = bh$ Area of a rectangle	$C = 2l + 2w$ Circumference of a rectangle	$A = \pi r^2$ Area of a circle
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$C = 2\pi r$ Circumference of a circle	$A = \frac{1}{2}bh$ Area of a triangle	$m = \frac{y_2 - y_1}{x_2 - x_1}$ Slope
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12 inches = 1 foot	5280 feet = 1 mile	3 feet = 1 yard
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16 ounces = 1 pound	2.54 centimeters = 1 inch	100¢ = \$1
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1 kilogram = 2.2 pounds	1 ton = 2000 pounds	1 gigabyte = 1000 megabytes
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1 mile = 1609 meters	1 gallon = 3.8 liters	1 square mile = 640 acres
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1 sq. yd. = 9 sq. ft	1 cubic foot of water = 7.48 gallons
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$V = \pi r^2 h$ Volume of cylinder	$V = lwh$ Volume of rectangular prism	$V = \frac{4}{3}\pi r^3$ Volume of a sphere
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SunSplash - TEAM PROJECT

2007 Excellence in Mathematics Contest

The Team Project is a group activity in which the students are presented a series of mathematical problems relating to a specific theme. The team members are to solve the problems and write a narrative about the theme which answers all the mathematical questions posed. Teams are graded on accuracy of mathematical content, clarity of explanations, and creativity in their narrative.

This team project centers around SunSplash Water Park in Mesa, AZ. We will take a mathematical tour of the Water Park answering questions about many of the attractions at SunSplash.

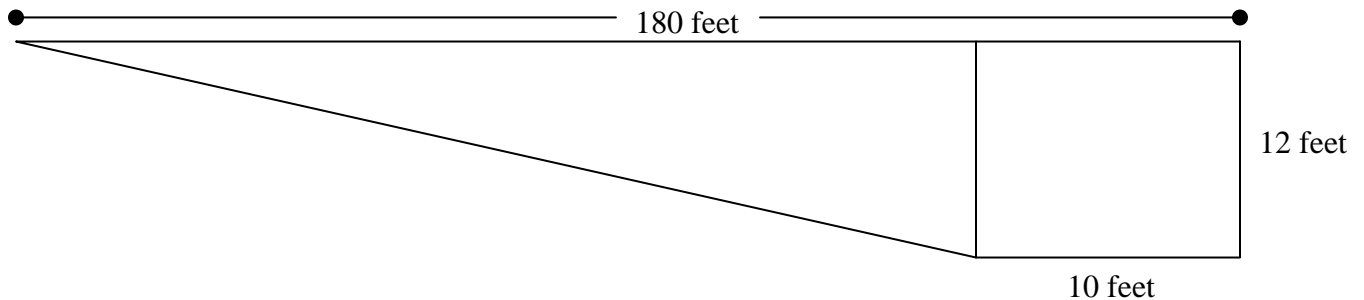
Activity 1: Thunder Bay Wave Pool

Thunder Bay wave pool may be one of the largest swimming pools you have ever seen! In this activity, you will estimate how much water is in the pool.

Remember that one way to measure the amount of water is to use gallons. To help you, imagine a 1-gallon jug of water. To measure how many gallons of water are in the pool, imagine that the pool is empty and that you have to pour the water in, one jug at a time. How many jugs would it take to fill the pool?



We can tell you that the pool is 180 feet in length, 56 feet wide, and is 12 feet deep at the very end of the pool. A cross-sectional view of the pool is provided below (not to scale).



Activity 1: Thunder Bay Wave Pool continued

Activity 2: The Cauldron

The Cauldron is a very exciting water ride at Sunsplash. Notice that it is a very large circular shape. In this attraction, riders drop four stories into an open bowl, and then see how many revolutions they can make on The Cauldron! Each ride on The Cauldron is a different intense experience. Use the picture to answer each of the questions below.



1. Assuming that the man in the photo is 6 feet tall, find the radius of The Cauldron. Be clear as to what part of The Cauldron you are measuring.

2. Use your result in #1 to find the circumference of The Cauldron.

3. Suppose it takes the rider 8 seconds to complete one revolution. How fast, in miles per hour, is the rider moving?

4. How many revolutions do you think someone could make in one minute? Explain.

Activity 3: Bonzi Speed Slides

According to mesa.golfland.com/attractions, the Bonzi Speed Slides will plunge you into the lagoon at speeds of up to 25 miles per hour. In this activity, you will explain what this means and use this reported speed to answer some questions about this SunSplash attraction.

