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Park Planner: A Lesson on Area, Perimeter, Circumference, and Volume

WebQuest Description: This WebQuest is intended for students in 6th and 7th grades. After mastering scales and scale drawings, students will learn how to calculate area, perimeter, circumference, and volume as they design a park. All or parts of the following Common Core State Standards are met through this WebQuest: 6.G.1, 6.G.2, 7.G.4, and 7.G.6.
Grade Level: 6-8
Curriculum: Math
Keywords: Area, Perimeter, Length, Width, Circumference, Radius, Diameter, Volume, Rectangular Prism
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Introduction

Design a Park!Congratulations - your hard work has paid off! Your boss has just promoted you from landscaper to Director of Landscape Design (that means you are making the big bucks!). Your very first job is to design a family park. What should it look like? How big should it be? You are required to follow a few specific guidelines; however, it is up to you and your creative mind to decide what your park will look like and what is in it. You do not have to stick to a normal playground/park theme. Your park can have restaurants, swimming pools, fish ponds, shops - the possibilities are endless! This is your chance to prove to your boss that she did the right thing by giving you a promotion, so be creative and design a one-of-a-kind park!

Tasks

Park ProjectTo prepare yourself for your first challenging job assignment, you will need to attend design school so you can master the skills of calculating perimeter, circumference, area, and volume. Once you complete the brief online courses and show mastery through online practice, you will be certified as a master designer! As you near graduation, you will choose a fellow design school graduate (classmate) to help you create the scale drawing of your one-of-a-kind park. After following a few city code regulations, you and your partner will sketch and label your design. To really sell the park design, your final plan must be on poster board, neatly designed, and colored. So what are you waiting on? Get started and show your boss that you deserve this promotion!

Process

Welcome to The School of Landscape Design! As you work your way through the following courses, you will learn everything you need to know in order to design your park. Make sure you take the courses in order and carefully follow the directions. Good luck!Course 1 - The BasicsUsing the Math Dictionary, write a definition and draw a picture for each of the following terms.
perimeter
area
quadrilateral   triangle   trapezoid
volume   parallelogram
circle
radius
diameter
circumference   formula
pi
cylinder   rectangular
prism

rectangleYou know the basics of perimeter and area, but a refresher course won't hurt! Go to Everything You Need to Know About Perimeter and Area and click on the shapes. Practice makes perfect! Go to Area of a Parallelogram, read through everything carefully, and complete the 5 exercises at the bottom of the page. Print the exercise page.Staple and turn in: Vocabulary Words and Area of a Parallelogram (5 exercises). Course 2 - Triangles and TrapezoidsA triangle is just half of a rectangle, so all you have to do is take half of the area. What??? This Triangle Rap will teach you everything you need to know!Print the Area of a Triangle worksheet and answer all the questions.Just in case you decide to include some trapezoids in your design, you need to know how to find the area. This video on Trapezoids will teach you exactly how to do that! Now complete and print the 5 exercises in Area of a Trapezoid. Take the End-of-Course Test to make sure you are ready to move on to Course 3. You will need to print and complete the worksheet.Staple and turn in: Area of a Triangle Worksheet, Area of a Trapezoid (5 exercises), and End-of-Course Test. Course 3 - All About CirclesYour design will include some circles, so get spinning with this Circumference and Area of a Circle song!This video on finding the Circumference of a Circle will walk you through some great examples.Finding the area of a circle also involves using pi and a special formula. Walk with Spot through this lesson to learn how to calculate the Area of a Circle. You will also discover something really cool about rainbows! Print the Circle worksheet, answer all the questions, and turn it in to your teacher. Select another classmate to be your design partner. You will complete Course 4 together. Course 4 - How Much Water?Your park must contain some sort of water feature like a pool, a pond, or a fountain. In order to figure out how much water is needed, you have to know how to calculate volume.If your water feature will be shaped like a cylinder, let Tim and Moby help you calculate the Volume of a Cylinder. Take the Review Quiz. Then take the Classic Quiz, print your results, and turn them in.If your water feature will be shaped like a rectangular prism, then watch as Mrs. Dawson teaches you the steps. Once you finish, take the Self-Check Quiz, print your results, and turn them in. Congratulations! You have graduated with honors from The School of Landscape Design! You will continue working with your partner to create a scale drawing of the city's newest park. Make sure you follow the city park regulations - you don't want your design to be turned down by the mayor! As you work together on your park, keep in mind that your final design must be presented to your boss. Your boss is very picky, so pay careful attention to the presentation requirements. Time is running out, so get busy! City Regulations for Park DesignHalf of the city park should consist of a picnic area and a playground, but these two sections do not have to be located together.The picnic area must contain a circular flower garden. There must be two gardens in every park.The park must contain at least one circular or rectangular water feature.All parks must contain trees. Young trees will be planted, so designs should show room for the trees to grow.All parks created in this city must appeal to families, so they must include more than a picnic area and playground. Team Presentation Requirements (Include all of the following requirements on poster board)Park nameScale drawing in black and white with all design features labeledDesign elements coloredDimensions (sizes) of each item in your designAmount of land needed for each item and the calculations used to determine the amount of land neededMaterials needed and the calculations you did to determine how much you needed (number and type of playground equipment, fencing, number of picnic tables, trash and recycling cans, the amount of land covered by concrete or wood chips, the amount of water required to fill your water feature, and the quantities of other items included in your park)100 word statement explaining your design (size and quantity of items in your park) and why your design should be chosen as the city's newest park Additional Requirements (Individual)Go to Microsoft Word, type and print a 100 word journal entry that describes what you learned from this project. Some things you may want to include are: what you liked best, what you liked least, what was easy, what was challenging, your thoughts on working with a partner, what you would do differently if you had to do this again, etc.Complete the Self-Reflection Survey.Complete the Partner Poll (be honest!).Thanks for working so hard! No pressure here, but be prepared for your presentation. The City Council (your classmates), the Mayor (your principal), and the boss (your teacher) will be voting on the best park design!

Evaluation

 Plan A Park- RUBRIC Student Name:_____   Final Score:_____ Sketch of Park Design ____/ 10 Design has the following: ____/ 25
·   About half of the park should consist of a picnic area and a playground, but these two sections do not need to be located together. (5 pts)·   The picnic area should contain a circular flower garden. There should also be a garden in at least one other place in the park. (5 pts)·   There should be trees in several places in the park. Young trees will be planted, so your design should show room for the trees to grow. (5 pts)·   There is a water feature in your park. (5 pts)·   The park must appeal to families, so there should be more than just a picnic area and a playground. (5 pts) The final design is neat, clear, colorful, and easy to follow. ____/5 Math Calculations are completed and displayed: ____/30
·   Formulas are listed·   Work is shown on separate paper·   Calculations have units/labels Written Report: ____/20Must include the following:·   The size (dimensions) of each item. These items should include gardens, trees, picnic tables, playground equipment, and anything else you included in your design.·   The amount of land needed for each item and the calculations you used to determine the amount of land needed.·   The materials needed. Include the amount of each item needed and the calculations you did to determine the amounts. Include the number and type of each piece of playground equipment, the amount of fencing, the numbers of picnic tables and trash containers, the amount of land covered by concrete or blacktop (so the developers can determine how much cement or blacktop will be needed), and the quantities of other items you included in your park. ·   Journal Entry ·   Surveys Presentation of Park: ____/ 10 TOTAL SCORE: _____/ 100

Category and Score					Score
				Total Score	

Conclusion

Congratulations! You and your partner have used your knowledge of area, perimeter, circumference, volume, and scale drawings to design a park. You also showed your artistic and creative skills by drawing your park and sharing it with your fellow classmates. Who knows? This may be the beginning of a great new career for you!

Teacher Page

In this WebQuest, 6th and 7th graders will learn about perimeter, area, circumference, and volume as they design a park. Before starting this WebQuest, students must understand scale and scale drawings. This project should take about one week to complete.

Standards

The Common Core State Standards addressed in this WebQuest are as follows:

6.G.1 - Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

6.G.2 - Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\, w\, h$ and $V = b\, h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

7.G.4 - Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

7.G.6. - Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Credits

Other