STUDENT EDITION



Absolute Value Inequalities

Written by Kelly Clark



Creating a generation of mathematicians through innovative and interactive curriculum

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In this workbook:

You will learn about absolute value equations and inequalities as well as their real-world applications. These concepts are important because you will come across situations in your life that require you to solve problems involving absolute value equations and inequalities, such as the following problems. You will be required to answer the following problems at the throughput of this workbook.

Once you have completed the following lessons, you will have gained the skills required to answer the following problems.

These skills include.

• Solve and graph various inequalities that involve absolute value



Amusement Park Mathematics

Finding the hidden mathematics in everyday situations

dventure City in Loganville, CA is looking to expand their theme park in order to increase business. As the Lead Project Developer you were hired to oversee all aspects of the expansion. You spend the next six months working closely with everyone on your team. In order for Adventure City to be prepared for its grand opening, your boss decided to have a "soft" grand opening. A "soft" grand opening is like a practice trial run before the actual event. Many businesses, including Casinos, do this so that

there aren't any "hiccups" during the actual Grand Opening Event. About 200 people will be attending the "soft" grand opening including employees' friends and family and, more importantly, several inspectors. You are expected to give a grand tour of the park and should be ready to answer any and all questions they may ask. Your boss has given you a heads up on some of the people that will be attending and has also given you an insight into some of the questions they will ask you. You are a little nervous, but feel confident because you have worked with an awesome team!

Grand Tour I

Below is a list of the some of the people who will be attending the grand tour that you will be giving.

WHAT IS ABSOLUTE VALUE? ►

Blakeleigh Howard, from the Amusement Ride Association, is coming to test the speed of the Buffalo Stampede. It travels around the track four times, but goes backwards 45 miles per hour. You are expected to present the information to her as a sentence using absolute value.



ABSOLUTE VALUE= TOTAL DISTANCE TRAVELED ►

Allieya Dixon is from the Association for a Healthy California. She wants to determine the total distance traveled if a group of high school students come visit Adventure City. The high school students split up into four groups. One of the groups walks west 40 feet from the Group Entrance to the Twin Looper. Then they walk west 15 feet to the Black Hole. Afterwards, they walk 55 feet east to the restrooms. Next they walk 15 feet east to the Aztec Adventure Trail and 10 feet to the Aztec Kingdom. Then they walk 35 feet to the Adventure Park. Finally they walk 20 feet west to Buffalo Stampede and 60 feet east to the group entrance. Ms. Dixon wants to know the total distance traveled and needs to see it visually on a number line.

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DID YOU KNOW?

The first "rollercoasters" were in 15th century Russia and made from ice slides between seventy and eighty feet tall. People rode down on sleds.



WRITING AN ABSOLUTE

Rachael Davis is from the Department of Public Safety. She is coming to test the speed of The Missile. The speed of the roller coaster cannot be faster than 78 miles per hour, but must travel faster than 71 miles per hour. Ms. Davis needs to know the range of speed that The Missile can travel. You are expected to present the information to her as a sentence using absolute value and as a graph.



DID YOU

The first

KNOW?

amusement park

1583 in Denmark.

The amusement

park in the U.S.

was opened

in 1846

was opened in



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ABSOLUTE VALUE= TOTAL DISTANCE TRAVELED ►

Miguel Rodriquez helped design the SkyCoaster, which is similar to bungee jumping. The minimum weight for a person riding the SkyCoaster is 100 pounds and the maximum weight is 250 pounds. Mr. Rodriquez is coming to find out the total distance traveled for two minimum weight riders, the total distance traveled for two maximum weight riders, and the average distance traveled for two riders.

In order to provide this information, you have to do two test runs and then average the total distance. You find two people who weigh the minimum and two people that weight the maximum. The height of the SkyCoaster is 240 feet. The first test run is for the two riders who weigh the maximum. During the first fall, the riders fall 180 feet to the bottom and bounce 125 feet up. Then they fall 75 feet down and bounce 45 feet up. Finally they fall 30 feet down and bounce 15 feet up. The second test run is for the two riders who weigh the minimum. During the first fall, the riders fall 200 feet to the bottom and bounce 160 feet up. Then they fall 100 feet down and bounce 75 feet up. Finally they fall 45 feet down and bounce 25 feet up. You are going to use this information to tell Mr. Rodriguez the total distance traveled for the minimum weight riders, the total weight for the maximum weight riders, and the average distance traveled for riders.

DID YOU KNOW?

The Steel Dragon 2000, in Japan, is the longest steel coaster with 8,133 feet of track.





▲ SOLVING AN ABSOLUTE VALUE EQUATION

Miguel Lopez is going to be the new graphic designer for the marketing team. Since Adventure City is expanding to bring in new business, they needed to hire an additional graphic designer to create new ads and billboards. Using the following information he found on a website, what is the range of his starting salary?

The average starting salary is \$37,600, but the actual salary could differ by \$2590 depending on experience and education.



▲ SOLVING AN ABSOLUTE VALUE INEQUALITY

Brandi Fitzgerald, a designer of the slide at Adventure Park, is coming to test the slide. She needs to make sure that riders go down the correct slide. Slide A can hold riders up to 100 pounds and Slide B can hold the rest of the riders. (The ride designers designed Slide A to be safer for smaller children.) When a rider gets on the slide and the rider believes that he/she is randomly sent down a slide. However, when they sit down they are really being weighed. Then they are spun around in a circle and sent down the correct slide. If it is determined that their weight differs from the desired 100 pounds by more than 5 pounds, they are sent down Slide B. If their weight is less than 100 pounds they are sent down Slide A. Ms. Fitzgerald wants to know the equation that can be used to determine if a rider goes down Slide A. She also wants to see the work needed to solve the equation.



▲ SOLVING AN ABSOLUTE VALUE INEQUALITY

Richard Manning is from the City Water Department and is coming to test the temperate of the water on the Rocky Mountain Rapids and Nightmare Niagara. The temperate must be within 5 degrees of the ideal water temperate of 72.5°F. Mr. Manning needs to know the range of acceptable temperature. You are expected to present the information to him as an equation using absolute value and as a graph.

STANDARDS & OBJECTIVES

Lesson Standard: California (Algebra 2)

• Content Standards 1.0 -Students solve equations and inequalities involving absolute value.

Lesson Objectives:

- After you have completed this section, you will be able to:
- Solve and graph various inequalities that involve absolute value

REVIEW

- You need to understand the following concepts prior to solving absolute value inequalities:
- How to solve absolute value equations
- How to solve compound inequalities
- How to solve equations
- How to graph absolute value equations
- How to graph compound inequalities