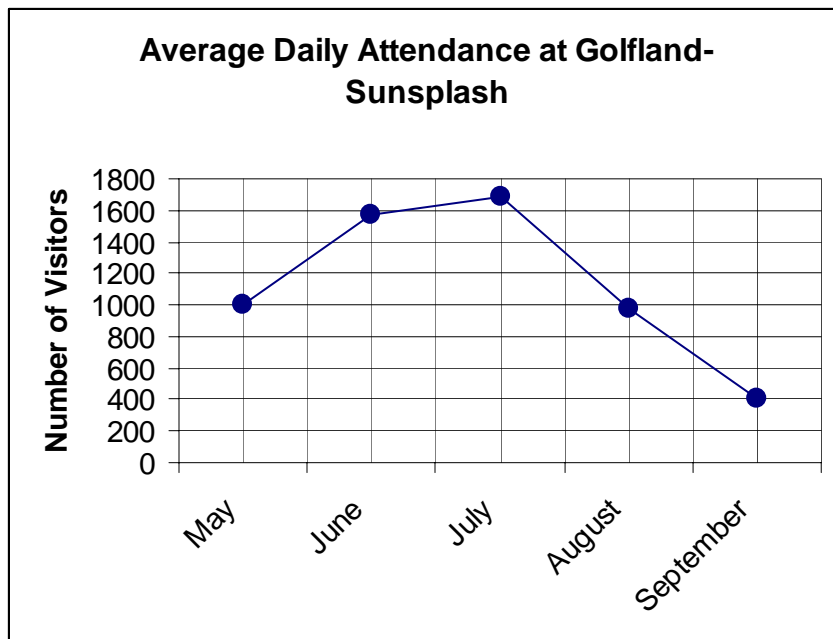
1. Write an explanation of what you think the web site means when it reports that you will be plunged into the lagoon “at speeds of up to 25 miles per hour”. Certainly, it can’t mean that you always go 25 miles per hour since when you first begin the ride, you are going much more slowly. In your written explanation, be sure to explain what you mean if you use mathematical terms.



2. Suppose that you used a stopwatch to determine how long it took a rider to reach the bottom of the Bonzi Speed Slide and found that it took 3.5 seconds. Assuming that the rider traveled at a constant speed of 25 MPH, how long is the Bonzi Speed Slide?

Activity 4: SunSplash Waterpark

During the summer months, Golfland/SunSplash is a very busy place! The line graph below shows the average number of people that visited Golfland/SunSplash each month from May to September. Use the graph to answer the questions.



1. Suppose that you were responsible for a Golfland-SunSplash marketing and advertising campaign. When would you spend the most money on advertising (TV/Radio/Newspaper advertising)? Why?

2. We can say that the rate of change of the number of visitors is -600 people per month between consecutive months. Which 2 months is this true for? What does it mean?

Activity 5: The Dragon Tail Slides

The Three Dragon Tail slides ***each*** have 250 feet of tube with many twists and turns to thrill and excite you.

The following is a hypothetical situation that you will solve that will require you to make assumptions. Clearly state your assumptions and then solve the following problem.

Suppose that water is flowing through the tubes at a rate of 0.75 gallons per second. A cap is placed over the end of the tube so the water cannot flow into the pool. How long will it take for the tube to fill with water? How many of these tubes full of water would it take to fill the wave pool (refer to Question #1)?



The cap is placed here.

Clearly state any assumptions you must make and clearly explain your solution process in order to maximize your score. Use additional sheets of paper as needed.

Activity 6: The Tie Breaker

In past years, there have often been more than one team project that has been done extremely well and the judges have had a difficult time deciding on a winner. To help eliminate that possibility this year, we have instituted the tie breaker. In the event of a tie, the judges will consider a problem situation that you and your team create. Your task is to create an interesting and creative problem(s) related to the Sunsplash theme. Write and solve the problem in the space provided. If additional paper is needed, please ask your proctor.



Scoring Sheet

The Team Project is a group activity in which the students are presented a series of mathematical problems relating to a specific theme. The team members are to solve the problems and write a narrative about the theme which answers all the mathematical questions posed. Teams are graded on accuracy of mathematical content, clarity of explanations, and creativity in their narrative. A holistic scoring approach should be used to judge the team project. For each project, assign a score to each of the major areas:

School Name: _____-

Accuracy of mathematical content: 0 1 2 3 4
Comments:

Clarity of Explanations: 0 1 2 3 4
Comments:

Creativity in Narrative: 0 1 2 3 4
Comments:

Overall Presentation: 0 1 2 3 4
Comments: